

The impact of a new bus route on a new suburban development in Melbourne

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Abstract

Much of Melbourne's future growth is expected to be accommodated on the urban fringe in new, 'greenfield' developments. In recent years questions have been raised about the impacts of these developments on the mobility and accessibility provided to residents. Long travel distances and poor access to public transport restrict households to becoming heavily dependent on the private car. Households with limited incomes may be 'forced' into investing a large proportion of their income on multiple car ownership and use. Even households with relatively high incomes are pushed away from more sustainable and active travel modes.

This study explores the impact of a connecting bus service on a new development in Melbourne's fringe, Selandra Rise in Clyde North. The development opened in 2011 is located 6km from the nearest town centre and train station. In 2014 a local bus service was introduced to connect the development to the nearest town centre and train station. Two surveys were conducted to explore the use and impact of the new bus service: a survey of Selandra Rise residents (including non-bus-users) and an on-bus survey of riders. Surveys showed that bus users were highly dependent on the service, which performed an important function as a social transit service in the estate. The implications of these findings for the planning of new housing estates were discussed.

1. Introduction

Australian cities are growing at a considerable rate (Australian Bureau of Statistics 2015). Although some of this growth is being accommodated in inner 'brownfield' developments, the highest growth rates are occurring in suburban 'greenfield' developments (Australian Bureau of Statistics 2015). With this growth comes a range of challenges, including providing sufficient infrastructure to new communities. The dispersed nature of greenfield development provides particular challenges to the provision of efficient and sustainable transportation infrastructure. Greenfield developments are often kilometres away from existing public transport services, entrenching residents into car-dependent travel habits. Where services are provided, they usually begin months or years after residents have made their initial decisions about car ownership and mode choice.

When new bus services are provided to these greenfield estates, there are sometimes important questions around the justification for these buses. Ridership can be low and costs can be high, demonstrating the need to understand how new bus services are used by residents. Although such bus services are unlikely to serve a 'mass transit' function, they may serve an important 'social transit' function (Betts 2007).

This paper presents a study of a new bus route connecting a new greenfield development (Selandra Rise) in Melbourne's South-east to the nearest train station and shopping centre 6kms away. The aim of the study is to understand the impacts of the new bus survey on residents of Selandra Rise. It does this through two surveys: an on-board bus survey and a survey of Selandra Rise residents (both bus users and non-bus users).

The structure of this paper is as follows. Section 2 provides a review of past research on the role of public transport in suburban greenfield developments. This is followed by a brief description of the study context in section 3. The survey methodologies are then described, followed by the survey results. Finally the results are discussed in section 6.

2. Literature Review

Lack of public transport services on the growing urban fringe of Australian cities is now a common finding of numerous studies (Faulkner 1978, Hurni 2005). A quantitative study of the distribution of public transport supply in Melbourne (Currie 2010) found that outer Melbourne, which includes the Selandra Rise development area, has some 90% of its area not covered by bus services at all while the areas that do have a service have an average of 156 bus services per stop per week. Inner Melbourne by contrast has 98% service coverage with an average of 630 services per week (Currie 2010). The same study identifies a considerable mismatch between areas without a public transport service on the urban fringe and local communities with high degrees of social disadvantage. Some 38,000 residents were identified as living in areas with the very highest social needs yet without any public transport service at all. These areas were predominantly in fringe urban areas and included parts of outer Cranbourne where Selandra Rise has since been developed (Currie 2010).

Numerous studies have now a linked lack of public transport to significant barriers to social and economic participation for disadvantaged groups on the urban fringe. Reduced employment and education participation rates amongst young people are now clearly linked to lack of transport options (Winter 1995, Hurni 2007). The population is ageing in place and aging makes auto based mobility problematic. This has significant implications for older people living in areas without walk or public transport access (Browning and Sims 2007). These issues are shared with a wider range of disadvantaged groups including the unemployed, young mothers, aboriginal groups and new migrants living in fringe urban areas (Currie and Phung 2007, Hurni 2007).

