

Halcrow

SHOROC Transport and Land Use Strategy
Phase 2 - Strategy Development

Final



April 2008

**Shore Regional Organisation of
Councils (SHOROC)**



SHOROC

Shore Regional Organisation of Councils

*Incorporating Manly, Mosman,
Pittwater & Warringah Councils*

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Shore Regional Organisation of Councils

SHOROC Transport and Land Use Strategy

Phase 2 – Strategy Development

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1 Introduction

1.1 *Background Information*

Halcrow has been commissioned by the Shore Organisation of Regional Councils (SHOROC) to develop an integrated transport and land use policy document that underpins the Council's vision for the region.

The study is comprised of two parts as follows:

1. Phase 1 – establishing the SHOROC transport task by documenting existing transport usage and potential future demand.

This will be delivered through a final Stage 1 Report and workshop presentation.

2. Phase 2 – will involve reaffirming the Council's values and vision for SHOROC with a key objective to develop an evaluation framework to be used in the appraisal of transport schemes. The framework will be applied as a policy instrument to enable SHOROC to pursue an integrated transport strategy that will realise the regional vision. Within this context, currently proposed transport schemes will be reviewed and potential transport strategies considered.

This will be delivered through a preliminary report, workshop presentation and final report.

This report presents the results of Phase 2 of the study.

1.2 *Structure of this Report*

The report is structured as follows:

Chapter 2 – gives details of the workshop held on 11 October 2007 and summarises the salient issues raised.

Chapter 3 – provides an overview of the range of transport options for the SHOROC region, the relative environmental impact of each mode and consideration of possible future transport technologies.

Chapter 4 – contains a recommended transport strategy given the Councils’ vision for the region.

2 Workshop Outcomes

2.1

Introduction

A workshop was held on Thursday 11 October at Manly Council Offices to present an overview of the Phase 1 study findings and to discuss with councillors and council staff the preferred approach in developing transport strategy options in Phase 2 of the Study. The workshop comprised a presentation and comments/discussion of the issues raised as well as feedback on the preferred way forward. Minutes of the meeting are provided in Appendix A.

2.2

Workshop Presentation

The objective of the presentation was to highlight existing transport conditions within the region and to consider the two key objectives, sustainability and accessibility, previously explored by the Councils. This was followed by a discussion of existing traffic conditions along SHOROC’s three strategic corridors, discussion of the accessibility/land use relationship with reference to two Sydney based examples and an overview of the main transport strategy options available to SHOROC. A copy of the presentation is included as Appendix B.

The emphasis of the presentation was also to raise awareness of the implications of improving accessibility to the region in terms of increasing pressures on development densities and the implications for sustainability and lifestyles.

2.2.1

Sustainability

Sustainability was defined as leaving the planet as we found it, being more energy efficient and emitting less pollution, using less of the world’s finite resources so that the next generation can live as we have. In transport terms this equates to generating fewer trips, reducing trip lengths and shifting to more sustainable modes of transport such as walking and cycling and discouraging private car use. Sprawling urban areas where jobs, workers and services are spatially dispersed are

not sustainable in the long-term, rather sub-regional self containment should be encouraged where jobs, workers and services are all available within the same locality.

Currently the SHOROC sub-region has high levels of self containment as detailed in the Phase 1 report although there is a high dependence on private car for internal trips and east-west movements.

2.2.2

Accessibility

Accessibility was defined in terms of reductions in congestion and greater ease of travel, resulting in improved journey times. It is used to refer to the accessibility of jobs and community services. Economic centres generally have relatively high levels of accessibility and improved accessibility, through major infrastructure provision for instance, is usually a major contributor to economic growth.

In economic terms, improved accessibility is reflected by reduced journey times; reduced journey times mean the cost of travel is cheaper; and as costs go down so more is demanded of any normal good or service thus the demand for travel increases.

Improvements in accessibility into and out of the SHOROC region would release suppressed demand and encourage new and longer trips, which is contrary to objectives of improving sustainability. This would also have implications for land use changes.

In the case of SHOROC there is a dichotomy between internal accessibility and accessibility across the regional boundary (internal-external-internal). In the main we are referring to internal-external accessibility which can give rise to changes in land use and development densities. Internal accessibility, however, refers to the ease with which the resident population can access jobs and services within their region. The latter is to be promoted if self containment is to be maintained.

2.2.3

Issues for Consideration

An overview of existing transport conditions in SHOROC was provided and can be seen in the presentation in Appendix B. Detailed information is provided in the Phase 1 report.

Attention was drawn to existing traffic volumes along the three main corridors:

- Spit Bridge – 71,600
- Warringah Road (west of Forest Way) – 74,300
- Mona Vale Road – 52,000

*2002 average daily weekday traffic flow, bidirectional.

These numbers were compared to demand on Sydney's toll road network and it was noted that demand generated by the SHOROC region could warrant further investigation into new infrastructure in the form of a toll road, funded on a PPP (Public-Private Partnership) basis.

Bondi Junction and the M4/M7 interchange were used to illustrate the relationship between accessibility and land use changes. Heavy rail services became available in Bondi Junction with the completion of the eastern Suburbs line in 1979. From that time the Bondi Junction area has developed into regional centre and is now a major town centre characterised by high rise residential buildings and large scale shopping facilities. The rail service now carries around 75,000 trips with the shopping centre, Westfield's, acting as a major attractor.

Attention was also drawn to the M4/M7 interchange, as discussed in the Phase 1 report, which has created around 12,000 new jobs in the area (both directly and indirectly). However, there is potential for the creation an additional 30,000 jobs in the region affected by the improved accessibility, that were not in the original planning of the scheme, leading to further infrastructure upgrades.

The examples highlighted the potential of major transport infrastructure to stimulate land use developments within a given zone of influence and that invariably major land-use developments are accompanied by major transport infrastructure and vice versa.

2.2.4

Options for Consideration

The main transport strategy options for SHOROC outlined at the workshop are summarised below:

1. Implement the Transport Priorities Wish List¹ – and reinforce the north-south corridor movements
2. Improve transport linkages to the west:
 - connections to Gordon and beyond
 - connections to Chatswood
3. Increase accessibility:
 - increase road capacity
 - high speed bus or light rapid transit (LRT)
 - high capacity public transport
4. Improve Sustainability:
 - improved public transport
 - public transport linkages to Gordon/Chatswood
 - improved ferry frequency
 - constrain capacity to ensure no net increase in trips
 - park and ride to support regional initiatives
 - land use plans to promote regional self containment, walking and cycling

2.3

Issues Raised

The key issues raised during the workshop, in no particular order, were as follows:

- Increased emphasis on the north-south corridor could result in 24hr clearways being imposed by the RTA. Twenty-four hour clearways may have a significant detrimental impact on the existing retail outlets along the north-south corridor, c/f Parramatta Road.

¹ SHOROC canvassed their member councils and the State Transit Authority and produced a Transport Priorities Wish List. This is essentially a list of transport projects seen as a high priority by the Councils given the shortcomings of the local transport system.

