

Demand responsive passenger transport in low-demand situations

December 2010

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Auckland

ISBN 978-0-478-37124-6 (print)
ISBN 978-0-478-37123-9 (electronic)
ISSN 1173-3756 (print)
ISSN 1173-3764 (electronic)

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Scott, RA (2010) Demand responsive passenger transport in low-demand situations. *NZ Transport Agency research report no.425*. 106pp.

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Keywords: accessibility, community transport, demand responsive transport, flexible, low density, mobility, public transport, paratransit, Telebus

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Acknowledgements

I would like to thank Susan Chapman for her work on the literature review and early stages of the research. The case studies would not have been possible without the assistance of Alan and Grace Byers volunteers for Te Aroha Red Cross community van, Mike Cuthbert volunteer for the KatiKati community van, and Harry Pollok and Chris Ross from RE-LI-ON-US Mobility Services. Thanks also to Michael Lancaster for the photographs of the Telebus. Thank you to Adrian Gervasoni from Grenda transport for his insight into the daily operations of the Telebus. The guidance provided by Graham Currie and Avi Ceder on additional literature sources and restructuring the content was invaluable. Thanks to Jeanine Benson for her editing and encouragement.

Abbreviations and acronyms

ACTION	Australian Capital Territory Internal Omnibus Network
AVL	automatic vehicle location
CBD	central business district
DART	Dial a Ride Auckland
DHB	District Health Board
DRT	demand-responsive transport
GIS	geographical information system
GPS	global positioning system
IRD	Inland Revenue Department
ITS	The Institute of Transport Studies, Monash University, Victoria, Australia
LTA	Land Transport Act 1998
NZTA	New Zealand Transport Agency
OPT	Office of Public Transport (Adelaide)
PHAB	Physically Handicapped and Able Bodied Association
PPFM	<i>Planning, programming and funding manual</i>
PT	public/passenger transport
PTMA	Public Transport Management Act 2008
UK	United Kingdom

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Executive summary

Demand responsive services are seen as a cure for high-cost bus services in low-demand areas. Demand responsive transport (DRT) services cover a wide spectrum and international experience is mixed in terms of success. By adopting the best practices of successful services and avoiding the pitfalls that caused others to fail, DRT can have a role to play within the transport sector in New Zealand. Public transport (PT) in areas of low demand is a problem that many communities and transport agencies are engaged in solving. Smaller communities have developed community vans as their solution and transport authorities worldwide have introduced various types of DRT solutions.

Booz & Company (New Zealand) Ltd studied DRT as part of the NZ Transport Agency (NZTA) 2008/09 Research Programme. The research examined the role and potential for DRT and other flexible forms of PT to cost effectively meet PT accessibility needs in low-demand situations in New Zealand. The research focused on the access needs of PT dependent groups and low-demand situations including suburban areas, smaller towns and rural areas. A literature review identified DRT experience worldwide as well as assessing three New Zealand/Australian case studies as follows.

- community vans in the towns of KatiKati and Te Aroha
- commercial mobility service RE-LI-ON-US Mobility Services, Auckland
- Telebus service in Melbourne.

Existing, withdrawn and proposed DRT schemes in New Zealand, Australia and internationally were investigated. Based on the strengths and weaknesses of prior DRT services the role and scope for successful DRT schemes in NZ were developed. A number of lessons learned from successful and withdrawn DRT services are relevant to DRT services operating in or being considered for low-demand situations.

DRT services are growing in popularity in Australasia and internationally. They are able to deliver alternative PT solutions in situations where conventional PT services fail, or are not the optimal solution. Situations that suit DRT services include:

- specialist community-based services for older people and people with a disability
- services in rural and other low-density areas
- services during off-peak times, like evenings and weekends
- where greater levels of service flexibility are required
- where more affordable forms of transport than single-hire taxis are required.

As patronage demand increases, fully flexible services become unreliable and demand can drop again creating a self-equalising low-demand service pattern. This demand-based reliability problem is common to all flexible services where the door-to-door service is only practical in terms of journey time if the demand is low. Once demand increases, the required journey length and therefore journey time becomes too high resulting in long and slow journeys with winding route paths. This effect can be limited by reducing the flexibility of the service. Adding fixed-route peak commuter and school trips to the DRT timetable ensures peak demand periods remain reliable, therefore retaining passengers. To speed up the trip in the counter peak direction the service can be operated as an express using a direct route. This strategy could be used on many fixed-route bus services providing a motorway express service in the

counter peak direction or a service that uses a main arterial with limited stops. Concentrating demand on high-quality centralised bus stops increases the visibility of the service and reduces the number of stops. Limiting the drop off or pickup points to the entrance to dead-end streets (cul-de-sacs) avoids doubling back. All of these strategies involve reducing the flexibility of the service as demand increases. Keeping a fully flexible service in high demand has frequently ended in failure.

PT can be introduced to a suburb by starting a fully flexible DRT service and offering long-term subscriptions thus enabling the route to be established by the regular users over the first one to two years. After this period it can become a fixed-route service using the established pattern of use. The service offered needs to evolve over time towards a more fixed-route service with limited stops. Fixed-route services can also adopt this same changing pattern of service with the addition of peak express services and bus priority measures including bus lanes and even busways.

In rural areas, a community van approach is a cost-effective method of meeting transport needs. Financial support of community transport initiatives would be an efficient way to improve mobility in small towns and rural areas. Cooperation between health, education, regional and local councils along with funding would provide mutually beneficial services to the community and cost-effective transport expenditure.

By adopting best practices of successful services and avoiding pitfalls that caused others to fail, DRT services have a role to play within New Zealand.

Abstract

Demand responsive services (DRT) are seen as a cure for high-cost bus services in low-demand areas. DRT services cover a wide spectrum and international experience shows mixed success. In 2009/10 Booz and Company investigated DRT services to understand common success and failures. An international literature review was conducted, as well as assessing three New Zealand/Australian case studies as follows.

- community vans in Katikati and Te Aroha
- commercial DRT service RE-LI-ON-US Mobility Services in Auckland
- Melbourne Telebus.

DRT services have been used in areas with street patterns that cannot be efficiently navigated by foot or by bus and prove to be inherently more expensive to serve than multimodal networks. The conflicting objectives of service efficiency and coverage can be balanced by serving areas where demand is concentrated, by limiting the service area and by reducing flexibility as demand increases. Providing DRT services to commuters, schoolchildren and shoppers caters for most journey purposes. Many-to-one DRT service operations are more successful than many-to-many DRT services. Limited stop services are more successful than hail and ride or door-to-door services. DRT services have a role to play within New Zealand by adopting best practices of successful services and avoiding common pitfalls.

1 Overview

1.1 Purpose and objectives

The research detailed in this report was conducted by Booz & Company (New Zealand) Ltd as part of the NZ Transport Agency (NZTA) 2008/09 Research Programme. The aim of the research was to assess the role and potential for demand responsive transport (DRT) and other flexible forms of passenger transport, to cost effectively meet public transport (PT) accessibility needs in low-demand situations in New Zealand. It did this by investigating existing, withdrawn and proposed DRT schemes in New Zealand, Australia and internationally, and using the lessons learned from them to identify a role and scope for successful DRT schemes in New Zealand. The research looked, in particular, at the access needs of PT-dependent groups, and at low-demand situations including suburban areas, smaller towns and rural areas. A literature review identified DRT experience worldwide, and three New Zealand/Australian case studies were assessed as part of the research. Based on the findings of the literature review and the case studies, optimal DRT solutions were identified to meet the various low-demand transport situations across New Zealand.

1.2 Background and context

A primary reason for transportation is to access essential activities, goods and services so that individuals can participate fully in society. While non-transport solutions like telecommunications can deliver some of these needs, people still require some form of mobility to get to most services. The more mobile you are the more activities you can reach.

Over the last 70 years, New Zealand has experienced ongoing urbanisation of the population and increasing growth of low-density developments and road networks to support them, often at the expense of (PT) provision. PT services are generally of a reasonable standard on the main corridors in larger New Zealand cities; however, **they tend to be inadequate to meet users' needs in low-density urban areas, small towns and rural areas. Where these 'low-demand' situations are serviced by traditional PT, such** services are typically of low frequency and coverage, and sometimes heavily subsidised, further exacerbating any accessibility problems caused by spatial development patterns.

These drivers, together with an aging population, mean the New Zealand government faces increasing challenges in ensuring residents and visitors have their access needs met.

An expanded role for PT is pivotal to much of current government policy, including the NZ Energy Strategy and NZ Energy Efficiency and Conservation Strategy. This and changes to external factors (eg the increased oil price, response to the effects of climate change and an aging population) are placing greater demands on the provision of such services, with DRT likely to be part of the solution.

2 Literature review

This review summarises literature relating to the types of PT services provided in low-demand situations and the circumstances in which each type is most cost effective.

2.1 Characteristics of demand responsive transport

There are many definitions of DRT (see for example Mageean and Nelson 2003; Brake et al 2004; KFH Group 2008; Laws et al 2008), all of which recognise DRT as a flexible (route and/or timetable), shared ride, passenger-responsive transport service operating somewhere between traditional public bus services and taxis. DRT services may be publicly available or serve specific groups of passengers such as disabled or elderly people. The use of DRT has increased in recent years in response to more dispersed land-use patterns and the inflexibility of traditional PT services, as a means to reduce social exclusion and to improve the provision of social services transport (Laws et al 2008). It is also seen by operators and authorities as an alternative to conventional PT, providing services in low-demand situations (such as to geographically dispersed areas or during off-peak periods). This is because there is an expectation that the reduced fare box revenue will be matched by lower operating costs. DRT can also provide a more affordable form of flexible transport than conventional single-hire taxis.

DRT is typically categorised according to the type of service being provided and the characteristics comprising it, as summarised below.

Table 2.1 Operational components of DRT (Enoch et al 2004)

Characteristic	Alternatives	Description
Scheduling type	Fixed schedule	Timetable with specific departure times at predefined stops
	Demand responsive	Various options including timetable with allowance for deviations, as required at specified intervals, or solely in response to demand
	Unscheduled	Fully on-demand or continuous (multi) hire
Route type	Fixed route	Predefined route and stops between two fixed points
	Route deviation	Fixed/partially fixed route and schedule but with deviations within a predefined area for passenger pickups or set-downs. Generally operating between two fixed points
	Flexible route	Either operating anywhere within a specified area but with one or more fixed points; operating anywhere within a specified area; or operating anywhere as required by the passenger(s)
Vehicle type	Taxi	Standard 4-5 seat motor vehicle
	Minivan/maxitaxi	Up to 8-10 seats. Can be modified to carry wheelchairs
	Minibus/midibus	8-30 seats. Can be modified to carry wheelchairs
	Bus	Passenger carrying capacity of 30-200 (bi-articulated bus). Can be modified to carry one or two wheelchairs
Origin-destination relationship	One to one	Trips between two fixed points
	One to many	Patronage concentrated at one of the two trip ends. Services often run to/from a key hub, eg train station, bus depot or shopping centre
	Many to one	
	Many to many	Covers multiple trip origins and destinations. May involve a

Characteristic	Alternatives	Description
		transfer to a different vehicle during the trip, eg as a feeder to a conventional bus service
Origin-destination service	Door to door	Service runs between points specified by the passengers, generally being their home, and/or operator, ie may be a predetermined location or one requested by passengers
	Checkpoint	Service runs via predetermined points, passing through the checkpoint at a specified/scheduled time

2.1.1 Fixed schedule services

Conventional bus operations are the most common fixed schedule (timetable) services. They run to a fixed route between two points, with specified arrival/departure times at predetermined points providing users with a high level of certainty. Vehicles are allocated based on projected demand for a service, which, if demand projections are incorrect, can result in an inefficient allocation of the fleet. The fixed nature of the services can translate into high fixed costs for the operator as well as difficulty modifying the service to reduce any inefficiency.

2.1.2 Unscheduled services

Taxis and shuttles are the most common unscheduled PT service. The benefits of such services are the increased flexibility over conventional buses, with operators also benefiting from lower operating costs and passengers benefiting from an anytime, door-to-door service. However, due to the nature of such services they are generally more expensive for the user than conventional buses.

2.1.3 Demand responsive services

As DRT services are introduced to provide some level of flexibility to operators and users, whether scheduling, route, cost or resource, the characteristics in table 2.1 may be varied to meet user demand or operator/agency outcomes. Generally speaking, any level of flexibility in the route travelled will require a corresponding level of flexibility in the schedule, with fully flexible routes tending to operate without a timetable or with specified start and end times only (**usually corresponding with the driver's on and off times**).

With the exception of specialist community transport, the key differences between the various DRT services tend to be in route variance. While all services are likely to operate within a specified zone or area, route deviation services extend fixed-route services by permitting a certain amount of deviation from the route. This deviation can be measured in time or by distance. For example, a vehicle may be required to deviate from its route and yet pass through all its checkpoints at the scheduled times. Flexible routing is a further extension of route deviation, whereby a vehicle will travel to pick up and set down as required within its specified zone. Flexible services can be known as area-based services, and also include the previously mentioned unscheduled services like taxis and shuttles as well as continuous multihire DRT services, which pick up and set down continuously as required.

Table 2.2 summarises the typical relationship between the service characteristics, compared with conventional bus and taxi services.

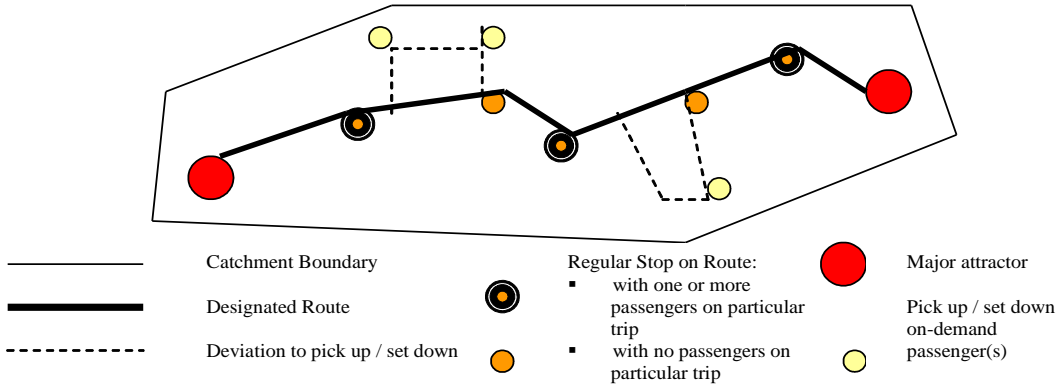
Table 2.2 DRT service characteristics (Currie 2007)

Characteristic	Mass transit (bus)	Demand-responsive services			Single hire taxi
		Route deviation	Flexible route		
			Area-based services	Continuous multi-hire services	
Timetable/schedule	Fixed	Usually uses a timetable with specific departure times. Timetable includes an allowance to cover any deviations	Can be operated at particular times (eg every 30 minutes) or as required	No timetable - operates purely in response to demand	No timetable - purely on demand
Route/origin - destination	Fixed	Fixed, but with deviation to allow pickup/set-down off-route	No route, but covers a specific catchment area, usually with one or more fixed points	Anywhere to anywhere within a given zone or service area	Anywhere to anywhere, no route
Typical vehicle	Bus	Conventional bus or smaller (midi/mini bus)	Small bus or maxi taxi	Maxi taxi or multi-hire taxi	Standard taxi
Typical operator	Bus company	Bus company	Bus, taxi or community transport	Taxi operator, community transport	Taxi operator
Typical fare structure	Standard bus fares	Bus fares, possibly with supplement for door-to-door service option	Zone-based fare	% of single-hire fare, or fixed based fare on origin and destination	Based on meter (flag fall plus distance plus time)
Typical application	Mass transit	Low density area and/or low demand periods	Special needs customers	Affordable, flexible transport	Individual transport
Booking system	None	Required for customers wishing to be picked up off the fixed route	Required for all customers except those at key stops	Essential for all customers	Required except for hail or rank trips

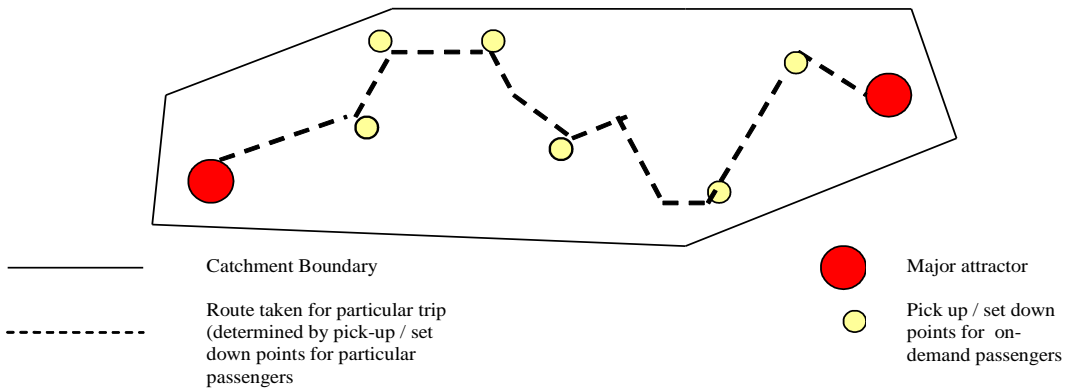
Figure 2.1 illustrates how each of these demand responsive services typically operates in an area/zone.