An important feature of transport related problems faced by disadvantaged communities on the fringe is the overwhelming need to have a car for mobility despite the high costs associated with fringe urban travel and their low income (Currie 2009). This feature has been termed 'forced car ownership' (FCO) with numerous studies identifying high car ownership levels despite very low income levels in fringe suburbs (Banister 1994, Currie and Senbergs 2007). A more recent study of forced car ownership in Melbourne found a 93% increase in FCO households in outer Melbourne between 2001 and 2011 (Currie and Delbosc 2013) as fringe areas continue to grow but transport provision remains lacking. A key feature of high car ownership on low income is the financial pressures which result for young families. Indeed transport disadvantage on the urban fringe has been characterised as "transport poverty" where it is not lack of mobility but its high cost which can act as a barrier to progress in disadvantaged households. A study of travel behaviours in forced car ownership households found very high degrees of car sharing and lifting notably for younger family members on social and work/educational purposes (Currie and Delbosc 2010).

The provision of at least some form of a base public transport to free up access for disadvantaged groups on the fringe has been a major policy of mainly left wing governments in Australia. In Victoria in 2006 some \$1.4B was invested in bus services including 'social transit' services to provide a basic social safety net of service to fringe growing communities (Department of Infrastructure 2006). A study of community impacts of new social transit services was undertaken in the Pakenham area (Bell and Currie 2007). This found that most new bus service users would have been able to travel prior to the new service but mostly via lifts from family and friends or via very long walks. Because travel by bus was now much easier, more travelling was occurring implying more engagement in economic and social activities. A major benefit for users was less reliance on others for lifts and notably for younger people, a freedom to make mobility choices for themselves without needing to ask parents. Bus users were mainly a younger (under 25) or older (over 65) cohort with older people noting greater choice for shopping with new bus services. Interestingly a non-user survey was also included in this study and noted that lift giving was common in the majority of households but that this had reduced as a result of new bus services (Bell and Currie 2007). Major benefits in this case appear to be better choice, freedom from reliance on others and easier access.

The Selandra Rise context is rather different to the Pakenham study since residents have made a specific choice to locate within the confines of the new development presumably for lifestyle choice. Exploring what this might mean for use of the new bus service is a major aim of this project.

3. Study Context

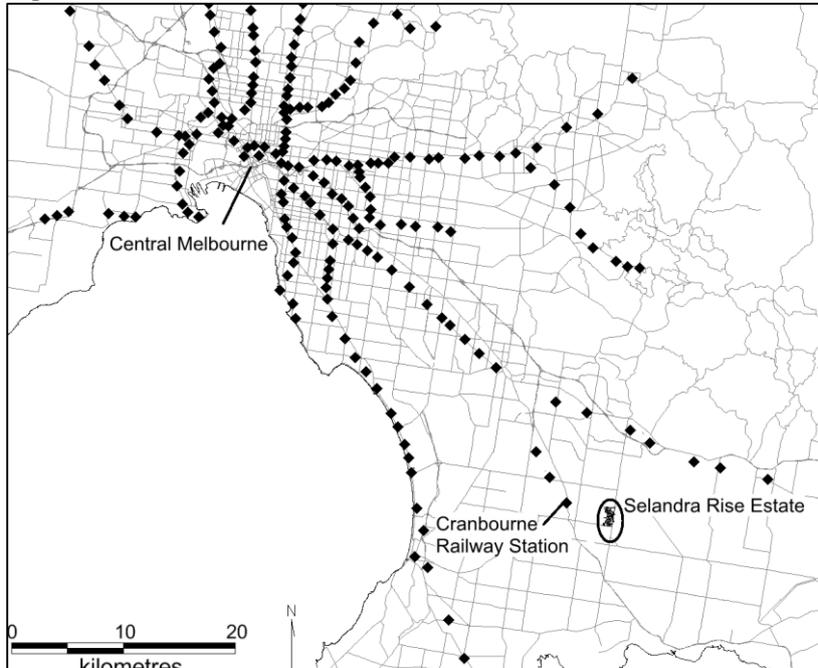
This study focuses on residents of Selandra Rise, a 1200-1500 lot master-planned estate in Clyde North in Melbourne's south-east suburban fringe (over 40km from the city centre, see Figure 1). The estate is approximately 6km from Cranbourne railway station and the nearest shopping centre. The roads between these destinations have few bike lanes and include stretches without footpaths. The surrounding area is heavily car dependent with 76% travelling to work by car (as driver or passenger) compared to the Melbourne average of 65% (Australian Bureau of Statistics 2011).