- It was agreed that increasing accessibility to the region by car through the construction of major infrastructure was not desirable.
- It was noted that a high proportion of internal trips are dependant on the private car use and that internal linkages and interchange facilities should be improved to encourage a modal shift for this travel demand segment.
- There is thought to be no current state government interest in the development of motorways to improve accessibility (evident in the sale of land set aside for the Warringah Freeway).
- The implementation of state funded motorways and/or heavy rail is considered highly unlikely due to political/economic reasons.
- Shifting road space allocation to something more public transport orientated should not be overlooked.
- Improving public transport whilst simultaneously relieving pinch points on roads, as recommended in the Metropolitan Strategy, was considered contradictory.
- It was noted that one of the reasons the Peninsula has developed in the way that it has is due to the absence of mass public transport modes and the constraints imposed by the limited water crossings to the peninsular.
- The lack of public transport provision along the east-west corridor needs to be addressed. Transport policy should emphasise the development of an east-west corridor.
- It was queried whether the region could successfully argue that it can not accommodate the increases in population and employment required by the Metropolitan Strategy. However it was the general opinion that SHOROC would be required to accommodate this growth. To this end there is an employment/development strategy review currently in progress.
- There is a desire to maintain and improve upon current levels of sub-regional self containment.

- A key concern in promoting containment was the lack of affordable housing and therefore available workforce, in particular key workers. Comment was made however, that more can be done to attract employers to the SHOROC region.
- Ferries are considered very costly particularly with regard to maintenance and existing services need to be improved if they are to serve the local community well.
- Consideration needs to be given to the policies of neighbouring sub-regions, particularly those with whom SHOROC shares a boundary.

2.3.1

Commercial Vehicles Issues

Since the workshop presentation a number of concerns have been raised as to the high volume of commercial vehicles using SHOROC's roads as well as several specific local issues relating to commercial vehicles. Some natural increases in commercial vehicles should be expected to enable planned growth in employment and residential areas to be properly serviced. However, significant increases in commercial vehicle numbers are likely to exacerbate the already congested road conditions. Safety concerns have also been raised with regard to bus and truck conflicts occurring as a result of narrow lanes along Military Road.

Sufficient commercial vehicle data was not available for analysis for the purpose of this study, however, the Roads and Traffic Authority, through SKM, is examining freight issues within the region. As part of this work the finding of the Employment Study, carried out Hill PDA Consulting, and this transport study will be considered and a more comprehensive understanding of current and future commercial vehicle trends will be established.

2.4

Agreed Way Forward

2.4.1

SHOROC Vision

Overall it was agreed that SHOROC wants to act in the interests of its residents to protect their existing lifestyle, and to prevent living standards being eroded by significant increases in development densities. To this end SHOROC supports the development of a transport strategy with a strong emphasis on improving public transport provision and a wider land use strategy that promotes containment.

2.4.2

SHOROC Objectives

At the Transport Priorities Workshop held in February 2007 three overarching transport policy objectives were identified and are listed below:

- “Efficiency” – getting the most out of the existing infrastructure
- “Sustainability” – leaving the planet as we found it
- “Accessibility” – being able to access places of work, recreation, etc

The aim of focusing on the three objectives was to retrospectively apply an “objective-led” approach to resolving transport related problems in the region. The Transport Priorities Wish List, compiled in advance of the workshop, was essentially a “problem-led” approach with improvement schemes being identified with a particular existing transport problem in mind and not with reference to a long-term vision. Consideration of the objectives was intended to encourage a more long-term approach to transport policy. Efficiency, sustainability and accessibility were selected because these objectives seemed to reflect the broad spectrum of transport schemes identified in the Wish List. Although there is some overlap between the objectives (sustainable schemes that are also efficient or efficiency schemes that also improve accessibility for example) they are not necessarily complementary.

In February a pre-workshop questionnaire was used to canvass the opinion of members regarding how highly they rated each objective. The findings of the questionnaire and workshop discussions indicated that sustainability was valued more highly than efficiency and accessibility in terms of overarching transport planning principles. However, the variance in results led to the suggestion that further discussion would be required on the overarching objectives for SHOROC in order to achieve a better consensus.

The recent workshop focussed on establishing a consensus regarding sustainability and accessibility issues and exploring of the apparent conflict between the two objectives. Discussions indicated a strong leaning toward sustainable transport policies with the overriding aim of protecting the currently enjoyed lifestyle of SHOROC residents, at the expense of improving accessibility. Outcomes from discussions with SHOROC council members have enabled regional objectives to be honed. The following objectives and sub-objectives, which will assist SHOROC in developing their vision of the region, have therefore been identified:

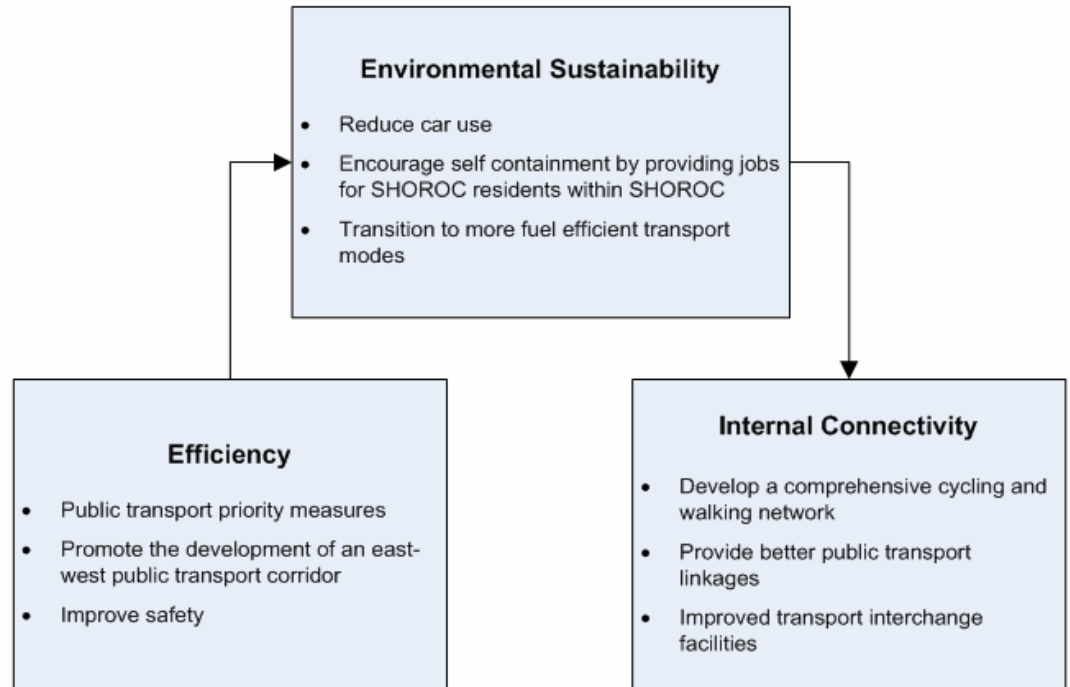


Figure 2.4: SHOROC Objectives

This framework is also considered appropriate in the assessment of schemes that will impact on the levels of commercial vehicles travelling within and through the region.

