Draft Concept/Initial TMAP Report

Royal North Shore Hospital Concept Plan

26 July 2006

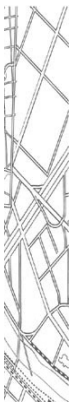
Prepared for

Burns Bridge Services Pty Ltd

Suite 20/809 Pacific Highway
Chatswood NSW 2067
(t) 02 9410 4100 **(f)** 02 9410 4199
(e) info@mwttraffic.com.au
(w) www.mwttraffic.com.au

MASSON | WILSON | TWINEY

TRAFFIC AND TRANSPORT CONSULTANTS



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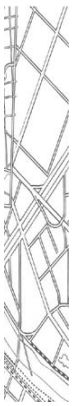

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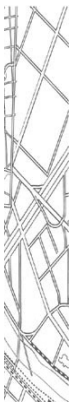

1. Introduction

The NSW Government, through the Northern Sydney and Central Coast Area Health Service is proposing to redevelop the Royal North Shore Hospital site, which is located at St Leonards. The Director-General of the Department of Planning has requested that a Transport Management and Accessibility Plan (TMAP) is prepared for the Concept Plan, and this would form part of the environmental assessment of the proposed redevelopment. Subsequently, Burns Bridge Services Pty Ltd (acting for NSW Health) commissioned Masson Wilson Twiney (MWT) to prepare this Concept/Initial TMAP.

The scope of work for this study follows requirements contained in the Draft Interim Guidelines on Transport Management and Accessibility Plans (NSW DOT and RTA). It also addresses the Director General's requirements for the environmental assessment of the site. It should be noted that this study and resulting TMAP are at a Concept/Initial level of detail, which is commensurate with the status of current site planning. Consequently, the measures developed for the site would require refinement when further information regarding the likely development of the site. This would occur later in the planning process. This is recognised in the DG's requirements.

This report should be read in conjunction with MWT's *Transport Assessment*, dated June 2006.

This current report describes the Concept/Initial TMAP for the site including:

- Objectives in Chapter 2;
- A description of the strategic context and transport policy for the site in Chapter 3;
- The existing transport conditions of the site and St Leonards are described in Chapter 4;
- Chapter 5 considers future base line transport conditions at St Leonards, as they would affect the site;
- Chapter 6 outlines the Concept Plan for the site, and analyses transport related elements;
- A set of measures to further support the Concept Plan are developed in Chapter 7.

Three appendices contain supporting information regarding rail station observations, public transport accessibility and bus user generalised time calculations.

2. Objectives of Concept TMAP

Preparation of this Concept TMAP a requirement of the Director-General's for the environmental assessment of the proposed Concept Plan.

The objectives of the TMAP are:

Objective 1 – Provide an assessment of the proposal against strategic planning and transport policy.

Objective 2 – Identify improvements to non-car access through:

- relationships between land use and the local movement network, and
- opportunities to increase the attractiveness of non-car modes to site users and, where appropriate, for the general locality (transport improvement spin-offs).

Objective 3 – Reduce the site's peak traffic generation.

Objective 4 – Develop measures to improve further transport outcomes.

3. Strategic Context

3.1 Site location

Figure 1 shows the location of the site. The main features of the site are:

- Location at St Leonards at the crossing of the road corridor (Pacific Highway) and rail corridor
- Proximity and access to the Sydney Orbital (Gore Hill Freeway) at Reserve Road ramps
- St Leonards is a major specialised employment centre within the Metropolitan area

Current activities within the RNSH Campus include:

- Tertiary teaching hospital with links to the Faculty of Medicine at Sydney University
- Private hospital
- UTS health campus

Surrounding activities:

- TAFE
- High density housing between RNSH and rail line and around rail station
- Residential catchment to the south of the site
- Commercial employment centre, with supporting services (e.g., limited retail, banking, etc)
- Industrial employment area to the north
- Proximity to Crows Nest, Artarmon
- Former ABC site, currently under development as a technology park

3.2 Planning policy - Metropolitan Strategy

3.2.1 Objectives

One of main focuses of the Metropolitan Strategy is to encourage employment in centres with good transport access. St Leonards lies along the "*global economic corridor*" (also known as the *Global Arc*), which is a corridor with a concentration of jobs and activities in centres from North Sydney to Macquarie Park and from the City to The Airport and Port Botany. The Global Economic Corridor contains approximately 40% of Sydney's jobs and 75% of Sydney's information technology and

telecommunications jobs (refer to Metropolitan Strategy pg 86). Approximately 30% of Sydney's new jobs will be located in the corridor (pg 39).

Concentrating jobs within specialised centres is put forward in the Metropolitan Strategy (on page 82) as supporting the five aims of the strategy:

- Enhanced liveability
- Economic competitiveness
- Fairness
- Environmental protection
- Improved governance

3.2.2 Implications for St Leonards

St Leonards is identified as a specialised centre for employment, along with Macquarie Park, Olympic Park/Rhodes, Port Botany, Sydney Airport, Randwick Education and Helath, Westmead, Bankstown Airport/Milperra and Norwest. Apart from lying on the Global Economic Corridor and currently supporting 25,000 jobs (in 2001, making it the third largest existing specialised employment centre, with more jobs than Chatswood), St Leonards has been identified as a specialised centre because it is a biomedical hub and business centre with higher order office activities that perform vital economic and employment roles across Sydney (page 85).

The Metropolitan also identifies St Leonards as:

- One of Sydney's knowledge and high skill clusters (pg 49);
- Part of a health cluster;
- A component of Sydney's knowledge infrastructure (pg 56);
- Innovation Strategy (pg 69) identifies a particular focus as Sydney's seven biomedical hubs of which St Leonards is one (Darlinghurst, Randwick, Westmead, Central Sydney, North Sydney and Liverpool are the others).

The Strategy sets an employment capacity target for St Leonards of 33,000 by 2031. This represents a 31.0% increase in the number of jobs that could be supported in the area over 25 years. The redevelopment of RNSH campus could potentially accommodate 3,000 to 4,000 of those new jobs, thereby assisting to meet the employment capacity target.

In addition to employment, the Strategy sets targets for new dwellings in different regions of Sydney and reinforces the need for new housing to be provided in locations well served by public transport. Based on this policy stance and the nominated target of 30,000 new dwellings in the Inner North Region by 2031 (pg 18), an increase of 2,000 to 5,000 residential units in St Leonards is considered a likely outcome.

3.2.3 Long term projects

The transport section of the Metropolitan Strategy identifies potential public transport projects to improve the accessibility of the Global Economic Corridor, including the

North West and South West Rail Links. These would link with the existing rail system and a proposed cross-CBD Harbour Rail Link.

The cost of these projects is estimated at $8 billion and the government has recently committed to funding studies and purchase of specific parcels of land along the alignment of these potential facilities[1]. However, the government has not committed to the projects as yet. It may be several years before a commitment is forthcoming, if at all (page 165).

Other measures in the Metropolitan Strategy are discussed below.

3.2.4 Proposed development and the Metropolitan Strategy

The proposed development is strongly supportive of the Metropolitan Strategy. The site is located adjacent to a high quality public transport corridor; it will provide improvements and expansion to the existing biomedical hub, expand the existing commercial activities and integrate existing and future housing and employment.

3.3 Planning Policy - Draft State Environmental Planning Policy 66

The Metropolitan Strategy states that the Integration of Land Use and Transport package (produced by DUAP in 2001) will continue to operate as government policy, but that draft SEPP 66 will cease to operate as a draft statutory instrument upon issuance of new Section 117 directions to Councils (page 104)[2].

3.4 Planning Policy – Section 117 direction

On 30 September 2005, the Minister for Planning issued new Section 117 directions to Councils, as post-shadowed in the Metropolitan Strategy, including direction number 17 regarding Integrating Transport and Land Use. The objectives of the direction are:

- Improving access to housing, jobs and services by walking, cycling and public transport
- Increasing the choice of available transport and reducing car dependence
- Reducing travel demand including the number of trips generated by development and the distances travelled, especially by car
- Supporting the efficient and viable operation of public transport services

The direction applies to all councils and wherever a draft LEP creates, removes or alters a zone or a provision relating to urban land. This suggests that this direction would apply to those parts of the RNSH Campus, if a zone is changed.

A consequence of this S117 direction is that the location of zones should include provisions that give effect to and are consistent with the aims, objectives and principles of the following:

- *Improving transport choice*

[1] Refer to brief summary released on 25 May 2006 committing $129 million to purchase land along the alignments.

- *The Right Place for Business and Services*[3]

Should a zone or provision not meet these requirements, then further justification is required. However, analysis of the location and nature of the Concept Masterplan, indicates that the proposal meets these requirements.

Improving transport choice – guidelines for planning and development

These guidelines provide a rationale for the policy and a number of measures to achieve these objectives.

- Improving transport choice
- Manage travel demand
- Role of land use planning

The guideline sets out 10 accessible development principles:

1. Concentrate development in centres
2. Mix uses in centres
3. Align centres within corridors
4. Link public transport with land use strategies
5. Connect streets
6. Improve pedestrian access
7. Improve cycle access
8. Manage parking supply
9. Improve road management
10. Implement good urban design

The Right Place for Business and Services – planning policy

The aims of this policy are:

Encourage a network of vibrant, accessible mixed use centres which are closely aligned with and accessible by public transport, walking and cycling

This to ensure that:

- There are development opportunities in centres for businesses and services
- Community investment in infrastructure is protected
- Investor confidence is maintained

The planning objectives of the policy include:

- Locate trip-generating development which provides important services in places that:
  - Help reduce the reliance on cars and moderate the demand for car travel
  - Encourage multi-purpose trips
  - Encourage people to travel on public transport, walk or cycle
  - Provide people with equitable and efficient access

[2] MWT assume that 'cease to operate as a draft statutory instrument' means that draft SEPP 66 is defunct and will not operate as a SEPP.

- Minimise dispersed trip-generating development that can only be accessed by cars
- Ensure a network of viable, mixed use centres closely aligned with the public transport system accommodates and creates opportunities for business growth and service delivery
- Protect and maximise community investment in centres, in transport infrastructure and facilities
- Encourage continuing private and public investment ion centres, and ensure that they are well designed, managed and maintained
- Foster growth, competition, innovation and investment confidence in centres, especially in the retail and entertainment sectors, through consistent and responsive decision making

3.5 Bus Reforms and Service Improvement

3.5.1 Basis of reform

NSW embarked on an ambitious reform process for the bus industry in NSW in 2003. A major review of the industry, the Unsworth Review[4], was released by the Government in March 2004, along with a commitment to implement many of the recommendations[5]. This was released against a backdrop of a desire to improve the efficiency and cost-effectiveness of public transport in NSW, with the *Ministerial Inquiry into Sustainable Transport*[6] running at about the same time as the Unsworth Review.

Unsworth made a number of recommendations for fundamental reform of the way bus services are delivered in NSW. Many of these are enabling measures that facilitate and enhance the introduction of 'integrated' networks. The enabling measures include:

- Consolidation of 79 metropolitan contract areas into 15 contract regions, falling to a 8 contract regions by 2012;
- Harmonisation of fares, so that bus users in Sydney pay the same fare for the same distance, whether they use private or public buses;
- A new contract, with a different funding model for services, and removal of territorial set-down and pick-up restrictions;
- Introduction of strategic bus corridors to provide a focus for networks, bus priority and other supporting infrastructure (e.g., shelters at stops).

3.5.2 New service planning – improved services

The objective of these reforms is to support a new approach to bus service planning that would provide an on-going mechanism to ensure that bus services' could respond to the needs of the community and stakeholders (e.g., council), with a focus

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[3] *Improving transport choice, guidelines for planning and development*, DUAP, 2001 and *The right place for business and services – planning policy*, DUAP, 2001

[4] *Review of Bus Services in NSW*, Final Report, released 17 March 2004 – known as the Unsworth Review

[5] *NSW Government's response to the Final Report of the Unsworth Review*, 16 March 2004, sourced from www.transport.nsw.gov.au, June 2006

[6] *Ministerial inquiry into sustainable transport in NSW – A Framework for the Future*, December 2003 – known as the 'Parry Report'

on developing networks that comprised routes focused on regional centres that were direct, fast and frequent. The Bus Service Planning Guidelines[7] set out the new approach to service planning which has an emphasis on achieving integrated networks and incorporate community consultation mechanisms. It also sets minimum service standards, in terms of frequency, span and coverage.