The estate's developer (Stockland), the local council (City of Casey), the Planning Institute of Australia and an independent state government statutory body (the Metropolitan Planning Authority) collaborated to demonstrate how to create an affordable, liveable and healthy environment for residents. The demonstration also intends to provide 'a blueprint for development of future communities' (Planning Institute of Australia 2015).

A key element of the demonstration was 'early delivery' of some initiatives including parks, walkable streets, a community centre, community development activities and public transport (a bus service). Early delivery did not refer to a specific time frame but was applied on an in-

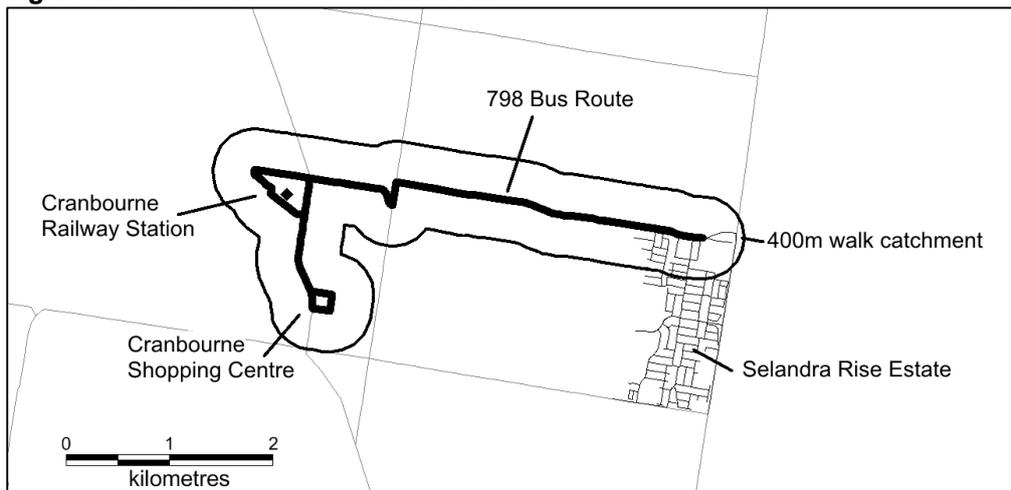
principle basis to deliver facilities in advance of normal timeframes for developments of a similar size. Generally, this meant some key facilities were delivered at between one and three years since the first houses were completed, rather than five or more years. The community centre was the earliest feature delivered, completed 4 months after the first residents moved in in November 2011. The site is nearing full completion with a shopping centre opening in June 2015 and construction of remaining houses expected to be completed by the end of 2015.

Figure 1: Selandra Rise Location



When Selandra Rise began, the only public transport service was a school bus. In July 2014 the 798 bus was introduced connecting the northern end of Selandra Rise to Cranbourne shopping centre via the Cranbourne rail station (see Figure 2).

Figure 2: 798 Bus Route to Selandra Rise



This is a relatively frequent bus service for a suburban area (20-30 minute headways) with long service spans (5:30-22:30 weekdays, 6:30-24:00 Saturday, 7:00-21:30 Sunday). However there is poor service penetration into the suburb; as shown in Figure 2, very few households are within 400 metres of the bus route. Broadly 20% of the Selandra Rise development footprint is penetrated by the catchment of route 798 notably the less

developed northern section of the development where the retirement village is located. The bus services carries broadly 2,500 boardings each week with most ridership occurring during weekday peaks. .

4. Research Method

Two surveys were undertaken to measure the impacts of the 798 bus on Selandra Rise residents. The first was an intercept survey of passengers on the 798 bus; the second was one of an ongoing series of questionnaires distributed to Selandra Rise residents. Although questionnaire surveys are limited by self-selection bias, comparing the results of two different survey methods provides additional information.

4.1 798 Bus survey

This survey was conducted as part of an undergraduate final-year project. Four students administered self-complete questionnaires to people on board the 798 bus. Surveys were conducted on weekdays and weekends in April 2015 (including school holidays), capturing both peak and inter-peak periods.