2.5

Evaluation Framework

To select the best schemes to take forward to ensure a sustainable future for SHOROC they should be assessed against criteria that reflect the Councils’ objectives. SHOROC will need to develop and refine an evaluation frame work that best suits their needs as time goes on. A suggested framework is provided in the table below:

Table 2.5: Summary Transport Evaluation Framework

Objective	Sub-objective	Qualitative Assessment	Quantitative Assessment	Overall Assessment
Environmental Sustainability	Private Car Demand			
	PT Demand			
	Containment			
	Green Transport			
Internal Connectivity	Cycling & Walking			
	Public Transport Linkages			
	Transport Interchange			
Efficiency	PT Priority			
	Safety			
Scheme Cost				

3 Overview of the Transport Options

3.1 Introduction

This chapter provides an overview of several potential transport options for the SHOROC region including commentary on the schemes identified in the SHOROC Transport Wish List.

It is intended to document some of the transport solutions that have been suggested to date including some discussion of their relative merits, which provides context for the recommendations provided in Chapter 4.

3.2 SHOROC Transport Wish List

The transport Wish List, shown in **Table 3.2** below, was used as a basis for the discussion of the Transport Priorities Workshop held in February 2007. It includes schemes put forward by members of each of the four councils and additional schemes suggested by Halcrow used to extend the discussion.

Table 3.2: SHOROC Transport Priorities Wish List February 2007

Type of project	Specific examples [source]
Bottlenecks	Spit Bridge widening. [Ma]
	Spit Rd / Parriwi Rd intersection improvement. [Mo]
	Spit Rd / Ourimbah Rd capacity improvements (e.g. Awaba St / Ourimbah Rd tidal flow). [Mo]
	Pittwater Rd / Wakehurst Parkway additional southbound lane. [P]
	Bus pull in bays at Dee Why (main stop). [W]
	Measures to reduce queuing on Military Rd at Neutral Bay Caltex. [S]
Clearways	Military Rd clearway (7am-7:30pm) Cowles Rd and Brady St. [S]
	Weekend clearway on Pittwater Rd (W.Mall to Collaroy). [S]
T3 lanes	Extend T3 along Sydney Rd. [Ma]
	Extend T3 restrictions on Military Rd and Spit Rd to 7:30pm. [S]
Bus services	Pittwater to Chatswood via Wakehurst Parkway. [P]
	Express from Warriewood park 'n ride. [P]
	Express via Wakehurst Parkway and Seaforth. [P]
	Late night services to/from Manly, Dee Why, Brookvale and W.Mall. [W]
Bus priority	Convert Seaforth roundabout to signals with bus priority [Ma]
	Convert Balgowlah Rd / Pittwater Rd to signals with bus priority [Ma]
	Florida Rd / Ocean Place (Palm Beach) intersection upgrade. [P]

	Bus lanes or t-way in Dee Why to Chatswood corridor (Warringah Rd). [W]
	Bus lane (am peak) beside Warringah Golf Course. [W]
	Bus lane, southbound on Condamine St (Pittwater Rd-Campbell Pde). [S]
	B-signal, southbound on Condamine St at Kentwell Rd and Campbell Pde. [S]
	B-signal, southbound on Pittwater Rd at William St. [S]
	Increase road width at Forest Way at Rabbett St. [S]
	Bus priority, southbound at Pittwater Rd / Wakehurst Parkway. [S]
Bus stops/interchanges	Bus interchange at Village Park, Barrenjoey Rd, Mona Vale. [P]
	Provide footpaths to access bus stops. [P]
	Provide bus shelters and upgraded bus stops. [W,P]
	Bus interchange improvements at Warringah Mall. [W]
	Introduce a bus bay at the Spit Junction bus stop. [Mo]
	Introduce a bus bay at the Military Road/Spofforth Street stop. [Mo]
	Remove major fixed object intrusions at bus stops on Military Rd. [S]
Park 'n ride	Seaforth Oval. [Ma]
	Corner of Warringah Rd and Wakehurst Parkway. [Ma]
	Ernest St bus depot, Cremorne. [Ma]
	Throughout Warringah Council area. [W]
	Warringah Mall. [W]
Cycleway network	Balgowlah to Manly Wharf cycleway. [Ma]
	Pittwater Rd / Condamine St / Wakehurst Parkway / Warringah Rd. [W]
Pedestrian facilities	Upgrading pedestrian facilities at Spit Junction. [Mo]
	Pedestrian footbridge on Pittwater Rd at Warringah Mall and Dee Why. [W]
Tolls	Spit Bridge, Roseville Bridge and Mona Vale Rd. [H]
Light rail	No details. [Mo]
Containment	Brookvale/Dee Why employment centre providing jobs for region. [H]

The proposed schemes were assigned into categories depending on the type of project as shown in the table above. The schemes proposed to address bottlenecks are largely concerned with increasing road capacity. Widening of the Spit Bridge for example, combined with other measures along the route, would significantly increase capacity and attract additional trips that would erode any journey time improvements experienced initially. The scheme is also no longer being pursued at a state level due to escalating cost estimates.

The proposal for clearways along military Road and Pittwater Road has implications for improving accessibility and impacting upon local retail outlets. Clearways would discourage patrons who currently have the option to park on street and in the long term this could result in the relocation or closure of these businesses, particularly if the clearways were extended to cover the busy weekend periods. Improvements for car journey times would also run contrary to the objective on reducing car dependency.

The imposition of T3 lanes in SHOROC and in the greater metropolitan area have largely been considered successful in increasing car occupancy. The extension of T3 lanes to incorporate Sydney Road is likely to assist in increasing occupancy and leveraging private car dependency.

Improved bus services and the expansion of bus priority measures, particularly at busy intersections, will improve journey time reliability and provide some incremental increases in transport capacity. Improvements to bus stopping and interchange facilities should help improve public transport accessibility within the region. However, the proposal for bus pull in bays at Dee Why and elsewhere should be reviewed as part of a wider bus strategy. Whilst stopping buses can cause problems with blocking back particularly at peak times, bus bays can prove unpopular with bus companies due to problems with pulling out into fast moving traffic. Park and ride sites are important in achieving bus accessibility improvements although the potential impact of these schemes should be examined in detail to ensure new and/or longer trips are not induced.

The proposed improvements to cycling and pedestrian facilities will enhance internal linkages by reducing the severance caused by the road network, and in particular Pittwater Road. Such measures will encourage a shift from car dependency which is high for internal movements.

With regard to toll roads, these have proven an effective means of reducing car dependency and the resulting revenue streams can provide a useful source of investment for public transport. However, the political connotations of introducing tolls on all three strategic corridors are significant. This is essentially a captive market and toll roads (particularly on east-west corridors where the public transport alternative is limited) could seriously disadvantage lower income groups and compound the problem of attracting key workers to the area.