Figure 2.1 Typical DRT service operation area/zone

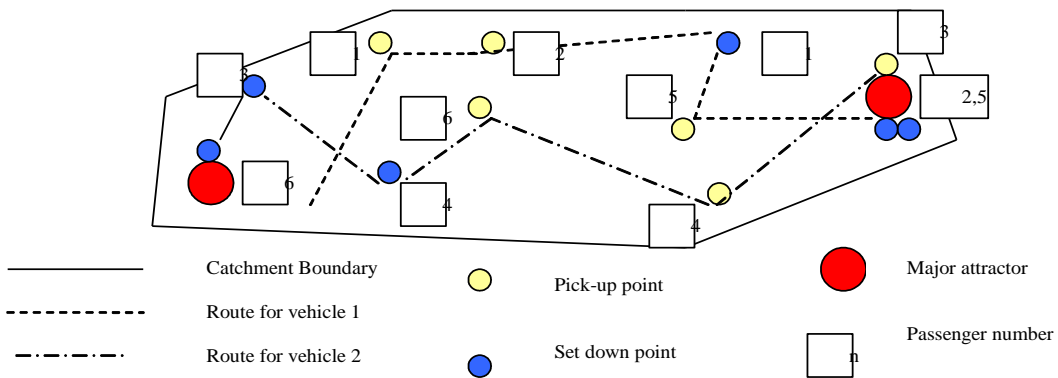
Route Deviation



Area-Based



Continuous Multihire



Source: Booz Allen Hamilton (2004)

Another way to view DRT services is to differentiate them according to the purpose they serve. For example:

- Interchange DRT operates **within some form of schedule, providing additional capacity as a 'feeder' service to conventional PT, eg to a bus depot or railway station.**

- Network DRT enhances conventional PT by providing additional services, or replacing existing uneconomic services such as those running at night or to dispersed communities.
- Destination-specific DRT, while similar to network DRT, serves specific destinations such as airports or employment parks. These services may be introduced by a partnership comprising the operator, **local authority and the 'destination' company**.
- Substitute DRT operates entirely or substantially in place of conventional PT. This is usually the provision of services in rural or new low-density, outer-lying suburbs.
- Community DRT operates across many types of **'community' in many geographical and temporal** situations. Its operation is as varied as it is complex as it can be privately or publicly available and/or operated. Community DRT can be a destination-specific, network or substitute service or can operate entirely independently of PT.

Examples currently operating in New Zealand include:

- district health board (DHB) buses providing services to medical or hospital appointments
- marae, pub, church or sports club vehicles providing services for their respective members
- **volunteer drivers using their own vehicles to drive 'qualifying' people to appointments**, eg Cancer Society volunteers driving patients to appointments
- private businesses such as freezing works providing transport for seasonal workers
- private transport companies contracted to regional councils such as Dial a Ride Auckland (DART), which provides a specialist wheelchair vehicle shuttle service that offers on-demand door-to-door transport for any person whose impairment limits or prevents them from accessing other PT services (Blake 2008).

2.2 DRT operations planning

The literature review included previous studies of DRT operations planning. Farwell (1996) examined the operation of routes with flexible itineraries. Farwell found that although flex-route services were less productive and efficient than fixed-route services, in lower-density auto-oriented suburban environments flex-route services might be the most appropriate means of delivering transit services. Where land use and population densities were not conducive to fixed-route services, especially given the additional paratransit service requirement of the Americans with Disabilities ACT 1990, flex-route services might be a more fiscally palatable alternative (Farwell 1996).

Stone et al (1993) evaluated software for a computerised paratransit operation to consider whether computer dispatch technology was, or would be, capable of effectively improving the efficiency of dispatching shared-ride vehicles on a real-time basis.

Spring et al (1998) analysed aspects of employing automatic vehicle location (AVL) technologies for paratransit services. Key findings were that the paratransit system's efficiency improved slightly with AVL, but that demand variables did not change significantly relative to non-AVL equipped vehicles.

Bakker (1999) identified that demand responsive shared taxi services were better suited for less dense criss-cross travel patterns than regular fixed-route time-scheduled bus services. In less dense suburban

trip patterns paratransit is more competitive to private car use than traditional PT. Bakker concluded that it was not financially viable to provide paratransit with regular PT fares and that higher fares were needed. Advanced technologies offered more opportunities to improve paratransit than traditional PT and those in use yielded better performance especially in large-scale operations (Bakker 1999).

Benjamin and Sakano (2000) presented a geographical information system (GIS) applied to a dial-and-ride service and analysed the quality of the service and consumer response. The study analysed consumer response to Mobility Manager, a GIS applied to the site's demand responsive minibus service for the elderly and people with disabilities. Horn (2004) developed an algorithm for planning multi-legged trips that could minimise travel time on both DRT and fixed routes. The main planning procedures were a high-level request broker and a branch and bound procedure to handle multi-legged journeys. The request-broker also invoked a fleet-scheduling module to obtain bookings on demand responsive services.

Most North American DRT literature focuses on paratransit services that are a specialised mobility service for the disabled. The American paratransit services have a regulatory basis under the 1990 Americans with Disabilities Act, which places some limits on the operational characteristics. **New Zealand's approach to providing service to the disabled is via the Total Mobility taxi scheme and is not directly comparable.**

Einstein (2000) noted that a software program was only marginally better than a competent scheduler or dispatcher. Efficiency gains could be made with a focus on optimising prescheduled (subscription) trips, grouping trips that were not time dependent, expanding eligibility, differentiating fares based on zones, concentrating vehicle fleets in high-density yield areas, and deployment of vehicles in time and space. Pagano et al (2001) found that 'the use of computer aided scheduling and dispatch systems to promote higher vehicle productivity resulted in slightly longer ride times'. Pagano et al also found that most operators did not use the optimisation feature of the software. Kikuchi (1988) noted: 'The more customers who are added to a vehicle through effective use of computer aided scheduling and dispatch systems, the greater is the efficiency, but also greater are the passenger ride times, thus the quality of service ultimately is diminished'.

2.2.1 DRT operational strategies

Ceder (2010) examined a multi-criteria and multi-strategy design of PT shuttles serving the San Francisco Bay Area Rapid Transport (BART) metro rail stations. At the operational level 10 different routing strategies were examined, looking at all the combinations of fixed/flexible routes and schedules, a uni- or bi-directional concept, and short-cut (shortest path) and/or short-turn (turn-around) concepts. These strategies were investigated by employing a simulation model specifically developed and constructed for this purpose.

The service design aimed to

- meet the needs and desires of end users
- utilise intelligent – transport technologies
- increase operational efficiency.

Ceder identified 10 operational strategies to achieve these three goals.

- 1 Fixed route with a fixed schedule (timetable) and fixed direction of travel (typical bus route)
- 2 Fixed route with a flexible (demand-driven) schedule, fixed direction (such as DRT hospital shuttles)

- 3 Fixed route, flexible schedule, bi-directional
- 4 Fixed route, flexible schedule, fixed direction, possible short runs
- 5 Fixed route, flexible schedule, bi-directional, possible short runs
- 6 Fixed route, flexible schedule, fixed direction, possible short turns (return to train station)
- 7 Fixed route, flexible schedule, bi-directional, possible shortcuts
- 8 Fixed route, flexible schedule, bi-directional, possible short runs and short cuts
- 9 Fixed route, flexible schedule, bi-directional, possible short turns and short cuts
- 10 Flexible (demand responsive) route with a flexible schedule (such as RE-LI-ON US, Dial a Ride).

Similar strategies have been adopted in practice by services such as Treintaxi in The Netherlands, which uses a flexible route and the schedule is set by the arrival of trains at the station. The night-rider buses that operate in Wellington and Auckland use a single direction of travel (outbound from city) and can use a shortcut method to return to the depot once the last remaining passenger is dropped off. The Telebus uses a fixed direction of travel during the peak (towards the train stations) and has a mixture of fixed route and flexible route. Most of these services tend to vary the route more than the schedule so they operate trips on an hourly or half-hourly basis thus grouping sets of passengers together and dropping them at their desired destination within a geographically bounded area. Services to areas of high demand such as airports and train stations have the advantage of serving an area of concentrated demand and depending on the frequency of the train service can operate on a flexible schedule basis returning to the station to pick up the next group of passengers.

2.3 Booking and routing technologies

While some DRT services utilise simple operator-based booking and dispatching systems, a number of newer technologies are employed that, while costly up front, can result in operator cost savings over time. These include:

- booking and routing technologies
- vehicle and destination location systems
- integrated fares and ticketing.

These technologies enable providers to meet a **wider range of users' needs, including reduced passenger** waiting times between booking and pick-up, more direct routing, door-to-door services and efficient ticketing solutions.

Booking and routing technologies include simple phone operator systems and booking directly with the driver (when boarding at a hub in a one-to-many situation), internet bookings, the use of customer databases, automatic customer callback facilities and automated booking systems. Taxi companies, for example, historically used phone operators with real-time dispatch information transmitted to all taxis. Automated booking systems used in the taxi industry are now highly advanced, enabling large numbers of bookings for single-hire taxis as well as group and multi-hire bookings. They are now also utilising the internet to accept bookings at a minimum of one hour in advance.

A key issue for DRT services is how to deal with real-time ('dynamic') booking requests, without delaying pre-scheduled pickups. This is particularly so for route deviation services, where it is critical to determine how much scheduled operating time should be reserved to accommodate dynamic booking requests (Alshalalfah and Shalaby 2008). Alshalalfah and Shalaby (2008) created and tested a scheduling model that **employed 'constraint programming' on a hypothetical network to determine** optimal slack time length and spacing of fixed stops, and the effect of constraining the vehicle to be at the fixed stops prior to its departure time from them. They concluded that relaxing the constraints around fixed stops would allow the operator to assign less slack time to the service, thereby reducing operating costs. At the same time, this would maintain an acceptable level of service for both fixed-route and demand responsive customers.

Real-time autonomous dial-a-ride transit developed by Dr. Robert Dial of the Volpe centre¹ is one area that has potential to reduce dispatching costs. This is based on autonomous vehicles being able to negotiate with one another in order to assign passengers to a vehicle at the lowest cost. The system consolidates scheduling, fare collection, credit verification and vehicle routing into a single automated system. The driver is alerted to the next pickup by the system without using a dispatcher (Lau 1998).

The ACTION flexibus DRT service in Canberra, Australia used a screen-based booking system that sent multiple text messages to individual driver consoles. This system enabled two-way information flows between the call centre and drivers, and the cancellation of a service if there were no booking requests.

The method for determining the optimal route depends on the type of service being provided (route deviation, area based, continuous multi-hire) and the number of vehicles operating in the area. Route deviation services operate on a tightly defined route but deviating off it between set points to pick up on-demand passengers. Area-based services undertake a much less formal trip between two points. Multi-hire services require multiple vehicles to be routed to group the pickup and set-down locations for each individual vehicle.

Many mathematicians have studied the issue of multiple pickup points. It was initially known as the travelling salesman problem in the 1800s in Germany. Later the Irish mathematician W.R. Hamilton devised Hamiltonian cycles to find an efficient way to cover each city without visiting them more than once. Other variants of the travelling salesman problem include the vehicle routing problem (Dantzig and Ramser 1959), the dial-a-ride problem or the Stacker Crane problem. These problems remain an area of research and were studied by Berbeglia et al (2009) in their paper *Dynamic pickup and delivery problems*. Mathematicians solve these problems with algorithms and transport operators solve them by changing operating methods or the service. Route optimisation software based on algorithms enables operators to provide the most flexible DRT service. However, it is relatively costly and, if used unnecessarily, can undermine the success of a service (Ministry of Transport 2007). For over 30 years, the Melbourne Telebus drivers have calculated this in their heads using local knowledge of the roading system and traffic conditions. Route optimisation software can only partially solve the problem. A mathematically optimum route may translate into an unattractive service for the customer, where the wait or journey time is increased or the flexibility of the service reduced. The effect is a self-regulating cycle between increasing patronage demand causing unreliable service, which then reduces demand.

The reduction in cost and proliferation of global positioning system (GPS) software and hardware has made these technologies increasingly cost effective. Where the scale of the operation is large, involving many vehicles and drivers, and when operations are over a wide area these technologies may well be

¹ www.volpe.dot.gov/infosrc/journal/winter00/reach.html

appropriate. There is already widespread use of vehicle location and GPS-based dispatch software in the taxi industry and paratransit market in the USA. The balance between route optimisation and customer experience is critical and can be obtained through the right mix of operational characteristics and application of technology.

2.3.1 Vehicle and destination location systems

Linked to the routing of services is the requirement for drivers to be familiar with the area in which they are operating. Vehicle and destination location systems, typically using GPS technology, are employed in call centres for operators to readily locate and dispatch vehicles, and in vehicles to assist drivers navigate the optimal route to the required destination both quickly and easily.

2.3.2 Integrated fares and ticketing

Integrated fares enable users to pay for a journey regardless of the number of modes or vehicles they use to complete that journey, or pay for a series of trips within a defined timeframe. An integrated ticket is the **'media' that is accepted by any operator for individual trips within the area/zone the ticket applies to. Such media are becoming increasingly more sophisticated, with 'smart cards' adopted by many transport operators around the world. Hong Kong's Octopus Card, was the first contactless, rechargeable, stored value card in the world.** It was introduced in 1997 for use on the mass transit system and is now also used as a payment system for car parks, supermarkets, restaurants, parking meters and service stations.

Integrated fares and integrated ticketing often operate in tandem. The transport network in metropolitan **Melbourne has employed both for the last 25 years. Users can purchase, for example, a day pass for 'zone 1' for AU\$6.80 (being an integrated fare),** which enables them to travel any number of times that day on the tram, train and/or bus, regardless of operator, within that zone. The pass is a magnetised **'ticket'** (being the integrated ticket) that is validated on the first trip and scanned on each subsequent trip. An integrated ticket removes some of the natural oligopoly that exists in PT and can allow niche providers to be added to the network. This may enable smaller van or midibus operators to provide DRT services. Local feeder/distributor services from rail stations are an example.

The benefits of adopting such systems include ease of use for passengers, especially those interchanging between DRT and conventional PT services. Operators benefit from improved patronage data, reduced-to-no driver-passenger ticketing interaction (which can translate into reduced trip time variability) and improved fare box revenue. The Total Mobility Scheme provides a type of integrated ticket as the cards can be used in many different taxis.