The reforms will also support the introduction of T-card, the NSW Government's integrated fares strategy, which is likely to be introduced over the next few years.

In order to ensure the financial sustainability of bus services, the reforms seek to increase the number of boardings per kilometre of in-service running. This will result in better utilisation of existing resources.

This new service planning process is currently underway in Sydney, with two contract regions, 10 and 13, having just introduced, or about to introduce new bus service networks as at mid-2006.

3.5.3 Implications for St Leonards

The Royal North Shore Hospital site is within Contract Region 7, and is just west of the border with Contract Region 8. Services in both these regions are operated by State Transit. By 2012, the Contract Region boundaries will be amended to further simplify these arrangements. There is also a long distance service from the Hills District (Contract Region 4). The MOT propose that integrated network reviews for Region 8 is undertaken in 2006/07 and for Region 7 in 2007/08[8].

The focus of the integrated bus service networks are and will be the major (regional) centres in this part of Sydney:

- Chatswood
- Macquarie Centre
- CBD
- Brookvale

There is a proposed strategic bus corridor that would run past the RNSH Campus: Corridor 14, between Macquarie Centre and the City via Pacific Highway[9]. As stated above, this would provide a focus for bus priority and other supporting measures; thereby improving the attractiveness of bus services.

It should be noted that the current form of the bus service networks in these contract regions is broadly in line with the recommendations of Unsworth. At this stage MWT do not anticipate that there would be major changes in bus service networks' structure as a consequence of the integrated network reviews. However, the opening of the Lane Cove Tunnel and the Epping to Chatswood Railway (refer below), both have

[7] *Service Planning Guidelines Sydney Contract Regions*, Ministry of Transport, 14 July 2004
[8] Refer to Ministry of Transport website www.transport.nsw.gov.au/busreform/index.html for information on service review schedule

implications for bus services and patterns of public transport demand. Longer term there may be opportunities for incremental bus service extensions – these are explored further in Chapter 5.

3.6 Transport Projects

3.6.1 Lane Cove Tunnel

This road link, running under Epping and Longueville Roads between the Lane Cove River and Gore Hill Freeway, will complete the Sydney Orbital, a high standard motorway route around the metropolitan area. This facility will provide:

- A faster link for bus services into the City via the Gore Hill Freeway, should they choose to use the tunnel. It is possible that some of the longer distance services that currently use the M2 between the Hills Distract and CBD, would use the tunnel in this manner.
- Bus lanes along Epping and Longueville Roads for the length of the tunnel. This is expected to reduce the peak period travel times for current Epping Road bus services and to improve their reliability for the length of the project.

The main implication of this facility for St Leonards is an anticipated improvement in public transport accessibility between the Lower North Shore and the area east of the Main North Rail Line and south of the Lane Cove River. This area includes the North Ryde / Macquarie Park employment area, Macquarie Centre and Macquarie University.

A further element of the project is the introduction of north facing ramps between Falcon Street and Warringah Freeway. This is likely to reduce travel times between St Leonards and Mosman/Manly area. Re-routing bus services so that they used the ramps and freeway would improve public transport accessibility of St Leonards from the Manly/Mosman area; however, such diverted routes would miss serving the existing bus market along Falcon Street and Pacific Highway through Crows Nest.

The Lane Cove Tunnel is likely, according to press reports, to be opened sometime in the second half of the 2006/07 financial year.

3.6.2 Epping to Chatswood Railway

When it opens in mid-2008, this link will permit the re-routing of selected train services from the Main Northern Line at Epping to the North Shore Line at Chatswood; these trains would serve new stations at Macquarie Centre, Macquarie Park and Delhi Road. As part of the works a new station is under construction at Chatswood.

The new line will permit train services to run south along the Main North Rail Line to Epping, then divert to Chatswood and continue south through the CBD and then west to Strathfield and north to terminate at Epping.

[9] Refer to page 169 of the Metropolitan Strategy

The main benefits of this project for St Leonards will be:

- Additional train services through St Leonards Station;
- Direct rail connections between St Leonards and new areas along the new rail line and locations along the Main North Line north of Epping;
- Additional direct connections between the Central Coast and St Leonards;
- Improved indirect connections between St Leonards and stations along the Main North Line south of Epping Station.

These amended services will increase the usefulness of train as a mode for access to St Leonards and, more generally, the Lower North Shore.

3.6.3 Rail Clearways

This is an ongoing program to reduce the rail system's complexity and improve reliability. It comprises a series of small-scale upgrades at critical points of the CityRail network that will provide increased capacity and improve reliability. It will also permit a degree of sectorisation of the rail network into a set of partially isolated operating lines.

The program is managed by TIDC and their website (www.tidc.nsw.gov.au) provides a brief outline of projects. The main projects that are likely to directly improve services at St Leonards are:

- New platform at Berowra Station
- New platform and stabling at Hornsby Station

Other projects will provide benefits for passengers travelling to and from St Leonards, as a result of general system-wide improvements to reliability.

The program is expected to be completed by 2010.

3.7 Developments in the vicinity of RNSH

There is a proposal to redevelop the former ABC site at Gore Hill, which is located on the eastern side of the Pacific Highway, immediately north of the TAFE. In summary the *Traffic and Transport Impact Assessment*[10] prepared for that site describes the proposal as:

- The development would comprise a technology park of approximately 69,000 sqm (gross floor area) on approximately 4.5 hectares.
- A total of 710 car parking spaces would be provided at a rate of 1 space per 100 sqm of GFA, with 26 spaces ear marked for use by a community facility.
- The development site is well-related to existing bus services on the Pacific Highway with a supportive pedestrian circulation system.
- The movement network and site are designed to permit a pedestrian link into the TAFE site (on the southern boundary), should TAFE agree to the link at some stage in the future.

[10] *Gore Hill Technology Park, Traffic and Transport Impact Assessment*, Final Report, December 2005, Parsons Brinckerhoff, on behalf of Gore Hill Technology Park Pty Ltd

4. Existing Conditions

4.1 Public transport services

RNSH Campus is served by rail and bus services.

4.1.1 Rail services

St Leonards Station is 630 metres from the entrance to the Main Building. Rail services through this station run on the North Shore Line, linking to the CBD and Hornsby. There are also direct services between the Central Coast and the CBD; and Hornsby and the Western Line.

Service frequencies are summarised below.

Table 1 Rail service frequencies at St Leonards Station, weekdays

Direction	Time period				
	7-8	8-9	10 -12	16-17	17-18
Southbound	12	15	13	10	12
Northbound	9	12	13	15	13
Total	21	27	26	25	25

Source – CityRail on-line timetables www.cityrail.nsw.gov.au, accessed June 2006

Scheduled services operate between the following times:

Direction	Weekday		Weekend	
	First	Last	First	Last
SB	4.47	23.47 (24.47 on Friday)	4.58	23.43 (24.43 on Saturdays)
NB	4.36	24.37 (1.37 on Friday)	5.29	24.55 (1.18 on Saturdays)

Access to St Leonards Station from the RNSH Campus is currently via three alternative routes:

1. From the Main Building east along Third Street, to Herbert Street, along Herbert Street to the pedestrian overbridge that links directly into the Forum Building, at concourse level for St Leonards Station. This is the most direct access but its character is back-of-house.
2. From the Main Building south along Reserve Road to a walkway about 80 metres north of the Pacific Highway, follow the walkway to Herbert Street and use the pedestrian overbridge to access the Forum Building and station. The

section of this route between Reserve Road and Herbert Street is a pleasant pedestrian environment, remote from traffic, with landscaping and lighting. However, at night this has a sense of isolation.

3. From the Main Building south along Reserve Road to the Pacific Highway, walk along the Pacific Highway to the signal controlled intersection with Herbert Street, then cross to station access from the Pacific Highway.

As part of MWT's Transport Assessment, St Leonards Station was visited during the peak periods. Appendix A provides site notes from the inspection. In summary, the findings of the assessment were:

- Pedestrian access from the station's ticket barriers to the overbridge of Herbert Street is not conspicuously sign-posted and it is not immediately obvious to first time users that this is a useful link to get to RNSH Campus. The link is, however, on one level.
- During peak periods there were transient queues of modest length at the ticket barriers. The configuration of ticket barriers (proportion in/out) was altered during the PM peak to provide additional capacity out, very few patrons observed entering the station at that time (approximately 5.30pm).
- Notwithstanding this, there appears to be a need for additional ticket barriers at St Leonards Station.

4.1.2 Bus services

Scheduled bus services run along the Pacific Highway, forming parts of service networks from several areas:

- Epping Road services – Epping/North Ryde/Denistone to City/North Sydney-Milsons Point/Manly
- Pacific Highway services – Chatswood to Bondi Junction via North Sydney & Chatswood to Manly via St Leonards and Falcon Street
- Hills District to North Sydney/Milsons Point services

The following table summarises the service frequencies of buses that run near RNSH, with route 144, that runs into the site, highlighted.

Table 2 Summary of scheduled bus service frequencies at St Leonards, selected time periods, weekdays

Route	7-8		8-9		10 -12		16-17		17-18	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
E43	0	0	0	2	0	0	0	0	2	0
143	2	4	1	4	4	4	2	2	4	2
144	2	4	6	5	4	4	6	4	5	5
140	0	0	0	1	0	0	1	0	1	0
286	2	0	2	0	1	0	0	1	0	2
287	3	0	3	0	0	0	0	1	0	2
289	0	0	0	0	0	0	0	0	0	0
290	4	2*	5	2	3	2	2	2	2	5
294	0	1	0	3	0	0	0	0	0	0
252	2	1	2	2	4	4	2	2	1	2
253	0	0	0	0	2	2	1	0	0	0
254	1	2	5	3	2	2	2	1	2	2
200	3	3	4	2	4	4	3	3	4	3
612	2	0	5	0	0	0	1	1	1	4
Total	21	15	33	24	24	22	20	17	22	27

*Note: * one of these trips s route 291*

Source: On-line timetables sta.nsw.gov.au and westbus.com.au accessed June 2006

The days and hours of service are tabulated below.

Table 3 Summary of time and days of service at St Leonards

			Weekdays		Saturdays		Sundays	
Route	**From**	**To**	**First Bus**	**Last Bus**	**First Bus**	**Last Bus**	**First Bus**	**Last Bus**
E43	Chatswood	Manly	17:09	17:59	n	n	n	n
E43	Manly	Chatswood	8:16	8:40	n	n	n	n
143	Chatswood	Manly	6:54	18:02	7:49	18:37	9:05	19:15
143	Manly	Chatswood	6:18	20:14	8:46	20:14	7:39	20:14
144	St Leonards	Manly	5:09	0:09	7:05	0:48	7:07	0:09
144	Manly	St Leonards	5:48	23:28	6:19	23:28	6:52	23:28
140	Manly	Epping	8:07	9:18	n	n	n	n
140	Epping	Manly	16:34	17:39	n	n	n	n
286	Epping	York St	6:53	10:47	n	n	n	n
286	York St	Epping	16:39	18:51	n	n	n	n
287	Ryde	Milsons Pt	7:14	8:43	n	n	n	n
287	Milsons Pt	Ryde	16:51	18:24	n	n	n	n
289	Epping	York St	5:41	1:22	6:33	19:33	6:39	6:39
289	York St	Epping	5:47	2:05	5:48	3:35	7:24	8:30
290	Epping	York St	7:07	23:22	8:30	2:22	7:36	23:37
290	York St	Epping	7:51	0:07	6:57	3:35	8:47	22:56
294	Epping	York St	n	n	n	n	n	n
294	York St	Epping	7:46	9:08	n	n	n	n
252	LnCv Wst	York St	6:15	18:00	8:12	17:41	n	n
252	York St	LnCv West	7:37	18:29	9:13	18:44	n	n
253	LnCv Wst	York St	9:39	16:40	7:28	17:27	n	n
253	York St	LnCv Wst	9:11	19:15	7:30	18:59	n	n
254	LnCv Wst	York St	6:38	23:52	5:05	23:52	8:36	22:12
254	York St	LnCv West	5:27	0:37	8:28	12:29	8:12	11:21
200	Bondi Jcn	Chatswood	6:52	19:13	n	n	n	n
200	Chatswood	Bondi Jcn	6:47	18:56	n	n	n	n
612	Kellyville	Milsons Pt	7:14	17:25	n	n	n	n
612	Milsons Pt	Kellyvile	15:49	18:29	n	n	n	n

Source: On-line timetables sta.nsw.gov.au and westbus.com.au accessed June 2006

Route 144, which directly serves RNSH, is consistently the highest frequency service, with the greatest span of operation, running seven days a week, between 5am and midnight during the week and starting between 6am and 7am and running to midnight on weekends. A proportion of 144 trips are wheelchair accessible services.