Overall the existing transport Wish List, developed through a “problem-led” approach, has a strong bias towards achieving travel improvements along the north-south corridor incorporating Pittwater Road, Spit Road and Military Road. This emphasis can be seen from the map-based presentation of the proposed schemes shown in Appendix C. The potential impact of reinforcing the north-south corridor will be to increase dependency on movements along this route and put the existing infrastructure under increasing strain.

3.3

Increased Accessibility

3.3.1

Road

The provision of new road infrastructure that significantly increases accessibility to the region can be discounted since significant increases in accessibility are not part of SHOROC’s long-term vision. However, the provision of major infrastructure that benefits public transport at the expense of car traffic and does not represent a significant increase in capacity could help achieve the regional objective of environmental sustainability by reducing car dependency. Examples of such schemes include; the creation of bus permanent way through adjacent lane take, public transport tunnels (Spit/Roseville) and/or north-south corridor grade separation for public transport whilst reducing capacity for car traffic.

However, major infrastructure, such as bridges and tunnels, would require significant investment and could not be financed at a local council level. For instance, research based on recent tunnelling projects in Sydney suggests that tunnels cost on average \$400m per km and at a State level there seems little interest in investing in major infrastructure for the region. This is evident in the rejection of Sugar Loaf Bridge, the sale of land on the Warringah Freeway corridor, and the decision to abandon plans to widen the Spit Bridge.

3.3.2

Rail

Rail infrastructure, in its various forms, could provide a significant increase in capacity into the region and thus increase accessibility. A number of rail options have been suggested to date and include:

- High capacity Heavy Rail or Rapid Transit

- Medium capacity Light Rail (slower speeds and less frequent than the above, usually with more stops, generally runs along its own right of way) such as:
 - VAL – is a form of medium capacity light rail that runs on rubber tyres.
 - Hybrid-electric light rail – has fuel efficiency benefits over conventional systems as discussed below.

Since it is not an objective of SHOROC to increase accessibility then the introduction of a heavy or light rail system would be contrary to the Councils' current vision for the region. However, to introduce such a system whilst simultaneously reducing road capacity could provide significant public transport improvements and help generate a modal shift from car user to public transport. Nevertheless, due to the high capacity of rail systems reductions in road capacity are unlikely to enable current levels of accessibility to be maintained and would be considered unpopular.

As with road, rail also implies significant infrastructure costs and State investment in a rail system for SHOROC seems unlikely at present.

If it was decided that SHOROC should increase accessibility, or increase public transport accessibility at the expense of road space, then the transport technology options would need to be investigated more thoroughly to enable the most cost effective and environmentally sustainable mode to be chosen.

3.3.3

Ferries

Sydney ferries are iconic and are popular with tourists, however, they have been criticised for a lack of efficiency and affordability to cater properly for local commuters.

Recently a Special Commission of Inquiry was carried out to review the ability of Sydney Ferries Corporation to “provide safe, efficient and customer-focussed ferry services”². The key recommendation of the Inquiry was for the NSW Government

² Report of the Special Commission of Inquiry into Sydney Ferries Corporation, 31 October 2007, pp3.

to consider forming a partnership with a private operator, who would pay a fixed price for the service contract. It was considered that a public-private partnership would provide the best environment to rejuvenate the existing ferry services, including replacing the entire ferry fleet. At the time of writing these recommendations have not been implemented, however, it is noted that any overhaul of Sydney Ferries could provide an opportunity for improvements in services and affordability for SHOROC’s existing services.

3.4

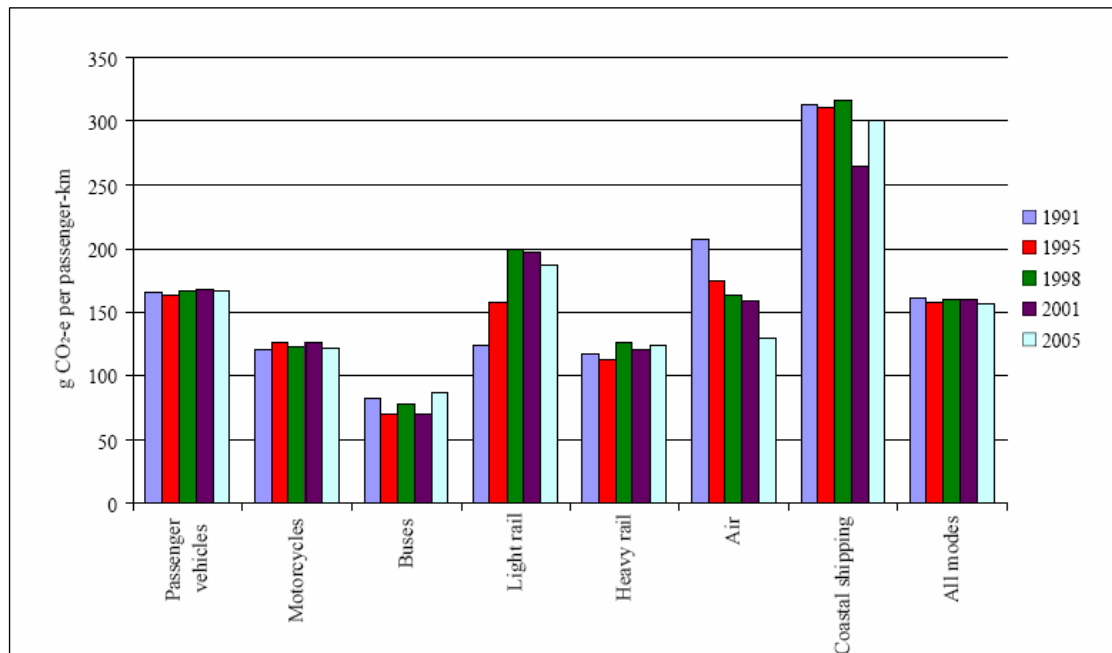
Environmental Sustainability

The main environmental concerns relating to the transport industry include air pollution, global warming, leaking tanks, and oil spills. Many of the pollutants emitted by the transport industry have also been proven as damaging to health.

A brief description of some of the most environmentally harmful gases emitted by the transport industry is provided below:

Carbon Dioxide	CO ₂	the major greenhouse gas contributing to global warming
Carbon Monoxide	CO	impairs breathing, can be fatal
Particulate Matter	PM ₁₀	causes respiratory problems and is a source of haze that inhibits visibility
Nitrogen Oxide	NO _x	can cause lung damage and respiratory illness and contribute to acidic deposition (“acid rain”)
Nitrous Oxide	N ₂ O	the third major greenhouse gas contributing to global warming
Methane	CH ₄	the second major greenhouse gas contributing to global warming
Non-Methane Volatile Organic Compounds	NM _{VOC}	source of air pollution, such as smog, detrimental to the health of plants and animals
Sulphur Dioxide	SO ₂	can cause lung damage and respiratory illness and contribute to acidic deposition (“acid rain”)

The various transport modes emit different levels of harmful gases, including those listed above; these emissions also vary with fuel type, vehicle model and so on. To enable a direct comparison of the performance of transport modes with respect to emissions it is helpful to use the international measure known as Carbon Dioxide Equivalent (CO₂-e). This measure expresses the amount of global warming greenhouse gases in terms of the amount of CO₂ that would be necessary to generate the same global warming effect.



