Appendix F: Social Impact Assessment Report

Nelson Arterial Route Options Initial Report: existing social environment

1. Background to the SIA

A Social Impact Assessment (SIA) is currently being prepared for the area in which the Nelson Arterial Route options are being developed. The assessment will include information describing the existing social environment in terms of:

- demographic and behavioural trends
- current travel patterns and modes of travel
- effects of existing traffic on residents and community facilities
- perceptions of factors contributing to the existing traffic problem
- perceived solutions to the existing traffic problem
- perceived social effects of previous roading options.

The main body of the SIA will identify the social effects of the options selected for more in-depth analysis in terms of their impacts on individuals, communities, groups, services and facilities.

This document (the initial report) sets out the information collected to date regarding the existing traffic situation and its effects on residents and communities, perceptions of factors contributing to the traffic problem and perceived solutions expressed in submissions and interviews. This information will contribute to the scoping of issues to be considered in the social impact assessment.

2. Consultation and secondary data

Information for this initial report was gathered through an analysis of submissions on the Nelson to Brightwater Consultation Document and face-to-face discussions with representatives of a range of interest groups, specialist organisations, community services and educational institutions, and brief observations made during a three-day site visit in February 2010.

Other sources of secondary information referred to includes:

- newspaper articles and letters to the editor
- Nelson City Council's analysis of submissions received on the draft Regional Land Transport Strategy (2008)
- North Nelson to Brightwater Strategic Study: Technical study (April 2008)
- North Nelson to Brightwater Strategic Study: Travel demand management discussion document (April 2008)
- North Nelson to Brightwater Strategic Study: Public transport discussion document (May 2008)
- "Pedalling Along", NCC Cycle Strategy (2006).

3. The existing situation

This section sets out the effects of existing traffic on the existing arterial traffic routes (Tahunanui Drive, Rocks Road and Waimea Road) between the Annesbrook roundabout and the QEII/Haven Road roundabout as expressed in submissions, interviews and secondary documents. To a limited extent these responses have been verified by site observations.

The main social effects of the existing traffic network and travel behaviour raised in submissions and interviews were severance and pedestrian and cyclist safety. Air pollution, adverse effects on amenity, traffic delays and noise were also noted to a lessor extent.

3.1 Severance

Severance was noted as an effect of the current traffic routes. Severance is created by the introduction of physical barriers, such as roads, which remove or reduce access. Severance is exacerbated when roads are associated with safety concerns (real or perceived). Examples of current severance include:

SH6/Tahunanui Drive/Rocks Road

- from the Port Hill area to the waterfront for pedestrians, cyclists, and the mobility impaired as a result of difficult access across Rocks Road
- the amount and speed of traffic along Tahunanui Drive was noted as a current issue for pupils accessing and Tahunanui School
- recent roading changes at Tahunanui which was designed to favour heavy through-traffic over local movement, and which have brought traffic closer to the buildings and narrowed the footpaths. Severance resulting from these changes was noted by residents, business operators and the school.

Waimea Road

- crossing Waimea Road is becoming increasingly difficult for pupils at adjoining schools and for other pedestrians because of the limited number of pedestrian crossings. The lights at the crossing near Nelson College has improved the situation but this crossing location does not suit. It was noted that this was not a convenient crossing point for many pedestrians.
- The amount and speed of traffic along Waimea Road was noted as an issue for pupils accessing Nelson Intermediate, Enner Glynn School and Hampden Street School.

3.2 Safety

Safety concerns as a result of existing roading were commonly noted in submissions and by interviewees. Most examples referred to a lack of adequate provision for cyclists and pedestrians. Specific concerns included:

SH6/ Tahunanui Drive/Rocks Road

- risks to pedestrians attempting to cross busy roads without appropriate pedestrian infrastructure (such as pedestrian crossings, median strips/refuges overbridges/underpasses). Examples included Rocks Road and Tahunanui Drive. Pedestrians coming off Days Track have no footpath on the landward side - the work has been half done and then deferred.
- risks to cyclists where road verges were considered unsafe (such as along Tahunanui Drive), at pinch points (such as Rocks Road between the Boatshed Restaurant and Nelson Yacht Club and on the landward side

between Poynters Crescent and Victoria Road), and at roundabouts (considered by some to be due to inadequate lane widths at Saxton Rd roundabout)
- high traffic volumes through residential areas in an attempt to avoid congestion-prone areas (rat running). Examples of streets experiencing rat running included Muratai Street to avoid Tahunanui Drive.

Waimea Road

- running red lights at congestion hot-spots, such as the pedestrian lights on Waimea Road
- risks to pedestrians as a result of speeding traffic and lack of pedestrian crossings
- high traffic volumes through residential areas in an attempt to avoid congestion-prone areas (rat running). Examples of streets experiencing rat running included Vanguard Street to avoid Waimea Road, and Beatson Road to avoid The Ridgeway / Waimea Road intersection.

3.3 Air pollution

Interviewees raised the issue of air quality resulting from traffic congestion. It was acknowledged that council policies regarding open fires have improved the quality of air in particularly affected areas but increased traffic would negate much of this improvement.

SH 6 Tahunanui Drive

- Tahunanui residents and school staff were concerned about the level of air pollution generated by current traffic volumes on Tahunanui Drive.

3.4 Amenity

Amenity refers to the quality and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes. Loss of amenity may result from real or perceived effects.

SH 6/Rocks Road

- Submissions and interviewees highlighted the amenity value associated with the waterfront. The waterfront is considered by many to be an iconic feature of Nelson, providing important seascape and landscape features, recreation opportunities, and a pleasant ambience for leisure opportunities (such as dining out, picnicking and passive recreation). Many submitters noted that the focus should be on reducing the volume of traffic along Rocks Road and Wakefield Quay to safeguard the amenity of the waterfront. It was also noted that the character of the waterfront is closely linked to the identity of the city and region, upon which the tourism industry is based.
- Submitters refer to the work on Tahunanui Drive as being contrary to the Tahunanui Structure Plan, which sought a people-friendly village - compact, walkable and accessible.

3.5 Travel delays

Waimea Road

- Interviewees noted that at peak times traffic along both routes is slowed.

- pedestrian crossings on Waimea Road and at Hampden Street School were seen to exacerbate the slowing of traffic, especially when pupils were crossing to and from the numerous schools in this area
- slowing also caused by intersections along Waimea Rd at peak times, particularly at Beatson Rd and where Waimea Road merges with The Ridgeway traffic.
- the median has helped with traffic flow by providing spaces for turning vehicles to wait

SH6/Tahunanui Drive

According to some submitters:

- the traffic lights at Tahunanui cause cars to back up
- the pedestrian crossing at Tahunanui School holds up traffic

3.6 Noise

Tahunanui Drive/Rocks Road

- Tahunanui School experiences some noise nuisance from passing traffic but this has been reduced to a large extent since the school built an earth bund on the playing fields adjoining the road.

Rocks Road

- Residents and pedestrians experience noise impacts especially from heavy traffic accessing the port. An interviewee suggested that much of this noise is caused by the use of airbrakes and running over the cats eyes along the road.