In addition to these services, STA operate school services within this area and CityRail operate Nightride bus services in the small hours of the morning (between about 11.30pm and 5.30am). There is a bus stop (with glass shelter) for NightRide buses on Herbert Street, immediately north of the Pacific Highway. At other times this bus stop operates as a taxi rank.

Access to the bus services is:

- Route 144, which runs between Chatswood and Manly, accesses the hospital grounds from the Pacific Highway via Reserve Road. Buses use a roundabout to turnaround and serve a single stop, which is located on the east side of Reserve Road approximately 50 metres south of the roundabout and approximately 210 metres from the Main Building's entrance. A shelter with bench seat and bus service information is provided at this bus stop. Of note is that the bus queues with general traffic at the boom-gate controlled access to the site on both the inward and outward movement.
- The other routes have bus stops on Pacific Highway either side of Reserve Road (south of the site) and near signal controlled pedestrian crossing of the Pacific Highway, north of Westbourne Street (west of the site). The closest bus stop pair would depend upon the passenger's precise destination within the site. Both sets of bus stops are within the same section, therefore no fare saving would accrue from selecting one stop pair over the other.

4.1.3 Pedestrians and cycles

Because of the significant number of pedestrian movements between St Leonards Station and RNSH and TAFE, Reserve Road functions as a main pedestrian travel route. To assist these movements three zebra crossings have been provided along Reserve Road between Pacific Highway and the main hospital building. The car parking ticket booth along Reserve Road also helps by slowing and creating gaps in the traffic and enables pedestrians to cross.

The dispersed nature of the buildings along the eastern boundary of the site affords permeability that enables pedestrian access. However, there is not a strong formal pedestrian route (as noted above in the discussion regarding station access routes).

Signalised pedestrian crossings are provided at the Pacific Highway intersections with Reserve Road and Herbert Street, providing a safe crossing to the station, bus stops and local shops.

A pedestrian overbridge of Herbert Street is an alternative route to/from the station. The overbridge has weather protection, lighting, CCTV and a lift at the western end (as well as stairs). Its eastern end is connected directly into The Forum, which contains St Leonards Station, on the same level. The overbridge's western end does not relate well to the pedestrian access network to RNSH Campus.

Walking tracks are provided around the Oval and through the Gore Hill Cemetery, as alternative routes to Pacific Highway.

The closest bicycle path is an on-road cyclepath provided along Atchison Street between St Leonards Station and Crows Nest which feeds to/from West Street. Other cycling routes in the area are located almost parallel with the Gore Hill Freeway and along Greenwich Road.

4.2 Census-based journey to work travel patterns for St Leonards

The RNHS Health Campus is located in travel zone[11] 776. This zone covers the area between the railway line and Pacific Highway as far north as Dickson Street in Artarmon. There are three other zones in St Leonards. This section provides an analysis of the commuter patterns to and from each of these zones.

Table 4 shows the number of commuter trips from St Leonards (i.e., employed persons who live in St Leonards and work somewhere within Sydney).

Table 4 Commuter origins from St Leonards area, by zone, 2001 (trips)

Zone	Train	Bus	Car Driver	Car Pax	Other	Not Travelled	Total
St Leonards/ Crows Nest (58)	167	124	234	17	173	64	779
St Leonards/ Greenwich (492)	407	67	849	74	289	352	2,038
RNSH plus (776)	158	11	157	10	66	90	492
Chandos St (777)	443	119	499	69	269	160	1,559
Total	1,175	321	1,739	170	797	666	4,868

Table 5 shows the mode share of those persons who travelled on Census Day.

Table 5 Commuter origins from St Leonards area, by zone, 2001 (mode share %)

Zone	Train	Bus	Car Driver	Car Pax	Other	Total
St Leonards/ Crows Nest (58)	23.4%	17.3%	32.7%	2.4%	24.2%	100.0%
St Leonards/ Greenwich (492)	24.1%	4.0%	50.4%	4.4%	17.1%	100.0%
RNSH plus (776)	39.3%	2.7%	39.1%	2.5%	16.4%	100.0%
Chandos St (777)	31.7%	8.5%	35.7%	4.9%	19.2%	100.0%
Total	28.0%	7.6%	41.4%	4.0%	19.0%	100.0%

Commuters who live in St Leonards have a transit mode share of 35.6%, which is substantially above the Sydney-wide average for 2001 of 22%. They also have a high use of other mode, which is primarily walking and cycling, when compared with the Sydney-wide average of 11%.

[11] Transport and Population Data Centre in the NSW Department of Planning has developed a travel zone system to permit modeling of population and transport within Sydney. There are approximately 800 zones in Sydney.

For commuters who work in St Leonards, the number of trips by mode are summarised in Table 6.

Table 6 Commuter destinations in St Leonards area, by zone, 2001 (trips)

Zone	Train	Bus	Car Driver	Car Pax	Other	Not Travelled	Total
St Leonards/ Crows Nest (58)	1,523	406	3,009	290	505	546	6,279
St Leonards/ Greenwich (492)	1,797	356	3,484	259	468	1,066	7,430
RNSH plus (776)	1,890	385	5,913	420	618	994	10,220
Chandos St (777)	1,210	217	1,694	129	234	277	3,761
Total	6,420	1,364	14,100	1,098	1,825	2,883	27,690

Commuters who work in St Leonards had the following mode share.

Table 7 Commuter destinations in St Leonards area, by zone, 2001 (mode share %)

Zone	Train	Bus	Car Driver	Car Pax	Other	Total
St Leonards/ Crows Nest (58)	26.6%	7.1%	52.5%	5.1%	8.8%	100.0%
St Leonards/ Greenwich (492)	28.2%	5.6%	54.7%	4.1%	7.4%	100.0%
RNSH plus (776)	20.5%	4.2%	64.1%	4.6%	6.7%	100.0%
Chandos St (777)	34.7%	6.2%	48.6%	3.7%	6.7%	100.0%
Total	25.9%	5.5%	56.8%	4.4%	7.4%	100.0%

The average mode share to transit of people who work in St Leonards is 31%. This is relatively high by Sydney standards, with a Sydney-wide mode share 22% to transit[12].

Table 8 compares the structure of the commuter travel market to a number of other employment centres in Sydney, including Liverpool and Westmead, which both contain major health campuses.

Table 8 Comparison of commuter mode shares to selected employment centres in Sydney

Centre	Train	Bus	Car Driver	Car Passenger	Other	Total
Bondi Junction	23%	16%	44%	5%	12%	100%
Burwood	24%	4%	58%	7%	7%	100%
Chatswood	32%	7%	48%	5%	8%	100%
Hornsby	19%	1%	62%	8%	10%	100%
Hurstville	15%	4%	66%	8%	8%	100%
Liverpool	9%	4%	73%	8%	5%	100%
Macquarie Park	4%	5%	80%	6%	5%	100%
North Sydney	44%	9%	33%	4%	9%	100%
Parramatta	27%	5%	54%	8%	6%	100%
Rhodes	13%	1%	78%	5%	3%	100%
St Leonards	**26%**	**5%**	**57%**	**4%**	**7%**	**100%**
Westmead	10%	1%	76%	6%	6%	100%
Total	24%	6%	57%	6%	7%	100%

[12] For contextual analysis of 2001 journey to work data, refer to, *An Exploration of Mode Choice in Sydney Using Journey to Work Data*, presented at the 28th Australasian Transportation Research Forum, Sydney, 2005

The market analysis in Table 8 demonstrates that St Leonards is a relatively attractive location for workers to access by transit, achieving a train mode share that is superior to all selected centres, apart from Chatswood, Parramatta and North Sydney. The overall transit mode share for workers in St Leonards (31%) is well above that at other centres with major health campuses, such as Liverpool (13%) and Westmead (11%).

Comparison of JTW data for 1996 and 2001 indicates that the use of non-car modes increased faster than the growth in the number of workers who live in St Leonards, and faster than the number of workers who work in St Leonards. This 'incremental' mode share, or marginal attractiveness of transit, is summarised in Table 9 for commuters living at St Leonards and for workers with jobs in St Leonards.

Table 9 Mode shares of marginal journey to work trips out and into St Leonards

Measure	Workers resident in St Leonards		Workers with jobs in St Leonards	
	Change (96 to 01)	Share of change	Change (96 to 01)	Share of change
Incremental commuters - all	1,097		2,527	
Incremental commuters – travelled	1,005		2,009	
Train	460	46%	1,138	57%
Bus	21	2%	9	0%
Car	250	25%	312	16%
Other	274	27%	550	27%

The transit mode share of 48% for incremental workers living in St Leonards is more than twice the Sydney average transit mode share and their car mode share, at 25%, was a third of the Sydney-wide average. This indicates that the relative attractiveness of transit increased between the two census years of 1996 and 2001. For workers in St Leonards, the incremental transit mode share was more than two and a half times the Sydney average (at 57%), and the mode share to car was a quarter of the Sydney-wide average.

Summary

This analysis indicates that:

- Transit is an attractive method for commuters to get to work in St Leonards
- Transit is also an attractive method for residents of St Leonards to use to get to work
- For residents of St Leonards there is a high rate of use of other modes (mainly walking and cycling) to get to work, this indicates relatively low car generation and relatively high self-containment
- The relative attractiveness of transit as a mode has increased since the previous census in 1996 and the relative attractiveness of car as a mode has declined

4.3 Site accessibility

Site accessibility on foot and by bus and by train was analysed using isochrones and also a combined index measure of public transport accessibility.

Isochrones

The isochrone analysis provides an indication of the relative 'footprint' of these non-car modes serving St Leonards. The 'footprint' shows the activities, facilities and areas that can be reached from the RNSH site within specific door-to-door travel times. It also permits potential changes to walk networks and transit services to be assessed in a graphical manner.

Travel time isochrones for the AM Peak used the following process and assumptions:

- Walk isochrones are based on walk speed of 80 metres per minute, and follow available pedestrian pathways and accessible open space. They are not crow-fly distances (refer to Figure 2).
- Bus isochrones are based on walk distance to nearest bus route, plus a wait time of half the service headway, and then in-vehicle time based on published timetables. Wait times are capped at an average of 6 minutes to reflect passengers' timing their trips to match service timetables, as far as is practical. Bus service groups are bundled by corridor to provide combined service frequencies, for sections of corridors where this is applicable. The isochrones represent accessibility by direct services, without service changes or modal interchange. Walk distances to access bus routes are capped at 400 metres for the trip end away from RNSH (refer to Figure 3).
- Rail isochrones use a similar approach to bus, with walk distances capped at 800 metres from stations (refer to Figure 4).

These analyses show the reach of rail in providing accessibility to large parts of the hospital's catchment. The importance of bus is to in-fill parts of the Hospital's catchment not served by the rail system, and to support those areas between rail stations. Of note is the pedestrian catchment, which contains a broad range of facilities and activity opportunities, including St Leonards Station.