The survey addressed a range of questions including:

- Origin/destination and usage of route 798
- Purpose of trip
- Reason for taking the bus
- Satisfaction with the bus
- Impact of route 798
- Suggested improvements to route 798
- Household and personal demographics

4.2 Selandra Rise resident survey

The Selandra Rise resident survey was conducted three times between 2012 and 2015 as part of a longitudinal evaluation of outcomes at the estate. The survey was hosted in Qualtrics web-based survey software and distributed to residents by both email (where addresses were available) and delivery of hard copy and reply paid return envelopes to occupied houses. A web link for completion of the survey online was also promoted through a Facebook group established and used by the majority of estate residents. The most recent iteration of the survey was conducted between February and April 2015 and included questions about the 798 bus service. Among wider questions about the estate, the survey included questions about:

- Own/other household member's use of the bus
- The importance (or otherwise) of having a public bus at the estate
- Satisfaction with various aspects of the estate including access to public transport
- Car ownership

Approximately 900 houses were built and occupied at the time of this survey.

5. Results

The 798 bus survey resulted in a total of 71 responses. The Selandra Rise resident survey had a sample size of 202 respondents (all aged 18+) from 190 households (out of 900 occupied houses).

5.2 Respondent demographics

Table 1 presents the demographics of the two survey samples. Where possible, these demographics are also compared to the 2011 census for Cranbourne East, although the census was conducted when Selandra Rise had only just opened.

Table 1: Survey Demographics

| Data | | 2011 Census ^a | SR resident survey | 798 bus survey |
|-------------------|------------------------------------|--------------------------|--------------------|----------------|
| Gender | Male | 48% | 42% | 41% |
| | Female | 52% | 58% | 59% |
| Age | 18-24 | 12% | 3% | 37% |
| | 25-34 | 31% | 47% | 27% |
| | 35-44 | 24% | 31% | 12% |
| | 45-54 | 15% | 7% | 8% |
| | 55-64 | 10% | 8% | 8% |
| | 65-74 | 5% | 3% | 5% |
| | 75+ | 10% | 0.5% | 3% |
| Occupation | Employed FT | 43% | 66% | 20% |
| | Employed PT | 15% | 19% | 18% |
| | Unemployed | 3% | 4% | 10% |
| | Student | - | - | 37% |
| | Retired | - | 5% | 13% |
| | Other | - | 6% | 3% |
| | <i>Not in labour force (total)</i> | 31% | 17% | 53% |
| Place of birth | Australia | 65% | 49% | - |
| | Not in Australia | 35% | 51% ^b | - |
| Live in SR? | Live in SR | - | 100% | 57% |
| | Visiting someone in SR | - | - | 28% |
| | Not visiting SR this trip | - | - | 15% |
| Cars in household | 0 | 3% | 1% | 13% |
| | 1 | 32% | 18% | 45% |
| | 2 | 47% | 72% | 33% |
| | 3+ | 18% | 9% | 8% |
| Access to car | No car | - | - | 23% |
| | Yes but can't drive | - | - | 45% |
| | Have to share car | - | - | 13% |
| | Yes can use car | - | - | 18% |

^aCranbourne East SA2 statistical area 2011. 'Age' percentages are calculated out of those over age 18 to be consistent with survey samples.

^b40% had lived in Australia for 5 years or less and a further 32% had lived in Australia for 6-10 years. The main countries of birth for migrants were India (23%), Sri Lanka (21%) and the Phillipines (9%).

The demographics of the residents surveyed in Selandra Rise were similar to the 2011 census from Cranbourne East. The survey population was fairly young (majority aged 25 to 44) and employed full-time. The Selandra Rise survey respondents were more likely to be born overseas and had higher car ownership than the census average.

The 798 bus survey respondents displayed some differences in demographic makeup. They were considerably younger with 64% aged under 34 and they were less likely to be employed full time. They were more likely to live in a household with no car or only one car, and 68% either had no car or could not drive. Some 85% of respondents were either residents of Selandra Rise or visiting the estate; the remaining 15% were generally using the bus to travel between Cranbourne rail station and shopping centre. For the remainder of the bus survey results, only residents and visitors of Selandra Rise will be included in the analysis (sample size 51).

5.3 Use of the 798 Bus

The combination of a resident's survey with a bus user survey allows a broader understanding of the role of the bus in the estate. Table 2 compares the frequency of use of the bus between the resident surveys (covering resident population) and the 798 bus user survey (covering bus users). As would be expected in this context the resident survey suggests a wider base of lower frequency use. Some 25% of the residential population use the bus at least 'rarely'. The bus survey necessarily oversamples more frequent users (88% of the bus user sample use the bus at least a few days a week or more). These two outcomes are entirely consistent with the sampling approaches adopted. They suggest a very strong resident base and penetration for using the bus even if only on an occasional basis. The bus survey illustrates the significant level of use being made by a few higher frequency users who tend to be mostly younger people using it for work and educational purposes.

