



## **Results of the survey of rail commuters and inventory of long term on street parking around Sutherland Shire rail stations**

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### **Abstract**

Travel in the Sutherland Shire (southern Sydney, Australia) is supported by a heavy rail system that comprises thirteen (13) railway stations. The two rail lines provide access to the major retail / commercial centres of the Shire ie. Cronulla, Miranda, Caringbah, Sutherland, Gymea and Engadine and the retail / commercial centres north of the Shire that include Hurstville, Kogarah, Rockdale and Sydney CBD and Wollongong to the south.

From a review of existing data, a significant data gap was identified in relation to rail travel. Sutherland Shire Council found it necessary to obtain relevant data to enable an assessment and analysis of the role of the Shire's railway stations, their commuter catchments and the subsequent impact of long term on street commuter parking.

Sutherland Shire Council undertook a survey of commuters at each railway station, an inventory of on street long term parking within a 500m radius of each railway station and barrier counts on the day of the survey. The data collected providing valuable information on the choice of travel mode to rail stations, trip origin and destinations, trip purpose and the demand for on street parking around the Shire's railway stations.

The views expressed here are those of the authors and not those of Sutherland Shire Council or any other organisation.

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## **Introduction**

This paper examines transport-planning activities at the Sutherland Shire Council in Sydney, Australia. Sutherland Shire Council (SSC) undertook research on rail commuters and long term parking (RCLTP), by means of a survey of commuters (the survey) an inventory of long term street parking (the inventory) and barrier count. Specifically, the project looked at the relationship of the heavy rail system, the railway station hierarchy and commuter parking in the Shire, a local government area of 210,000 people and 370 square kilometres, of which some 200 square kilometres is national park and crown lands.

Travel in the Sutherland Shire is supported by a heavy rail system that comprises thirteen (13) railway stations. The two rail lines provide access to the major retail / commercial centres of the Shire ie. Cronulla, Miranda, Caringbah, Sutherland, Gymea and Engadine and the retail / commercial centres north of the Shire that include Hurstville, Kogarah, Rockdale and Sydney CBD and Wollongong to the south.

SSC is one of 12 members of the Southern Sydney Regional Organisation of Council's (SSROC). Adopted in 1995, the SSROC Public Transport Strategy (1995) was committed to

- reducing VKT
- improving air quality
- reducing traffic congestion.

Members of the Transport Planners (TPG) group proposed the RCLTP research to better inform transport, planning and land-use decisions. The SSROC TPG had met over a twelve-month period during 2000-2001 to share information and identify a number of projects across the region that would address transport issues identified in the SSROC Region. Once these projects were identified they were scoped through the preparation of project briefs. They were then prioritised by SSROC members and within the individual local governments.

Both the SSROC General Managers Group and the SSROC Transport Committee endorsed the projects proposed by the TPG including the RCLTP.

The RCLTP research undertaken in August 2001 provides an insight into the demands by commuters for long-term parking and the subsequent impact on on-street parking capacity around the railway stations within the Sutherland Shire.

## **Study Purpose**

The purpose of the study is to

- examine and report on data gathered from Rail Commuters and Long Term Parking Survey
- provide analysis of the results and possible explanations for the results
- consider the implications of the results for transport planning in the Sutherland Shire.

## **Background**

Sutherland station has the highest rail patronage in the Sutherland Shire and has a wide catchment that extends to Wollongong in the south, Kurnell in the east and Illawong to the West.

An initial commuter survey undertaken on March 7 1996 at Sutherland railway station, provided an insight into the commuter response to the construction of the new 380 space car parking station within 100m of the railway station. The research by Sutherland Shire Council found that the opening of the new three-storey car park at that time had influenced travel patterns and mode choice. Of the 40 commuters surveyed the study reported that

- 32.5% previously used alternative stations preferring now to drive to Sutherland station
- 57.5% previously drove to Sutherland station but parked on street
- 10% previously walked, drove to a station further away or caught a bus to the station (SSC,1996).

In addition, from the data collected and observations made in this initial survey, the provision of car parking appears not to have attracted new users to train travel. Instead, the report states that “development of a new car park

- supported an increase in vehicle kilometres travelled through greater car usage (VKT)
- made less attractive the use of alternative modes of travel such as bus to a more local station
- compromised the role and function of the railway station as a major bus-rail interchange” (SSC,1996).