Combined public transport accessibility index – Hammersmith and Fulham PTAL

A single index measure of combined public transport accessibility for the site is provided by the Hammersmith and Fulham PTAL method. This provides a measure of public transport network density at a specific location at a specific time. This permits comparison of relative levels of public transport accessibility to the site at different times of the day, or with amended walk distances to bus stops of stations. Appendix B provides further information on the method and calculations for RNSH.

The following table summarises the public transport accessibility index for the site during the AM peak, midday and PM peak.

Table 10 Existing public transport index by time of day, Main Building Entrance, weekday

	Period		
	AM Peak	**Inter-peak**	**PM Peak**
Existing	12.5	9.8	11.4

Source: Appendix B

By way of comparison, the following locations have:

- Sydney Fish Market – Main Retail Arcade 11.1 in AM peak and 12.6 during the day[13]
- Norwest at corner of Solent Circuit and Inglewood Place – 1.7 in AM peak[14]

4.4 Road System

This section summarises the description provided in MWT's *Transport Assessment*.

The RNSH Campus is bounded by Westbourne Street to the north, Pacific Highway to the south, Herbert Street to the east and Reserve Road to the west. Direct access to the main hospital building and the Emergency Department is provided from Pacific Highway via Reserve Road and access to the multi-storey car park is provided from Reserve Road and Westbourne Street. The Gore Hill Oval, Gore Hill Cemetery and TAFE are all located adjacent to the hospital.

The Pacific Highway is a busy arterial route that connects St Leonards with North Sydney and Epping and also provides access to the Warringah Freeway at Gore Hill and Falcon Street. Limited access to the freeway is provided via Herbert Street, which also links St Leonards and Artarmon. Westbourne Street currently dead ends at Reserve Road, therefore only provides access to the Private Hospital, the multi-storey car park and TAFE. Reserve Road dead ends at Westbourne Street and provides access to surface car parking lots north of the Oval, dispersed hospital buildings in the eastern section of the site, the and the main hospital building. It also functions as the access route for buses to the front door of the hospital.

4.5 Royal North Shore Hospital

The reader is referred to MWT's *Transport Assessment* for more complete details.

4.5.1 Activity and Trip Generation

RNSH's transport task is diverse, with many travel segments by purpose, as well as a range of modes; each have specific characteristics and needs.

Major categories of site visitors are:

- Patients
  - In-patients, staying at the hospital
  - Day surgery arriving and departing on the one day, but generally staying for more than a few hours
  - Casualty/emergency patients
  - Out-patients clinics, generally of shorter duration stay on a single day
  - Other medical services, such as diagnostic, with similar travel characteristics as out-patients clinics
- Staff
  - clinical

[13] *Sydney Fish Market Final Draft TMAP*, SHFA, March 2003

    - temporary clinical staff (e.g., agency nurses)
    - research
    - administrative
    - support staff including cleaners, kitchen staff, security
    - students and educators
- Visitors
    - Patient support – stay with patient for extended periods including overnight
    - Casual visitors – stay for short periods
- Servicing
    - Deliveries of supplies, food, medical/therapeutic products, blood
    - Refuse collection

Transport-related characteristics of site users include:

- Urgency of access
- Time profile of access/egress – shift work, 24 hour operation
- Party size
- Mobility
- Baggage and medical needs (e.g., oxygen, diagnostic/therapeutic equipment)

The above types of hospital user and characteristics influence the likely modes that would be appropriate. The following modes are available or supported at RNSH:

- Ambulance and helicopter for emergency patient transport and for transfer of acutely sick patients
- Patient transport for routine movement of patients
- Service vehicles – motorcycles, cars, light commercial through to larger rigid vehicles for refuse collection
- Car
- Taxi
- Bus
- Train
- Bicycle
- Foot

Other features of activity at the site:

- Links with Faculty of Medicine at Sydney University (the Northern Clinical School of University of Sydney is centred on RNSH). This results in a variety of casual and on-going interactions between this campus and other health campuses within Sydney.
- Staff canteen on site and two cafes also on-site, providing ancillary facilities for site users.
- Relatives of patients can arrange accommodation on campus at Rotary Lodge – suited to long term stay patients from rural areas.

[14] Based on www.westbus.com.au timetables for rts 613, 614, 706 and 715 and www.131500.info for bus stop locations

4.5.2 *Trip generation*

Traffic counts conducted at intersections accessing the hospital show that the hospital currently generates approximately 1030 vehicle trips in and 330 trips out in the AM peak and 525 trips in and 935 trips out in the PM peak. The site is thus a substantial generator of traffic.

4.5.3 *Mode Split*

A travel survey was conducted in May 2005 of staff of RNSH. The TEF report stated that the response equated to approximately 33% of peak staff accumulation during the day, which is about 2,323 people. The survey found that a clear majority of staff arrived by car, most driving themselves. The Visiting Medical Officers, doctors and nurses are most likely to drive and cleaning and administration staff least likely to drive. The train was the next most popular form of mode followed by the bus. The results are summarised in Table 11.

Table 11 Mode Split of RNSH Staff

	Car Driver	Car Pass	Dropped Off	Other	Bus	Train	Walk	Bicycle/ Motorcycle
Doctors	79%	2%	0%	0%	1%	10%	6%	2%
Admin	60%	1%	2%	0%	8%	26%	2%	0%
Catering	75%	5%	5%	0%	7%	2%	7%	0%
Other	80%	10%	10%	0%	0%	0%	0%	0%
VMO	100%	0%	0%	0%	0%	0%	0%	0%
Nursing	85%	1%	2%	0%	2%	5%	5%	1%
Cleaning	42%	17%	0%	0%	8%	33%	0%	0%
Allied Health	76%	2%	1%	1%	3%	15%	2%	0%
NAHS	79%	0%	0%	0%	7%	10%	5%	0%
Community Health	100%	0%	0%	0%	0%	0%	0%	0%

Source: TEF Consulting (2005)

4.5.4 *Parking*

The total parking provision at RNSH is about 2,410 spaces. The main car park is the multi-storey car park located off Reserve Road, north of Westbourne Street, and this provides about 1,500 spaces. The remaining spaces are located in several small surface car parking areas dispersed throughout the campus. These include 267 staff designated spaces, 598 for patients/visitors, 34 disabled parking spaces and 9 ambulance bays.

The scale of charges are levied for car parking for casual users, hospital users and concession card holders are summarised in Table 12.

Table 12 Published scale of existing parking charges, RNSH

Duration of stay	Casual Users	Concession card holders
Up to 15 mins	Free	free
15 mins to 1 hour	$4.50	$4.50
1 hour to 2 hours	$7.00	$4.50
2 hours to 3 hour	$9.00	$4.50
3 hours to 4 hours	$11.50	$4.50
4 hours to 10 hours	$22.00	$4.50
10 hours to 24 hours	$30.00	$4.50

Source: charge scale displayed at boomgate, June 2006

It is understood that hospital staff pay for parking at $2.40 per day for pre-arranged parking with payment deducted from salary. The casual staff rate is $3.50 per day.

Since the commencement of this study, new car park access arrangements have been implemented and parking charges have been reviewed. This has resulted in the causal staff rate increasing from $3.50 per day to $4.20 per day. Other rates increase by around 11%.

On-street parking is available on Pacific Highway between Herbert Street and Westbourne Street. On the eastern side of the highway parking is available after 10 am, when the clearway/T3 ceases to operate. The parking is pay and display with a maximum of 4 hours. On the west side of the highway, parking operates for a mix of hours (some are 1 hour) up to 3pm when the outbound clearway / T3 commences operation.

4.6 Existing Traffic Operations

The details of existing traffic operations are in MWT's *Transport Assessment*, this section summarises the findings of that analysis.

The intersections surrounding the site were analysed using the SCATES intersection analysis program, in accordance with normal RTA traffic analysis requirements. SCATES determines the average delay encountered by vehicles and the level of service. These analytical results can be compared to the performance criteria set out in Table 13. The analysis results are presented in Table 14.

Table 13 Level of Service Criteria

Level of Service	Average Delay per Vehicle (secs/veh)	Signals & Roundabouts	Give Way & Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & Spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	> 70	Extra capacity required	Extreme delay, traffic signals or other major treatment required

Adapted from RTA Guide to Traffic Generating Developments, 1993.

Table 14 Intersection Operations

Intersection	Intersection Control	AM Peak LOS	AM Peak Delay (secs/veh)	PM Peak LOS	PM Peak Delay (secs/veh)
Pacific Hwy/Christie St	Signalised	B	16.0	A	12.0
Pacific Hwy/Herbert St	Signalised	A	13.0	B	16.0
Pacific Hwy/Reserve Rd	Signalised	A	13.0	A	6.0
Pacific Hwy /Greenwich Rd	Signalised	F	>120.0	D	44.0
Pacific Hwy/ Westbourne Ave	Signalised	A	3.0	A	5.0
Pacific Hwy/ Campbell St	Signalised	A	2.0	A	4.0

Note: At signalised intersections delay is calculated as the average for the intersection.
Source: MWT Transport Assessment.

5. Future Transport Situation

5.1 Background

As noted in Chapter 3, a number of projects and policy processes will influence transport outcomes at St Leonards. This chapter classifies them as short/medium and long term changes and their likely effects are discussed below. The improvements identified in this chapter are irrespective of the RNSH Concept Plan, although additional activity at the RNSH Campus would derive greater community benefit from these proposals.

5.2 Short to medium term changes to transport and land use

Lane Cove Tunnel

The Lane Cove Tunnel project will improve access to St Leonards by completing the Sydney Orbital route. These improvements in access include:

- North facing ramps between Falcon Street and Warringah Freeway
- Reduced traffic volumes on the surface route through Lane Cove
- Bus priority measures along Epping Road/Longueville Road, which will provide small travel time advantages for buses, and a degree of protection from traffic congestion
- Bus priority measures along Pacific Highway between Longueville Road and North Sydney, which will also provide small travel time advantages for buses and a degree of protection from traffic congestion

Epping to Chatswood Railway

The Epping to Chatswood Railway (ECR) will provide direct rail access from the Main North Line at Epping to the city via Chatswood and St Leonards. This will include:

- Improved rail access between St Leonards and the North Ryde area, as well as from sections of the Main North Line either side of Epping Station.
- The new rail line is likely to increase the number of rail services through St Leonards to approximately 20 per hour per direction during the peak[15] and additional service at other times.
- The broader benefits of the Epping to Chatswood Rail line include substantial improvements to public transport access to the major North Ryde employment

[15] Discussion with RailCorp, June 2006

area from the broader Sydney area. This will increase the proportion of workers in that area using public transport, rather than car, to get to work. Operational advantages of the ECR will apparently permit additional services to access the CBD from the west in the morning peak. This will further enhance the attractiveness of rail as an access mode to the Lower North Shore, including St Leonards and Chatswood.

Significantly, this rail link would provide direct rail access between high technology businesses in North Ryde/Macquarie Park and the RNSH site, as well as the rest of St Leonards. There are a number of bio-medical and pharmaceutical firms located in the North Ryde / Macquarie Park area, and if they have links with RNSH-related activities at present, then rail link may capture some of this travel. It may also result in re-alignment of use/activities to take advantage of this direct access.

A further advantage of higher service frequencies at St Leonards Station will be a more even spread of exits from the station during the peak, which should reduce the transient queues due to demand surges observed at the ticket barrier. All else being equal, this may reduce the average passenger delay on station exit.

A site visit to St Leonards Station (refer to Appendix A) indicated that there was physical scope to provide additional ticket barriers, should RailCorp identify a need for them.

The likely form of the bus service network, once ECR opens, is unknown; options and their influence on bus accessibility at St Leonards are discussed in Section 5.4.

Rail Clearways

Rail Clearways will improve reliability and provide additional rail network capacity to permit increases in service frequency. This is likely to enhance the accessibility provided by rail across the Metropolitan area.

Integrated ticketing

The NSW Government has been developing a system of integrated ticketing for several years. It is currently being trialled for specific groups in Sydney (school travel T-Pass). Its introduction in the next few years is likely to simplify and improve the efficiency of fare payment.