2.4 Pricing of DRT

2.4.1 Pricing structures

DRT services, like the majority of conventional PT services, tend to involve subsidies. The level of subsidy will vary and it may be linked to the primary reason for the service. For example, provision of a service in response to a central government social policy may have a higher level of funding than, say, a DRT service introduced to replace an uneconomic, regionally funded, conventional bus service. Enoch et al (2004) have identified the following four key levels of financial performance of DRT services:

- 1 Commercially viable DRT. These are services that are either profitable, or operate within a commercial context (eg temporary losses are accepted as a service is built up or a loss-making service is compensated by its positive financial effects on a service network as a whole). Such services are rare. They tend to comprise the following features:
 - a low technology, eg manual scheduling
 - b low-cost drivers, eg non-unionised; full passenger licence not required
 - c spatially confined operating areas
 - d high fares
 - e many-to-one/one-to-many operation.
- 2 Acceptable subsidy DRT. This is where DRT requires the same or a lower subsidy than other comparable fixed-route/tendered services. A subsidy of £2 (equivalent of NZ\$5.34) per trip or less appears to be the crucial threshold. Higher fares are a factor that can reduce subsidies to an acceptable level. DRT services with an acceptable subsidy are rare.
- 3 Justifiable higher subsidy DRT. This is where a subsidy higher than that of tendered services can be justified. This may be due to the operational area, eg low-density or rural areas, where the DRT option would be more cost effective than the tendered service, or because it could yield significant cross-sector benefits.
- 4 Financially unsustainable DRT. This may be demonstration or trial projects, or other services whose losses remain very high, often due to overspecifying the services provided.

2.4.2 Cost effectiveness

The Institute of Transport Studies at Monash University Australia (Currie 2007) updated to 2006 values a 1990 analysis (by Travers Morgan) of the performance of 24 DRT services across North America, the UK and Australia. Data analysed included population density, service type and number of vehicles used, boardings, operating costs, revenue, subsidies and cost recovery for each service. Currie formed the following conclusions:

- None of the DRT systems are profitable.
- There is a relationship between residential land-use density, hourly boarding rates and profitability.
- Many-to-many services with modest subsidies are operating in higher-density areas.
- Cost recovery and fare per trip are generally directly related, but the relationship is weak.
- Of the services operating within residential densities typical of Australian conditions (≈ 1000 people/km²):
 - the average cost recovery is between 15% and 44%. The Melbourne Telebus services in Lilydale has the highest cost recovery and a relatively high fare, compared with other services analysed
 - subsidies per boarding range from AU\$2.24 to AU\$5.92. Telebus has the lowest subsidy per trip.

- Almost all the low-density DRT services are many-to-one (or few) services operating with a small fleet of buses. Subsidies for such services are expected to be high and have low cost-recovery levels.
- Although the data is dated (1990), the Lilydale Telebus service has:
 - excellent relative productivity at 18 boardings per hour. This is the highest for the services operating in low-density areas
 - one of the lowest subsidy levels despite operating in one of the lowest-density areas
 - good relative cost recovery. Although it has a higher fare than many other services analysed, it also has good relative fare levels versus cost-recovery balance.

2.5 Situations in which DRT is used

DRT services are used in a variety of situations to address a wide range of user needs. This research focuses on the application of DRT services in low-demand situations, with regard for the access needs of the transport disadvantaged. (Koffman 2004) studied operational experiences with flexible transit services and found that North American transit agencies used flexible services to:

- provide cost-effective coverage to spread-out, low-density areas
- serve low-demand periods
- balance customer access and routing effectiveness
- reduce or eliminate the expense of separate paratransit for people with disabilities
- lay the groundwork for future fixed-route transit
- respond to community preferences and geography.

DRT services operate on a flexibility continuum between the fully flexible unscheduled door-to-door service typical of taxi and van-based DRT services to less flexible full-size bus services that operate a relatively inflexible scheduled route. The service offered may need to change over time as demand increases or decreases to balance the efficiency of running time with the coverage of flexible services.

2.5.1 Low demand

Low demand for PT can be brought about by a number of factors, including:

- time of day, eg evening
- day of week, eg weekends
- low-density land-use patterns, eg suburban, outer suburban, peri-urban, provincial and rural
- population characteristics of different land uses.

Some of these factors are interrelated and may be exacerbated by each other. For example, high car ownership in outer suburban and provincial areas may result from a low-density single-use land-use pattern, household composition (often families) and a lack of PT. The latter, if provided, would most likely have high operating costs due to the former variables, which in turn act to reduce demand for PT.

2.5.2 Transport disadvantaged

The NZTA (2008) *Planning, programming and funding manual* (PPFM) defines the transport disadvantaged as ‘those who do not have access to a private means of transport and who face actual or potential obstacles in using traditional public transport by living in areas not served by public transport, or by being unable to afford public transport, or by being unable to access public transport due to having a permanent or temporary disabling condition’. The Public Transport Management Act 2008 has a more succinct (but general) definition, being ‘people whom the regional council has reasonable grounds to believe are the least able to get to basic community activities and services (for example, work, education, health care, welfare, and food shopping)’. Based on these definitions, the groups at a higher risk of being transport disadvantaged include:

- elderly people
- young people and children
- those without access to a motor vehicle, either involuntarily or by choice
- disabled people (mobility and/or communication impaired)
- those on low incomes
- minority groups and new migrants
- people in areas not served by PT, including those in geographically isolated areas.

The original aim of this research stated that particular regard would be given to the access needs of PT-dependent groups and low-demand situations. While this is still valid, in defining the transport disadvantaged it can be concluded that PT-dependent groups are a subset of the former. Furthermore, given that low-demand situations include geographically isolated populations such as rural areas that are not serviced by PT, this research will have regard for the access needs of the transport disadvantaged.

2.6 Examples of successful DRT services

DRT can be applied to a broad variety of services. The level of demand is the main distinction between those DRT services that operate commercially and those that require a subsidy. Some examples of successful DRT services include:

- Airport shuttles are the most common DRT service operating worldwide offering a shared ride to and from airports. These services operate commercially providing a model of the types of situations that suit DRT.
- The Treintaxi service began in 1990 in The Netherlands, using shared taxis operating from train stations to suburbs and vice-versa. The number of stations served has been adjusted according to demand and subsidy requirements. Treintaxi services are still in widespread operation (59 cities). Airports and train stations are high-demand locations, able to support commercial DRT. In low-demand situations, DRT services require subsidy.
- The Melbourne Telebus has been operating for over 30 years (see case studies in chapters 4 to 7).

- In the UK the Wigglybus began in 1999, was renamed Connect2Wiltshire in 2007 and was still operating in 2009.
- The Cango service in England began in 2002 and was still operating in 2009. The Hampshire County Council (2006) transport plan noted that the Cango service: 'Whilst very effective in terms of strong brand image, public awareness, accessibility and social inclusion, these services have significantly higher costs than conventional bus services'.
- The Adelaide metro runs both area-based and route-deviation DRT services under the brand name Roam Zone (appendix A). Six Roam Zone services operate across metropolitan Adelaide, including in some outer suburbs. The original Roam Zone commenced in 2001 in the southern suburbs of Hallett Cove/Sheidow Park. This was an area-based evening service whereby passengers could be delivered, by contracted (shared) taxis, from Hallett Cove station to their homes for a flat fare of \$0.50. The general operating parameters of the current Roam Zone services are:
 - two Roam Zone services operate during the day and five of the six services run in the evenings
 - the majority of services operate seven days from 7pm, with 30 minute headways
 - all services are billed as a 'to your door service'
 - standard fixed-route bus services operate during the day
 - Roam Zones cover a predefined area around the regular bus routes
 - the route deviation Roam Zone services will pass all stops on the route as well as deviate into the predefined zone to drop off passengers
 - the area-based services roam within their respective zones, between pre-specified hubs
 - there is no pre-booking facility
 - Roam Zone is a one-to-many service. Passengers can connect from standard PT services to Roam Zone services at specified hubs in each zone. These include railway stations, bus depots, shopping centres
 - all roaming **services are Hail 'n' Ride, so passengers are** required to clearly hail any Roam Zone service they see in their street
 - passengers can request to be dropped off at any safe location other than the regular bus stops within the Roam Zone, including their own home where possible
 - normal metro ticket fares apply, ie there is no surcharge.

The ITS (Currie 2007) review of the Hallett Cove/Sheidow Park Roam Zone services deduced that the three services (681P, 682, 683):

- were each operated by a single minibus travelling between termini
- replaced low patronage evening bus routes, and patronage was thought to have increased since its introduction although half the services carried no passengers
- had low patronage, at around 5.2 boardings per vehicle hour (0.2 boardings per vehicle km)

- had a unit cost per boarding of around AU\$8.90 per trip. While appearing high, this was the same price as a fixed-route equivalent evening service.

2.7 Examples of DRT services that have failed

Agencies and PT operators assessing the validity of DRT services can learn a lot by reviewing DRT services that have been withdrawn, alongside the review of successful services. Information pertaining to withdrawn services is less readily available than DRT services that continue to operate. However, Enoch et al (2004) undertook the following assessment.

Table 2.3 Lessons from withdrawn DRT services

Operating characteristics	Lessons learned
<p>Translink, Shellharbour, NSW, Australia</p> <p>Route deviation service trialled 1992-93</p> <p>Rural Woollongong</p> <p>Weekdays, no night service</p> <p>Designed around high technology including bus priority signalling, real-time passenger information, digital stop announcements, guaranteed transfers</p> <p>Phone requests accepted up to 10 minutes prior to deviation point</p> <p>5-minute window for arrivals</p>	<p>Over reliance on untested technology.</p> <p>Resulted in low technology solution being used instead</p> <p>Rushed planning meant not enough time allowed to test the technology</p> <p>Operator disenchantment due to technology issues</p> <p>Operators reverted to conventional bus service at trial conclusion</p> <p>Lack of marketing resulted in low patronage</p>
<p>Dial-a-Bus, Milton Keynes, England</p> <p>Highly dispersed, low-density land use not suited to conventional PT</p> <p>Many-to-few door-to-door service with 10 external stop points (feeder service to them)</p> <p>Good advertising and high-quality service</p> <p>Free street phones and phone booking. Radio phone between call centre and bus</p> <p>Bookings up to 30 minutes in advance</p> <p>Popular with users</p>	<p>High cost and high losses</p> <p>Fares too low to reflect high-quality service</p> <p>Underestimated costs/poor budgeting</p> <p>Overly flexible service - too complex to operate</p> <p>Inflexible, unsympathetic operator</p> <p>Land use/street network too complicated/difficult to service</p> <p>Service operated in partially developed area, giving low returns</p>
<p>Shared taxis, Blackpool, England</p> <p>Established in 1991 by taxi operators</p> <p>60p fare for trip in shared taxi</p> <p>Taxi bays installed</p> <p>Service became fully commercial as so popular</p> <p>Fare raised to 80p in 1996</p> <p>Local authority sought to stop the service as it was perceived a threat to bus services</p> <p>Fare increases were stopped and taxi bays removed</p> <p>Service eventually petered out</p>	<p>Local authority support is critical (or at least no opposition) even when a DRT service is commercial</p> <p>Resistance to ride sharing can result in the failure of a service</p> <p>Good marketing can overcome resistance to ride sharing</p>

Operating characteristics	Lessons learned
Dial-a-Bus, Adelaide, Australia	
Trial of a many-to-many service	Overly flexible timetable to difficult to operate
Cross-suburban travel	System too flexible to be practical
Avoided CBD so as not to compete with regular bus services	Many-to-many too flexible
No timetable	Technology too basic for complex system. Needed higher capability technology to process many-to-many service requests
Withdrawn after six days as consistently overloaded	

Some DRT bus services have been touted as successful yet have been cancelled as a cost-saving measure. The Yellow Taxibus, introduced in August 2003 by the Stagecoach group between Dunfermline and Edinburgh, was an attempt to introduce a commercial DRT service. The DRT part of the service failed to reach profitability and also failed to gain public subsidy and ended in November 2005. The ACTION **Flexibus in Canberra began in April 2005 but was cancelled in December 2006** as ‘There were ongoing issues with the service reliability and costs in the back-office, as well as customer complaints (having to plan ahead needed to ring at least an hour in advance, etc). Patronage was also dropping’ (Standing Committee on Planning and Environment 2007). The Regina Telebus in Canada featured in Time magazine in 1972 but was scrapped by the early 1980s. DRT services have survived the proof of concept but relatively few have stood the test of time. Those that have lasted a long time have had a mixture of continued subsidy and good service design.

2.8 Critical success factors for DRT services

A number of lessons learned from successful and withdrawn DRT services are relevant to DRT services operating in or being considered for low-demand situations. These lessons are summarised into the following critical success factors (Currie 2007):

- KISS: Keep it simple. Only introduce a highly complex system if confident it will work and be cost effective.
- One-to-many services operating in spatially confined areas and linked with existing PT services are easier and cheaper to run.
- Keep zones small in low-density areas. This will reduce the chance of overloading and reduce routing complexity.
- Off-peak times are a good opportunity to run bus-based services at marginal cost.
- Raise fares to pay for higher quality services.
- Higher fares and fixed subsidies will help operators manage their risks and, therefore, gain their buy-in.
- Run a high-profile marketing campaign. Include messages designed to alleviate passengers potential concerns associated with using the service.
- Ensure operator buy-in, capability and confidence. Operators should be engaged in service design and planning.

- **Introduce services in ‘sympathetic’ operating areas. This includes established suburbs, users familiar with PT and PT-friendly street networks**
- Understand the market – services need to be responsive to customer needs. This includes information, temporal and spatial needs as well as vehicle fit-outs (low floor, wheelchair/pram accessible, bicycle racks etc)
- Understand the desired outcome and what is required to deliver it: DRT can provide services in many situations for many different groups of users. Each will have its own operating characteristics and associated costs, which must be clearly identified and accepted during the design phase.
- Use existing, under-utilised vehicles as this spreads the cost allocation across both regular and DRT services. Where possible use smaller vehicles (including taxis) as they have lower operating and fixed costs.
- Flexible labour arrangements can reduce operating costs.

2.9 DRT design elements in New Zealand’s low-demand areas

The type of DRT service and operational characteristics implemented need to reflect the demand profile of the area. In remote locations the demand is so low and there are few examples of any service whether volunteer, commercial or PT. In small towns and in some rural areas communities have implemented community vans. The case studies will examine some of the New Zealand approaches to DRT. There have not been any long-term bus-based DRT services in New Zealand, so in order to examine a service with some longevity the Melbourne Telebus service was selected. Many-to-many services are confined to the commercial taxi environment in New Zealand and a specialised Auckland mobility provider RE-LI-ON-US was chosen as a case study.

2.9.1 DRT design elements in small towns

Many small towns do not have sufficient demand to sustain a commercial taxi operation so have devised other ways to meet local transport demands. The most common approach is to fundraise to purchase a community van, which is driven by volunteer drivers from a small town to medical appointments in the nearest city. This approach adopts cost-saving measures of reducing labour costs, and using community funds for capital costs as recommended by previous research. The service area is often limited to the small town and the destination is often the regional hospital. This way the service is a many-to-one operation that can be managed by one vehicle. The trips made each day are limited to the number of return trips the van can make in one day. Typically, this is only two return trips. A midibus could operate this same service and an area-based flexi-route could be a viable option in small New Zealand towns. This type of service has been used in the UK (Cango, Wigglybus) and in Australia (GisBus in Gisborne, Victoria) and the Barossa Valley Dial-a-Ride linking Tanunda, Nuriootpa and Angaston. More targeted services include the Transport NSW funded Bat Bus (Byron Bay), Yaxi (Ballina) and Yowie (Lismore, Kyogle and Richmond Valley Council shire areas) which provide access to regional sporting events for young people aged 12–25.

Community transport in small towns is focused on meeting specific transport needs, such as enabling the elderly to go to hospital appointments, or for youth to reach certain activities. Usually the vehicles are

driven by volunteers or are self-drive hire vehicles. The vehicles may be purchased via fundraising, and fares reflect the running costs and an allowance for vehicle replacement costs. These strategies enable the fares to remain low and for communities to operate the vehicles without using paid drivers.