Very little was known about the demands for commuter parking at the other twelve railway stations in the shire, the mode choice, origins and destinations or basic demographics. The opening of the Sutherland railway commuter car park in 1996 also highlighted the need for a broader strategic approach to managing commuter car parking not only within a local government area but also within the context of the Illawarra line which traverses through a number of Local Government Areas.

The deficiency in the data has meant that much of the debate concerning public transport use, accessibility and car parking was based on anecdotal information or a fragmented array of marginally related studies. To obtain a greater understanding of commuting by train within the Sutherland Shire the RCLTP research included a questionnaire survey of commuters and an inventory of long term street parking, supplemented by a barrier count.

In the broader southern Sydney context it is important that a consistent and united approach between Councils (and State Government agencies) is pursued to ensure that appropriate actions are undertaken that better reflect and support the various roles and functions of these important transport nodes.

### Railway Station Hierarchy and Land Use Context

The railway stations within the Sutherland Shire each have their own particular characteristics, function and role. The Draft Interchange Policy (1993) developed by CityRail remains a draft policy document but the principles expressed are considered as a useful guide in defining the station hierarchy.

The Draft Interchange Policy (1993) has five station categories, Regional, Sub Regional, Multi Access, Car Interchange and Local of which the railway stations in the Sutherland Shire consist of two Sub Regional Railway stations, ten (10) multi-access stations and one (1) Car Interchange. Based on the definitions of the Draft Interchange Policy (1993) the characteristics of the three station types in the Sutherland Shire are defined as follows.

#### Sub-Regional

- high frequency train services
- the focal point of an extensive bus network
- well served by taxi services
- pedestrian access integrated with surrounding development
- town centre which is the focus of employment, commercial and retail activity
- commuter parking may be available but will gradually be subsumed by commercial development as the town centre develops and land values increase.

#### Multi Access

- good frequency train services
- focal point of a bus service which primarily serves the surrounding residential area
- large numbers of walkers from surrounding residential areas
- commuter car parking both on and off the street.

#### Car Interchange

- isolated from surrounding development
- land values are relatively low
- well connected to the regional road network
- can be strategically located on the rail network.

The railway stations in the Sutherland Shire are a major part of the urban fabric. The function and role of these stations is influenced by the strong links to both residential and retail / commercial development in the area.

As seen in Table 1 the railway stations are linked to a hierarchy of retail / commercial centres and different levels of medium density development. The highest patronage are generally located adjacent to medium density development and centres of retail / commercial development. Though beyond the scope of this paper, understanding this relationship better will greatly assist in more effective and efficient allocation of resources and strategic development.

**Table 1. Station Hierarchy and surrounding development characteristics**

<b>Railway Station</b>	<b>Station Category</b>	<b>Retail / Commercial Classification</b>	<b>Level of Medium Density Housing Developed</b>	<b>Barrier Count Weekday Average</b>
Sutherland	Sub Regional	District	Medium / High	9,750
Miranda	Sub Regional	Major	Medium / High	3,540
Caringbah	Multi Access	District	Medium / High	3,270
Jannali	Multi Access	N'Hood	High	3,000
Cronulla	Multi Access	District	Medium / High	2,610
Gymea	Multi Access	N'Hood	Low / Medium	2,060
Engadine	Multi Access	District	Medium	1,800
Kirrawee	Multi Access	N'Hood	Medium / High	1,710
Woolooware	Multi Access	Local	Low / Medium	1,000
Heathcote	Multi Access	Local	Medium	930
Como	Multi Access	Local	Nil	720
Loftus	Multi Access	Local	Nil	720
Waterfall	Car Interchang	Local	Nil	240

Table Notes: Barrier Counts source CityRail (2000), Retail Commercial Classification source, SSC (2002). Medium density development is based on the proportion of land developed for medium density by available land developed in 2c and 2b zones.

## **Methodology**

### **Review of existing data**

From a review of existing data, a significant data gap was identified in relation to rail travel. Sutherland Shire Council found it necessary to obtain relevant data to enable an assessment and analysis of the role of the Shire's railway stations, their commuter catchments and the subsequent impact of long term on street commuter parking. The objectives of the study were to

- conduct a limited literature review of commuter car parking
- investigate existing commuter parking
- establish guidelines for future commuter car parks
- establish profile of commuters and travel preferences.