As shown in Table 1, residents of Selandra Rise were more likely to be migrants than other areas of Cranbourne. The resident survey suggests that the bus was used more often among migrant households; 36.5% of migrant residents had used the bus service compared to 12.9% of Australian-born residents ($\Phi = 0.272$, $n = 189$ $p < .001$). Households with children were also more likely to have used the bus service than those without children (47.4% vs 22.7%; $\Phi = 0.257$, $n = 185$ $p < 0.001$). The presence of children in the home was not significantly associated with birth in Australia/overseas and there was little difference in bus use between households without a car or only one car and those with multiple cars.

Table 2: Frequency of bus use (SR survey and 798 bus survey)

| | SR Survey | SR Survey bus users | 798 Bus Survey |
|----------------------|-----------|---------------------|----------------|
| Daily | 0.5% | 2% | 43% |
| A few days per week | 5% | 21% | 45% |
| A few days per month | 6% | 26% | 6% |
| Rarely | 12% | 51% | 6% |
| Never | 77% | - | - |

5.4 Role of the 798 Bus

The 798 Bus Survey gave some strong insights into the role of the bus in the lives of its riders. The majority of respondents (75%) used the bus to travel between Selandra Rise and either the Cranbourne shops or rail station and 22% continued on to a connecting bus or train service. Over 90% of respondents walked to the bus.

Figure 3 shows that the trip purpose of bus riders was quite diverse. Despite the high proportion of students in the survey sample, the most common trip purpose was work (28%) followed by study (24%) and shopping (24%).

Figure 3: Main Purpose of Bus Trip

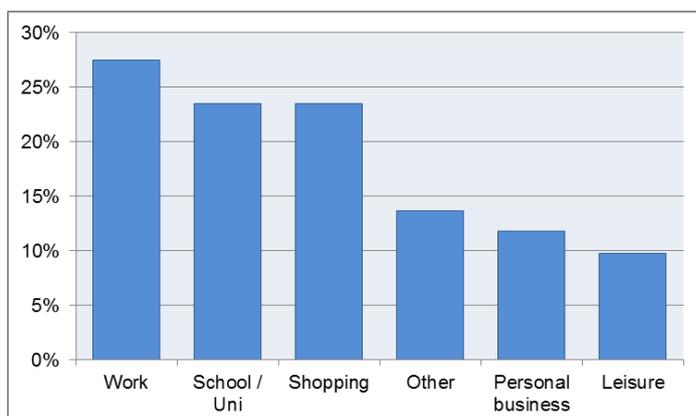
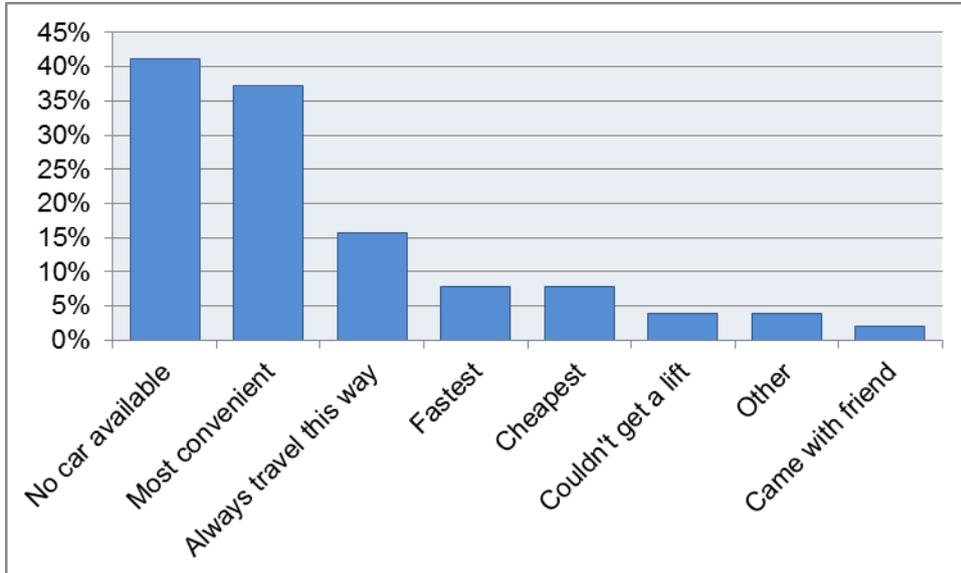


Figure 4 shows the main reasons people used the bus (multiple answers were allowed). Reflecting the low car ownership and availability shown in Table 1, the most common response was that survey respondents had no car available. A further 37% said the bus was the most convenient way for them to make their journey.