The table below provides CO₂-e statistics per passenger kilometre for each transport mode as published by the Australian Greenhouse Office (AGO) and is based on information for all States:

Table 3.3: Emissions by Mode (2005)³

Mode	Passenger Motor Vehicle	Bus	Domestic Air Travel	Coastal Shipping	Light Rail	Heavy Rail
g CO ₂ -e/passenger-km	166	87	129	301	187	124

Figure 3.3 below presents a comparison of CO₂-e emissions for each mode between 1991 and 2005:

Figure 3.3: Emissions per Passenger-km by Mode⁴

The emissions levels for shipping are markedly higher than for any other mode. Whilst the AGO statistics note that nearly all passenger traffic used in the analysis is carried by ferries this is in reference to coastal ferries and not the commuter

³ National Greenhouse Gas Inventory: Analysis of Recent Trends and Greenhouse Indicators 1990-2005, Australian Greenhouse Office Department of the Environment and Water Resources, 2007, pp30-34.

⁴ Ibid, pp34.

ferries used to cross Sydney Harbour. It has not been possible to identify comparable figures for Sydney Harbour Ferries.

Of the remaining figures, the results clearly indicate that travel by bus is the most environmentally sustainable mode of transport. It should be noted that inaccurate occupancy data can skew the emissions estimates. The assessments in this case are based on aggregated data for all states and territories across Australia. It should also be remembered that both light rail and heavy rail options use energy derived from the burning of coal and the subsequent generation and distribution of electrical power. These modes therefore suffer in terms of green house gas production unless high vehicle occupancies are attached.

Buses, and diesel fuelled vehicles in general, are relatively more problematic with regard to sulphur dioxide (SO₂) and particulate matter (PM) and their stop/start operations also mean they are generally “dirtier” than other vehicles. However, the use of ultra low sulphur diesel has eased this problem and further pressures for cleaner engines should improve this in time. In terms of passenger kilometres travelled they are clearly cleaner than other modes and will continue to out perform other modes provided occupancy levels can be maintained.

In recent years there has been a shift toward the use of compressed natural gas (CNG) as an alternative energy source for powering buses. Buses using CNG emit lower levels of particulate matter and carbon dioxide, although they emit higher levels of methane. Overall, considering the emissions created during fuel production, CNG fuelled buses emit similar levels of greenhouse gases to diesel buses⁵. However, CNG fuelled buses represent a reduction in noise pollution when compared to similar diesel fuelled buses and in Australia CNG is locally produced and offers a cheaper alternative to diesel⁶.

Electric forms of transport, such as electric light rail and electric buses, are often cited as being more environmentally sustainable than traditional fuel burning modes. However, it should be noted that electrically powered trains and buses, although not pollution emitting at the point of service, often rely on electricity generated by burning coal in power stations. Only when the electricity used is

⁵ Clean Cities fact Sheet, U.S. department of Energy, May 2000.

⁶ http://www.greenhouse.gov.au/transport/comparison/pubs/2c_h8.pdf.

generated by renewable energy sources do electrically powered modes offer significant environmental benefits over vehicles powered by diesel or CNG for instance.

In the most part electricity used in transport is produced by burning coal, so although the service is emission free at the point of use it is still generating environmentally damaging effects. The main alternative energy sources to burning coal include wind power, tidal power, wave power and solar energy. These energy sources are still not well established or widely available but offer great potential for the future.

3.4.1

Transport Technology

Transport technology is advancing on a daily basis; cleaner engines, more efficient and renewable fuels, and better materials for example are all working towards a more environmentally sustainable transport system. Innovations affecting the internal combustion engine, hybrid electric transport and vehicles powered by fuel cells are all likely to play their part in shaping the transport system of the future.

Hybrid electric vehicles for example, combine a conventional propulsion system with a rechargeable energy storage system (RESS). This gives better fuel economy than a conventional vehicle and does not have the range limitations associated with purely electric vehicles. Hybrid-electric can be used for road, rail and water based transport. Benefits of electric or hybrid electric vehicles include reduced noise creation, less wasted energy (since the combustion engine can be switched off during idle times) lower emissions at point of consumption and the capacity to generate electricity using renewable energy sources as they become more developed. However, vehicles powered only by electric have several draw backs including a limited range resulting from the need to recharge batteries which are currently still costly to purchase.

Other advances, including advances in electronics have also been successfully deployed by the transport industry in recent years, in particular in the development of intelligent transport systems (ITS) such as on-board vehicle navigation systems, real-time passenger information and electronic tolling as well as the facility for on-board monitoring of vehicle emissions.

There are many different technology solutions available and there is likely to be more choice in the future as existing technology is refined and new modes introduced. As new technologies become more developed and achieve a higher

market penetration they will become more accessible with lower costs and represent a more viable alternative. However, at present it is not the choice of transport technology that is the focus of debate; rather the emphasis should be placed on the impact of that infrastructure in terms of increasing accessibility and the potential to change the character of the SHOROC region.

3.5

SHOROC Employment Study

An employment study for SHOROC was commissioned and undertaken by Hill PDA Consulting. The key findings of the study will be used in the refinement of the draft North and Northeast Subregional Strategies (released by the Department of Planning) and in the preparation of the regional Economic Development Strategy.

Results of the employment study indicate a high level of containment, as also shown by the transport analysis, with an average of 77% of jobs provided within the region being taken by local residents.

It is noted, however, that as property prices increase and the existing labour force retires there will be increasing pressure for people from outside of the region to fill local jobs. This has the potential to generate significant counter-peak movements, whether by private vehicle or public transport.

The growth of alternative regional centres, including Chatswood, Macquarie Park and Norwest, are also identified for their potential to limit or reduce job containment and put increasing strain on the existing east/west corridor transport infrastructure.

4 Recommendations

4.1 *The Transport Strategy*

Given the findings presented in this paper the recommended strategy for SHOROC is to pursue a transport policy that preserves for future generations the lifestyle currently enjoyed by SHOROC residents. The transport strategy will focus on satisfying the objectives and sub-objectives identified in Figure 2.4 whilst preparing to accommodate the growth in population and employment as required by the Metropolitan Strategy. The sub-regional planning targets will be the key drivers of future transport improvements, which should encompass:

- Demand-side policies to reduce car dependency;
- Preserve and develop a public transport (bus) corridor for east-west movements;
- Enhance public transport, cycling and walking linkages particularly for internal movements;
- Pursue an employment strategy that facilitates high levels of containment and hence shorter trip lengths; and
- Develop a housing strategy that prevents key workers from being marginalised due to unaffordable house prices.

4.1.1 *Reduced Car Use*

Both demand and supply-side measures should be pursued by the Council to achieve a modal shift from car to public transport. Examples include:

- Increased use of park and ride facilities;
- Targeted car parking strategy to increase the cost of and/or reduce the availability of car parking (reference should be made to the Metropolitan Parking Policy being developed by the Department of Planning, including parking in strategic urban centres such Dee Why, Brookvale and along strategic bus corridors);

- Speed restrictions and capacity reductions; and
- Better use of work place travel plans and similar travel demand management measures.