2.9.2 DRT design elements in low-demand suburban environments

Bus-based DRT services have not been used until recently in New Zealand. The design elements commonly found overseas include limited service areas, where the service is only available within bounded areas. These may relate to a particular suburb or settlement. Links to a main shopping area, rail station or other major attraction enable services to have a many-to-one rather than a many-to-many operating structure. Services are often booked in one direction only reducing complexity and administration costs. Smaller vehicles may be used if streets are narrow. Timetables are structured to enable services to be provided with one vehicle. Flexible routes are used on some late night (night rider) routes for example in Auckland and Wellington.

3 Defining low demand

Meeting accessibility needs in low-demand areas is a challenge for transport authorities worldwide. In order to examine what constitutes a low-demand area, it is useful to first identify the determinants of demand.

3.1 Determinants of patronage demand

Ceder (2007) identified the following factors as key influences on demand.

Population characteristics and changes (general growth in the region, high and increasing immigration, high and increasing number of elderly, high and increasing tourism, high number of college students).

Economic conditions (employment/unemployment levels, per-capita income levels, household auto-ownership levels).

Cost and availability of alternative modes (fuel and toll pricing, parking pricing and availability, taxi fares, fuel taxes, auto purchase and ownership costs, availability of a commuter-benefits programme for employers).

Land-use and development patterns and policies (density of development, relative locations of major employers and residential areas as from, eg increasing suburbanisation, land-use and zoning controls and incentives).

Travel conditions (climate and weather patterns, traffic-congestion levels and highway capacity, traffic disruptions owing to, eg major construction projects).

Public policy and funding initiatives (air quality mandates, auto emission standards, federal- and state-operating capital and transit-funding levels).

Low demand areas will be characterised by low and dispersed population, high levels of car ownership and sprawling suburban development patterns.

3.2 Low demand in urban settings

Some transport agencies have developed minimum patronage levels to establish thresholds for maintaining or removing services. Translink has a minimum threshold of an average seven passengers per in-service hour (Translink 2007). Cities that grew rapidly after 1950 are often characterised by sprawling suburban development. The outer suburbs of many cities are designed on the premise of high levels of car ownership and the use of cars as the primary means of transport even for short distances. They reflect a time when oil prices were low and most of the external costs of cars were unpriced. These suburbs may not even include footpaths and do not have the grid-like street patterns found in the inner city. DRT services in Milton Keynes, Gowanbrae and Croydon were introduced to address the combined issues of low density and curving road patterns.

In *Shaping up*, Queensland Department of Transport (2007) recommends that new residential areas have minimal densities of 15 dwellings per hectare to support effective PT services. The Translink (2007) network plan has specific goals to introduce services into new developments with densities that will support the cost-effective provision of PT services and which have made provision for direct and efficient

transport routes into and through the new development. By addressing the urban design elements that contribute to low PT demand, the inherent inefficiencies are reduced enabling all forms of PT to be more effective in new suburban developments. Auckland **Regional Transport Authority's** (ARTA 2006) *Auckland passenger transport network plan 2006* has a threshold of 30 residents per hectare or 25 jobs per hectare over a minimum developed area of 10 hectares for services to be introduced, including PT-supportive road layouts (including temporary road links to connect areas during staged development). Furthermore, good pedestrian access exists.

ARTA (2006) also identifies a minimum patronage level split into peak and off-peak periods based on the following:

- Peak – minimum patronage is less than 50% of seated capacity (averaged by the number of trips operated during any 20-minute period) at maximum load point
- Other periods – minimum patronage is less than 30% of seated capacity (averaged by the number of trips operated during any 20-minute period) at maximum load point.

These threshold-based planning tools help to identify areas where PT services will and will not be introduced. By setting some density and street design limits future development should be served efficiently by PT rather than requiring specialised DRT services as a second-best solution.

3.3 Summary

DRT services are growing in popularity in Australasia and internationally. They are able to deliver alternative PT solutions in situations where conventional PT services fail, or are not the optimal solution.

Situations that suit DRT services include:

- specialist community-based services for older people and people with a disability
- services in rural and other low-density areas
- services during off-peak times, like evenings and weekends
- where greater levels of service flexibility are required
- where more affordable forms of transport than single-hire taxis are required.

Researchers have identified a number of critical success factors that should be taken into account when considering the introduction of DRT services. These factors were tested in three case studies completed on DRT services currently in operation in New Zealand and Australia:

- 1 DRT in the form of volunteer-driven community vans in the townships of KatiKati and Te Aroha
- 2 An urban commercial DRT service providing specialised mobility service for the mobility impaired
- 3 A long-running, bus-based DRT service in suburban Melbourne.

These case studies cover some of the spectrum of DRT services found around the world and are detailed in the following chapters. The aim of the case studies was to provide examples of how services are operated in different environments ranging from volunteer-based community vans to a commercial mobility taxi service and a bus-based DRT service in Melbourne.

4 Case study 1: DRT in towns: Katikati and Te Aroha community vans

4.1 Katikati community van

The KatiKati community van is a volunteer service providing a link between KatiKati and Tauranga Hospital. This case study involved visiting Katikati on Monday 10 August 2009 to interview Mike Cuthbert, who has been managing the community van since 2003. The van was examined and photocopies of the bookings between 20 December 2007 and 4 September 2009 were taken (the copies were later returned). This provided 386 bookings.

4.1.1 History

This section provides the background to the service, how it began and how it has developed. The Katikati community van started in 1997 with a vehicle purchase via Lions Club fundraising, and donations from local business to provide a community service. Local people who had been involved with St John Ambulance saw the need for non-ambulance transport to Tauranga. Volunteers were co-opted to assist locals who commenced the operation and additional drivers were gained by word of mouth. The Katikati resource centre is used as the booking centre.

The first vehicle, a 1994 Nissan Homy equipped with a New Zealand-made wheelchair hoist, was originally registered to a private individual. In 2003, it was discovered that the van was operating illegally and the service was suspended for about five months. It was explained that the van needed to operate under a registered charity. The unintentional mistake of operating the van outside government regulations was corrected and the vehicle is now registered to the Reach Out Trust and operates within the law.

The vehicle was sold in 2003/4 to a local rest home and was replaced by a 1997 Diesel Nissan Homy, a Japanese import, which includes a Japanese factory-made hoist by Nissan. Funds for the purchase of this vehicle came from the sale of the older vehicle, accumulated trip earnings and a donation from the Lions Club consisting of the proceeds of the Katikati Wine and Food Festival.

Maintenance costs are paid from the Reach Out Trust community van cheque account. When the balance builds up it is transferred to a term deposit to save towards the next van purchase. The community van drivers make decisions as a group, keeping brief minutes of their meetings with decisions made by discussion and consensus. Any decision to replace a van is based on the age of the vehicle and the mileage completed.

4.1.2 The community

Katikati has a population of 3579 (2006 census). It is a fast-growing community with 22% population growth between the 2001 and 2006 census. Katikati is located 35km northwest of Tauranga and is bisected by State Highway 2 with a bypass under consideration. The Uretara stream links the town to Tauranga Harbour. Katikati was settled in 1875 by protestant migrants from County Tyrone, Ireland through the Orange Institution. The land on which the town was built was bought from local Māori and given to the settlers by the central government. The economy was sustained initially by Waihi gold mining, then dairying and now horticulture (mainly kiwifruit). Thirty-three percent of Katikati's population is aged

over 65 and it is a popular place to retire, as property is affordable compared with Tauranga, Mt Maunganui and Papamoa. Te Ara Encyclopedia of New Zealand (2010).

4.1.3 Data collection and analysis

A visit was made to Katikati and the local organiser of the service, Mike Cuthbert, was interviewed. Photocopies were taken of the bookings, which are held at the Katikati Resource Centre. The data was entered into a spreadsheet to enable analysis. A number was allocated for anonymity to each person who used the service in order to capture the regular users. The pickup addresses were generic such as Katikati, Athenree, Waihi, or if it was a rest home with multiple residents then the name of the rest home was used. For rural addresses, 'Rural' was used to as a form of identification. Photocopies were then returned to Mike Cuthbert, so that only Excel data was kept (which had no personal identifiers).

Table 4.1 Booking details

Booking number	Day of week	Date re-quired	Appt time	Appt venue	Location	Patient ID no	Pickup address	RTN distance km	Don-ation*	Wheel-chair Y/N	Date of booking	No of days in advance	Cents per km
1	M	1/7/8	10:00	Tauranga Hospital	Tauranga	1	Katikati	70	\$30	N	20/6/8	10	40c

*Donation is based on a standard suggested donation

4.1.4 Bookings analysis

During the period December 2007 to August 2008 inclusive, 386 bookings were made, 40 (10%) of which were cancelled. Of the 357 completed trips, 78% were to Tauranga and 17% were to or within Katikati. Six trips were made to Auckland and four to Hamilton. Wheelchairs were used in 41 trips (13%). The van was used by 104 different people, which equates to 3% of the Katikati population. Some individuals used the service frequently with three individuals making 23% of the trips and 10 individuals making 46% of the trips. Some individuals required treatment from several different health providers.

If everybody had paid the full charge, \$10,400 would have been collected over the 20 months studied. There were about 18 bookings per month which were, on average, made nine days in advance. The most common booking was three days in advance with one booking made 46 days in advance. Often a person makes all their bookings at once because they have a regular treatment programme and know the dates and times well in advance. The medical providers are aware of the service and link their appointments to the travel times for the Katikati service. By suggesting to regular clients a booking time of between 9.30am and 11.30am, the van can take several people to Tauranga instead of making several trips.

Twenty percent of the bookings during the period studied were to or from rest homes. Communities where there are concentrations of rest homes are more likely to need medical transport facilities and there may be ways to formalise the requirement for funding of these services by rest homes. Many rest homes have suitable vehicles but cannot afford to have them away on long trips to district hospitals. Likewise the ambulance service requires vehicles to be available for local emergencies so cannot have its vehicles doing non-emergency transport for patients who no longer have a car or who are unable or unwilling to drive long distances.

4.1.5 Service characteristics

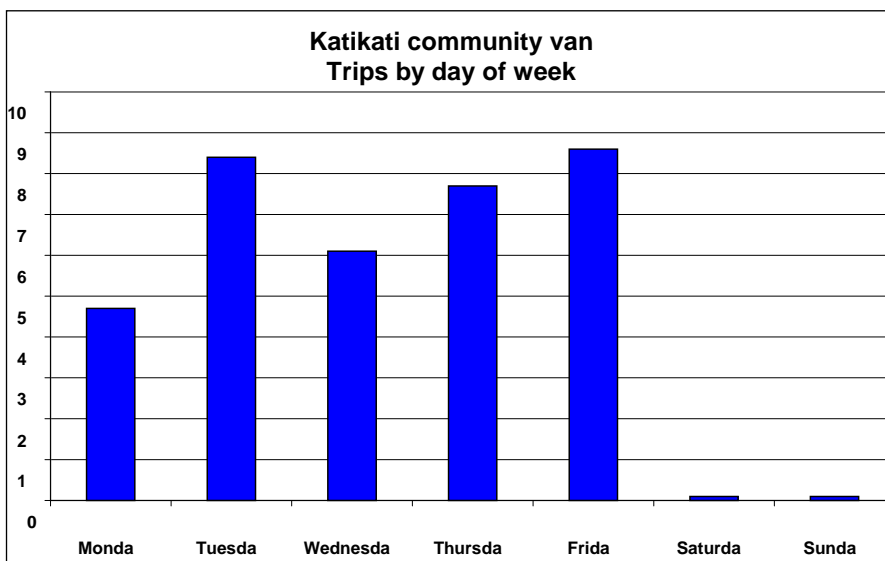
The hours of operation are daylight hours 8.00am to 5.00pm but trips for cancer treatment in Auckland may be an exception. Driver training is minimal; all drivers already hold a licence and a list is kept of licence numbers and the class of licence held. A check is made for any offences and training is given on how to operate the hoist. New drivers are sent with another driver for a few trips as a training run. There is no transfer of patients required as people in wheelchairs can be wheeled onto the lowered hoist where the wheelchair is secured by tie downs. Drivers are trained to do this as part of their role.

The van is advertised at the local information centre, medical centre and various other locations in Katikati. The specialist appointment secretaries at Tauranga Hospital are also aware of the service and try to make bookings at suitable times and advise patients of its availability. The van has Shell and BP fuel cards to make refuelling easy for the drivers.

One of the current drivers works for the ambulance service and provides a refresher first aid course periodically to drivers. There is a strong link between the St John Ambulance service and the Katikati community van as the latter began as an idea from St John drivers who saw the need for non-emergency transport for those unable to drive.

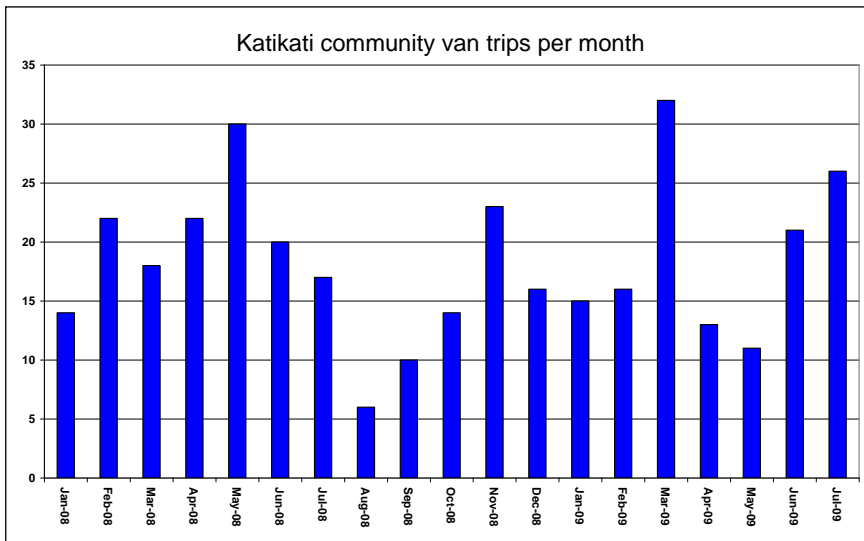
Based on the analysis of the bookings the van was used most often on Tuesdays, Thursdays and Fridays with very few weekend trips as illustrated in figure 4.1.

Figure 4.1 Katikati community van trips by day of week



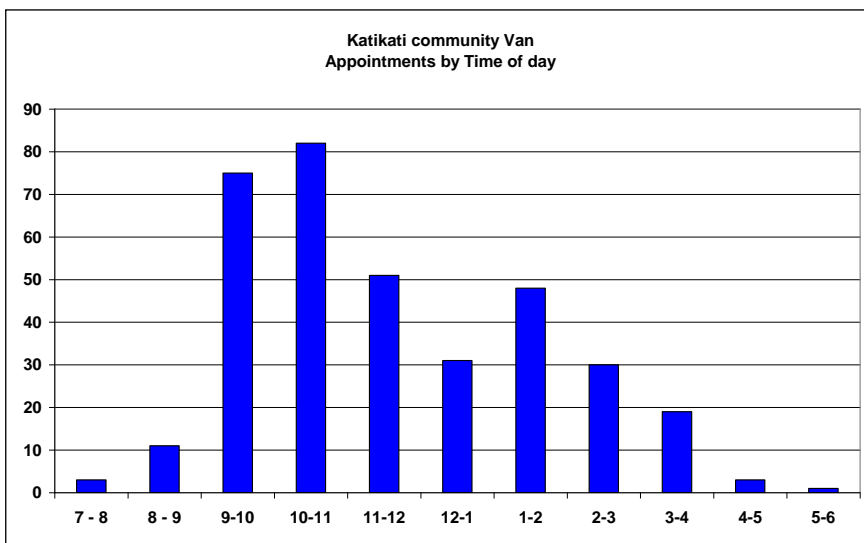
On average there are 18 trips per month with some months having 30 trips. As a comparison, the Te Aroha van averages 34 trips a month and has carried 74 passengers in one month so there is potential for the Katikati service to be used more. The Tauranga DHB does not provide any subsidy to the Katikati service despite benefiting from it (66% of the community van trips are to Tauranga Hospital). The donations required are therefore higher than in Te Aroha and the service is used less.