Figure 4: Main Reason for Taking Bus

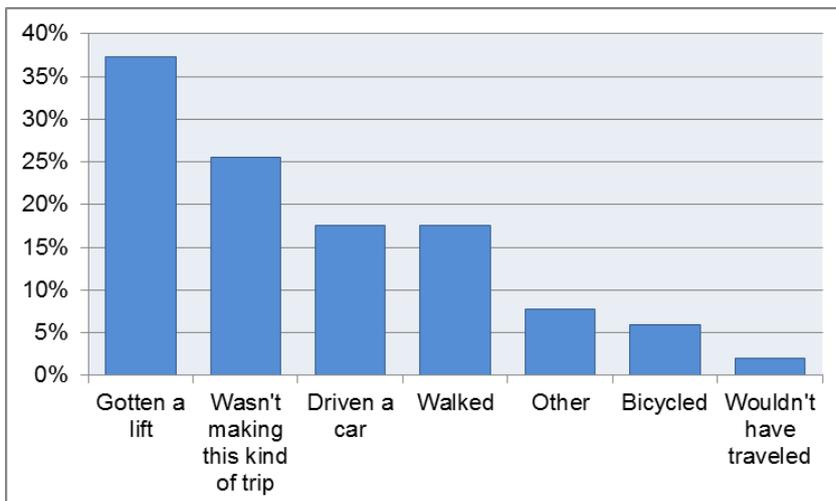


5.4 Impact of the 798 Bus

The resident and bus surveys together give a multi-faceted understanding of how the 798 bus has impacted residents of Selandra Rise. Among the resident surveys, 92% of respondents (including those who had not used the bus themselves) considered the bus service to be important.

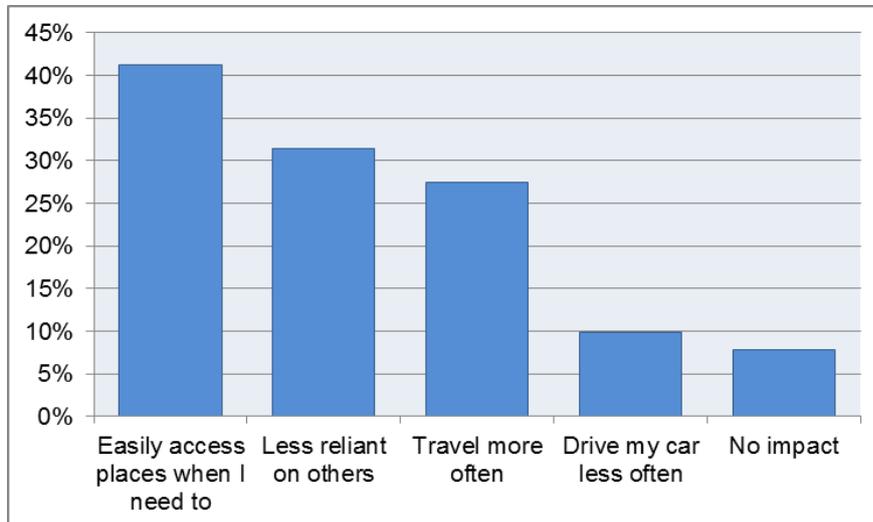
Figure 5 shows how respondents would have made their trip before the bus was implemented in July 2014. Most respondents would have gotten a lift, driven or walked. Over 25% were not making this kind of trip before the bus, either because they moved to the estate after the bus was implemented or they had only started making that type of trip (e.g., new job or study).

Figure 5: How Would Have Made Trip Before Bus



Bus survey respondents were asked to nominate the impacts of the 798 from a list. Figure 6 shows that easily accessing places was the most common impact, followed by being less reliant on others and travelling more often.