The proposed transport strategy is largely consistent with regional and sub-regional strategies although there are some key differences. The Metropolitan Strategy for the North East Sub-region identified the area's three main corridors (Warringah Road, Mona Vale Road and Spit Road) as routes that will be targeted in improving traffic conditions, including the implementation of bus priority measures and road upgrades aimed at relieving congestion (widening of Mona Vale Road at Ingleside, and "pinch point" works on Pittwater Road, Warringah Road and Boundary Street.).

Whilst each individual scheme should be judged on its merits, and assuming such improvements would benefit private car travel, it is considered somewhat counter productive to simultaneously target public transport improvements and patronage growth whilst increasing road capacity. In this respect SHOROC should focus on those road improvements that are required to provide safety improvements and/or where the benefits are more heavily weighted toward public transport provision.

4.1.2

East-West Corridor

Movements from SHOROC to the west, including Gordon and Chatswood, currently represent about a third of total demand from the region, with movements from the west (contra-flow) representing an even greater proportion of demand to SHOROC (2001 Journey to Work Data). The private car dominates these movements with a little under 90% modal share, largely due to the lack of a public transport alternative. Thus the development of an east-west public transport corridor has the potential to achieve significant reductions in car use.

Along the east-west corridor bus represents a cheaper and more flexible alternative to rail and the development of a bus corridor along existing roads will naturally reduce the road space available for car users. It is therefore proposed that a comprehensive bus corridor be developed including express services, bus lanes and other complimentary bus priority measures as discussed below.

Such a corridor would include:

- Dee Why – Chatswood along Warringah Road with:
 - initial increased bus services supported by park and ride facilities
 - increased bus priority at traffic signals
 - further encouragement for high occupancy vehicles, e.g. T2 or T3 lanes
- Mona Vale – Gordon along Mona Vale Road with:
 - initial increased bus services supported by park and ride facilities
 - increased bus priority at traffic signals

4.1.3

Public Transport

(a) Buses

At present buses represent the most environmentally sustainable public transport option. They also offer flexibility in terms of routing and service frequency. It is considered that at present buses represent the most realistic and logical transport option in achieving SHOROC's transport objectives.

As well as the development of strategic bus corridors, as recommended in the Unsworth Review report, further developments should ensure that the key regional retail and employment centres are well served and improve bus links to those areas that are currently less well catered for.

To further improve the efficiency of bus services it should be part of SHOROC's overall strategic to roll out intelligent information systems including:

- expansion of the RTA's PTIPS (Passenger Transport Information and Priority System), the real-time bus priority system linked to SCATS traffic signals;
- comprehensive real time information systems on buses and at bus stops; and
- SHOROC web portal with real-time bus information.

Further efficiency improvements include:

- Extension of bus lanes and T3;
- Off-board ticket sales (that is, pre-pay only); and

- Variable message signs (VMS) where appropriate.

While not SHOROC council's direct responsibilities, member councils are in a position the lobby for the above initiatives.

With regard to bus technology, the potential for the introduction of hybrid electric buses, combining a battery and a smaller diesel engine (or gas turbine generator developed more recently), should be considered. Initially considered to be an expensive alternative (excluding the monetary benefit of reduced environmental impact) recent research suggests that, despite the higher initial outlay, hybrid-electric buses offer a cost saving over the bus life-cycle when compared to conventional buses. This is largely due to fuel and maintenance savings. The results of the Victorian planned trial of an Australian built hydro electric bus on a route in Melbourne should be observed with interest.

(b) Ferries

The current figures, as documented in the Phase 1 report, indicate that Sydney Ferries patronage has declined in recent years and that current services are heavily subsidised and are heavily patronised by the tourist sector. If the benefits are not reaped by the local community then this can not be considered socially sustainable. Further, without improvements to the frequency of operation this mode will not achieve significant improvement in its patronage.

The Special Commission of Inquiry into Sydney Ferries recommended a shift toward a Public-Private Partnership model for the provision of ferry services. Whilst this recommendation has not yet been implemented any overhaul of the organisational structure will be designed to bring about cost efficiencies and will present SHOROC with the opportunity to lobby for improved services/frequencies and wharf infrastructure. The region would also benefit from improved integration of bus and ferry services and better aligned ticketing systems.

4.2

Further Considerations

Following an examination of the Wish List in light of the regional objectives, discerned through discussions and workshops with SHOROC, it will be possible to refine the list to prioritise those schemes that will help achieve the regional vision and remove schemes that do not, that is, retrospectively apply an objective-led approach to the initial problem-led approach.

It could also prudent to review the recommendations of previous studies and identify where improvements consistent with the revised strategy have yet to be implemented, including Section 22 Committee recommendations, the Unsworth Report, the Parry Report as well as documents such as the Metropolitan Strategy.

Now the long-term vision for SHOROC has been established there is a need to understand what this means in quantitative terms to enable the development of better targeted schemes and policies. For example, SHOROC would benefit from setting long-term and interim targets for the reduction of internal car trips.

Assuming SHOROC will be required to meet the employment and population targets of the Metropolitan Strategy, a more detailed assessment may be needed to determine the levels of employment necessary to maintain or increase current levels of self containment. In particular estimates of person trips associated with the forecast growth will be required to allow adequate public transport services and facilities to be planned.

Appendix A. Minutes of Meeting 11 October 2007



NOTES TAKEN AT LAND USE AND TRANSPORT FORUM

THURSDAY 11TH OCTOBER 2007 6-8PM

COUNCILLORS' LOUNGE, MANLY COUNCIL

Attending

Manly Council

Cr Dr Peter Macdonald , Mayor
Cr Barbara Aird
Cr Dr Judy Lambert
Anthony Hewton
Jennie Minifie
Tony Goninon

Mosman Council

John Carmichael
Craig Covich
Beki Boulet

Pittwater Council

Cr David James, Mayor
Cr Lynne Czinner
Cr Natalie Stevens
Paul Davies
James Payne

Warringah Council

Rik Hart
David Kerr

SHOROC

Andrea Dawson

Consultant

Mr Stephen Moore, Halcrow
Hayley Davis, Halcrow

Apologies

Henry Wong, General Manager, Manly Council

Cr Jean Hay AM, Manly

Cr Brad Pedersen, Manly

Dick Persson AM, Administrator, Warringah Council

Viv May, General Manager, Mosman Council

Leta Webb, Executive Director, SHOROC

1. Welcome

Cr Dr Peter Macdonald opened the meeting and welcomed everyone . Apologies were noted. He also thanked Dr Stephen Moore and Ms Hayley Davis for attending and looked forward to their presentation.

Before handing over to Stephen Moore, the Mayor reminded those present that any strategies proposed would have to be assessed in the light of the requirements of the Metro Strategy. He invited comments from everyone attending and indicated that he was pleased that a regional approach to land use and transport issues was being taken.

He introduced Dr Stephen Moore and invited him to proceed with his powerpoint presentation.