4. Perceived causes and solutions

This section sets out the perceptions of submitters and interviewees as to the factors contributing to the traffic problem and what they consider is needed to improve the current situation.

4.1 Perceived factors contributing to traffic issues

Submissions and interviewees 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 of the public transport system (bus services). Three factors seen to act as further disincentives to use the bus services were:
    i. the difficulty in accessing bus stops for many residents, particularly in Tahunanui where a high proportion are elderly, and in locations such as Atawahi where most residents are located more than half a kilometre from a bus route;
    ii. the lack of park and ride facilities for Tasman residents who live outside Richmond and
    iii. no worker buses operating after 5.30pm
- inadequate provision of cycling which makes this alternative mode of transport dangerous and/or unattractive or inconvenient - cycleways are not well linked or continuous over longer distances

- inadequate provisions for pedestrians - consideration of pedestrians in new subdivisions has been minimal; Annesbrook roundabout has been designed for cars and not pedestrians; pedestrian links are required across Tahunanui Hills, especially between Princes Drive and Toi Toi Street, and Tasman Heights and Bishopdale
- 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 lack of coordination in planning and transport provision for commuters between Nelson City Council and Tasman District Council
- heavy traffic on Rocks Road, particularly as a result of the location of Port Nelson
- lack of an arterial road to support the significant population growth in the region; the closure of the railway was not followed through with the construction of a road.

4.2 Perceived solutions to traffic issues

The community has had various opportunities to comment on ways in which to address traffic issues between Nelson and Richmond during the different stages of the Nelson Arterial project. The views of the community appear to have remained fairly consistent over this time. For example, submissions on the Nelson to Brightwater Consultation Document and draft Regional Land Transport Strategy (draft RLTS), and comments made in recent interviews (February 2010) indicate a strong preference for solving traffic issues through public transport, cycling and pedestrian measures.

4.2.1 Prioritise public transport

Placing higher priority on providing and promoting public transport was one of the most commonly raised solutions to addressing Nelson's transport issues. Submissions and interviewees noted the need for more frequent and faster bus services (including services that are extended into the evening) and supporting infrastructure. Supporting infrastructure included park and ride facilities, bus priority lanes, Council policies aimed at reducing private vehicles in the city and measures such as subsidised fares.

4.2.2 Prioritise cycling and pedestrian measures

Submissions and interviewees identified a need for improving the current cycle and pedestrian network in order to encourage commuters and school children to cycle or walk. Solutions included:

- providing well-connected pedestrian and cycle routes that build on the existing network. Priorities included dedicated cycle routes to address safety and access concerns along Rocks Rd and Waimea Road (from Bishopdale to Fairfield House), linking a Rocks Road cycle route to the CBD, and off-road extensions to cycle routes at Annesbrook roundabout. For safety reasons, there was a general reluctance for dual-use cycle/pedestrian routes and dual-use cycle/bus lanes.
- increasing use of the Railway Reserve for access and recreation by cyclists, pedestrians and runners was noted as an example of what can be achieved if safe and pleasant alternatives to car travel is provided.
- assisting pedestrian access and reducing traffic congestion by providing grade-separated access. Specific locations were identified, with many of these focussed on improving access and limiting congestion around schools and

commercial areas (such as Tahunanui Village, Waimea Road businesses and restaurants along the waterfront)
- a rigorous assessment of all future roading developments for their suitability for pedestrians and cyclists.

4.2.3 Alternative roading solutions

Other commonly raised alternatives (submitters and interviewees) to the options presented in the Nelson to Brightwater Discussion Document for solving traffic issues included:

- creating a new arterial route utilising the north end of St Vincent Street, but avoiding the Victory community by measures such as a tunnel, a viaduct, or a flyover
- providing a new arterial route that is similar to the proposed Southern Link, but is restricted to heavy traffic and buses in off-peak periods
- increasing the capacity on Waimea Road through the use of clearways at peak periods.

4.2.4 Reduction in heavy traffic to port

- consider alternatives for moving freight to / from the port e.g. the creation of an inland port for the management of products destined for shipping connected to the port by a rail-link.

5. Implications of the do-nothing scenario

The following conclusions on the social impacts arising from the predicted changes in traffic volumes over the next 25 years are based on information provided in submissions and interviews as well as field observations made during brief visits earlier this year. They may change as a result of the more in-depth analysis which will be undertaken during the Phase 3 work.

5.1 Predicted changes

The traffic volumes predicted by the transportation model for 2036 indicate that in the **morning peak**:

- vph travelling **north** along Waimea Road will not increase
- vph travelling **south** along Waimea Road will increase by about 140
- vph travelling **north** along Rocks Road will increase by about 100
- vph travelling **south** along Rocks Road will increase by about 220

The traffic volumes predicted by the transportation model for 2036 indicate that in the **afternoon peak**:

vph travelling **north** along Waimea Road will increase by about 80
vph travelling **south** along Waimea Road will increase by about 110
vph travelling **north** along Rocks Road will increase by about 210
vph travelling **south** along Rocks Road will increase by about 100

The traffic volumes predicted by the transportation model for 2036 indicate that in the **inter-peak** hours:

vph travelling **north** along Waimea Road will increase by about 110
vph travelling **south** along Waimea Road will increase by about 50
vph travelling **north** along Rocks Road will increase by about 110
vph travelling **south** along Rocks Road will increase by about 220

These predictions are based on the land use assumptions of Nelson City Council and Tasman District Council, some increase in public transport services and retention of the current level of travel demand management measures (TDM). The latter is unlikely to be the case given Council's expressed wish to encourage walking and cycling as well as a switch to public transport. Recent figures (preliminary) for walkers and cyclists using the newly sealed railway reserve indicate that improving cycle tracks will encourage more people to use them. These preliminary figures show a significant increase in use (more than double) over the past year.

Submissions, interviews and my brief site observations indicate however that there are existing traffic concerns that need to be addressed and while some of these can be mitigated by stricter enforcement (e.g. traffic speeds and the running of red lights at the pedestrian crossing in Waimea Road) others can only be addressed by the provision of an alternative route and/or more effective public transport and TDM.

5.2 Severance and risk to pedestrians and cyclists

Severance and risks to safety for pedestrians is an issue on Rocks Road, Waimea Road and Tahunanui Drive. This problem is likely to increase with increasing traffic volumes unless more pedestrian crossings are provided and those crossings are supervised before and after school. (If however, traffic increases to the point where traffic is slowed significantly, it may become easier and safer for pedestrians to cross these roads.)

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 – a practice which currently adds significantly to the volume of traffic particularly in the morning peak period. 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.

Conflict between cyclists and pedestrians and motorists will continue and may worsen especially at the pinch points on Rocks Road.

Rat running is already occurring as motorists seek to avoid more heavily trafficked areas by diverting through residential streets. This is likely to continue and may increase.