Figure 4.2 Katikati community van trips per month



Based on analysis of the appointment times in the booking register, 90% of the appointments are between 9.00am and 3.00pm with 44% falling between 9.00am and 11.00am and 63% before midday. Fourteen percent of appointments are at 10.00am.

Figure 4.3 Katikati community van appointments by time of day



4.1.6 Passenger characteristics

People who used the Katikati service during the survey were going to medical appointments. Originally, the service was quite restricted in geographic spread and use. A broader approach has been adopted to enable other types of service, eg wheelchair-bound people are taken from their rest homes to visit their family on Christmas and Boxing Days. The community van will tend to offer wheelchair passengers a wider range of service, as they have no other transport options. Although rest homes tend to have their own vehicles, these are not always wheelchair accessible.

It is estimated that by 2030, 25% of the New Zealand population will be over 65. To put this in context, Katikati already has 33% of its population over 65 so it gives an indication of the community transport

needs to be met in the future. Communities with an already high proportion of retired residents will have even more by 2030. Community transport needs may become too great for the number of vehicles and volunteer drivers available as these vans are highly used, with the services already at a point in Katikati where another vehicle will soon be required to meet the growing demand.

Many passengers have their own licence and some have a car. Lack of confidence in driving in the city conditions of Tauranga causes some to opt for the van. Some people have given up their cars because age or disability precludes them from driving.

4.1.7 Destinations

The following observations were made during the survey regarding destinations:

- The longest journey was 328km return to Auckland and the shortest just 2km from a rest home in Katikati to the local GP.
- 66% of the journeys were 70km return from Katikati to the Tauranga hospital.
- 20% of journeys were to the eye clinic in Park St, Tauranga (those with vision problems are more likely to be unable to drive so it is not surprising that both the Katikati 20% and Te Aroha community vans 27% (discussed later) are used to attend so many eye appointments).
- Chemotherapy patients are often able to drive but are too sick after treatment to drive home safely.

4.1.8 Vehicle characteristics

The community van seats five passengers plus one wheelchair, with all seats fitted with seat belts. The van has a high roof, which is needed due to the high seating position if someone is in the wheelchair. The van can still take five passengers even when there is a person in a wheelchair. The vehicle capacity is not a problem; it is usually the timing of appointments that dictates the van's passenger loading.

The vehicle is registered as a passenger service vehicle and as such requires a six-monthly certificate of fitness check. The organisers of the service are looking for a replacement vehicle with less than 60,000km on the clock, no older than 2003 and with a high roof and diesel engine.

Figure 4.4 Major sponsors of the KatiKati community van are acknowledged



Photo source: author

A good safety feature of the Katikati van is the open door disabling system, which means that the van will not start if there is a door not properly shut. There is a pull-out step to make access easier for those who do not need to use the wheelchair hoist. A cell phone is kept in the van, which enables the van to be contacted.

This is important as there are 14 volunteer drivers. A wheelchair is stored in the van, which is useful when patients are discharged from hospital or when they are unable to get parking close to entrances.

Figure 4.5 Wheelchair stored in community van



Photo source: author

The van has a factory-built hoist, which provides the advantage of being purpose built for the vehicle. This particular hoist has an easy two-stage operation with a lift function under hydraulics and then a slide into the van under electric power. The tying down procedure can be completed outside the van making it much easier than having to crawl around the floor of the van. This is an important feature as the hoist tie down and seat removal design is mentioned later as a reason why the Te Aroha van removed its hoist. Although the written instructions are in Japanese, the diagrammatic instructions make operation very simple.

The hoist can also be used to assist people using a walking frame into the vehicle. The wheelchair can be secured before the platform is raised and slides into the vehicle.

Figure 4.6 Katikati community van hoist



Photo source: author

4.1.9 Driver characteristics

The **drivers' ages range** from 50 to 75. As older drivers retire from volunteer driving new volunteers are found. Some drivers left due to over commitment and some have decided they no longer want to drive due to medical problems. This is the reality of an aging volunteer base that is susceptible to sudden deterioration in health that can preclude them from driving. Currently there is no shortage of drivers and

in general, new recruits tend to be recently retired people who are looking for some community work to do. They are motivated by being able to do something for the community they could not do while working, and by volunteering they remain active and meet a wide variety of people in the local community. Some complications arise during the Kiwifruit season as some of the drivers get work grading and packing fruit. Although this is a temporary situation, it adds pressure on the other drivers. The drivers have a logbook to record the distances and details of van usage.

4.1.10 Passenger service licence

The Katikati van has a passenger service licence but its drivers do not hold P endorsements so it is a hybrid between a full passenger service and the level of service offered by other community vans that do not hold passenger service licences.

The van undergoes certificate of fitness (CoF) tests instead of warrant of fitness (WoF) tests. There are some safety benefits from having CoF instead of WoF checks, and having an engine disabling system when a door is open is part of the higher standard required for a passenger service vehicle. Due to the high mileage that these vans do, with multiple drivers, stringent checks on the vehicle are necessary.

4.1.11 Booking system

The service uses a phone booking system and the Katikati Resource Centre is the central point for all phone calls. It contacts the diary holder who keeps the van bookings up to date and checks on the availability of drivers. There are five diary holders who work on a weekly rota system. Bookings are supposed to be made at least 24 hours prior to the date of travel but some same day bookings are accepted when they fit with the times of existing bookings. Many bookings are made well in advance as they are for medical appointments with lengthy advance notice.

4.1.12 Pricing

The fares are based on an estimated cost of 40 cents/km. This was increased from 33 cents/km in 2008 following a period of sustained high diesel prices. The most common run, which is to Tauranga Hospital, increased from \$25 to \$30. The adjustments in suggested donations are driven by increases in diesel costs or road user charges increases. Some invoices are sent to the Accident Compensation Corporation (ACC) which provides an order number and pays standard fares.

The fares are clearly displayed on the back of the front passenger seat. The volunteer nature of the service is made clear to the passengers with suggested donations displayed within the vehicle. There are also instructions on how to complain.

4.1.13 Summary

The Katikati community van is typical of a community-based service and has succeeded through the support of the local community. The service is heavily dependent on its volunteer drivers to make it financially sustainable and affordable. The service is health focused but extends to social activities for wheelchair-bound passengers. Katikati has no taxi service and therefore has no Total Mobility funding. Katikati does have a regional council funded bus that services the Tauranga Hospital but the service is so infrequent it is almost unusable. Initially, the Katikati van was not compliant with legislation, as it was not

owned by a trust, but this has been remedied. The service is registered as a passenger service despite being exempt from this requirement under legislation.

4.2 Te Aroha Red Cross community van

The Te Aroha Red Cross community van is a volunteer service providing a link between Te Aroha and Waikato Hospital. This case study involved visiting Te Aroha to interview Alan Byers, the manager of the service. Later as part of the exercise, a trip to Hamilton was made with the duty driver of the day and two passengers.

4.2.1 History

The Te Aroha Red Cross community van service began in 1989. Local leaders, Betty Hubbard, Marie Kidd and Maureen Linehan, saw the need for a service and began to fundraise. Initial funding came from many sources but the main funders were:

- Rotary
- Dr W R Lawrence Trust
- Roy and Enid Nichol Trust.

Once enough money had been raised, a vehicle was purchased and the service began with three drivers. As people became aware of the service, it began to gain momentum and more drivers were needed. When Alan Byers retired in 1992, he applied to be a driver after the Red Cross advertised that it needed volunteers. He has now been driving the van for 17 years and has managed the service for the last six years. Alan has been recognised for his long service to the community by Rotary International.

The service has had several different vans since it began.

Table 4.2 Vehicle details

Van	Bought	Sold	Years of service
Toyota Hiace	1989	2002	13
Mitsubishi L300	2002	2007	5
Mitsubishi L300	2007		2

The level of demand is such that the purchase of a second van has been authorised.

4.2.2 About the community served

Te Aroha is located 53km northeast of Hamilton and is overlooked by the 952m Mt Te Aroha. Maori had settled there to make use of the natural thermal and mineral springs. European settlement began in 1880 as a river port for gold mining and was initially known as Aroha gold field town, Morgantown, and Aroha (Encyclopaedia Britannica 2010). Te Aroha further developed as a spa town; in 1898, the Cadman bathhouse sanatorium was opened for the 'taking of the waters' in the natural thermal and mineral springs located in the centre of the town. Tourism and supporting the dairy farming community are now the main economic activities. Te Aroha has a population of 3800 (2006 Census).

23.5% of people in Te Aroha are aged 65 years and over compared with 12.3% nationally. The community van service is heavily used by those aged 70 and older. The 137 individual users of the service represent 3.6% of the Te Aroha population. This group is highly dependent on the transport to attend medical appointments in Hamilton. Twelve percent of the Te Aroha community aged over 65 used the van in the 12-month period studied. In 2006, 24% of the Te Aroha community was aged 65 or over (2006 Census). According to the 2006 disability survey of New Zealand, 45% of adults over 65 had a disability. By 2030, 25% of the New Zealand population will be over 65 so this provides an insight into the potential special transport needs of this community.

4.2.3 Data collection and analysis methodology

Photocopies of the claim forms were provided covering the bookings between 1 July 2008 and 30 June 2009 – a period of 364 days. The originals were photocopied then the data entered into a spreadsheet to enable analysis. The photocopies were returned. The names and addresses of the people using the service were replaced by numbers and Te Aroha was used as the address. The same number was used each time the person's name appeared in the logbook to capture the regular users.

Table 4.3 Booking details

Booking number as per sheets	Sheet number	Date of trip	Month	Day of week	Patient ID no.	Age	Pick up address	Service/ clinic	One way or return	Total km	Donation	WDHS reimbursement	Costs per km	Total revenue
1	1	15/12 2008	Dec	Mon	1	80	Te Aroha	Cardiology	R	112	\$15	\$44.80	\$0.40	\$59.80

There were 405 appointments attended; only eight were on weekends so the remaining 397 appointments were on weekdays. There are 260 weekdays in a year and it is unlikely there would have been appointments made on statutory holidays so that leaves 249 working days. There were 55 days when no trips were made. If we are to exclude the 11 statutory holidays then that leaves 44 days when the van was not used to travel to Waikato hospital. There were 205 working days when the 397 people attended appointments which equates to 1.9 people per day.

4.2.4 Service characteristics

The service mostly operates during daylight hours. The appointment times at Waikato hospital dictate the operating hours and appointments are usually in the mornings or early afternoon. The bus provides a shopping run on Thursdays for which a \$5 donation is suggested. Around once a week people need to use their own vehicles (or find another source of transport) as the van is already on a hospital trip. The earliest trip is at 6.30am depending on the appointment, eg 7.30am surgery, and the van is usually back at Te Aroha by 5.00pm. The service is predominantly for Te Aroha residents but it has taken people from Paeroa on occasion. It also picks up people en route from farms between Te Aroha and Morrinsville, and smaller settlements like Waitoa. The local information centre and citizens advice bureau know about the service and how to contact Alan Byers, but do not overtly advertise it. Posters have been provided to senior citizens, the bowling club and local GPs.

In the period surveyed, the two people who made most use of the van, made 32 and 15 trips respectively. Both of these patients were fighting cancer and required frequent treatment. Most of the frequent users

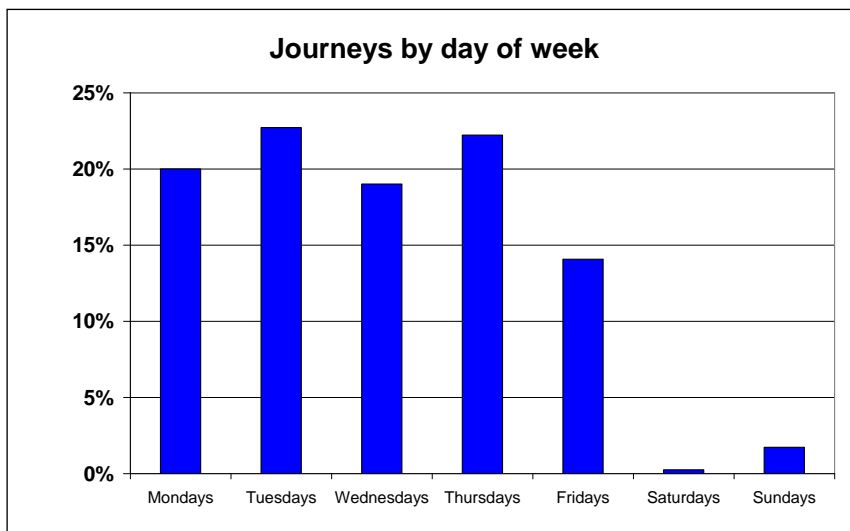
were oncology patients; others had multiple medical issues that required frequent treatment. Seventy-six percent of the passengers used the service three times or less.

Table 4.4 Frequency of travel

Number of trips	%	Individuals
1 trip	45%	61
2 trips	16%	22
3 trips	15%	21
4 trips	7%	9
5 trips	4%	5
6 trips	3%	4
7 trips	4%	5
8 trips	2.9%	4
9 trips	1.5%	2
10 trips	1.5%	2
15 trips	0.7%	1
32 trips	0.7%	1
		137

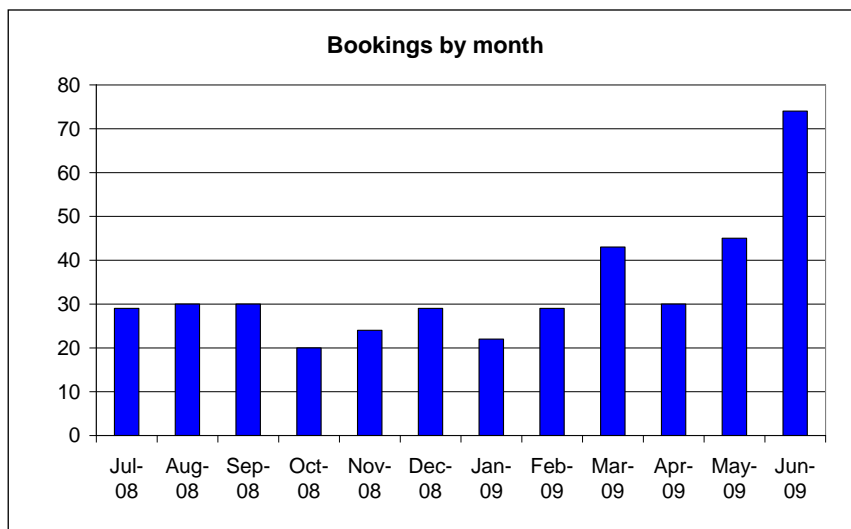
Medical appointments are mostly on weekdays so the service is used predominantly Monday to Friday with occasional trips on Saturday or Sunday if the treatment regime requires this. The van could be utilised on weekends for a local shopping trip or outings for the elderly without vehicles. There could also be volunteer drivers available at weekends who would not be available during the rest of the week.

Figure 4.7 Te Aroha community van journeys by day of week



There are on average 34 appointments per month but there were 74 in June and over 40 in March and May 2009. The van usually makes a trip every weekday to Hamilton and often two return trips on the same day.

Figure 4.8 Te Aroha community van journeys per month



The high level of bookings continued into August and September and the van was having to make four return journeys in one day, which is too long a driving day for the drivers. The purchase of another van has been authorised to cope with this demand, and with two drivers needed each day some more volunteers will be required to help run the service.

4.2.5 Finances

The Red Cross, a registered charity, owns the van. The donations and reimbursements from the DHB are paid into a Red Cross van account, which is used for operating expenses. This account is monitored and if funds rise over a certain threshold, eg \$2000, then money is transferred into a higher-interest savings account, which is called the Red Cross van replacement account. Any large donations received or grants made go into this account. This enables higher interest to be earned and a pool of savings to be generated to pay for the replacement of the vehicle. It may take several years of grants before there is enough to buy a replacement van.