## Inventory and survey methodology

During August 2001, Sutherland Shire Council with the assistance of Arup Transportation Planning undertook both a questionnaire survey of commuters at each railway station and an inventory of on street long term parking within a 500m radius of each railway station. For the survey, commuters were selected at random passing a fixed point on the station platform. Data collected included travel zone origin and destination, purpose of trip and mode of access to the station. Demographic data including age and gender collected. School children were excluded from the survey. The interviewers monitored train arrival and departures to ensure completion of surveys once commenced.

For the parking inventory, a foot inventory was conducted working systematically along a predefined route listing vehicle numberplates. These locations were revisited in the afternoons prior to the afternoon peak travel time to identify "all day parkers". The preliminary scoping had identified 500 metres as the distance from the station likely to be taken by all day parkers, with the exception of Sutherland. At Sutherland a radius of 600m was identified as the extent of existing parking. The inventory was undertaken at 8.00 am and 3.00pm to minimise the inclusion of local employee parking in the results. The inventory was undertaken on one day mid week (Tuesday, Wednesday or Thursday) at each of the thirteen stations, coinciding with the station survey. The survey was only of untimed parking and excluded 1,2 and 4 hour parking.

A barrier count was also completed during the morning peak period. The questionnaire, barrier count and commuter car parking survey was undertaken on the same day for each station. The barrier count on a single day provided comparative data within the survey. Having excluded Mondays and Fridays, it was felt to be of no additional benefit to extend the barrier counts beyond the single am peak at each station as little variation was anticipated.

## **Results and analysis of rail commuters and long term parking research**

### Commuter car parking demand

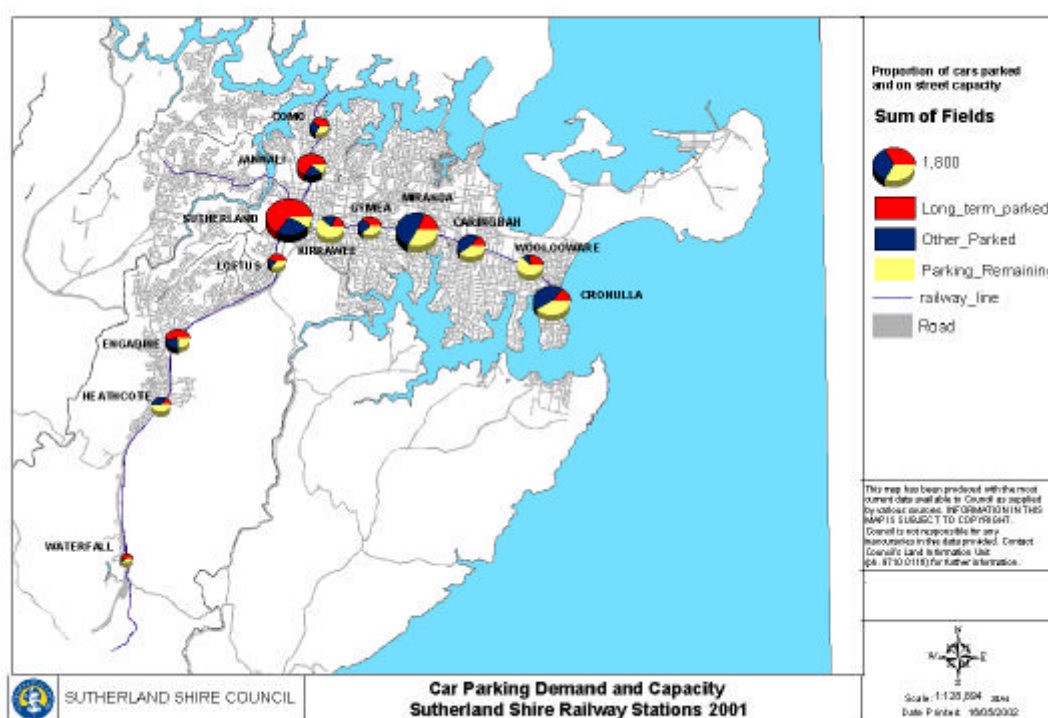
The inventory shows that the greatest demands for commuter car parking was at Sutherland, Jannali and Engadine (see Table 2 and Figure 1 below).