5.3 Rocks Road enhancement

While even assuming no additional TDM measures, the predicted increases are relatively small, the increases predicted for Rocks Road during the south-bound morning and inter-peak and the north bound afternoon peak periods are double those predicted for Waimea Road. There is no estimate available of the percentage of heavy traffic included in these figures.

Submitters and interviewees were concerned about the impact of current volumes on the amenity of the waterfront and were particularly concerned about the impacts of heavy traffic travelling to the Port. It is unlikely that heavy traffic can be reduced through the use of TDM measures.

If traffic volumes, (particularly heavy traffic) is not reduced on Rocks Road, the potential of this area to be developed for passive recreation and as an area with high

aesthetic values is unlikely to be realised. 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.

Appendix G: Air Quality Assessment Report

Nelson Arterial Study: Preliminary Assessment to Develop a Base Case Scenario for Air Quality

Prepared for Nelson City Council

MARCH 2010

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NELSON CITY COUNCIL

Nelson Arterial Study: Preliminary Assessment to Develop a Base Case Scenario for Air Quality

CONTENTS

1 Introduction

In order to objectively examine the air quality issues associated with the various options proposed for a Nelson arterial transportation route, it is important to establish the relevant quantitative air quality indicators for the areas of Nelson which the several route options will traverse.

The issue of selection, and then construction, of a preferred arterial route from North Nelson through to Brightwater (as the total length of a proposed route) has been on the agenda for Nelson City and the region for many years. It has come to particular prominence in the past decade with a number of options (and often sub-options) for the total route having been scrutinised by regulatory authorities, national transport agencies, the Environment Court and the general public.

One consistent issue which has been prominent in just about every case has been air quality and, more specifically, the possible (or even probable) compromising of air quality along whatever route option has been up for debate. The focus on air quality as the major environmental issue stems fundamentally from the unique geographical configuration and associated meteorological parameters that are features of Nelson City. Thus, especially in winter months, Nelson is prone to inversion layers and extensive calm periods and, when coupled with the deeply incised residential valleys within the City limits, the outcome is often highly elevated air pollution episodes which may exceed national guideline levels, sometimes by large margins.

There are also clear associations of air pollution with adverse health outcomes for residents in areas of the City which are prone to these high pollutant concentration episodes. Any suggestion of a further increase in pollutant levels associated with an arterial transport route carrying enhanced traffic volumes in a particular locality will immediately raise significant numbers of objectors.

In the Environment Court decision on the so-called Southern Link option the matter of deleterious air quality effects and the inability to satisfactorily mitigate these effects on a specific area of inner City Nelson (the Victory Square area) was central to the Environment Court's cancelling of the Notice of Requirement to designate land for the purposes of constructing the Southern Link route.

Thus the options to be considered in the Nelson Arterial Study will undoubtedly be scrutinised in great detail as to their implications for air quality. The question ultimately to be answered will be – which option (or options) have the least impact in local air quality terms. Further, to enable the question to be answered in a quantified manner, the existing local air quality baseline needs to be established; the following sections of this report are aimed at this outcome.

2 Monitoring Data Available on Baseline Air Quality Parameters

2.1 Note on Nelson Airsheds

In line with the requirements of the National Environmental Standard for Air Quality, the Nelson Air Quality Plan divides discrete areas of Nelson City and its environs into a total of three "Airsheds" for the purposes of air quality assessment (see Airshed maps attached in the Appendix).

A (gazetted) airshed is defined as:

A specific area identified by a council where air quality standards are (or may be) breached.

2.2 Nelson City Monitoring Stations

Within each of the three Nelson Airsheds the Nelson City Council (NCC) has a fixed air quality monitoring station. Each station measures PM_{10} particulate concentrations (PM_{10} = particles smaller than 10 microns in aerodynamic diameter) and the St Vincent St monitoring station in Airshed A has, on occasions, measured carbon monoxide.

There are 10 years of PM_{10} monitoring data for the St Vincent St monitoring station in Airshed A and 7 years PM_{10} data for the three composite monitoring sites of Airshed B. Particulate monitoring has concentrated over the past decade on PM_{10}; however, almost two years of $PM_{2.5}$ data from the St Vincent St monitoring site will be available for use in this study. At present these $PM_{2.5}$ data have been compiled as numerical data in a draft report which is still undergoing final review and updating. Following discussions with Paul Sheldon of NCC it was decided that the availability of this $PM_{2.5}$ data for use in this Nelson Arterial Study would only be confirmed after the finalisation of the aforementioned monitoring report.

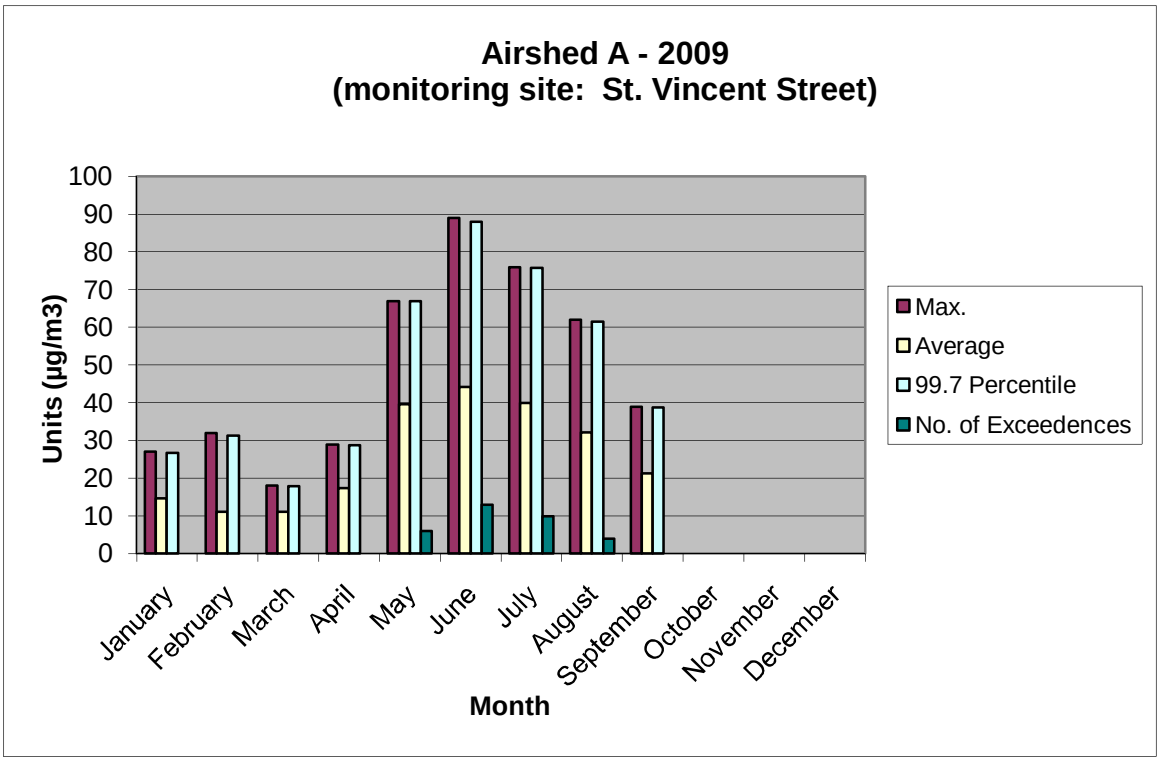
The Airshed C monitoring site in Brook St has only been active for the past two years. This very limited data set, together with the fact that the Brook St site is a considerable distance away from the northern sections of the probable route options, in combination mean that the data from Brook St is not useful for the development of overall baseline air quality data for further use in the Nelson Arterial Options Study.