The main source of operating revenue is from Waikato Hospital's Travel Assistance Fund, which in the past was administered by the Health Funding Authority (HFA). The Waikato District Health Board negotiate a km rate, which in 2007 was 20 cents/km and is now 40 cents/km, backdated to July 2008. Based on the year's data this averages \$45 per patient per trip or \$18,000 per annum. The contract is for two years and is between the NZ Red Cross and the DHB. The community van gains efficiencies by carrying more passengers on each trip, as the payment is by passenger rather than by van trip made. The subsidy of the community van is cost effective for the DHB as it avoids the expensive administrative costs of reimbursing individuals and enables group transport via volunteer drivers. The volunteer drivers make this system a cost-effective option for both patients and the DHB. The van frequently carries more than one patient at a time and does not use scarce long-term car parking resources at the hospital. It is the practice of the drivers to drop the patients and then leave the hospital grounds and go to the nearby Hamilton Lake to relax while they wait for the patients to finish their appointments or treatment. This gives the drivers a well-earned break and avoids the parking issues that plague every hospital.

The passengers pay a suggested donation of \$15 for the return trip to Hamilton. This equates to 13 cents/km. Caregivers travel free. The suggested donation increased from \$10 to \$15 following the petrol

price rises of 2008. If everyone paid the suggested donation, around \$6000 (13 cents/km) would be donated in addition to the \$18,000 (45 cents/km) from the DHB contract, towards the running cost of the service. This equates to around 58 cents/km, which is lower than the **IRD's running cost estimate of 70 cents/km. As** the donations and DHB reimbursement are lower than the actual total running costs (including purchase) the services can only be sustained if grants are used towards the purchase of vehicles.

There are annual grants and donations, which typically come from Waitoa Red Cross, Lions, Rotary, pub charity and the W R Lawrence and Roy and Enid Nichol Trusts. These grants are saved and used for replacing the van, which usually happens when the van reaches 200,000km. Under current conditions, this is every three years or so

Figure 4.9 Sponsors are acknowledged by sign writing on the van.

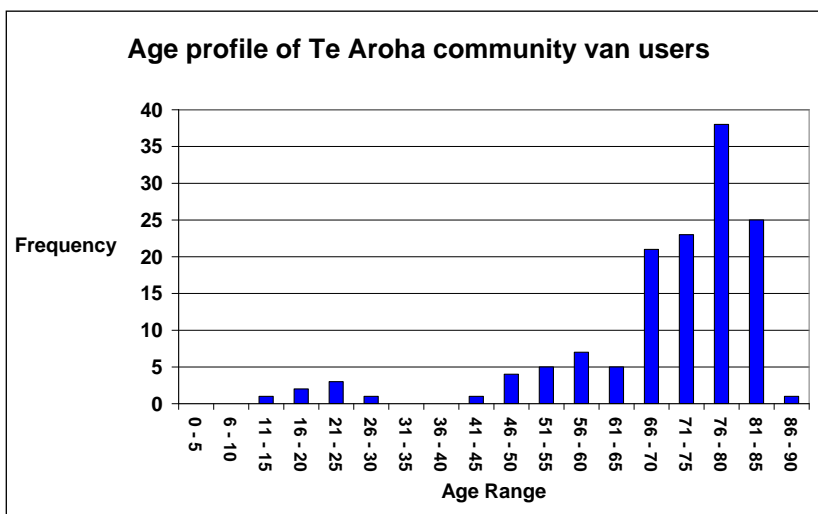


Photo source: author

4.2.6 Passenger characteristics

The service is available for anyone with an appointment at Waikato hospital. In the period surveyed, the passengers' ages ranged from 10 to 87 with an average age of 69. Forty-two percent of the passengers were male and 58% female. The age profile of the passengers (figure 4.10) shows that 79% were over 65.

Figure 4.10 Age profile of Te Aroha community van passengers



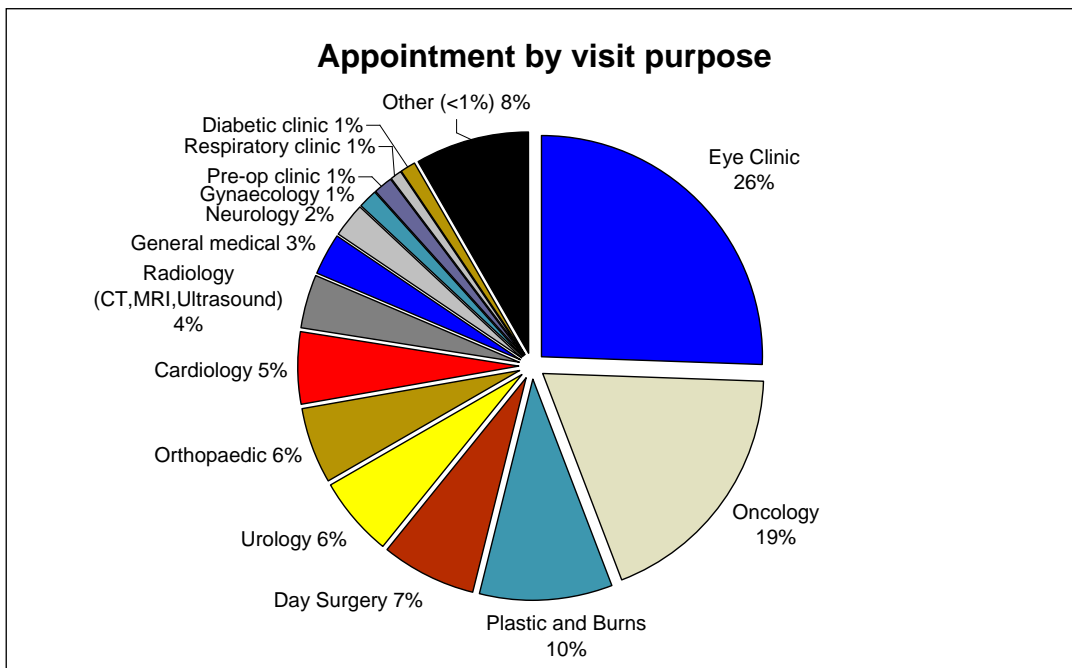
Despite the service being available for anyone with a hospital appointment the majority of users are elderly people who no longer drive or wish to drive to Hamilton. Alan indicated that people use the service for many reasons: many are not confident about driving the distance to Hamilton; the traffic puts some

off; the service is cheaper than using a private car door to door; and there are no parking costs or delays at the hospital. Neither of the patients observed during the visit were able to drive, one no longer had a car, the other was having chemotherapy and was unable to drive after treatment.

4.2.7 Destinations

In the period surveyed, all the patients were from the local Te Aroha area and all visited Waikato Hospital. Twenty-six percent of visits were to the eye clinic and 19% were oncology related. Chemotherapy patients who are able to drive normally are too sick after treatment to drive home safely and so require the community transport. There was very little variation in the kilometres claimed with trip distances ranging from 110km–118km return, the average of the 405 trips being 113km return. The minor variations reflect **the location of the passengers' home addresses. Details of all trips to the hospital are entered** on forms that are used to claim the mileage reimbursement from the Waikato DHB. Other trips are made but they are not eligible for reimbursement and are not listed in the data.

Figure 4.11 Appointments by medical speciality, July 2008 to June 2009



The appointments attended reflect the age of the travellers with many age-related conditions being treated. Treatments that required multiple visits such as oncology and burns appointments were common.

4.2.8 Vehicle characteristics

The current van is a Mitsubishi L300 and is two years old; it was purchased as new, and has driven 100,000km in two years. Maintenance is completed every 10,000km under the warranty conditions and it has a three-year warranty. The current van does not have a hoist and is not wheelchair accessible.

Figure 4.12 Te Aroha Red Cross community service van



Photo source: author

They did have a wheelchair accessible van in the past but it was not used very often and the hoist was heavy and required the removal of the back seat to use. This was not very easy to do and involved crawling around the van to tie in the wheelchair. The current van has a footstool that is used to assist people into the van. During the trip it was noted that one of the passengers had difficulty getting into the van. The Katikati van, which has four seats in the back with the hoist and another passenger seat in front, is easier and more efficient to use.

The total km claimed was 45,914km; however, the DHB reimburses the Te Aroha Red Cross for each **passenger's individual km rather than the km on the van's odometer. The 45,914km will be higher than** the actual km travelled as each trip may carry more than one passenger. From the bookings, it can be seen there is often more than one passenger with an appointment on any given day. The van was purchased new in 2007 and its odometer reading is currently 99,684 so it is completing around 50,000km per annum.

4.2.9 Driver characteristics

All drivers are volunteers, retired and over 65. There are three male drivers and one female driver. The drivers who have been driving for over 10 years are now in their late 70s or 80s. The long service indicates loyalty to the service but will inevitably cause a need for three new drivers in the next five years. New drivers will be needed for the second vehicle and it is best if they learn from the experienced drivers before the new vehicle arrives, rather than having to recruit at short notice if one of the current drivers becomes unable to drive.

Table 4.5 Driver experience

Driver	Length of service
Driver 1	17 years
Driver 2	16 years
Driver 3	15 years
Driver 4	3½ years

The drivers are typically motivated by having some time on their hands and wanting to give something back to their community. They are often driving their peers and people they know in the community. As the need for new drivers arises, advertisement will be by word of mouth. Health Waikato provides a

volunteer driver ID that stays with the van; this is useful as it avoids arguments with security and parking people. Over time the security and parking people get to know the van and drivers, give them priority and are lenient with temporary illegal parking, as they know they will drop off their patients and return later to collect them. Driver licences are sighted when drivers sign up and each driver is interviewed. Three of the four drivers have completed a first aid course with the Red Cross. Drivers have not undertaken a defensive driving course. The van has a fire extinguisher, first aid kit and there is a van cell phone.

4.2.10 Summary

The Te Aroha Red Cross van is typical of a community-based service established by local people to meet a local need. Once established it has continued through the support of the local community and has now gained funding from the DHB. The service is heavily dependent on its volunteer drivers to make the service financially sustainable and affordable to the local community. The service is health focused due to the funding from the DHB but is so busy doing hospital trips that there is not much time to provide other social services. Te Aroha has no taxi service and therefore has no Total Mobility funding. Without the DHB subsidy the users of the service would need to donate more for each trip.

5 Case study 2: Commercial DRT

5.1 RE-LI-ON-US Mobility Services

RE-LI-ON-US Mobility Services (RE-LI-ON-US) is a commercial DRT service based in Auckland. It is a wheelchair accessible service that targets the mobility market. This case study involved two visits to RE-LI-ON-US. The first was to interview Chris Ross, marketing manager for RE-LI-ON-US. On the second visit, Harry Pollok the owner was interviewed and the afternoon was spent in a RE-LI-ON-US mobility van driven by Harry. The dispatchers were observed allocating jobs and a tour of the vehicles in the depot was provided by Charlie, one of the drivers. A fleet list and job data for analysis were provided. This is a commercial operation so the data provided was limited and has been presented in a manner that avoids giving away commercially sensitive information.

5.1.1 Background history: 2005–2009

RE-LI-ON-US Mobility Transport began in 2005 with three wheelchair accessible vans. It saw an opportunity to focus on the disabled market which was having difficulty ordering a wheelchair accessible taxi during the school run period of the day. This is a nationwide problem where the transport demand for disabled school children, who often travel from all around the city to a specialist or local school, requires most of the wheelchair accessible fleet. The initial three vehicles and drivers all came from South Auckland Taxis which is a shareholder association. South Auckland Taxis had five to six mobility vehicles that had become tied up in school runs.

The strategy of RE-LI-ON-US was to avoid the school runs and focus on the adult disabled market. The initial area served was from Warkworth to Pukekohe, a huge geographic area to cover with only three vehicles. Some larger wheelchairs could not fit in all the vehicles so the vehicle choice was limited for some passengers. The booking and dispatch system was based on a taxi system which would accept unlimited bookings on the assumption that the taxi company would have capacity. There is no such back up for the mobility market in Auckland with the various mobility providers having entirely separate operations with no agreement to pass on work to other companies. Most taxi companies have a large vehicle and driver base and if they are unable to provide a service they can pass it on to another taxi company with whom they have a mutually beneficial arrangement. There is no brokerage of mobility transport in Auckland as in other parts of New Zealand. As the staff came from the taxi industry they were used to having a large fleet and a smaller geographic area to cover.

The service operated on a pre-booked basis with a preference for six hours advance notice. The customers were not used to a booking system so would often phone at short notice expecting the service to be the same as a taxi service despite the limited vehicles available. The demand quickly overwhelmed the available vehicles. The service over promised and under delivered resulting in dissatisfaction from passengers. The disabled community is highly dependent on a reliable service so when this expectation is not met it has worse consequences as the travel alternatives are limited. The community is also good at **word-of-mouth marketing and so bad service can quickly damage a company's reputation. The problems** in accepting all jobs with little hope of on-time pickup was damaging to the reputation of the company. This reliability problem made it unlikely that other services such as Dial A Ride would refer passengers if they were unable to take a booking. Some smaller mobility providers with single vehicles began to compete for the passengers and could do so because of the service issues. Some animosity exists between

taxi companies and the shuttle and mobility market which are seen as competition. There is little or no cooperation between taxi companies and mobility service providers. Many taxi companies have mobility vehicles but are not specialist providers.

It is an individual's experience with provider and driver that creates repeat customers. The individual will often find a provider or driver they trust and if they have experienced good service, they will make them their favoured provider. The core business of the operation is a loyal customer base which will be the source of most of the regular service. In building the relationship between the regular driver and the customer the service ethic of the driver improves. The driver may assist by carrying groceries inside homes, or opening front doors to help their passengers out of the house – all extra services that are alien to a taxi driver's experience. **The driver becomes part of the disabled person's network** which is unique to this market. The service works best when the pre-booking allows planning of the pickups, although the customers are more familiar with the on-demand booking of taxis.

5.1.2 RE-LI-ON-US Mobility Services in 2009

In May 2009 the business was sold to Harry Pollock and RE-LI-ON-US Mobility Services Limited began. Chris Ross was contracted as marketing manager and under the new management the service was refined to focus on transporting the disabled with a renewed focus on reliability. The medical transport market was seen as a business opportunity, and serving rest homes, hospitals and rehabilitation centres like Laura Fergusson became increasingly important. Some rest homes have their own vehicles but there is a growing trend to outsource the transport to companies such as RE-LI-ON-US to avoid maintenance and purchase costs. RE-LI-ON-US can transport large groups and has assisted in transfers of entire wards of patients including beds on occasion.

5.1.3 Barriers faced

Customers often do not understand they are not calling a taxi service so the pre-booked nature of the service requires adjustment for everyone involved. There is still an on-demand approach in both the customer and RE-LI-ON-US staff and there is not enough shifting of appointment times to allow efficiencies and to avoid late pickups. The dispatching staff need to learn to manage the bookings so non-urgent travel is not booked during peak periods.

Despite the vehicles being clearly marked as transport for the disabled, they are often ticketed for not displaying a disability parking permit, which can only be held by individuals. Disabled parking bays are not designed for vans that load at the back, which often results in loading and unloading in traffic areas.

The hoists in the van extend two to three metres from the back of the van, which in most cases is on the road space. Often they will need to park sideways across several disabled car parks to unload safely.

Rest homes are better designed with under cover unloading zones at the main reception. They often have a wheelchair accessible van (as pictured on the right in figure 5.1) but they are not always suitable for all wheelchairs.