*Results of the survey of rail commuters and inventory of long term  
on street parking around Sutherland Shire rail stations*

**Table 2 - Results of long term parking inventory of all stations**

Station	Peak demand	Long Term parked	Other parked	Remaining capacity	No. Long term parked
Cronulla	767	180	587	533	14%
Caringbah	451	109	342	301	14%
Heathcote	181	55	126	168	16%
Kirrawee	269	119	150	422	17%
Miranda	1,112	303	809	547	18%
W'ware	236	170	66	401	27%
Gymea	307	182	125	172	38%
Como	234	148	86	110	43%
Loftus	200	145	55	109	47%
Waterfall	82	69	13	57	50%
Engadine	434	290	144	132	51%
Sutherland	1,863	1,305	558	162	64%
Jannali	721	527	194	92	65%

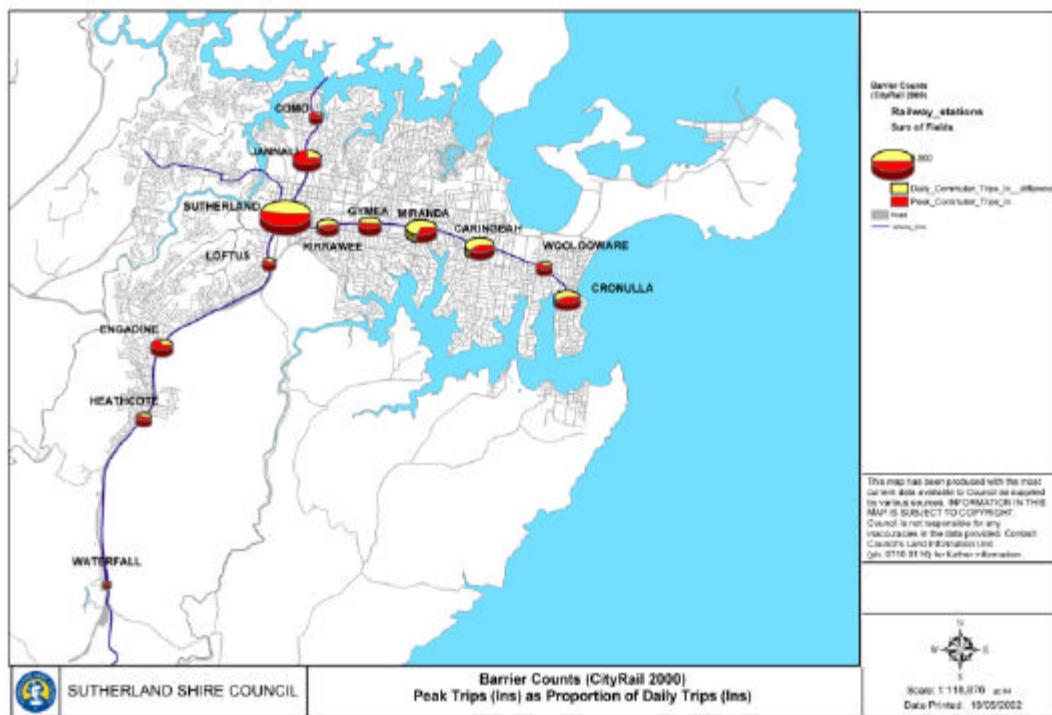
**Figure 1: The demand for car parking spaces as a proportion of the car parking capacity within 500m of the railway stations (600m for Sutherland)**



Within 500m of the railway stations between 14% and 65% of the unlimited car parking spaces were utilised for long-term parking. At Sutherland, Jannali and Engadine between 51% and 65% of the available long-term car parking spaces were occupied by commuters and 20% to 30% by other users (this includes local employees, shoppers etc). In Miranda, the demand for long-term parking

was also high but only 18% are likely to have been utilised by commuters, as the duration of the majority of persons parking in the area was less than 4 hours. In comparison to Sutherland, Jannali and Engadine, the proportion of commuters parked at Miranda<sup>1</sup> was low and reflects the demand for parking generated by other uses in the area.

**Figure 2: Shire railway stations and estimated barrier counts**



The demands for long-term commuter car parking clearly vary for each railway station and the research shows that competing demands for parking from other users of the centres exist. In some cases this may be at the detriment of local employee needs and businesses. Choices made by commuters may be made in response to decreasing on-street parking capacity, the provision of additional parking or implementation of restrictive parking controls. For example, restricting long term parking in Cronulla may result in a relatively small displacement of cars to other stations such as Woollooware due to the low demand for commuter parking. In comparison, further limiting long term parking at Sutherland could have significant implications on adjacent residential areas and centres due to the long term parking demands from commuters and their subsequent displacement. Centres that would be affected by changes at Sutherland would include Kirrawee, Engadine and Jannali as well as stations outside of the Sutherland Local Government Area such as Padstow, Rockdale and Hurstville.