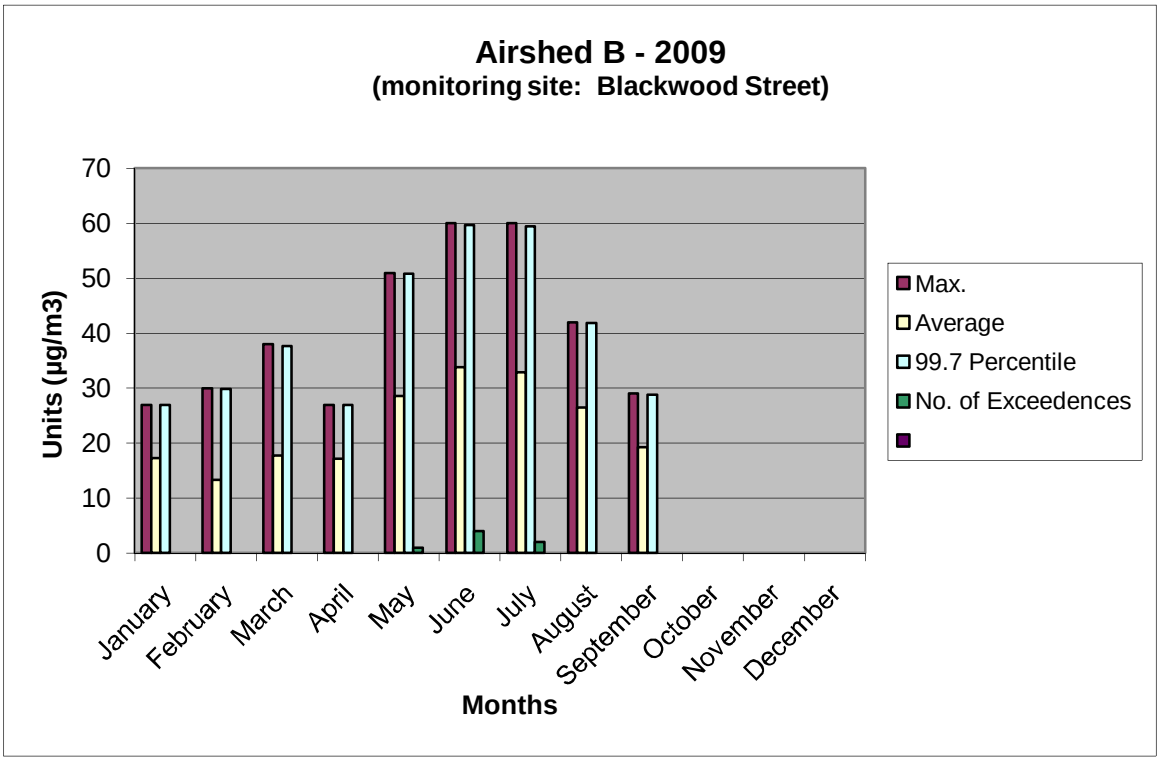
The preponderance of PM_{10} monitoring data (and the lack of data on other parameters) is not a limitation to the assessment of air quality in this study. In fact, even if other data were more generally available, it is considered that particulate monitoring data is the best generic indicator of air quality impacts associated with vehicular traffic and thus its use as an air quality baseline parameter and for subsequent options comparisons is fully justified.

It should be noted that only summary data are presented in the following sections of this report; however complete and highly detailed data sets of monthly PM_{10} concentrations are available to inform the more extensive scrutiny of Phase 2 of this study.

3 Current Measurements and Recent Trends in PM_{10} Particulate Concentrations in Nelson Airsheds

The following graphs are taken from PM_{10} monitoring data obtained at the various monitoring stations in Airsheds A and B. The graphs show, firstly, the most up-to-date data (until September) for the 2009 year at each of the St Vincent St (Airshed A) and Blackwood St (Airshed B) monitoring stations.