Bus Reform

Bus reforms will permit the development of bus networks that better serve passenger needs. In the short term this will be through:

- removal of set-down and pick-up restrictions, through the implementation of neighbouring operator agreements between affected operators. For St Leonards, this might permit additional pick-up and set-down by Westbus's route 612.
- introduction of consistent fares across all of Sydney's bus operators. This ought to encourage increased use of bus services from the Hills District as a result of

reduced fares. This would increase the attractiveness of the direct bus service to St Leonards, or via a service change to a State Transit bus service at Longueville Road, Lane Cove.

The proposed strategic bus corridor along the Pacific Highway will provide bus priority, increasing average speeds and reliability. The strategic corridor will also provide upgraded roadside furniture to improve service legibility and passenger information and comfort. The timing of this is unclear, but it is expected to build on the bus priority measures along the Pacific Highway to be provided as part of the Lane Cove Tunnel.

Improved buses

As the bus fleet is progressively turned over, the proportion of fully accessible, wheelchair-capable trips will increase.

Cycle network improvements

North Sydney Council proposes an on-road cyclepath on Oxley Street that will connect with the Atchison Street path.

Development of former ABC Site

The proposed redevelopment of the bulk of the former ABC site presents an opportunity to extend the pedestrian movement network parallel to the Pacific Highway. Given the planning controls on the site, which restrict uses to high technology (including biomedical), there is the potential for some of the site occupiers to be related either directly, or indirectly, with the RNSH site. This could lead to containment of travel, by virtue of the two sites' close proximity and likely complementary activities.

5.3 Long term changes

Long term rail projects

The major potential improvement to transport in the long term would be through the construction of the North West, South West and CBD Harbour Rail Links. These would improve rail accessibility in general.

Given the preliminary stage of planning for all three projects, and their long term horizon, it is not appropriate to consider the potential detailed benefit that the projects offer. What they do indicate, especially for places like St Leonards, is that there will be likely to be improvements to rail accessibility, linking with the rest of Sydney. As such, potential improvements from these particular, or similar, projects can reasonably be expected to materialise within a long term planning horizon.

Bus reform and service planning

The main benefit of this process is likely to be ongoing improvements to the utility of services through implementation of revised service networks using the new service planning process. Additional patronage generated by such changes could result in improvements to scheduled service frequency, especially along strategic bus

corridors. The benefits from this process will take several years to come through and then, because of the process's design, it is expected that incremental improvements will be on-going, as resources are deployed to better meet demands.

In addition to the service planning process, the new contracting and funding regime contains provisions to provide bonuses to operators who meet superior levels of service, and provide scope to introduce competitive tendering of services within contract regions in the future.

There is potential for longer term adjustment to service networks, to take advantage of new contract arrangements and revised contract region boundaries. The accessibility analysis in Chapter 4 identified that there is no direct bus service between St Leonards and the north eastern part of its catchment. Currently, people wishing to use transit to access St Leonards from areas such as Roseville Chase, Forestville, Beacon Hill and Brookvale, have options such as:

- Bus service along Warringah Road corridor to Chatswood and mode change to rail to St Leonards or service change to bus route 144 to St Leonards.
- Bus service to Military Road corridor and service change to bus route 144 to St Leonards.
- Bus service to North Sydney and train to St Leonards.

To improve accessibility from this part of the catchement, an approach would be to identify a Warringah Road service(s) that currently terminates at Chatswood and consider extending it from Chatswood along the Pacific Highway strategic bus corridor. This incremental extension would improve the attractiveness of transit as an access mode to St Leonards. For such a change to be considered by the operator and bus service regulator, the incremental extension would need to achieve the target of approximately 3 boardings per route kilometre[16].

5.4 Epping to Chatswood Railway – accessibility effects

Direct rail accessibility effects

Rail isochrones for the amended rail network were prepared on the same basis as those presented in Chapter 4. This analysis (refer to Figure 5) demonstrates the improved rail accessibility provided by the ECR to St Leonards. It should be noted that this analysis is for rail with walk-in access, capped at 800m walk (i.e., no kiss and ride, park and ride or bus access).

Comparing this figure with the bus isochrones in Figure 4, indicates that a number of patrons would be better off walking to the new train stations and taking a direct train to St Leonards.

[16] There is precedent for long 'super-routes', including route 400 between Burwood and Bondi Junction and route 545 between Chatswood and Parramatta (which runs through an Unsworth Regional Centre at Macquarie) – nonetheless a strong case would be required to justify any such extension.

The same findings of improved transit accessibility apply, to varying degrees, to other centres along the North Shore Rail Line, including Chatswood. This improved rail accessibility is expected to be beneficial in terms of reduced car use within the corridor. As a result of the mix of employment and population along the corridor, this benefit will be for both inbound and outbound travel in both peaks.

Implications for bus service network configuration

Amendments to the bus service network along Epping Road in response to the ECR could take a number of different forms. MWT selected two potential approaches to network adjustment to assess how they would influence accessibility to St Leonards. These are:

- rail-feed, which would see the current integrated network re-configured to a series of routes that fed to rail stations – this would have poor compliance with service planning principles; or
- integrated network (status quo)[17], which accords well with service planning principles.

In order to provide an illustration of the likely effect on current transit users travelling to St Leonards of these two approaches, analysis of selected bus and bus-rail trips compares accessibility.

The following five locations were selected for this illustrative analysis, served by different bus routes, with different distance from ECR stations:

- Point A – Herring Rd near Bridge Rd
- Point B – Kent Rd near Ruse St
- Point C – Coxs Rd near Blamey St
- Point D – Lane Cove Rd near Tunks St
- Point E – Blenhiem Rd near Morshead St
- Point F – Epping Rd near Vimiera Rd

Trip structures were developed with AM peak hour times for each component of the journey estimated from timetable information and walk distances. Two types of times were used:

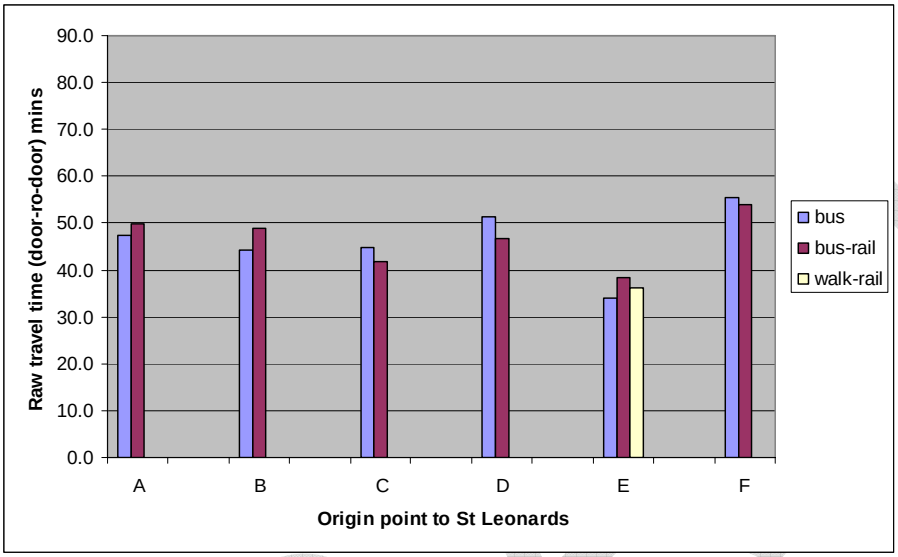
- **Door-to-door travel time** which treat all minutes as equal, and disregard modal interchange penalties. This is an objective measure of time.
- **Generalised or perceived time** which applies a penalty weight to waiting time, access time and egress time. A weight of 1.75 was applied, although 2 could also be used. An interchange penalty of 12 minutes was applied to each modal interchange. A mode specific constant of -2 minutes was applied to rail versus bus. Perceived time is a measure of time that best reflects travel behaviour, such as mode choice.

[17] It should be noted that most of the current Epping Road bus services do feed to the proposed ECR stations at Macquarie University, Macquarie Park and (near) Delhi Road. So even under the integrated service network outcome (i.e., status quo), bus-rail travel would also be facilitated.

Disaggregate data and calculations are set out in Appendix C. No travel time benefits from the Lane Cove Tunnel project or the strategic bus corridor on the Pacific Highway were included. These would have the potential to reduce bus travel times by about 3 to 5 minutes[18].

The results of the analysis are summarised in Chart 1 for raw door-to-door travel times.

Chart 1 Comparison of raw door-to-door travel times by origin and modal combination

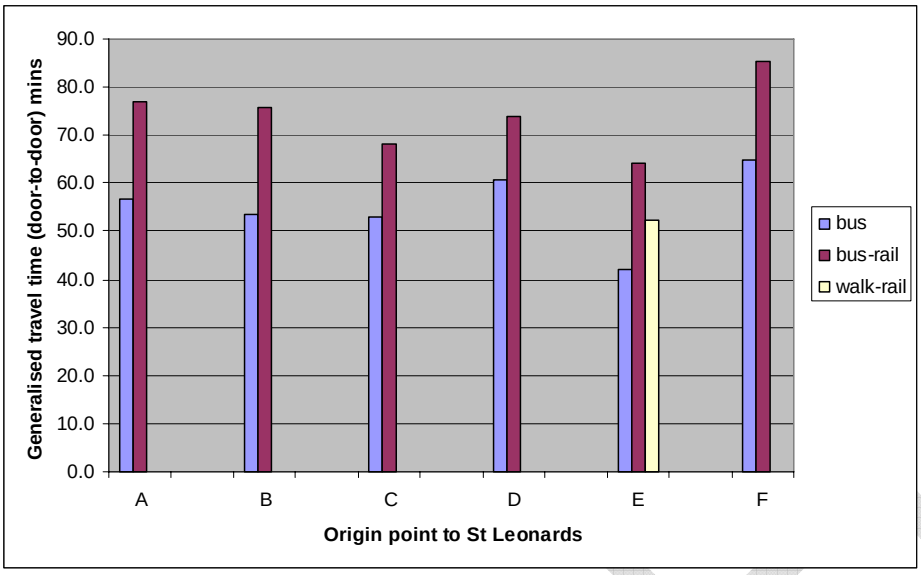


The raw time indicates little difference between current bus and potential bus-rail or walk-rail. Points A, B and E are all quicker by direct bus, whereas points C, D and F are quicker by rail-bus.

When penalty weights, interchange penalties and mode specific constants are included in the travel time to account for behaviour (refer to Chart 2), direct bus is the fastest option in each case, by between 13 and 22 minutes. For point E, walking to the station to take the train is faster than taking a rail-feed bus to the station; both of these methods are slower than taking a direct bus (by 22 and 10 minutes, respectively).

[18] Lane Cove Tunnel EIS, Traffic and Transport Working Paper, Table 8.24 for travel by bus between Pittwater Road/Epping Road and Hotham Road/Pacific Highway.

Chart 2 Comparison of generalised travel time by origin and mode combination



Summary

This analysis indicates that:

- a proportion of existing transit users (bus) from the Epping Road catchment, who live close to proposed rail stations, would be likely to walk to train and travel directly to St Leonards.
- others, who live further from the stations and close to direct bus routes would be likely to stay with integrated/direct bus services because they offer the lowest generalised time to St Leonards. Should the bus services be re-configured so as to provide rail-feed services, then existing transit accessibility in these locations would be reduced.

Consequently, it is recommended that RNSH take a direct interest in bus service planning processes for Contract Region 7, which are due to occur in 2007/06. Draft bus networks developed for community consultation, when available, ought to be reviewed to ensure that they maintain transit accessibility to St Leonards.

5.5 Future PTAL Analysis

5.5.1 Short/Medium Term

The public transport accessibility index for the existing RNSH was re-calculated using the higher rail service frequencies to be provided at St Leonards as a result of the ECR. Peak frequencies increased to 20 per hour per direction and off-peak frequencies increased by a similar proportion (9 per hour per direction).

The resulting public transport accessibility indices, by time of day are compared with the current situation in Table 15. All other transit services were assumed to remain unchanged.