<sup>1</sup> Some commuters may use Westfields Miranda for parking



### Mode of travel to railway stations

The commuter survey of the 13 railway stations within the Sutherland Shire showed that for most railway stations, walking was the primary mode of travel. On average approximately

- 46% of commuters walk to the railway station,
- 29% drive a car
- 18% travel by car as a passenger
- 4% travel by bus
- 1% ride a bicycle
- 1% other mode.

It is of note that the car was the most preferred mode of access to Sutherland station (61%) and Jannali station (67%). The strong focus by car at these two stations may be due to the higher frequency of rail services which appears to be the primary incentive for commuters to not only drive to the station (from as far as Wollongong) but also tolerate the high demands for parking and walking distances. At Sutherland some commuters that drive are willing to walk more than 600m to the railway station.

**Figure 3: Sutherland Railway station**

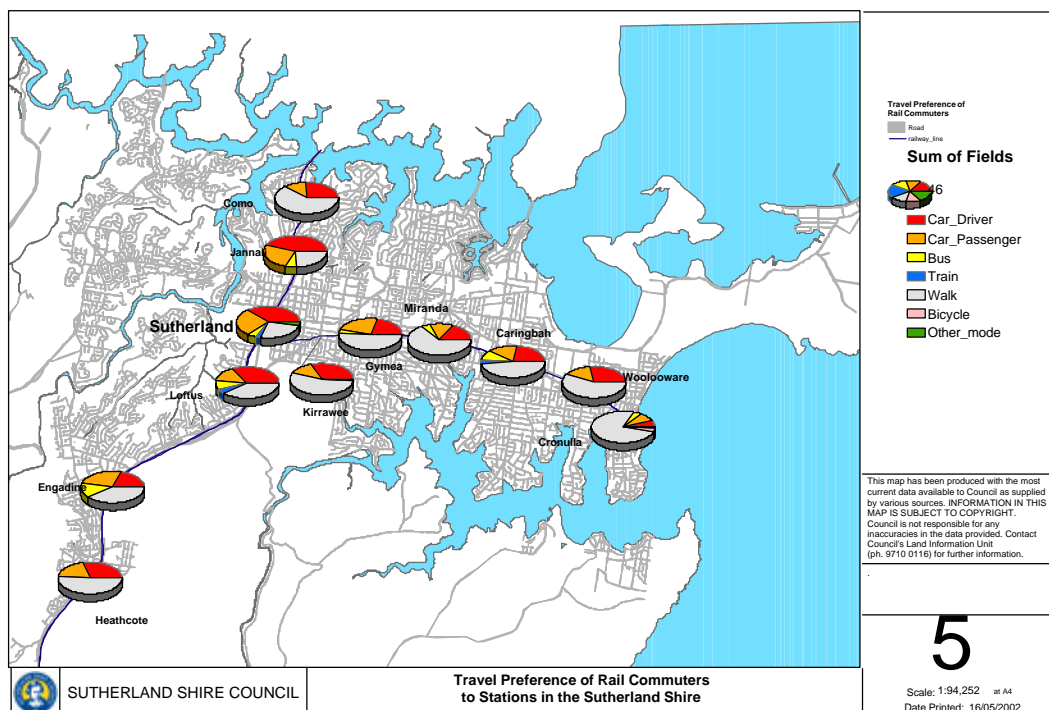


The attractiveness of Sutherland station to commuters is also reflected in the distances commuters are prepared to walk from the surrounding area. Of the commuters surveyed that walk only to the station, 34% walked from Loftus which is greater than 1km away. The high proportion of commuters that choose

to walk greater distances to the station has implications for planning, such as consideration of the general safety of pedestrians particularly the more vulnerable such as the elderly, young children and women. At Sutherland 59% of commuters during the morning peak were women and 24% of all commuters between 65 and 74 years of age. A safety audit in April 2002 of Sutherland centre and surrounds was undertaken by SSC planning and identified issues such as poor lighting, lack of pathways, dark and concealed areas that heighten the safety risks for pedestrians.

Other railway stations that have a strong catchment of commuters that walk include Cronulla, Miranda, Caringbah, Kirrawee, Woollooware and Como. The survey results from these stations suggest that a positive relationship exists between medium density development and the preference for commuters to walk to the station. Como is a peninsula with limited road access and no explanation is available.