Figure 5.1 Rest home vehicles may not be suitable or available for wheelchair-bound residents



Photo source: author

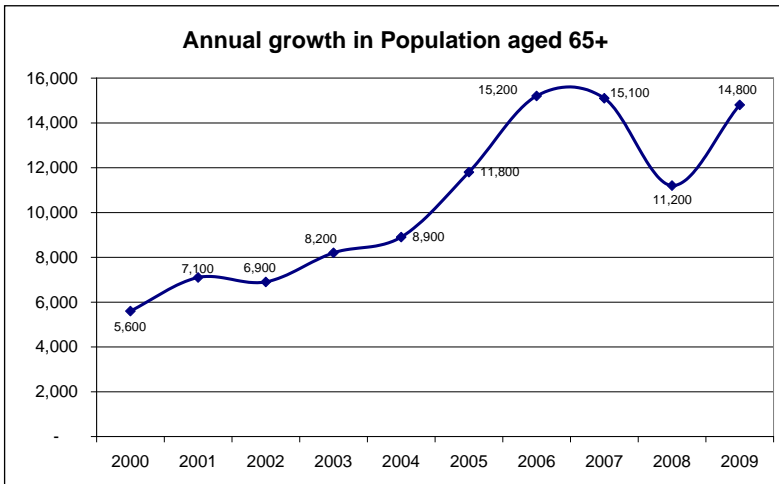
Hospitals are often difficult due to the lack of suitable unloading areas and the need to escort the patient to their appointments. Having a good relationship with hospital security and parking wardens is extremely important. Unloading a wheelchair using a hoist requires a large area like an ambulance bay. While cars that are modified to carry wheelchairs have a sideways hoist requiring a wide parking bay, the modified vans require long parking bays. Larger areas are required to enable drop off under shelter with access to the building. If orderlies were available to push wheelchair patients to their appointments from drop-off areas this would enable hospital drop-off areas to be much more efficient for everyone.

The disability parking permit card system is linked to the individual so while the cardholder using the van will have a card, if they are not in the vehicle then the van cannot park in a disabled area even while the driver is escorting the passenger to their appointment. If the van is dropping someone off at a hospital appointment the customer cannot leave their mobility card in the van, as a different van may return to pick them up. The vans have no interest in parking for long periods in the disability parks – all they want to do is drop off their customers and leave for their next job. The situation occurs frequently and could be resolved with a vehicle card. Also, some common sense from parking wardens would not go astray.

5.1.4 The community

RE-LI-ON-US covers the wider Auckland region and focuses on those with mobility needs. Wheelchair passengers make up 69% of its work; able-bodied passengers make up 20%; the remaining 11% of passengers have other mobility needs and may use walking aids such as walking frames or walking sticks. The group transport may include able-bodied caregivers, or groups of people with mixed abilities. Rest home groups often have a wide range of mobility needs but in order to travel as a group a wheelchair accessible vehicle is required. The hoists make it easy for those using walkers to be lifted into the vehicle.

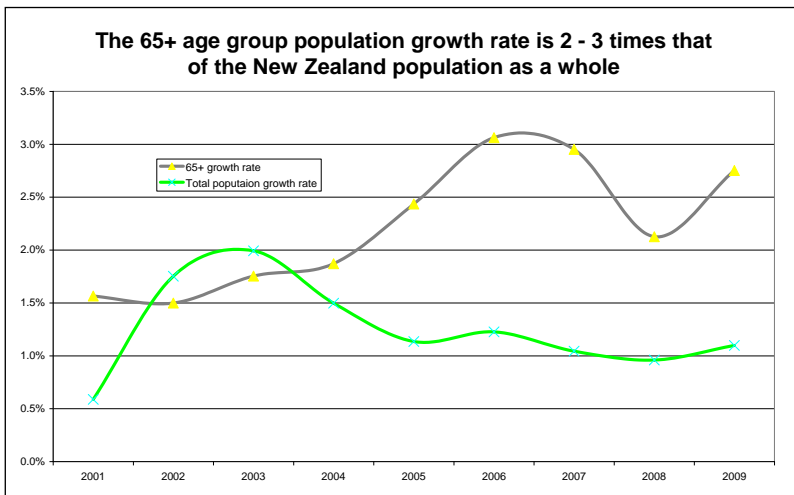
Figure 5.2 Annual growth in population aged 65 or more



Source: Statistics New Zealand population estimates

The 2006 Disability Survey found that 45% of those aged over 65 had a disability of some sort. The mobility issues facing New Zealand as its population ages will increase. Transport services for the elderly will increasingly be transport service for the disabled. Nearly all adults living in residential care facilities reported having a disability (99.7%) and most had multiple disabilities (94%) and high support needs (82%). Residential care facilities will require disabled transport for moving their residents. The inefficiencies of an underutilised van, which can only be used for a small proportion of **the rest home's** residents will inevitably lead to service agreements with specialist providers with larger fleets.

Figure 5.3 Population over 65 years old growth rate and New Zealand population growth rate



Source: Statistics New Zealand population estimates

The rapid rise in the population over the age of 65 has begun which will also be the beginning of an increasing mobility market.

5.1.5 Passenger characteristics

While RE-LI-ON-US will transport anyone, 62% of the trips were paid for using a Total Mobility card to receive a 50% fare discount. The fleet is made up almost entirely of wheelchair accessible vehicles so not

surprisingly 69% of trips include a person in a wheelchair. Social groups often include wheelchair or other mobility-impaired people, so to enable the group to travel together a wheelchair accessible vehicle is required. The groups may comprise stroke clubs, rest home residents or disabled youth groups.

The customers met during the survey were all in wheelchairs and unable to drive an unmodified car if at all. The first customer was leaving the rest home for the first time in the eight months since moving there. It was her birthday and she was meeting with her family for lunch. This customer was clearly delighted to be going out for the day and had spent the morning getting ready. She clearly considered it a highlight of her year.

The rest home did have a wheelchair accessible van but the van did not cater for the wider than average wheelchair this particular customer was using.

Figure 5.4 Customers with wide or heavy wheelchairs may have limited hoist vehicle options



Photo source: author

The RE-LI-ON-US wide hoist van is shown above. There would be very few vans and probably no taxis with the necessary hoist and tie down width for a wide wheelchair.

Two of the customers observed had cerebral palsy and had used the van to go into the city. They had then travelled down Queen Street from Aotea Square on their electric wheelchair and mobility scooter and had spent the afternoon at the waterfront. They paid for their fare using their Total Mobility card and a voucher from the Cerebral Palsy Society. When asked about the vouchers they explained that they received \$250 worth of vouchers every six months, which they used to top up the 50% Total Mobility discount. Even with the discount each trip is usually much more expensive than a typical bus fare or car journey. Most of the more severely disabled are not working so rely on benefits of one kind or another. Their transport costs are supposed to be met via the disability allowance, which is a catchall allowance towards visits to the doctor or hospital, medicines, extra clothing or travel. As at 1 April 2008 it was a maximum of \$54.05 per week. Even with the 50% Total Mobility discount \$54 does not go far in a taxi each week.

5.1.6 The getOutThere programme

Transport costs for people with cerebral palsy are a barrier to their involvement in society. The Cerebral Palsy Society recognised this issue and developed the getOutThere **programme**, which is specifically targeted at recreational and social outings and not medical appointment travel (see appendix E). It was great to witness

this programme in action with two members of the Cerebral Palsy Society enjoying the waterfront like many other people and being active and visible within the city life of Auckland. This type of programme could be used by other groups with similar mobility and transport issues. Unfortunately the existence of the programme highlights the problem that still exists even with a 50% discount. Travel costs can be a significant part of a disabled person's **expenditure and without the programme travel becomes limited to the essential medical appointments and shopping**. There is an inequity between the super gold scheme where those over 65 can travel free on PT and the situation for those in wheelchairs who have to pay full fare on PT (in Auckland). If the latter cannot use PT they pay significantly more by using taxi services.

Figure 5.5 RE-LI-ON-US provides subsidised transport for members of various disabled groups



Photos source: author

The holders of Total Mobility cards who may also be receiving other financial assistance towards travel costs are empowered to choose the mobility provider that provides a quality service. This is an important aspect of the Total Mobility Scheme in Auckland. In smaller towns there may not be as many providers available but in Auckland there are many providers and service quality can quickly shift demand from poor performing to better performing operators.

5.1.7 PHAB transport

The Physically Handicapped Able Bodies group (PHAB) also uses RE-LI-ON-US on a regular basis. PHAB provides social outings for their members, often after school in a youth group type of setting. Its transport subsidy enables these young people to get out and attend events independently. The **group's** aim is to provide some social independence for young people. It is important for families and teenagers with disabilities to have time apart, which is part of entering adulthood, and the activities enable the young people to socialise independently from their families as teenagers do. Most of the teenagers attending the PHAB events would be eligible for Total Mobility funding. Some may be able to use buses for their regular trip but evening transport can make PT unsuitable as the destination may be different every week and this places bus travel beyond the capabilities of some people due to the more complex nature of the trip planning. The PHAB transport subsidy is provided as a top up for those eligible for Total Mobility funding or a full subsidy for those not eligible.

Discussions with PHAB about their experience with RE-LI-ON-US highlighted that the service needed to be improved, as they had been let down in terms of reliability. Mass transport of many disabled people for a large event is beyond the capability of any one mobility provider. Despite its large vehicle fleet RE-LI-ON-US had difficulty managing the staffing, dispatch and bookings for the annual PHAB ball, which is a major event in terms of transport logistics. Most of their bookings are on weekdays so a large Saturday night event caused a problem. PHAB needed to use most of the mobility providers across Auckland to get enough wheelchair accessible vehicles. The ARTA-funded service Dial a Ride does not operate after 5.00pm so that removed 18 suitable vehicles from the available wheelchair accessible fleet. Transport of the disabled for the Rugby World Cup and other major events will require coordination among all the mobility vehicle providers in Auckland.

PHAB uses the Multiserve-funded providers to transport some children direct from school to their centre, which reduces transport costs for both Multiserve and the families. The return journey home is funded from PHAB fundraising. PHAB considers that a companion card allowing free PT for caregivers (as in Melbourne) would be worthwhile in Auckland as it would enable more PT travel by groups of disabled people without increasing the costs for the usually volunteer caregivers.

5.1.8 Total Mobility Scheme

Most passengers using RE-LI-ON-US will be Total Mobility cardholders. The Total Mobility Scheme aims to provide mobility for the disabled community of New Zealand. The Total Mobility eligibility criteria is established through an assessment which identifies whether a person has an impairment that prevents him/her undertaking any one or more of the following components of a journey unaccompanied, on a bus, train or ferry, in a safe and dignified manner:

- 1 Getting to the place from where the transport departs
- 2 Getting onto the transport
- 3 Riding securely
- 4 Getting off the transport
- 5 Getting to the final destination point (source: Maxx website 2009²)

The 2005 review of the Total Mobility Scheme included an important change in the eligibility criteria.

People with impairments who meet the criteria for the Total Mobility scheme and are able to use bus, train or ferry services some of the time, but not all of the time, should be eligible for the scheme (Land Transport NZ 2008).

This improvement is a more flexible and sensible interpretation which allows for people with epilepsy, partial blindness (where night travel is the main problem), or those with Alzheimers who can manage very familiar routes to be entitled to Total Mobility assistance. The fact that a person may be able to undertake all five journey components, some (but not all) of the time, does not therefore affect their eligibility. This will reduce Total Mobility trips when they are able to use bus, train or ferry services. This important change has not been communicated well to the disabled community or to PT authorities and operators. There is an opportunity to empower more use of PT by the disabled community through a better understanding of this principle. A marketing campaign aimed at the Total Mobility market with a PT fares discount for Total Mobility cardholders may reduce the long-term costs of Total Mobility by encouraging a dual use of PT and Total Mobility taxis.

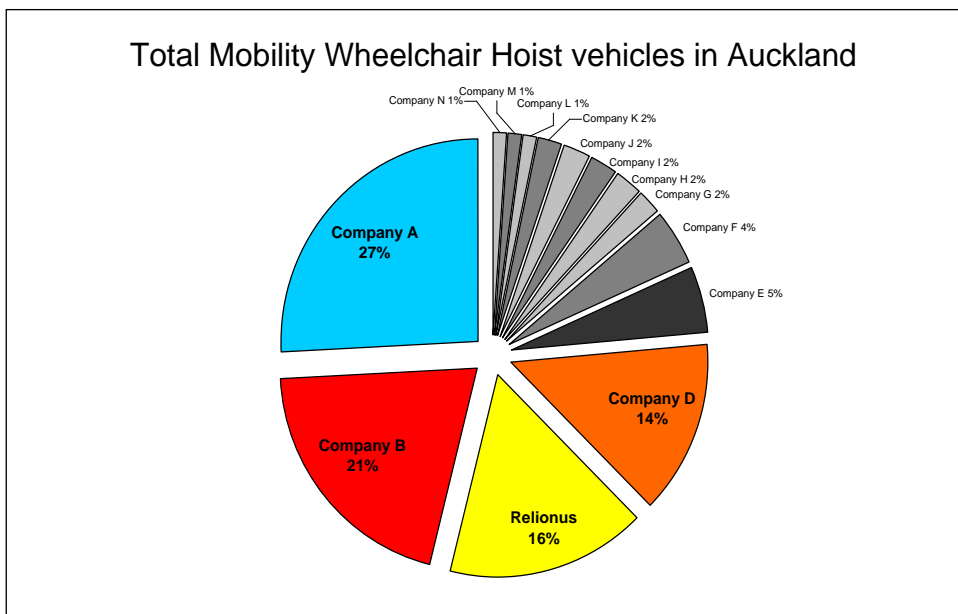
From July 2007 to June 2008, the Total Mobility Scheme facilitated approximately 426,000 taxi journeys in Auckland at a cost of about \$3.1 million (ARTA nd). The maximum subsidy on any one journey is \$30 but only around 4% of fares reach this cap (ARTA nd). For the individual the cost of using a taxi is substantially higher than PT with the typical flag fall of \$3 more than the cost of a single stage/zone adult fare. Increasing the use of PT instead of Total Mobility taxis would reduce the overall subsidy. Adding Total Mobility cardholders to the concessionary fares scheme may be an option to improve access and mobility

² www.maxx.co.nz/pricing-passes/fare-policies-for-discounted-travel.html

and reduce Total Mobility costs. PT fares in New Zealand are not equitable with those over 65 travelling free, blind passengers receiving a 40% discount (Auckland) but wheelchair passengers having to pay full adult fares. As the PT system becomes more accessible the numbers who can use PT some of the time will increase – adding a fare concession would encourage more use of PT by those who are able to.

There are 93 hoist vans eligible for Total Mobility support in Auckland. RE-LI-ON-US Mobility Services operate 15 Total Mobility hoist vans in Auckland. While there are companies with more hoist vehicles they are large taxi cooperatives who do not specialise in mobility transport. RE-LI-ON-US Mobility Services is the largest specialist mobility provider in Auckland and probably the largest nationwide.

Figure 5.6 Total Mobility funded wheelchair hoists in Auckland



Source: Total mobility hoist data (ARTA 2009)

Four companies operate 78% of the wheelchair hoists in Auckland, the rest of the operators have less than five hoist vehicles. There are three companies with only one total mobility hoist vehicle and five with two hoist vehicles. Some of the larger taxi companies have larger fleets with more vehicles with hoists. RE-LI-ON-US is a specialty mobility provider so all but one vehicle have hoists. The smaller companies will not be able to cater for more than one wheelchair customer at a time so can quickly run out of options. There is virtually no sharing of customers between RE-LI-ON-US and other operators but some taxi companies will pass on work to other companies they have an arrangement with.

Regional councils contribute funding toward the hoists used by Total Mobility taxis and vans in the region. The Total Mobility Scheme sets a maximum age of 12 years for vehicles. ARTA funds five to eight hoists per annum, which are aimed at maintaining the hoists in the Total Mobility fleet. In 2009, it had 23 applications for the five to eight available hoists. Given the demand, it seems the funding is inadequate. There is around \$100,000 budgeted for hoist replacement each year. To replace the fleet within 12 years, at least seven hoists need to be replaced each year. The average age of the fleet will increase under this hoist replacement strategy resulting in vehicles with high mileage and older hoists. By the time a van is 10 years old it will typically have completed more than 400,000km. Vans that are five years old have already completed around 200,000km and are ready for replacement. The hoist replacement scheme needs a funding boost to keep up with demand and to improve the quality of vehicles in service. The population is aging which will create more

people eligible for the Total Mobility service and there is already a shortage of wheelchair accessible vehicles with the current hoist replacement programme only just replacing the fleet.

5.1.9 Vehicle characteristics

RE-LI-ON-US has a total fleet of 24 vehicles, 15 of which have Total Mobility funded hoists. There are three vehicles over 12 years old that cannot be used for Total Mobility work without dispensation from ARTA. These vehicles are used for training new drivers and will eventually be retired from the fleet and sold. Most of the fleet is made up of Diesel Toyota Hiace vans, which can take up to four wheelchairs at a time depending on the size of the wheelchair. The fleet could theoretically carry 54 people in wheelchairs if each van carried its full three to four wheelchairs.