Table 15 Comparison of future (short/medium term) and existing public transport index by time of day, Main Building Entrance, weekday

	Period		
	AM Peak	**Inter-peak**	**PM Peak**
Existing	12.5	9.8	11.4
Future (short/medium)	12.7	10.0	11.6

Source: Appendix B

The increase in rail service frequency at St Leonards Station results in s light increase in the public transport accessibility index in all time periods.

5.5.2 Longer term

Should the long term rail projects proceed, then further rail services through St Leonards would be provided (over the 40 trains per hour identified above). These projects would be completed sometime around 2017. A potential configuration might encompass:

- Four tracks between St Leonards and Chatswood
- Two new platforms at St Leonards, probably under the two current platforms

In order to gain an appreciation of the potential effect on the public transport access index for the current RNSH site, the analysis was re-calculated using a frequency of 30 trains per hour per direction in the peak period and similar proportional increase in the off-peak frequency (13 per hour per direction). These are illustrative assumptions developed by MWT and do not necessarily reflect potential rail plans.

Table 16 shows this additional rail service frequency would increase the public transport accessibility index slightly.

Table 16 Comparison of future (short/medium and long term) and existing public transport index by time of day, Main Building Entrance, weekday

	Period		
	AM Peak	**Inter-peak**	**PM Peak**
Existing	12.5	9.8	11.4
Future (short/medium)	12.7	10.0	11.6
Future (long term)	12.8	10.2	11.7

Source: Appendix B

5.6 Summary

The future public transport accessibility conditions at St Leonards will be superior to the existing conditions. In the short to medium term this will be the result of:

- New rail link between Chatswood and Epping
- More reliable and higher capacity rail system due to Rail Clearways
- Bus priority measures to improve running times and reliability on strategic bus corridors, including Epping Road and Pacific Highway
- More useful and attractive bus networks through the new bus regulatory regime, including a new approach to bus service planning, fares harmonisation and contracting arrangements

- Extended cyclepath network

It is recommended that RNSH monitors bus network plans developed as part of ongoing network reviews to ensure that the amended networks would not reduce the site's overall accessibility. In particular, the opening of the ECR in 2008 might be accompanied by a re-worked bus network plan. The analysis in this chapter indicates that there is the potential for reduced accessibility, should the current integrated bus network be re-configured as a rail-feed network.

There are a number of longer term initiatives and processes, some of which are still being formed, others of which are in place, which will further improve transit accessibility at St Leonards. These include:

- On-going improvements to bus networks
- Potential for route extensions, depending upon demand and reliability improvements from strategic bus corridors
- Additional extensions of the CityRail network, due to three new rail links (North West, South West and CBD Harbour Link

This analysis indicates that St Leonards will become more accessible by transit and more important as a specialised centre, as identified in the Metropolitan Strategy and its transport outcomes are likely to show higher use of non-car modes.

6. Analysis of Concept Plan

6.1 Description of Proposed Concept Plan

The proposed Concept Plan is shown in Figure 6. This general description is taken from MWT's *Transport Assessment*. More detail on traffic management and proposed road hierarchy under the Concept Plan can be found in that report. Subsequent sections of this current chapter analyse specific features of the Concept Plan.

The Concept Plan involves consolidation of activities from the dispersed hospital buildings south of Westbourne Street, into a new main hospital building straddling Westbourne Street north of Gore Hill Oval. This new building will replace the current main hospital building which will be reused for other activities, including possible aged care or hospital related commercial facilities.

A grid shaped system of new roads is proposed to open up the site and make it more permeable to traffic and pedestrians.

New blocks so created would be used for the development of a mix of commercial and residential buildings with an emphasis on medical related uses.

The new grid system would allow direct vehicular access to each new block but would be managed in such a way to avoid heavy through traffic through the middle of the site with any such traffic to be confined to the periphery.

The plan envisages Reserve Road and Westbourne Street being re-opened.

A more direct pedestrian connection through the campus is proposed between St Leonards Station and the TAFE site past a local shopping/activity precinct, and the new hospital building.

The future campus is proposed to be divided into 8 development blocks. For the purposes of this assessment the development schedule assumed is provided in Table 17.

Table 17 Indicative development schedule

Site	Residential (No. of Units)	Commercial (Floor Area sqm)	Retail (Floor Area sqm)
1*		20,000	
3		2,000	1,000
4	150	35,000	3,000
5		19,000	1,000
6**	150	23,500	450
7	700		
8***		28,200	
Total	**1,000**	**127,700**	**5,450**

*Notes: *Site 1 incorporates the new hospital building. This will accommodate the hospital activities currently spread throughout the site.*

**Site 6 will incorporate about 4,000m^2 of community health space that is already on the site.

***About two thirds of this space will be for education and research activities that are presently on the site.

6.2 New Main Hospital Building access conditions

Location and walk connections

The new main hospital building will be located closer to St Leonards Station than the current Main Building. In addition, a number of entrances for the building are proposed, including an entrance on the south side of the building, close to its eastern edge. This entrance would provide a better defined address for people arriving by bus or train or walking to the site.

The access paths between the New Main Building and St Leonards Station would be:

- More direct than the current circuitous access routes
- More legible than the current arrangement
- Of high quality urban design
- Would link to the existing Herbert Street pedestrian overbridge at the same grade as the bridge deck via development site #4
- The land use mix in development sites #3 and #4, through which the link would predominantly run, were developed to provide pedestrians with activated frontages that would provide visual interest, useful facilities and passive surveillance

Improved walk-in catchment

The effect of these improvements is better access to St Leonards Station, and a more extensive pedestrian walk in catchment, especially to the east. Figure 7 shows the resultant pedestrian isochrones, superimposed on the existing pedestrian isochrones from the current Main Building. This identifies that a greater proportion of the employment and high density floorspace within St Leonards would now be within a ten to fifteen minute walk of RNSH's Main Building. This would be expected to increase the proportion of trip self containment, as it would make living and working locally, based on a short walk commute, possible for more people.

Rail access conditions

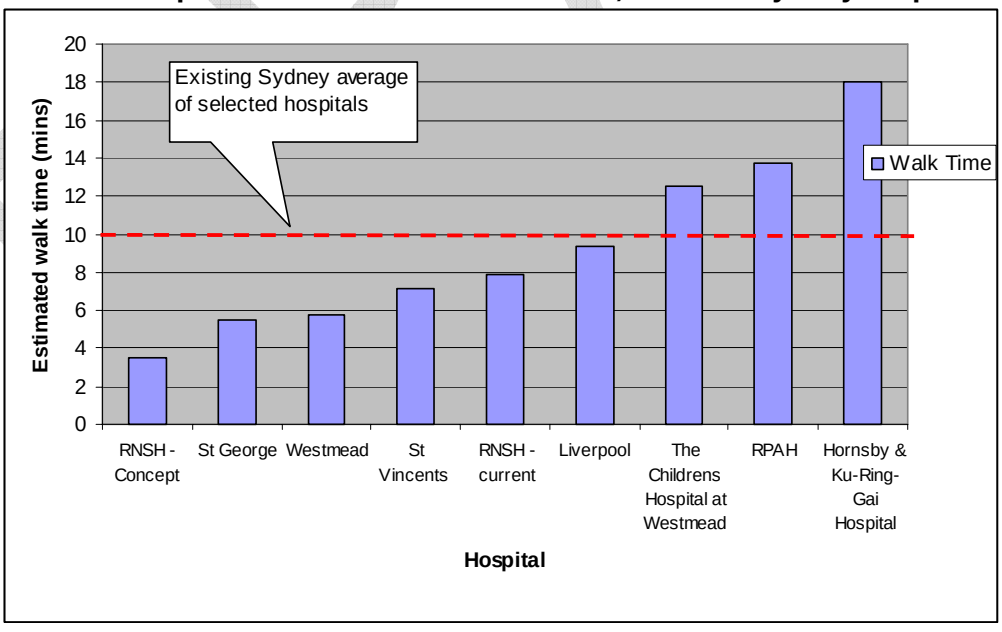
The reduction in walk time to St Leonards Station that would result is substantial, falling from just under 8 minutes to 3.5 minutes. These rail access distances and times are compared with a selection of Sydney's hospitals.

Table 18 Comparison of selected Sydney hospitals' rail access conditions

Hospital	Suburb	Distance (m)	Station	Walk Time (mins)
RNSH - Current	St Leonards	630	St Leonards	7.9
RNSH - Concept	St Leonards	281	St Leonards	3.5
Comparitors				
St Vincents	Darlinghurst	570	Kings Cross	7.1
RPAH	Camperdown	1,100	Newtown	13.8
Prince of Wales Hospital	Randwick	na	na	na
Liverpool	Liverpool	750	Liverpool	9.4
St George	Kogarah	440	Kogarah	5.5
Westmead	Westmead	460	Westmead	5.8
The Childrens Hospital at Westmead	Westmead	1,000	Westmead	12.5
Hornsby & Ku-Ring-Gai Hospital	Hornsby	1,440	Hornsby or Waitara	18.0
Average of existing selected hospitals				***10.0***

This analysis indicates that current rail access conditions at RNSH are about 2 minutes better (shorter) than the sample's average. Rail access conditions under the Concept Plan would result in walk times that would be the lowest of any Sydney hospital in the sample, at about 70% less than the current Sydney-wide average (refer to Chart 3).

Chart 3 Comparison of rail access walk times, selected Sydney hospitals



When considering rail access conditions, the level of rail service available at the closest station is also important. St Leonards Station with 25 to 27 services an hour (combined directions) at present, increasing to about 40 trains an hour when ECR opens in 2008, would have the highest service frequency of all stations close to the

selected hospitals. The next highest frequency in the morning peak hour for suburban services would be Hornsby at 31 trains per hour and Kings Cross with 30 trains per hour[19].

The implication of this improved rail access is that the generalised cost of rail as a mode would fall by around 6 to 7 minutes (based on an access/egress penalty factor of 1.75 to 2.0). As a broad order of impact on rail patronage, for current journeys of 40 minutes of generalised time, this would represent a 10 to 15% reduction in time. Applying a demand elasticity of -0.3 to -0.9[20], would yield an increase in rail demand of approximately 3 to 13%. For shorter journeys, the likely increase in patronage would be higher; and for longer journeys, the impact would be less.

Bus access conditions

It is proposed to relocate the current bus stop for route 144 from its current location on Reserve Road closer to the Main Building entrance. The detail of this would need to be developed with the design team and in consultations with State Transit. At this stage it is likely that the walk distance would be reduced to about 60 to 80 metres.

The current alignment of route 144, running a loop up Reserve Road from the Pacific Highway, and then back down to the Pacific Highway, is undesirable, as such loops are a source of frustration for through passengers. The Concept Plan makes provision for the bus services to run through the site, entering at Westbourne Street and exiting at Reserve Road, and vice versa. This provision was discussed in consultation with State Transit and MOT Officers.

Whether route 144 would run through the site is a matter for the bus planning process (described in Chapter 3). Advantages of such an amendment would be:

- Potential to serve two bus stop pairs within the site, providing improved site penetration
- Elimination of passenger frustration with current back-tracking arrangements
- Minor reductions in running time and distance, as back-tracking would be eliminated, this would reduce running costs and make the bus service more attractive

The main disadvantage of this arrangement would be that Route 144 would no longer serve existing patrons accessing the service at three bus stops along the Pacific Highway, between Reserve Road and Westbourne Street. The implications for service contract coverage requirements for the residential area on the southern side of the Pacific Highway would need to be addressed along with demand issues.

[19] Source cityrail.nsw.gov.au based on existing timetables for the Northern and North Shore Lines at Hornsby – note ECR may increase frequency at Hornsby; and all services at Kings Cross

[20] Refer to discussion regarding a central estimate of -0.6, with a range of -0.3 to -0.9 on pg 15 *Broadmeadow Transport Interchange Feasibility Study, Patronage Review*, prepared by Halcrow for TIDC, 2004

Further, more detailed information would need to be collected and analysed closer to the time of the network review, prior to commissioning of the new Main Building and RNSH's new road system.