**Fig 4. Travel Preference of Rail Commuters (SSC Commuter Survey 2001)**

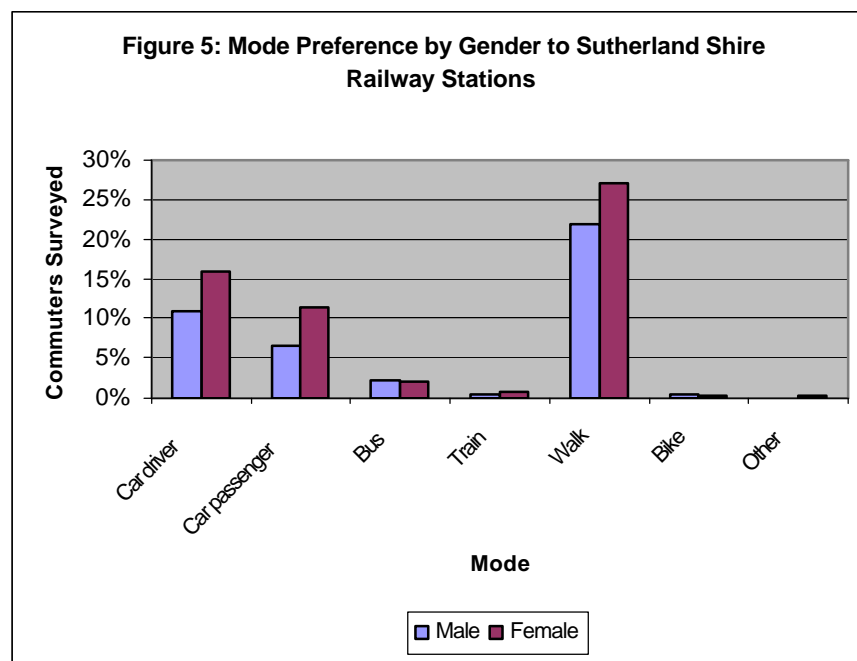


The use of buses to railway stations is generally low throughout the Sutherland Shire. Approximately 4% of the commuters surveyed use a bus in the morning peak. The commuter survey shows that the use of buses was highest at Caringbah, Engadine and Jannali where there is greater access to bus services and frequencies are generally higher than in other areas.

Cycling has a very limited appeal for commuters with less than 1% choosing to use this mode of transport. This may be as a result of poor off road access and parking facilities at railway stations.

## Age and Gender

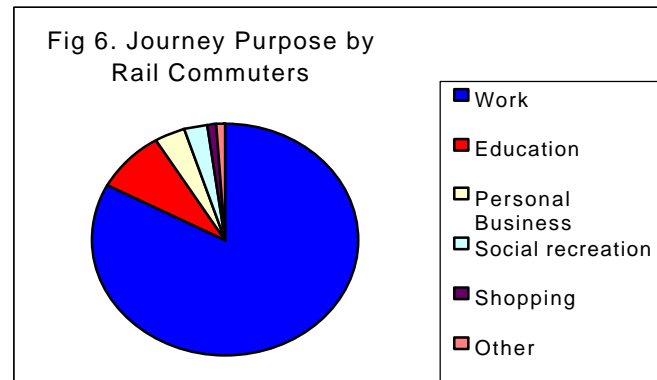
The results of the commuter survey shows that 52% of rail commuters (excluding children) during the morning peak are between the age of 17 and 34. The higher proportion of commuters in this age group is similar to the Household Travel Survey (HTS 1999), for the Sutherland Shire which shows that 31.6% of commuters between 21 and 40 years of age catch a train on an average weekday. The variation may be accounted for by the age differences where it is thought the 17-21 age group are more likely to be public transport dependent. There is a notable decline in train use for all trips on an average day with age. Approximately 41% of shire residents that travel by train (for any purpose) are over 40 years of age (HTS 1999). In comparison to travel by train, car use (as driver) increases with age. Over 53% of residents between 31 and 50 years of age drive a car (for all trips).



The commuter survey showed that women (57%) use the train more than men (43%) during the morning peak. In comparison to men, women accessed the railway stations by walking, car as driver and passenger more than men did, but fewer women, cycled or used a bus.

## Destination and purpose of trips

The commuter survey showed that the primary purpose of the trip undertaken by train was to work (83%), education (9%), personal business (3%), social recreation (3%) shopping (1%) and other (1%). 77% of trips were made to the CBD and 23% to other locations.



## Profiles of Sutherland and Engadine railway stations

Sutherland sub regional station.