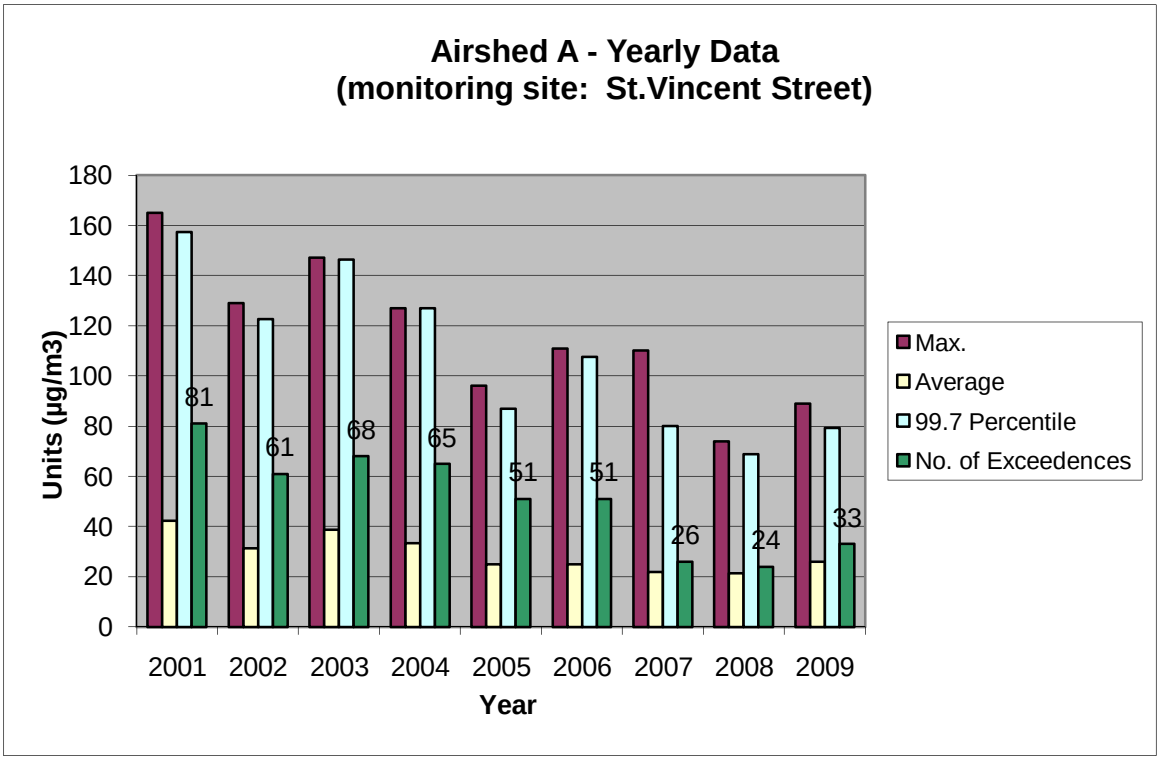


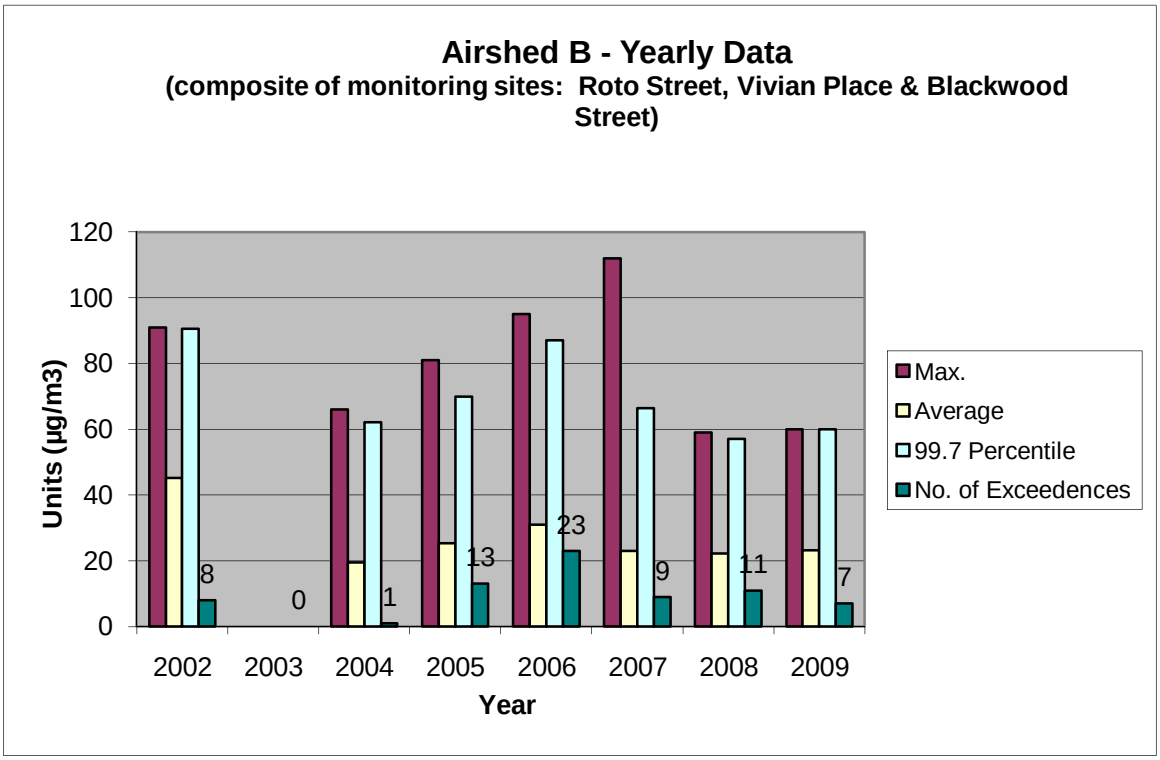


The graphs show clearly the elevated PM_{10} levels in winter months. The maxima and averages in the winter months are 50% higher at St Vincent St in Airshed A as compared to Blackwood St in Airshed B.

The context to be borne in mind when considering the relevance of the monitoring results is that the National Environmental Standard for PM_{10} particulate is 50 µg/m^3 (as a 24-hour average).

The further graphs below show the consolidated yearly data for the Airshed A and (combined) Airshed B monitoring sites.





It should be noted that the Airshed B sites include 7 years of data from 2002, but with 2003 having no recorded data available for technical reasons.

The reduction in PM_{10} concentration maxima in 2009 to almost half of the 2001 levels is most striking in the St Vincent St data and the average PM_{10} 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_{10} concentration in this Airshed.

In summary, the existing situation with respect to PM_{10} concentrations and monthly trends in those concentrations for both Airsheds A and B, 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.

4 Predictions for Nelson City Air Quality Under the Status Quo

This preliminary report has the purpose of establishing air quality baseline parameters and of making a qualitative prediction of the implications for Nelson City air quality in succeeding years if the status quo with respect to movement of vehicular traffic through Nelson city was maintained.

4.1 General PM_{10} Concentration Trends in Nelson City

The continuing trend in PM_{10} 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_{10} 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. It is impossible to quantify this contribution to the improvement in air quality, however, but it is still relevant to a consideration of the air quality in Nelson City going forward under a “do nothing” scenario; in other words, if the Nelson Arterial Route is not constructed.

4.2 Changes in Air Quality Along Existing Nelson City Route Options

As stated above, the total pollutant emissions from vehicular traffic will gradually decrease over time. However, as the population increases in the Nelson city area over forthcoming years there will (all other things being equal) be an associated increase in vehicle numbers on the City’s roads. If the status quo is maintained and the Nelson Arterial Route is not 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 traffic congestion, reduced vehicle speeds, and associated 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_{10} (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.

5 Preliminary Note on Arterial Route Implications for Air Quality

As noted earlier, the data are available and have been used to establish a general baseline for present-day air quality in Nelson City.

The selection, construction and implementation of an arterial route for vehicular traffic movement through the City, which is the subject of this study, will have implications for impacts on the air quality baseline. Traffic flows will undoubtedly increase along the corridor of the selected route option and vehicle numbers will be higher; although total emissions per vehicle will be lower (and will continue to decrease further over time).

Other relevant factors will be the extent of deceleration and acceleration imposed by route constraints on vehicles using the selected route, the extent to which gradients may increase vehicle emissions, the degree to which the selected route option will modulate the variability of vehicle speeds, and a range of other matters.

In the second phase of this study these option-specific implications will be analysed and set against the established air quality baseline. At that point 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.

In turn, this will provide decision makers with just one of the option selection parameters against which a decision on a preferred Nelson Arterial Route will be made. It will not by any means be the only parameter but, based on the importance of air quality considerations in previous deliberations, it will certainly be of major significance.