The potential for other existing Pacific Highway services to divert from the highway and run through the site could be supported as a result of the site's road network design. Whether any of these services would divert, would require further research and analysis. At this stage, diversion of an Epping Road service would appear to be a useful goal. However, further analysis would be required to identify potential route amendments and to support a reasoned submission along these lines to the relevant network review(s).

PTAL analysis

Improved pedestrian access to train and bus stop would increase the usefulness of public transport services for users of the Main Hospital Building. The public transport accessibility was re-calculated to provide a measure of this increase.

Table 19 Comparison of future (short/medium and long term) and existing public transport index by time of day, New Main Building Entrance, weekday

	Period		
	AM Peak	**Inter-peak**	**PM Peak**
Existing	12.5	9.8	11.4
Future (short/medium)	12.7	10.0	11.6
Future (long term)	12.8	10.2	11.7
Future (short/medium) plus Concept Plan	15.3	12.3	14.1

Source: Appendix B

The results in Table 19 indicate that better access to public transport from the entrance to the Main Building has a more marked effect on the index than increasing train frequencies to 40 per hour (in short to medium term future) or increasing the frequency to 60 trains per hour (in the long term).

The additional frequency has a marginal effect on the public transport accessibility index, partly because it would already be very high when this long term would project open.

Summary

Access to the proposed new Main Building would be a substantial improvement on the current arrangement. This would provide:

- An expanded walk-in catchment, encouraging self-contained commuter travel within St Leonards, by foot
- Shorter, more direct and higher quality access to St Leonards Station
- Provision for bus stops closer to the entrance to the Main Building than under current arrangements
- Provision for through running of the existing service through the site and capability to support other route diversions

- The combined public transport accessibility index in the morning peak for the New Main Building would increase from the existing 12.5, to 12.8 in the short to medium term (without the Concept Plan) and the Concept Plan would increase it to 15.3

These arrangements are likely to increase the use of non-car modes for access to the new hospital.

6.3 Access conditions to proposed residential and commercial development sites

In addition to the proposed consolidation of hospital activities within a new Main Building, residential, commercial and supporting retail floorspace is proposed in the Concept Plan within development sites #3, #4a, #4b, #5, #6, #7 and #8. The use mix and floorspace is summarised in Table 17 and shown on Figure 6.

Access between each of these development sites and St Leonards Station were estimated and are summarised in Table 20.

Table 20 Rail access conditions for development sites

Site	Distance via site roads/paths (m)	Time via site paths (mins)	Time via Herbert St* (mins)
3	206	2.6	na
4a	211	2.6	na
4b	103	1.3	na
5	201	2.5	na
6	351	4.4	3.5
7	412	5.1	4.6
8	421	5.3	na

*Note - * only estimated where use of Herbert Street would provide a shorter walk time than internal site road/paths.*

These access conditions are considered to be very good to excellent, with about 60% of the commercial floorspace in these sites within 3 minutes walk of St Leonards Station, and 85% within 4 minutes walk.

The furthest site from the station is #8, which is identified as a potential research/commercial facility. As such, it is likely to have different use and transport characteristics (e.g., different employee density, different arrival and departure patterns), when compared with the other commercial floorspace. Its close proximity to the hospital buildings is likely to be a more important locational attribute for its effective function than its access to the station (which is still very good at 5.3 minutes, and is better than substantial parts of the Sydney CBD).

All the proposed residential unit development sites would be within a five-minute walk of the station. This is considered attractive accessibility, and would be likely to result in low car use and high use of rail.

All the development sites would be within a four-minute walk of the potential location of the potential new route 144 bus stop within the site. Development sites #3, #4a, #4b and #5 would also be within a four-minute walk of other current bus services on the Pacific Highway.

6.4 Transport implications of development mix

The Concept Plan envisages a mix of commercial, residential and retail uses, in conjunction with the consolidated hospital function within a new Main Building. This leads to the potential for the following useful transport-related interactions:

- Retail floorspace would provide an ancillary function for the hospital, residential and commercial, as well as for existing surrounding commercial and residential. This would improve the attractiveness of self-contained travel.
- Residential provides the potential for further improving the balance of employment/population within St Leonards; this might further encourage trip self-containment within the centre. This might also lead to more vibrancy of St Leonards at weekends, including greater potential for weekend use of rail services.
- Commercial floorspace offers the potential for occupiers with activities related to the hospital. This provides capacity to strengthen the health-related cluster identified by the Metropolitan Strategy, as well as strengthening health-related activities in the corridor between North Ryde/Macquarie Park and St Leonards.

These potential interactions would work to further the aims of the Metropolitan Strategy in terms of achieving sustainable transport outcomes.

6.5 Parking

MWT's *Transport Assessment* proposes parking constraint as a major tool in reducing reliance on private vehicle transport. Specific constraints considered include:

- Subject to adequate non-car mode accessibility and other travel demand management measures, a target of at least 15 per cent less hospital parking provision per person is proposed. This implies no increase in hospital parking despite an expected staff increase of between 13 and 17 per cent.
- It is proposed that parking for commercial uses be provided at the Willoughby City Council DCP rate of one space per 110m^2 of floor area. This represents a provision rate of just over one third of the RTA's unconstrained parking provision rate of one space per 40m^2 and will lead to a substantial reduction in private car use.
- It is proposed that Willoughby Council's DCP rate for residential parking be set as a maximum and that hospital related staff accommodation be permitted to be provided with parking at only 50 per cent of the DCP rate where appropriate.
- Parking for retail uses is proposed to be provided at a rate commensurate with an expectation that about half of the business would be generated from on or near the site. Indicatively a parking provision rate of about one space per 30 m^2 of retail space is proposed.
- Parking for other uses on the site (e.g., research) will need to be determined on a case by case basis with an expectation that the proximity to the railway station will reduce parking needs below those which might apply in other circumstances.

The good level of public transport accessibility resulting from background transport improvements, plus the supportive features of the Concept Plan, as identified in this report suggest that parking constraint at RNSH Campus is a plausible measure to manage vehicle travel demand. Further opportunities and measures are developed in the next chapter to enhance the use of non-car modes.

6.6 Concept Plan and transport policy

6.6.1 Metropolitan Strategy

The Concept Plan is directly supportive of the Metropolitan Strategy through:

- Strengthening of a specialised employment centre and assisting to meet the employment capacity target for St Leonards.
- Strengthening the Global Economic Corridor, by:
  - Making provision for additional development in close proximity to St Leonards Station.
  - Enhances one of Sydney's knowledge and high skill clusters, with updated facilities and additional, related development.
  - Directly strengthens one of Sydney's health clusters.
  - Revamps a key element of the Innovation Strategy, by upgrading a biomedical hubs.
- It demonstrates how the five aims of the strategy can be furthered by concentrating employment within centres.

6.6.2 Improving transport choice – guidelines for planning and development

The Concept Plan meets the objectives of these guidelines:

- Improving transport choice – this is met by providing improved links to St Leonards Station, making rail a more realistic mode for a proportion of site users
- Manage travel demand – location on a strong and growing transit corridor with good access to train and bus is the key method of managing travel demand. This is supported through additional land use mix, to provided for and encourage self-containment of travel. A further supporting measure is parking restraint for all uses under the Concept Plan.
- Role of land use planning – features strongly in the Concept Plan through the mix of uses, location of uses and movement network. This provides an attractive and activated walk path between St Leonards Station and the RNSH Campus.

The Concept Plan would make a positive contribution to all 10 accessible development principles set out in *Improving transport choice*. These are assessed in Table 21.

Table 21 Concept Plan responses to Accessible Development Principles of ILUT

Accessible development principle	Concept Plan response
Concentrate development in centres	Development is in a designated specialised employment centre within the latest strategic planning guide for Sydney (administrative centre requirement met). St Leonards functions as a highly accessible centre (functional centre requirement met).
Mix uses in centres	The Concept Plan would retain the diversity of health-related activities currently provided by RNSH. It would add further to this diversity by contributing additional commercial, residential and retail floorspace. The commercial floorspace is expected to have a proportion of research related activity, furthering the mix of uses.
Align centres within corridors	St Leonards is a key centre within the broader Global Economic Corridor. It occupies an almost unique position on the Lower North Shore at the crossing of the rail and road corridor. The completion of the Epping Chatswood Rail Link will further strengthen this corridor, through the provision of direct rail services for the first time from the north western part of the Global Economic Corridor.
Link public transport with land use strategies	The Concept Plan makes the following contributions in this regard: o Substantially improved pedestrian link between the site and St Leonards Station. o Location of additional development within close proximity of St Leonards Station. o Improved access for existing bus route 144 to Main Building of RNSH. o Bus-capable road network through the site, with opportunities for through routing of services, and additional services.
Connect streets	Introduction of a grid pattern street network within the RNSH Campus and re-opening of Reserve Road and Westbourne Street connect streets, opening-up the general locality's movement network.
Improve pedestrian access	The grid pattern road network plus a network of pedestrian paths within the site greatly improve pedestrian access to: o St Leonards Station o Bus services o Surrounding commercial and residential catchment At the same time, this makes provision to support movement for non-site users.
Improve cycle access	Cycle access will be improved through the new site road network, with potential for connections into surrounding developments. Trip end facilities would be provided.
Manage parking supply	Parking supply will provide a degree of constraint for all uses on the site, including high constraint on hospital parking. Parking arrangements would continue: o Charging for parking o Restricted parking o Permit scheme
Improve road management	Site road management will be improved through the elimination of the current conflicts between general access traffic at the Reserve Road boomgate and emergency vehicles, buses and taxis.
Implement good urban design	From a transport perspective, the quality of the proposed urban design along the pedestrian links to St Leonards Station is considered to more than meet this requirement.

6.6.3 The Right Place for Business and Services – planning policy

The Concept Plan meets the objectives of this policy. Each of the requirements are addressed below.

The Concept Plan meets the policy's aim of:
Encourage a network of vibrant, accessible mixed use centres which are closely aligned with and accessible by public transport, walking and cycling
...by making a contribution to an existing mixed use centre that is directly aligned with, and accessible by, public transport, cycling and walking. St Leonards is part of a network of connected and vibrant centres within its region, including Chatswood, North Sydney and Macquarie. The opening of the ECR will further strengthen the ties with these centres, especially Macquarie.

The policy rationales are met by the Concept Plan:

- *There are development opportunities in centres for businesses and services*
  ...through the provision of well located development sites for business and services, including commercial and research.

- *Community investment in infrastructure is protected*
  ...and enhanced through the provision of improved access between the site and St Leonards Station, as well as additional development within the immediate catchment of the station, all with restricted parking provision.

- *Investor confidence is maintained*
  ...by providing a model development.

The planning objectives of the policy are met:

- *Locate trip-generating development which provides important services in places that:*
  - *Help reduce the reliance on cars and moderate the demand for car travel*
  - *Encourage multi-purpose trips*
  - *Encourage people to travel on public transport, walk or cycle*
  - *Provide people with equitable and efficient access*

  The Concept Plan provides important services in a place that is not dependent upon car; with a mix of uses that will encourage the making of multi-purpose trips; encourage people to use noon-car modes by making it easier for them to do so, while making the most of improved rail services at St Leonards Station; xxx

- *Minimise dispersed trip-generating development that can only be accessed by cars*
  By locating development in this location it reduces the need to locate development in less accessible locations.

- *Ensure a network of viable, mixed use centres closely aligned with the public transport system accommodates and creates opportunities for business growth and service delivery*
  The Concept Plan meets this objective – refer above.

- *Protect and maximise community investment in centres, in transport infrastructure and facilities*
  The Concept Plan strengthens the extensive investment of resources in St Leonards, in the existing rail system and the soon to be opened ECR. Further it would provide a mechanism to upgrade a key community facility of RNSH.

- *Encourage continuing private and public investment in centres, and ensure that they are well designed, managed and maintained*
  A revamped, modern RNSH would be expected to act as a catalyst to encourage private sector investment in bio-medical research within the Gobal Economic Corridor, possibly adjacent to the hospital.