Situated at the confluence of the Illawarra rail line and the spur line to Cronulla, commuters have the choice of 11 suburban services per hour (7 from Waterfall and 4 from Cronulla) to the Sydney CBD during the morning peak. In addition, there are a further three extra intercity express trains that stop at Sutherland station. The major roads that feed into Sutherland from the south provide a good level of service for commuters travelling from Wollongong, Engadine, Woronora and Loftus. To the west commuters from Menai and Illawong are subject to only moderate levels of traffic congestion, much of which has recently improved in response to the recent opening of a new four-lane bridge across the Woronora River.

Sutherland railway station can be defined as a subregional railway station. By definition it fits into the following characteristics (CityRail, 1993)

- a high frequency of bus services
- the focal point of an extensive bus network
- well served by taxi services
- pedestrian access integrated with surrounding development
- town centre which is the focus of employment, commercial and retail activity
- commuter parking may be available but will gradually be subsumed by commercial development as the town centre develops and land values increase.

**Figure 7: Sutherland railway bus interchange, commuter car park in background**



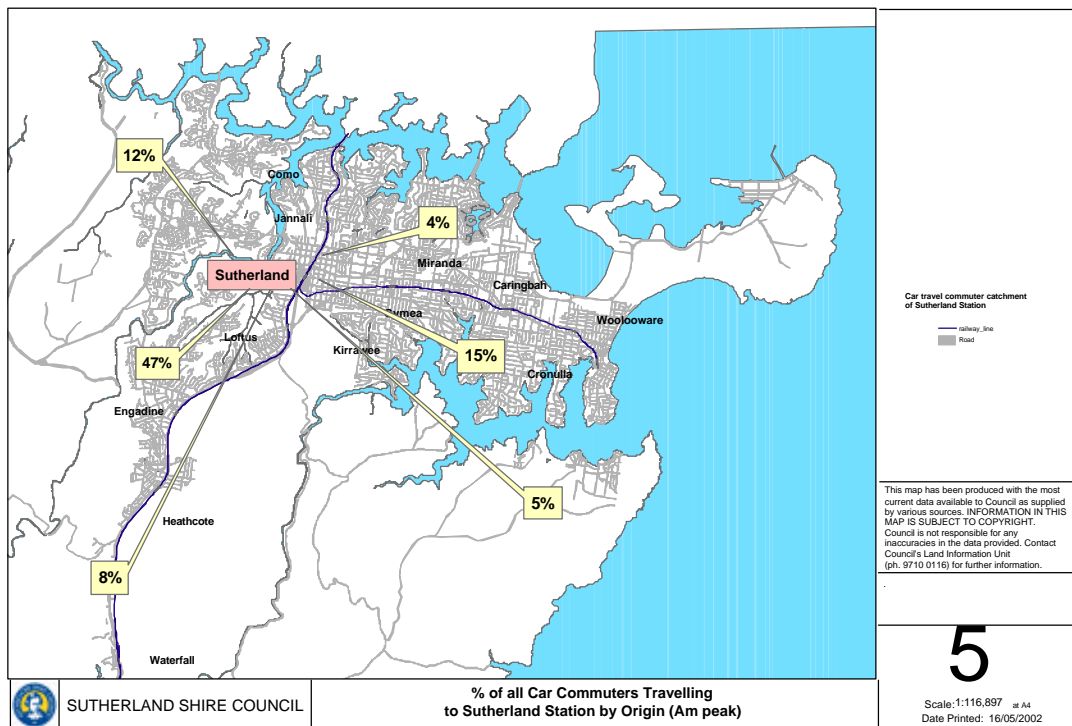
Sutherland bus/ rail interchange has the highest daily rail patronage in the Sutherland Shire. Between 1996 and 2000 the daily patronage at the station grew by 58% from 12,360 to 19,500 daily trips, ie total 'Ins' and 'Outs' (CityRail 2000). The growth in patronage occurs during both the peak period (45%) and off peak (13%). In comparison to Sutherland station there have only been minor increases of between 2 and 4% at other stations during this same time period and declines have been noted at Jannali, Engadine, Kirrawee, Woollooware, Heathcote and Como.

The growth in patronage at Sutherland station is thought to have been due to a number of factors that include increased medium density development around the centre resulting in a population increase in the younger commuter age group. Sutherland appears to attract additional rail commuters as a result of the frequency of trains. This continuing preference by commuters from outside of the local area is to access the station by car. The commuter survey showed that approximately 51% of commuters travel by car from Woronora, Engadine and Loftus, 10% from Menai and 5% from Wollongong.