2. Presentation by Dr Stephen Moore, Halcrow Consulting.

Dr Moore spoke to his powerpoint presentation and emphasised that it was desirable to embrace both sustainability and accessibility in any transport and land use strategies. The SHOROC region has one of the highest levels of self containment and was already practising some good sustainability practises. In considering strategies it was necessary to bear in mind:

- The reason for trips
- Congestion points
- Timing of congestion (peak hour)
- Existing travel time along various routes

His research has established that with 197,000 car movements in the region the building of a tollway on a PPP basis (Private/ Public Partnership) could be justified. However this may not be a good long term solution because of the social impact. He stressed that there was a delicate balance between increasing road capacity which ultimately leads to increased usage which results in further congestion.

There is currently a heavy demand north/south to the city, facilitated by bus but the east/west route to Chatswood, Gordon, Macquarie Park or Hornsby is not catered for by public transport.

3. Questions and Answers

During the course of the presentation, questions were raised and ideas put forward. Discussion and debate ensued, providing Stephen Moore with a

better picture of what our region is seeking and its long term aims. The following issues were discussed:

- Is it better to create employment within the area to alleviate travelling problems i.e. aim for self containment.
- Is it better to do nothing at all?
- Do we need further community consultation
- If infrastructure improves land densities will occur causing an increase in population
- Increased self containment needs improved bikeways and pathways
- Sustainability would be increased if we improve short-trip access
- Could buses run under Spit Hill to Warringah Freeway
- Widening the Spit Bridge would improve the contra-flow of buses across Spit Hill. At the moment with only one lane northbound during early morning peak hours, buses returning from the city get banked up and cannot keep to schedule.
- There is a monorail in Penang which carries 300 people per car. The cars are carried on stanchions and are economical to construct. But does this region want a monorail?
- In the Metro Strategy the State government is proposing to introduce 800 more buses into this region but can we influence where these buses go. There is a need to improve capacity to Chatswood/Hornsby.
- The fundamental "big picture" issues need to be resolved before moving to improve the smaller internal issues such as bikeways.

4. The Next Step

- Define our Transport Policy
Consensus needs to be reached as to which strategies should be incorporated in our Transport Policy. Is the region going to encourage self containment or pursue improvements to infrastructure?
- Stage 2
Stephen Moore will provide a report based on his current research and also taking into account the views expressed at this Transport Forum. The report will be available in approximately 2 weeks time. This report can be tabled at the SHOROC Board meeting on 31st October.

5. Conclusion

Cr Dr Peter Macdonald thanked Stephen Moore for his informative and thought provoking presentation. He thanked everyone for their participation in the Forum. The meeting concluded at 8pm.

Appendix B. Presentation 11 October 2007

SHOROC Transport Strategy Phase 1 – SHOROC Transport Task

Dr Stephen Moore
11 October 2007

- Discuss sustainability
- Discuss accessibility
- Present some numbers on SHOROC's transport system
- Discuss the impact of transport infrastructure
- Seek guidance

- There are many definitions, but the principle is:
 - Leave the world as we found it – or in a better state
 - Use energy which is renewable
 - Use less energy
 - Create systems so it's easier for the next generation to do the same

- Lower energy use implies:
 - Less pollution
 - More efficient use of energy
 - A land use system to support efficiency
- Shorter trip lengths
- Less trips
- More efficient modes of travel

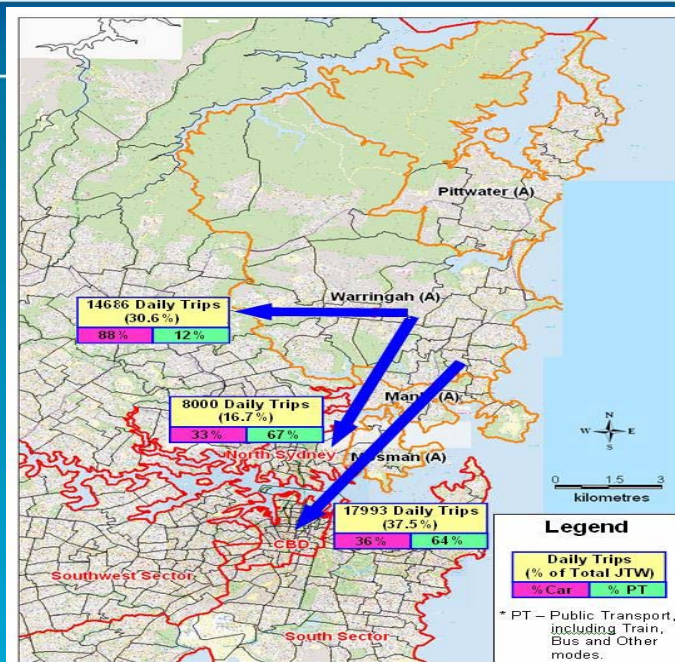
- **Higher levels of self containment**
- **Land use systems which encourage low energy travel, e.g. walk, bicycle, public transport**
- **Distributed job and residential locations so that jobs and homes are close to each other**

- **Greater opportunities within a given distance**
- **Usually, more jobs/community facilities within acceptable travel distances of residential areas**
- **Usually measured in terms of less congestion and greater ease of travel**
- **Usually a major contributor to economic growth**

- Often associated with infrastructure provision
- Can be additional road space or public transport facilities
- Lowers the cost of travel for trips
- Lower the cost of trips, so more trips will be made – conflicts with sustainability

Journey to Work

- Heavy demand to North Sydney and CBD – bus predominates
- Almost a third demand to the West where private car predominates



Some Numbers (AADT)

Location	2002 AADT
Sydney Harbour Tunnel	87,500
M5 Toll	85,000
Westlink M7 (2006)	79,000

Location	1991 AADT	2002 AADT
Parramatta Road East of Homebush Bay Drive	62,400	27,700
M4 Western East of Homebush Bay Drive	n/a	81,300
Total	62,400	109,000

Average Daily Weekday Traffic Flows - 2002

Route	From SHOROC	To SHOROC	Total
Spit Bridge	34,800	36,800	71,600
Warringah Road	37,200	37,000	74,300
Mona Vale Road	26,100	25,800	52,000
Total	98,100	99,600	197,900

Westlink M7 (2006)	79,000**
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†Addendum to the June 2001 Transport Investigations and Modelling Report Northern Beaches Peninsula, February 2004, Page 2.