- *Foster growth, competition, innovation and investment confidence in centres, especially in the retail and entertainment sectors, through consistent and responsive decision making*
  The provision of commercial floorspace well related to a major tertiary hospital is an enabling action for the support and encouragement of innovation in the bio-medial sector. This type of response is fostered by the Metropolitan Strategy.

7. Concept/Initial TMAP Actions

7.1 General

This chapter identifies and analyses a set of prospective measures to further the attainment of the Concept TMAP's objectives.

Analysis in the preceding chapters of this report found that the:

- existing situation is favourable to transit and non-car mode access;
- future background transport conditions will be more favourable for transit; and,
- design of the Concept Plan, including development mix, re-adjustment of Main Building's location, and improved pedestrian and bus access would improve this situation still further.

7.2 Pedestrian links

The proposed pedestrian network within the site has been analysed and would substantially improve access conditions. The quality of these links is critical to their success: the Concept Plan has developed a number of measures to ensure a high quality pedestrian link into the site from the direction of St Leonards Station.

Detailed design of these links will need to give due regard to:

- Appropriate arrangements to manage conflicts between vehicles and pedestrians
- Adequate lighting
- Provision of appropriate security facilities (e.g., help points and CCTV)
- Weather protection
- Way finding signage

Examine the potential to provide links to adjoining development, to provide the benefits of improved station access arrangements to the immediate environs of the RNSH Campus. These transport spin-off benefits for surrounding sites can work in both directions, potentially permitting RNSH Campus users with improved access to the surrounding area. As part of the proposed Gore Hill Technology Park the potential is recognised for a north-south spine between Campbell Street and TAFE through the site. This would provide a further extension of the pedestrian routes in the area and between St. Leonards, RNSH, TAFE and Artarmon Industrial Area. At this stage, this is not supported by TAFE for security reasons. However this remains a worthwhile long

term objective and it is desirable that both the RNSH site and the Gore Hill Technology Park site keep this option open.

7.3 Rail Station

Ensure that ticket barrier capacity at the station is sufficient to avoid undue delay to passengers.

Provide improved way-finding signage at the station and concourse (within the Forum), as well as in the other direction, from within the RNSH Campus.

Of note is that improving public transport access for health related employees provides a potential opportunity to increase public transport patronage outside of peak periods, when the public transport system has the greatest amount of spare capacity.

7.4 Buses

Improve access – ensure that roads and traffic management facilitate access for bus by providing direct movement paths, avoid traffic congestion and are not unduly affected by traffic management facilities that reduce passenger comfort (e.g., speed humps and tight horizontal curves).

At the potential new bus stop pair(s) within the site ensure:

- Direct, high quality pedestrian links from major potential patronage generators
- That there is activation of building frontages and passive surveillance near the bus stops
- Adequate lighting
- A shelter with seats and bus service information

Encourage buses within the site by investigating provision for a layover facility to provide opportunity and flexibility for the bus operator to develop new bus routes that can use the site, i.e., provide operational reasons, as well as patronage reasons, to serve the site. As the site's planning advances, liaison with STA and MOT will be essential to determine whether such a facility would have any prospect of being used, and if not, then it should not be included.

Monitor the development of amended bus networks through the service planning process to ensure that accessibility is maintained and, where possible, enhanced.

7.5 Further improvements for collective modes

Consider the potential for collective modes to serve the site, such as coach, and if appropriate provide set-down and pick-up facilities and coach parking.

7.6 Taxi

Well located taxi rank, with similar quality of facilities as the proposed bus stops:

- Direct, high quality pedestrian links form major potential patronage generators
- That there is activation of building frontages and passive surveillance
- Adequate lighting
- A shelter with seats and direct phone to taxi company

7.7 Cycle facilities

Provision of trip end facilities within developments including:

- secure cycle parking
- showers and locker facilities

Ensure that site road layout can adequately accommodate cycles.

A potential measure available to more broadly support non-car mode use in the St Leonards area would be the provision of cycle parking in proximity to the western end of the pedestrian overbridge of Herbert Street (near development site #4b). This could be used by persons wishing to cycle to St Leonards Station and catch the train. Discussion with RailCorp and Council, at a later stage of the planning process, should establish their level of interest in such a facility.

7.8 Parking restraint

7.8.1 Hospital

It is proposed to maintain current car parking levels, which, as already noted, implies a relative reduction in parking supply of 15%. There are difficulties when considering further reductions in parking supply for the hospital:

- Due to shift work, a proportion of staff have no viable alternative than to drive, due to personal safety concerns as well as lower utility of public transport due to lower service frequencies and reduced direct services during outside 'normal' activity periods.
- Similarly, a proportion of patients would not find public transport suitable for access/egress from hospital due to their health (e.g., restricted mobility and requirement to carry personal effects and health-related paraphernalia).
- A proportion of visitors to patients would generally be fitting the visit in between a disrupted normal schedule and may well have large party sizes. Both these attributes tend to restrict the utility of public transport, unless all elements of a multi-leg trip lie along the one service corridor. Larger party sizes tend to make car a more cost-effective option than public transport.
- With labour shortages in the health sector, placing impediments or frustrations in the way of employees could be detrimental to the overall health-related objectives of the RNSH Campus. In reality many workers, especially nurses, have bigger choice sets than car versus transit:
  - a proportion may feel that the frustration associated with getting to work, if no parking is available, means they don't bother working or reduce their hours;
  - all health professionals could obtain work at other Sydney hospitals, or elsewhere in Australia and New Zealand; and

- most health care professionals could readily obtain work elsewhere in the world.

Consequently, it is imperative that any adjustment to working conditions does not result in staff retention issues.

The higher non-car mode accessibility identified at the site, as a result of transport system improvements and the Concept Plan's features, suggest that the parking restraint under consideration for the hospital element is plausible.

7.8.2 Commercial

The proposed level of parking provision, at the Willoughby DCP rate of 1 space per 110 sqm of floorspace, is a low level of provision within Sydney. It represents about a third of the provision under the RTA's unconstrained parking rate of 1 space per 40 sqm of floorspace. On the basis of one employee per 25 sqm of floorspace, this means that just over 20% of employees could have access to a car space (ignoring visitors). Given that, in the 2001 census, about 57% of workers in St Leonards drove their car to work, this is a substantial level of constraint relative to existing mode choice in St Leonards.

Discussions with RailCorp indicated that not only would rail services at St Leonards be greatly improved in the short term with the opening of the ECR, but in the longer term when (if) the CBD-Harbour Rail Link was built, then rail services at St Leonards would be further improved. Consequently, it was suggested that measures be explored to consider possible reductions in car parking capacity, when (if) rail services are further improved (i.e., when the CBD-Harbour Rail Link is built). Such reductions might take the form of conversion of a proportion of parking space to storage or staff amenities, or, for at-grade or roof-top parking, conversion to landscaped space.

The current proposed level of parking provision is considered an appropriate level of restraint for the period after the ECR opens. While the thrust of RailCorp's concept of staged parking withdrawal makes logical sense, and it has been used in other places, it is considered a matter to be dealt with further into the detail of the planning of the site. It is envisaged that at that time further information would be available about the likely form and service offered by the CBD-Harbour Link, as well as its timing and funding.

A potential alternative that could be considered at that time, which would achieve a similar type of transport outcome, might be to increase the amount of floorspace, with the same quantum of parking. The transport implications of this could be assessed at that time, whilst the planning team would need to consider the implications of additional floorspace.

7.8.3 Residential parking

Research conducted by MWT at a number of locations in Sydney indicates that there are a poor correlations between car ownership (the immediate target of parking

restraint policies for residential use) and journey to work car use (the ultimate target of the such policies). The same research finds stronger relationships between access to public transport, the quality of that public transport and journey to work mode share. In particular, walk distances to rail stations correlate well with journey to work mode share to transit. Similarly, walk distances to bus services provides correlation, albeit weaker than for rail, with journey to work bus mode share.

Therefore, at St Leonards it is more likely that it will be the superior level of access to transit services and the useful destinations they serve that will influence mode choice more profoundly than car parking controls.

Consequently the proposed provision, using Willoughby Council's DCP rate as a maximum, is considered appropriate. This would permit a developer, should they choose to, to serve the small market for residential units with no parking, with a proportion of the units.

7.8.4 Retail

This is mainly an ancillary activity for the RNSH Campus users and for St Leonards's residents/workers. The level of proposed provision reflects this.

The retail use has the potential, at the margin, to reduce the need for current travel between St Leonards and Chatswood and Crows Nest.

7.9 Parking management

Currently, parking at RNSH is tightly managed, with restricted parking areas in operation, a progressive scale of charges, and a permit system. Enhancements to this management regime to be considered further include:

- Multi-use parking to facilitate sharing of capacity by different uses (with different accumulation profiles), thereby seeking to reduce the overall capacity of parking facilities required to meet the site's peak accumulation demand, when compared with segmented parking provision. This would need to recognise the needs of different users to ensure practicality.
- Differential scale of parking charges to discourage entry / exit during the peak hours.
- Preferential parking location for staff vehicles with more than one person and, possibly, public vehicles with more than two persons. This would involve provision of spaces with better access to vehicles with higher vehicle occupancy.

7.10 Transport information

7.10.1 Individualised travel information

An impediment to the use of public transport by some potential users is the lack of understanding of how transit services might assist them. This is one of the underlying rationales for voluntary travel behaviour change techniques. A number of states have conducted large-scale voluntary travel behaviour change projects (some of which are known as 'TravelSmart') and their evaluations identified substantial changes in

travel behaviour. A pilot project[21] was recently completed in Sydney and the Central Coast by the NSW Government, and an evaluation report of this pilot project is awaited by the industry.

One of the many interventions that these projects offer participants is an individualised journey plan. This comprises a summary of the participant's journey including:

- detailed descriptions of origin and destination locations,
- bus stop/rail station locations,
- which bus/train to catch in which direction and at what time,
- free tickets/pass for initial use, and
- further information, such as timetables.

The concept is that once a person is given detailed, easy to understand instructions on how to use transit for a journey they currently make by car and they don't have to worry about fares, and they actually make the trip, they are almost fully informed about the utility or otherwise of transit. This approach is useful for trips made frequently.

The development envisaged under the Concept Plan offers scope to use journey plans for:

- Residential at initial occupation
- Commercial and retail, also at initial occupation
- Hospital (for staff), perhaps in the lead-up to commencement of construction

Prior to recommending the application of this technique to RNSH Campus, it would be useful to review the efficacy of the Sydney home-based pilot study.

7.10.2 Transport guides

Provision of information about the full range of transport services, access arrangements and facilities at each of the sites ought to be prepared by the occupiers and made available to site users via websites.

As identified earlier, due to interactions with other health campuses and universities, there is scope to develop specific guides for persons moving between these. The major movements between one or two campuses and RNSH Campus would need to be identified and quantified prior to determining the usefulness of developing tailored travel information.

7.11 Encouragement of car pooling/higher vehicle occupancy

Preferential parking location for higher occupancy vehicles (refer to Parking Management above).

[21] www.planning.nsw.gov.au\travelsmart\index.asp - evaluation report was due for release in 2005.

Consideration of web-based bulletin board system to match drivers and passengers (see, for example, www.dublintraffic.ie) for lifts for commuters to and from the RNSH Campus. Investigation of liability, insurance and the lawfulness of such systems would be required prior to development.

7.12 Review mode of hospital operation

Can minor changes to the mode of hospital operation:

- reduce peak period traffic generation?
- reduce peak parking accumulation on site?

A dialogue between the planning team and RNSH administration ought to be commenced in the next stage of planning to establish if substantial transport gains can be made from minor changes to hospital operations. Matters to consider include:

- Are there opportunities to slightly alter staff shift times to further move transport demand out of the peak hours?
- By adjusting staff shift times and visiting hours, is it possible to reduce peak parking accumulation on the site, thereby reducing the need for parking provision?

7.13 Implementation strategy

Prior to implementation of measures, further site plans ought to be developed in the next stage of the planning process. TMAP measures can then be refined, in consultation with relevant agencies and stakeholders. An implementation strategy can then be developed.