Figure 6: Impact of 798 Bus



Both the bus survey and the resident survey also provided open-ended questions about the impacts of the 798 bus. The bus survey asked “13. How would it affect your household if this bus service stopped running?” and the resident survey asked “Do you consider it important to have a public bus service at Selandra Rise? If yes, why?” Both questions elicited similar responses

5.4.1 Impact on individuals

Many people in both surveys discussed serious impacts on their lives if the bus did not exist. Several mentioned the loss of jobs or study:

“I most likely would not have transport to work, possible job loss.” (798 Bus Survey)

“I would be unemployed.” (798 Bus Survey)

“As I don't drive at this stage, if my husband works late, this is my only mode of transport back home”. (SR Survey)

Other mentioned more general impacts on their travel, such as “Only mode of public transport to get to train station” and “Won't be able to go anywhere” (798 Bus Survey).

5.4.2 Impact on the wider household

The 798 bus does not only impact those who use it; it can also free up time within the household. Recall that most bus users could not drive a car and many said that without the bus they would rely on a lift from other household members (Figure 3). Several bus survey respondents said that without the bus they would have to rely on their parents or spouse (generally husband) for a lift:

“[Would] have to rely on my husband” (798 Bus Survey)

“[Would have to] rely on my family” (798 Bus Survey)

These impacts are not insignificant on overall household budgets. The resident survey shows that over one third of the estate's residents travelled more than 1 hour each way to and from work, mostly by car. These long commutes were often tiring and stressful and impacted the time available to spend time with family, exercise and other healthy practices. The bus helped free up parents' time and reduced the amount of time they spent driving

each day. For example one respondent who did not use the bus said that “[my] kids can travel by bus to / from school...saves my time”.

5.4.2 Impact on social connections

The bus helped residents entertain and maintain connection with friends and family; recall from Table 1 that 28% of survey respondents were visiting people living in Selandra Rise. Many households had relatives who visited from overseas, often for long periods. For example one resident survey respondent said “my mother visits 3-4 times per year for 3-4 weeks each time. When the bus wasn't here she was completely housebound. Now she can get out and about”. Another respondent said, “my sister is legally blind and cannot drive. If I can't pick her up she will use bus service to visit me” and others noted the need to have a safe mode of transport home after social events involving alcohol.

6. Discussion and implications

This paper explores the impact of the 798 bus on a new master planned estate (Selandra Rise) in Melbourne's south-east fringe. It draws upon two surveys to create a more complete picture: a survey of Selandra Rise residents and a survey of people on the bus. The two surveys revealed that the bus performs an important function as a form of ‘social transit’ for residents of the estate.

The bus had been running for less than a year and the bus route has poor penetration into the suburb (with only a small portion of households within 400m of the bus). Yet 96% of households knew about the bus and 35% of households reported that at least one person used the bus. Furthermore, over 90% of bus users walked to the bus despite the long access distance. A number of respondents commented on this, suggesting that more people would use the bus if it entered further into the estate.

When considered from the perspective of Selandra Rise residents, very few people used the bus more than a few days per week. However, those who do use the bus use it very frequently (88% at least a few days a week) and many of them use the bus for essential functions such as going to work or study. Most bus riders were young and could not drive or had no car available, making them quite reliant on the bus. The bus provides them with freedom to access important destinations and travel more often. In contrast, having to rely on others for mobility can have significant impacts on well-being and social exclusion (Delbosc and Currie 2011b).

Beyond the individual, the 798 bus also had an important role for other household members. When one household member uses the bus, it frees up the time of other household members who would have had to provide lifts. In a housing estate where many workers are commuting over one hour each way, these time savings can have a significant impact on how households use their time.

As is usually the case on the suburban fringe of cities, the 798 bus ridership is not high and is unlikely to become a ‘mass transit’ feeder mode. However, these results suggest that the 798 is performing an important ‘social transit’ function (Betts 2007). Without the bus, these individuals and households may be at greater risk of social exclusion, which has significant negative impacts on individuals and society as a whole (Currie et al. 2009), particularly in urban fringe areas (Delbosc and Currie 2011a). These findings highlight the need for early delivery of bus services in new fringe areas. Transparency about when bus services and other public transport will be delivered (and routes information) is essential to enable potential home buyers and renters to make informed decisions about what residential locations will support their family's social, health, educational and financial needs.

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