- **Increased accessibility changes the demand for travel and hence land use**
- **Accessibility increases via:**
 - **Motorways**
 - **High capacity public transport, e.g. heavy rail**
 - **High frequency moderate capacity public transport, e.g. express bus, LRT (tram)**

- **Eastern Suburbs rail line completed 1979**
- **Regional Centre**
- **Chicken or the egg? – doesn't matter**
- **Consequence – major town centre**



- Heavy Rail
- High rise residential
- Large scale shopping infrastructure
- Significantly more trips – 75,000 per day (Westfield's)

- **Redevelopment of Wonderland – 3,000 jobs in redevelopment, 9,000 flowing from those jobs**
- **Wider area, potentially 30,000 jobs**
- **Not in the planning for the M7**
- **M7 and M4-M7 Interchange to be upgraded**
- **More infrastructure, more trips, more infrastructure**

- **Continue as at present – reinforce North/South movement (wish list)**
- **Improved transport linkages West:**
 - **Connections to and beyond Gordon**
 - **Connections to Chatswood**
- **Increased accessibility or sustainable transport**

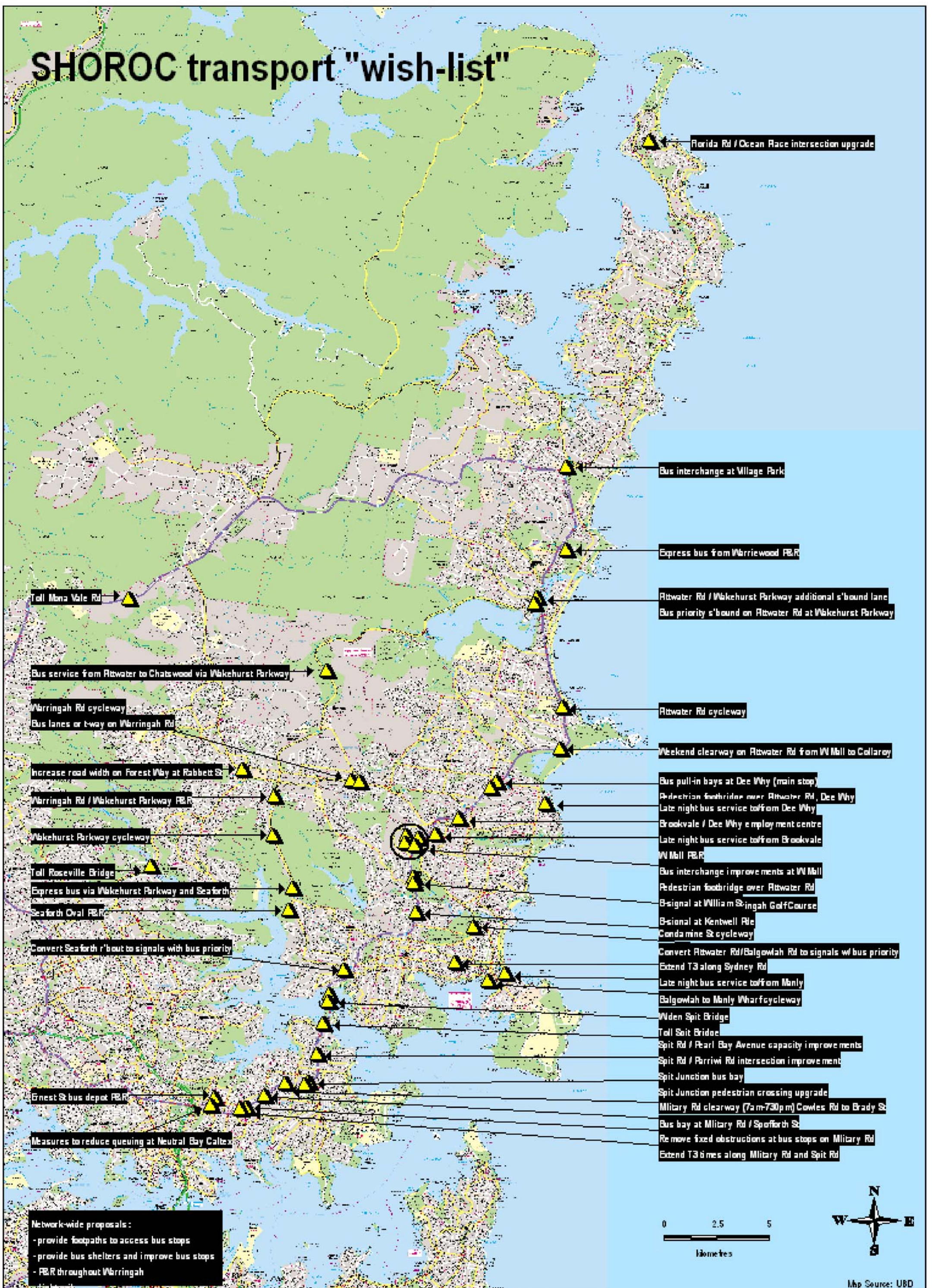
- **Increased accessibility:**
 - Increased road capacity
 - High speed bus/LRT
 - High capacity public transport

- **Sustainability:**
 - Improved public transport
 - Public transport linkages to Gordon/
Chatswood
 - Improved ferry frequency
 - Constrain capacity to ensure no net increase
in trips
 - Park and ride to support regional initiatives
 - Land use plans to support continued self
containment, walk and bicycle modes

- **Lifestyle issues**
- **Increased accessibility/economic growth**
- **A more sustainable transport system**
- **You can't have your cake and eat it too!**

Appendix C. Transport Priorities Wish List

SHOROC transport "wish-list"



Florida Rd / Ocean Race intersection upgrade

Bus interchange at Village Park

Express bus from Warriewood P.B.R.

Rtwater Rd / Wakehurst Parkway additional s'bound lane
Bus priority s'bound on Rtwater Rd at Wakehurst Parkway

Toll Mona Vale Rd

Bus service from Rtwater to Chatswood via Wakehurst Parkway

Warringah Rd cycleway
Bus lanes or t-way on Warringah Rd

Rtwater Rd cycleway

Weekend clearway on Rtwater Rd from W Mall to Collaroy

Increase road width on Forest Way at Rabbett St

Warringah Rd / Wakehurst Parkway P.B.R.

Bus pull-in bays at Dee Why (main stop)
Pedestrian footbridge over Rtwater Rd, Dee Why
Late night bus service to/from Dee Why

Wakehurst Parkway cycleway

Brookvale / Dee Why employment centre
Late night bus service to/from Brookvale
W Mall P.B.R.

Toll Roseville Bridge

Express bus via Wakehurst Parkway and Seafarth

Seafarth Oval P.B.R.

Bus interchange improvements at W Mall
Pedestrian footbridge over Rtwater Rd

Convert Seafarth r'bout to signals with bus priority

B-signal at William St / Ingah Golf Course
B-signal at Kentwell Rd
Condamine St cycleway

Ernest St bus depot P.B.R.

Measures to reduce queuing at Neutral Bay College

Convert Rtwater Rd / Balgowlah Rd to signals w/ bus priority
Extend T3 along Sydney Rd
Late night bus service to/from Manly
Balgowlah to Manly Wharf cycleway

Widen Spit Bridge
Toll Salt Bridge

Spit Rd / Pearl Bay Avenue capacity improvements
Spit Rd / Parriwi Rd intersection improvement

Spit Junction bus bay
Spit Junction pedestrian crossing upgrade

Military Rd clearway (7am-7:30pm) Cowles Rd to Brady St
Bus bay at Military Rd / Spofforth St
Remove fixed obstructions at bus stops on Military Rd

Extend T3 times along Military Rd and Spit Rd

Network-wide proposals:
- provide footpaths to access bus stops
- provide bus shelters and improve bus stops
- P.B.R. throughout Warringah



Map Source: UBD