The high demand for parking at Sutherland station is fuelled by the higher frequency of rail services and the difficulty for alternative transport modes to compete with the motor car.



**Figure 8: Map of Sutherland railway commuter car parking catchment**



Although over 200 bus movements occur at the Sutherland bus rail interchange on an average weekday (pers.com. SouthTrans 2002), bus services are not well patronised. Poor patronage may be due in part to factors that include the low frequency of bus services (generally half hourly), indirect bus routes and journey time. In addition, communication links between the railway station and bus interchange are not supportive of good integration resulting in connections being missed by travellers. Further, a 380-space 3-storey commuter car park is situated within 100m of the station and as noted previously has attracted commuters from alternative railway stations as well as caused some modal shift from bus to car. For commuters that drive to the station, there is currently little incentive to change modes.

### Engadine railway station

Engadine railway station by definition, is characteristic of a multi access interchange (CityRail, 1993). Engadine has

- a good frequency of train services
- is the focal point of a bus service which primarily serves the surrounding residential area
- large numbers of walkers from surrounding residential areas
- commuter parking both on and off the street.

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At Engadine station approximately 1,340 passengers enter the station between 7am and 9.30 am on an average weekday (SRA, 2001). Based on the commuter survey 2001, it is estimated that on a daily basis 1,870 persons use the railway station, 87% of which are from the Engadine area, 2% from Woronora and 2% from Loftus. The frequency of train services is between 15 minutes and 20 minutes during the peak and 30 minutes during the off peak period.

Within a 500m radius of the station there are approximately 570 long term car parking spaces that extend along the Princes Highway and into nearby residential areas. An at grade 40 space commuter car park is situated adjacent to the railway station to its north.

The inventory showed that 51% of car parking spaces were likely to be occupied by commuters, the third highest demand in the Sutherland Shire. During the day the demand for parking spaces peaked at 77% with the short term parking demands likely to be associated with local employees, overspill from the retail / commercial centre of Engadine and the needs of the local residential area.

Unlike Sutherland station there is a strong local demand to access Engadine station. Although car use dominates, in comparison to other stations in the Sutherland Shire the results of the commuter survey indicated that the proportion of rail commuters using a bus to the station was highest at Engadine. Approximately 11% of the commuters surveyed used a bus to travel to the station that day. One possible explanation for the higher bus use could be due the convergence of bus services from the north and south bus catchments, providing residents at the periphery of the centre with a higher frequency of services during the peak. Services at the edge of the Engadine centre during this time are in effect at 15 to 20 minute intervals. For other residents within the catchment bus services operate at 30 minute intervals during the peak.

## **Conclusions and findings**

Understanding commuter choice decisions will assist SSC to better manage car parking around railway stations.

The research into rail commuters and long-term parking has proved useful in a number of ways. It has

- helped to define and confirm the hierarchy of stations
- to identify the needs of commuters
- to understand the influence of medium density development
- to understanding the competitive demands for parking in centres

The car parking inventory and commuter survey undertaken by Sutherland Shire Council showed that commuters place a high value on the frequency of rail and bus services. Targeting long-term commuter parking and simultaneously implementing travel demand management strategies provides an opportunity to encourage commuters to use public transport. This may include improving public transport through travel blending and measures that assist public transport operators to increase service frequencies, reliability and accessibility within the objective of reducing car dependence and parking demands at key stations and maximising the focus of limited resources.

## **Recommendations**

1. SRA adopt a draft interchange policy to assist councils and state government agencies to better plan and coordinate infrastructure development at railway stations availability. A policy similar to the Draft Interchange Policy developed by CityRail in 1993, would provide a useful frame work from which the role and function of railway stations can be defined.
2. Rank stations according to Interchange policy. By ranking stations into four station types, ie regional, sub-regional, multi access and car interchange provisions for cars, management of both public transport and non motorised modes would be improved. It is intended that this approach would be used for the railway stations along the Illawarra line, with a clear definition of stations within the Sutherland Shire being the first step.
3. Undertake further research on a regional basis. The project fits into a regional framework supporting the SSROC goals, providing information and a template for further research across the region. This further research should be undertaken across the SSROC region, the south western Sydney and Illawarra regions.
4. Undertake further research within SSC to focus on the differences in mode choice between commuters, shoppers and residents within an area.

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