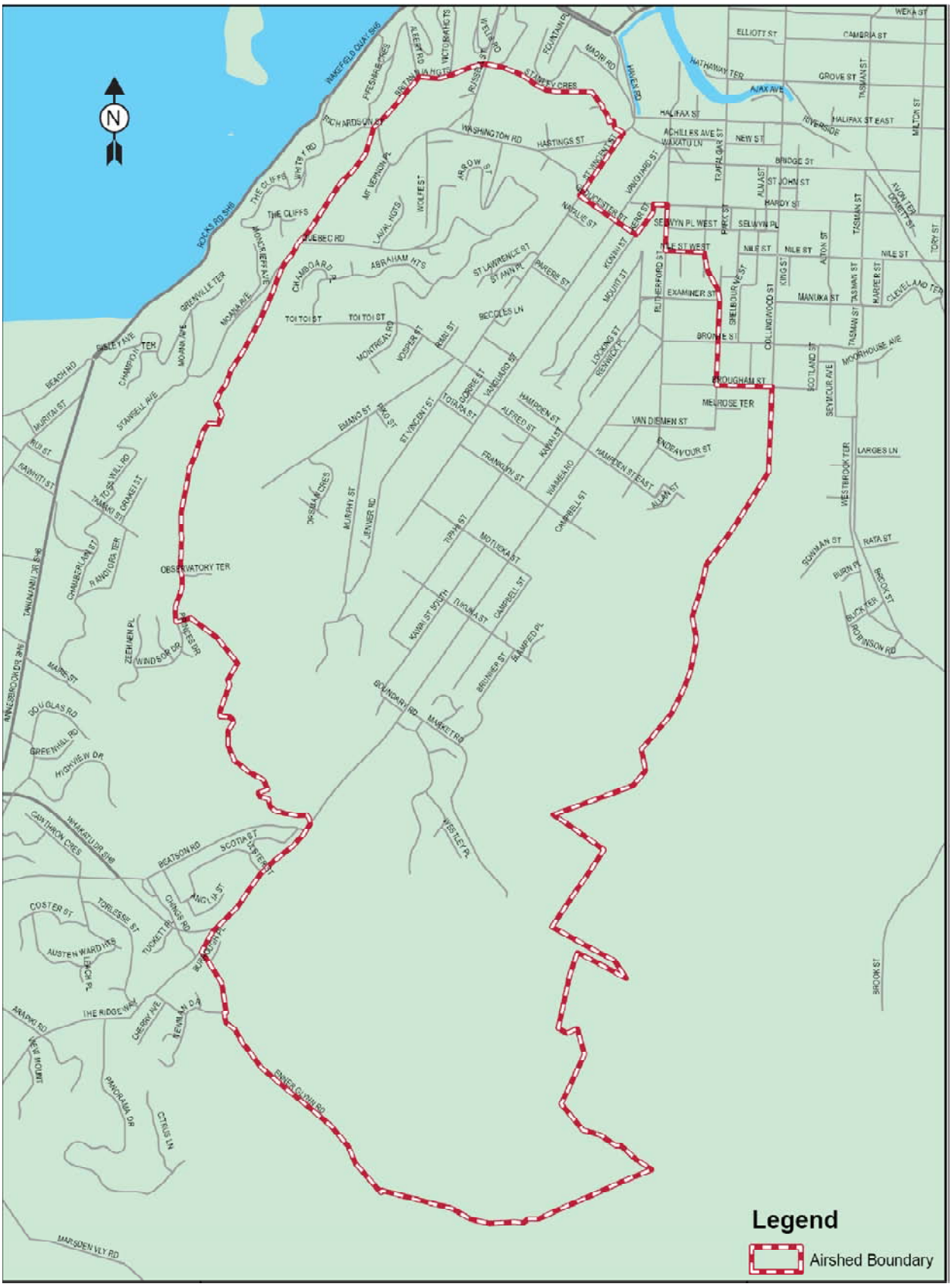


Figure 1: Map of Nelson City Airshed A

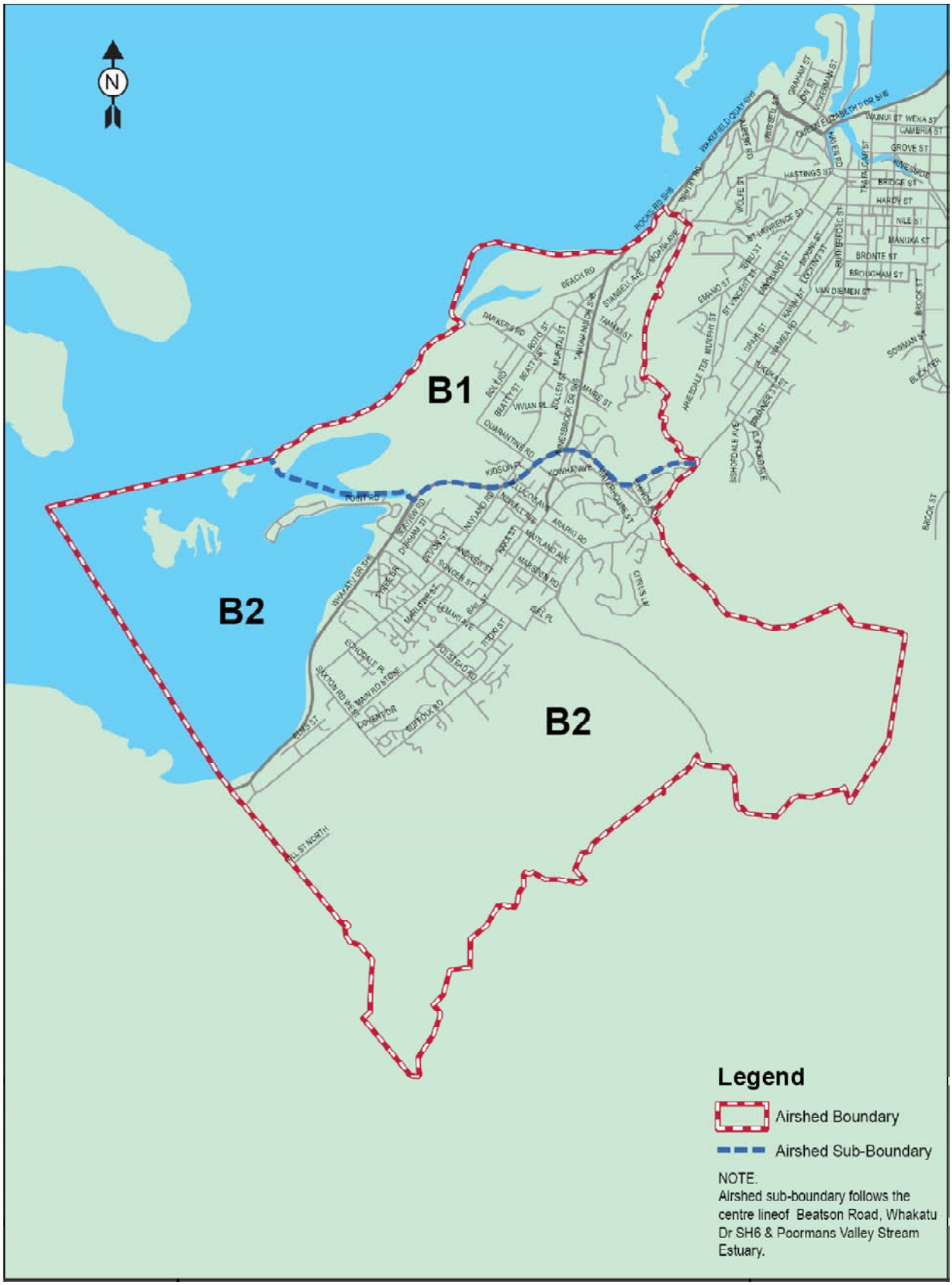


Figure 2: Map of Nelson City Airshed B

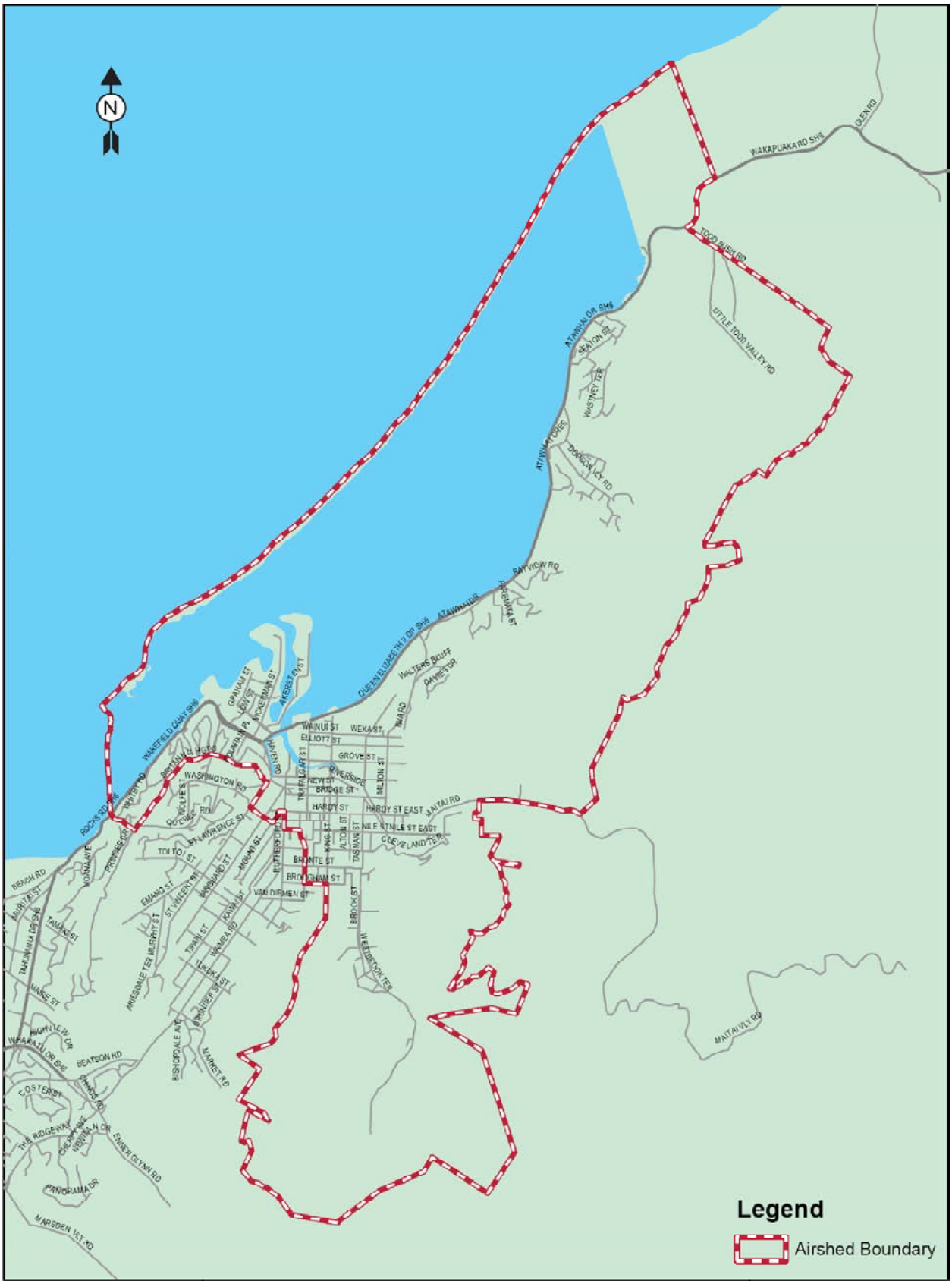


Figure 3: Map of Nelson City Airshed C

Appendix H: Water Quality Assessment Report

Arterial Traffic Study
Evaluation of Existing Routes: Water Quality

Prepared for Nelson City Council

MARCH 2010

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Arterial Traffic Study
Evaluation of Existing Routes: Water Quality

CONTENTS

1 Introduction

1.1 Background

Stage 1 of the Nelson Arterial Study includes an evaluation of the potential water quality and aquatic ecology impacts of the existing arterial routes. The existing routes are:

(a) State Highway 6 from Queen Elizabeth II Drive to Annesbrook Drive, and

(b) Rutherford Street and Waimea Road.

This evaluation will provide a base case scenario against which the options will be compared.

Potential water quality and ecological impacts arise at points where:

- either route crosses or impinges on a watercourse;
- where it alters the natural flow regime by channel straightening, widening, armouring or increasing the area of impermeable surfaces within the upstream catchment;
- where it creates a barrier to the upstream migrations of fish via culvert or weir;
- where it reduces shade and temperature control by reduction of riparian vegetation; and
- where stormwater runoff and associated contaminants from road surfaces are discharged to the water body.

1.2 Water bodies potentially affected by existing arterial route

The Queen Elizabeth to Annesbrook route impinges on water bodies at the following locations:

- Queen Elizabeth II Drive bridge crossing the Maitai River;
- Wakefield Quay and Rocks Road seawall running beside and extending into the intertidal zone of Tasman Bay between Port Nelson and Tahunanui Beach;
- Tahunanui Drive crossing an unnamed minor watercourse near Tamaki Street;
- Tahunanui Drive crossing an unnamed minor watercourse near Maire Street;
- Tahunanui Drive crossing of Jenkins Creek near Douglas Road.

The Rutherford-Waimea route crosses the following streams:

- Waimea Road Crossing of York Stream at Bishopdale Reserve; and
- Waimea Road Crossing of Jenkins Creek near Chings Road.

2 Ecological values of affected watercourses

The Maitai River is a moderately sized watercourse with median flow of 1158 L/s in its lower reaches. The River has its origin at an elevation of over 1000m in the Bryant Range to the southeast of Nelson City. The Maitai provides a drinking water supply for Nelson City. The upper catchment is in native forest, the middle reaches in mixed pine plantation and native forest, while the lower reaches pass through urban Nelson. While the lower reaches are highly modified and the water supply reservoir (Maitai Dam) creates an upstream barrier to migrating fish, the majority of the catchment is relatively unmodified and consequently the River has retained most of its ecological functions and maintains a high ecological value. A comprehensive review of the state of the Maitai River by the Cawthron Institute (Crowe *et al* 2004) found that water quality generally mirrors landuse, with relatively high water quality in the upper reaches within the native forest, but with increased temperature, nitrate-N, indicator bacteria, and lower water clarity, in the lower reaches.

High levels of sediment contamination, particularly by PAH's, occurs in the lower reach of the Maitai River, just before it enters Nelson Haven, at concentrations likely to cause adverse ecological effects (Crowe *et al* 2004; Bennett 2006). In the mainstem upstream of the Brook confluence, sediment contamination occurs in low or undetectable concentrations. The mid and lower reaches of the Brook are moderately contaminated with copper, zinc, lead and PAH's. Crowe *et al* (2004) considered that increased sediment contamination is due to increased urbanisation and urban stormwater inputs in the lower reaches of the Brook and Maitai catchments.

York Stream is a tributary of the Maitai River which has a median flow of 12 L/s. It arises south of Bishopdale at an elevation of some 180m. The upper catchment is in mixed scrub while the middle and lower catchment are fully urbanised. A long reach of the lower stream is culverted but the stream re-appears in the estuarine reach. The extensive urbanisation and culverting of the middle and lower stream, and possibly the influence of the York Valley Landfill in the upper reaches, have significantly impaired its ecological functions. A Cawthron review of the Nelson City Council's Freshwater Ecology State of the Environment monitoring programme (Wilkinson 2007) found the biological communities of the York Stream to be highly impacted by urban development. Physical stressors included the deposition of fine sediments and poor shading in the lower reaches. Chemical stressors included elevated conductivity and nutrients, low dissolved oxygen, low water clarity and elevated water temperature.

The other significant watercourses in the area are Jenkins Creek at the south of the study area and Poorman Valley Stream in the next catchment further south, just outside of the study area. These watercourses originate on the north and west faces of Jenkins Hill, respectively, at an elevation of approximately 750m. Jenkins Creek has a median flow of 51 L/s in its lower reaches while the lower Poorman Valley Stream has a median flow of 55 L/s. In both cases the upper catchment is in native forest and the upper stream is relatively unmodified while the middle and lower reaches pass through urban Nelson and are significantly modified. Wilkinson (2007) found the upper reaches of these streams, particularly upper Poorman Valley Stream to have relatively high water quality and healthy biological communities, while the lower reaches had poor water quality and highly impacted biological communities. Sediments in the lower reaches of Jenkins Creek had elevated concentrations of lead and zinc, while the upper reaches of Poorman Valley Stream had elevated PAH's. The lead, zinc and PAH contamination of stream sediments are believed to be associated with urban runoff (Bennett 2006).

Two minor unnamed watercourses between in the Tahunanui area drain a mostly or entirely urban catchment. Consequently the ecological functions of these watercourses are impaired. It is anticipated that urban runoff to these watercourses will have resulted in similar levels of metal and PAH contamination of sediment as has discussed above for other small urban watercourses.

A review of New Zealand Freshwater Fish Database (NZFFD) for the period 2000 to 2008 indicates at least 17 fish species are present in these watercourses, which represents a relatively high diversity, as summarised in Table 2.1.

Table 2.1: Fish species recorded in freshwater courses within the study area between 2000 and 2008 (NZFFD)

Common name	Maitai River	York Stream	Unnamed Tahunanui Stream	Jenkins Creek	Poorman Valley Stream
Longfin eel	✓	✓		✓	✓
Shortfin eel	✓	✓		✓	✓
Common bully	✓			✓	✓
Red finned bully	✓				✓
Upland bully	✓			✓	✓
Giant bully	✓				
Inanga	✓			✓	✓
Banded kokopu	✓	✓	✓	✓	
Koaro	✓		✓		
Giant kokopu					✓
Torrentfish	✓				
Common smelt	✓				✓
Yellow eyed mullet	✓				✓
Estuarine triplefin	✓				
Brown Trout	✓				✓
Goldfish			✓		
Koura	✓	✓		✓	

3 Potential adverse effects of existing routes

The ecological functions which are likely to be impaired by urban development can be categorised into hydraulic functions (i.e., processes associated with water storage, movement and transport), biogeochemical functions (i.e., those related to the processing of minerals, particulates and water chemistry), habitat provision functions (i.e., the types, amount, and quantity of habitats that the stream reach provides for flora and fauna) and the native biodiversity functions (i.e. the occurrence of diverse populations of indigenous native plants and animals that would normally be associated with the stream reach) (Rowe *et al* 2008).

All of the freshwater bodies within the Nelson study area have suffered some impairment of ecological functions, but these effects are largely associated with the wider urbanisation of the catchment, of which the major roads are but one component. Effects which can be attributed specifically to the existing arterial routes include the following:

- Bridge crossing of Maitai River estuary and associated erosion protection work may contribute to the channelization of the lower river and its separation from the flood plain, but this effect is negligible.

- Tahunanui Drive crossing of a minor unnamed watercourse near Tamaki Street. The culvert may make a minor contribution to the channelization of the stream and its separation from the flood plain. Much of the catchment surface area is impervious (roads, carparks, roofs etc) which will have a major impact on the hydraulic function of the stream. It is noted however that native fish (banded kokopu and koaro) have been recorded in the lower reaches (100m from the sea).

- Tahunanui Drive crossing by culvert of a minor unnamed watercourse near Maire Street. The culvert may make a minor contribution to the channelization of the stream and its separation from the flood

plain. Large sections of this stream are culverted and a high proportion of the catchment area is impervious. These factors will have impaired the ecological performance of this stream.

- Annesbrooke Drive crossing by culvert of Jenkins Creek near Douglas Road. The culvert may make a minor contribution to the channelization of the stream and its separation from the flood plain. It is noted that Jenkins Stream supports at least 6 species of native fish and the freshwater crayfish (koura).

- Waimea Drive crossing by culvert of York Stream at Bishopdale Reserve. The culvert may make a minor contribution to the channelization of the stream and its separation from the flood plain however most of the stream downstream of this point, which has a major impact on ecological performance.

- Waimea Drive crossing by culvert of Jenkins Creek near Chings Road. The culvert may make a minor contribution to the channelization of the stream and its separation from the flood plain.

- Stormwater runoff from the existing arterial route discharges to these watercourses or directly to Tasman Bay. Stormwater runoff from road surfaces typically carries elevated concentrations of copper, zinc and PAH's 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. Traffic volumes on SHW1 through Nelson are projected to increase by around 23% over the next 30 years indicating a potentially increasing rate of contaminant input to these watercourses in the medium term.

- The seawall extending along Wakefield Quay and The Rocks extends into the intertidal zone of Tasman Bay. The construction of the seawall may have resulted in the loss of some rocky shore habitat, but the ecological functions provided by this habitat may now be partially provided by the hard surfaces of the seawall.

4 Conclusion

The existing arterial routes on Queen Elizabeth II Drive to Whakatu Drive and Rutherford Street to Waimea Road impinge on a number of inland watercourses as well as the Maitai River estuary and the coastal marine area of Tasman Bay. All of these watercourses have been affected to some degree by structures associated with the existing arterial routes and by stormwater runoff from these road surfaces. While the cumulative effects of urbanisation of the wider Nelson area have significantly reduced the ecological functions of some water bodies, the contribution from the existing arterial routes makes up a small proportion of these modifications. Nevertheless, projected increases in traffic volumes on SHW1 may result in an increased contribution of contaminants to the lower reaches these watercourses, potentially increasing contaminant concentrations in streambed and estuarine sediments.

References

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