Figure 5.7 A typical RE-LI-ON-US van



The average age of the active fleet is four years with the ages ranging from one to eight years old. The vehicles average 40,600km per annum but this is not spread evenly across the fleet. Drivers are allocated to vehicles, which results in the busier drivers clocking more km than others do. There are also vans that are more popular so are they used more often, in particular, the Fiat van has been used a lot more than the others. There is not so much a shortage of vehicles as there is of drivers so the variation in kilometres will reflect if a vehicle has been allocated to a driver for most of the year or not. There is one standard car used for able-bodied transport but all the remaining fleet is wheelchair hoist fitted. First aid kits are held in the glove box and drivers have advanced first aid training. The fleet is fitted with fire extinguishers and several have oxygen cylinder holders.

The vans have wide and flat loading areas, which enables some electric wheelchairs to turn around inside the van so customers can face forwards to exit the vehicle. The vehicles have seats folded up as a default as they are predominantly used for wheelchair passengers. Sixty-nine percent of trips in the sample data months included a wheelchair user.

The vans are equipped with good handrails to make access easier for those able to walk with assistance.

Figure 5.8 Mobility vans have a specialised interior design

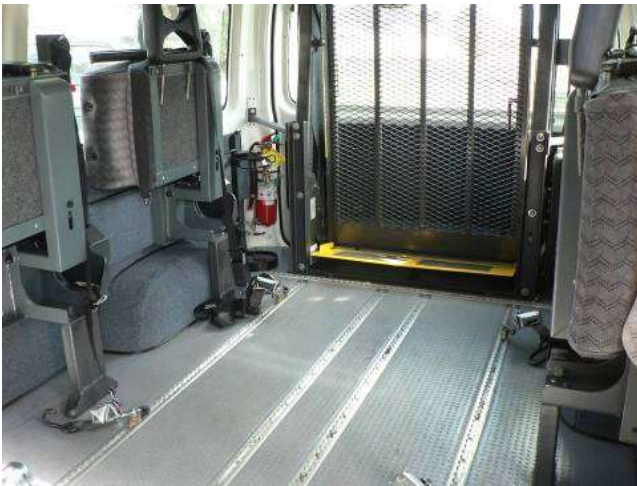


Photo source: author

5.1.10 Driver characteristics

The drivers are currently all ex-taxi drivers and have had advanced first aid training and Total Mobility training. There is no specialised training for mobility drivers as a group.

RE-LI-ON-US considers that Total Mobility training is insufficient to cover the work of a specialty service. A taxi company with a Total Mobility vehicle and driver may only have a few disabled passengers each week unlike a dedicated mobility service, which has predominantly disabled passengers. The drivers required are fundamentally different from typical taxi drivers as they are a different type of person. There is no career path or training providers to develop the type of driver needed for mobility providers.

Chris Ross, the marketing manager for RE-LI-ON-US, suggested there should be a new type of driver licence. He termed this an M-endorsement instead of the Passenger (P) endorsement required for taxi drivers. The M-endorsement would include specialised training on hoists, securing wheelchairs, understanding the special needs of different disabilities and advanced first aid. A licence that recognises that mobility drivers are not taxi drivers and that they require specialised training, and are therefore a different occupational group, would be beneficial. There is a need for professional standards and recognition as a group that will encourage quality in terms of applicants for the work and then the service provided. The extra service provided by mobility drivers in assisting with loading and unloading by using the hoists, and the extra care, patience and time that is required needs a different skill set. By providing a better and targeted service, the specialist mobility providers will eventually take the market from Total Mobility taxis that may not have the same standards of service or the ability to develop driver relationships with customers.

RE-LI-ON-US aims to recruit suitable staff so are looking for people with a nursing background, or those who have driven for disabled groups before. Ideally, they would like to be involved in a training scheme where people train to become licensed mobility drivers. This would enable the company to recruit suitable people and establish a career path for entry into the mobility industry. The intent is to improve the quality of service to their customers and to assist in providing appropriate training for the mobility drivers, which is fundamentally different from taxi driving training.

Drivers are paid 67% of their hourly rate per job; the average job is 40 minutes so drivers who do many jobs can increase their income. This is a deliberate shift away from paying a fixed hourly rate as there was no incentive for drivers to take jobs as they were paid whether they had jobs or not. This system will work well when the drivers are busy but not so well when things are quiet. Using a payment per job the drivers share the risk with the owner and have a stake in getting and retaining more customers. This system has only recently been introduced and has not been popular with the existing drivers.

Drivers that establish a good rapport with their customers can gain repeat or regular bookings and thus build up a weekly or monthly booking list of the same customers. This is a key advantage over traditional dispatching using a taxi company. It is also very important for the disabled community to have a company and drivers they trust, due to their vulnerability and close contact with the drivers when wheelchairs are secured and safety belts fitted.

5.1.11 Booking system

The booking system is via both phone calls and the internet. The booking is entered into the computer system, which will order jobs based on the time of the booking with a countdown in minutes. Eighty-two percent of trips are booked before the day of travel with the remaining 18% being booked on the day of travel. Despite so many of the trips being pre-booked there is no system for route optimisation prior to the day of operation, so jobs are allocated live based on what appears on the list. Some drivers, however, are allocated to certain jobs.

Each van has a GPS unit and Total Mobility card reader. The van's location is identified via GPS and is shown on a computer screen which displays four colours

If the vehicle is full and in use	RED
Loading passengers	ORANGE
Ready for another job	GREEN
En route to a job	BLUE

Figure 5.9 Real-time GPS dispatch system

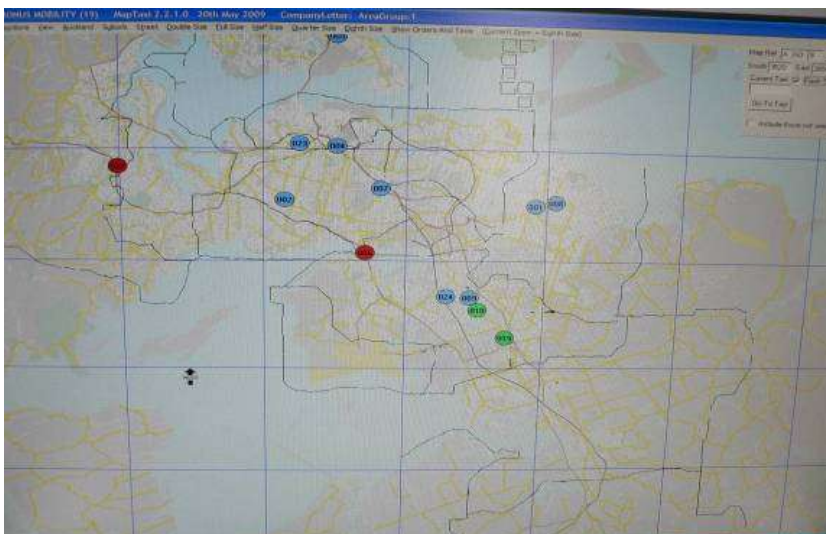


Photo source: author

There is no indication of the destination of the van so there are no route paths showing where the van will finish its run. There is no route optimisation to generate multiple pickup routes. Shared rides do occur frequently; however, these are group bookings from clubs, rest homes, or the Laura Fergusson centre to home.

There is no way of establishing if all vehicles are booked at a particular time so it is still possible to overbook the system beyond the vehicle capacity. This has been addressed to date by adding capacity via more vans and drivers and accepting bookings but turning up late. As vehicles are allocated dynamically, the ability to generate customer-driver relationships is reduced. There may be ways of splitting the fleet and drivers into an on-demand fleet and a booked fleet – this way regular customers can have the certainty of getting their favourite driver and by having a standard booking time establish a service time that suits RE-LI-ON-US and the customer. Links to other customers can also enable shared rides.

Some groups like Shanti Niwas require group transport for older and disabled people. These social outings of large groups are a growth area and often enable efficient shared rides that would not be possible if the vehicle could not carry wheelchairs. The groups often have a wide variety of mobility requirements ranging from able bodied to requiring the use of a walking stick, walking frame or wheelchair. Wheelchair based sports groups who play wheelchair basketball or rugby also use the services on occasion. Very few services can accommodate more than one wheelchair passenger in one vehicle let alone a large group.

RE-LI-ON-US is considering a booking prioritisation system as follows:

- Priority 1 Bookings where there is a time expectation, typically a medical appointment where the customer is required to be at a set location by a certain time, eg the airport
- Priority 2 Bookings for those needing to get to work
- Priority 3 Bookings for those who want to go shopping or to social/recreation events where the departure times may be a bit more flexible.

5.1.12 Tariffs

The tariffs as (at 20 August 2009) are typical of the taxi industry in Auckland.

Flag fall	\$3
Tariff 1	\$2.40 per km, 6am to 6pm
Tariff 2	\$3.20 per km, 6.01pm to 5.59am
Tariff 3	\$2.80 per km multiple pickups
Airport transfers	\$20

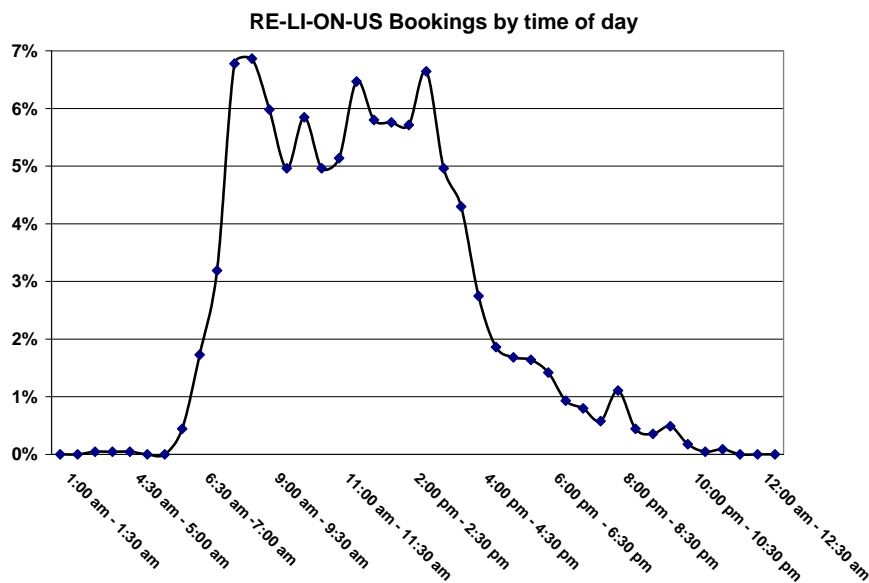
5.1.13 Data collection and analysis

The RE-LI-ON-US management team monitors each **month's performance**. A sample month was provided for analysis. There are several thousand bookings each month, so a single month provides a good snapshot of the business.

5.1.14 Demand profile

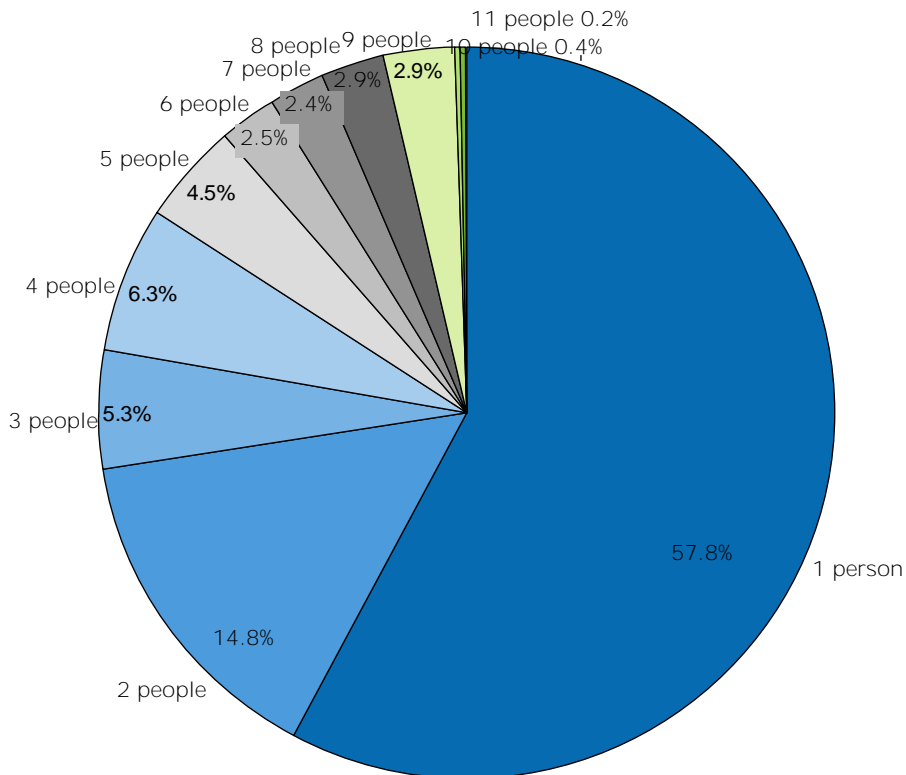
The peak resource issue is a common problem across all providers in the sector. The demand for wheelchair accessible vehicles is very high between 8am and 9am and much of the demand is linked to multiserve school contracts where wheelchair accessible vans are used to transport disabled children to school. This leaves a limited fleet available for the rest of the disabled community at this time of day. The situation is made worse by the lack of job sharing across the industry, with companies with no capacity simply declining jobs rather than passing them on to other providers. This reflects the competitive nature of the industry.

Figure 5.10 Bookings profile



RE-LI-ON-US demand peaks between 7.30am and 9am and again between 2.30pm and 3pm. After 3pm demand drops considerably. The lack of demand after 3pm is unusual as there is normally an increase in travel demand in the evening peak. Traffic congestion, however, is worst at this time of day so Total Mobility passengers may try not to travel at peak periods to avoid large fares. Most of the users of the service are not in full-time employment and do not use the service to get to work. Eighty-six percent of bookings are between 7am and 4.30pm.

Figure 5.11 Passengers carried per trip



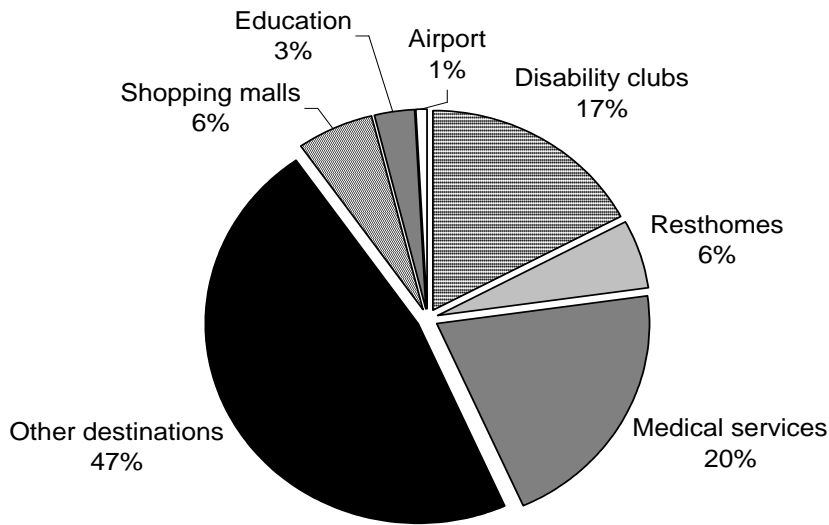
While 58% of trips carried only one passenger in the period surveyed, 27% of trips carried three or more passengers. Disabled groups such as stroke clubs, Shanti Niwas and PHAB tended to be the main users of group transport with rest homes also frequently providing multiple passengers.

5.1.15 Common destinations

The total trips for August 2009 were analysed and the common destinations by trip purpose are shown in figure 5.12. Most of the trips were to unique or uncommon destinations (47%). While there was a significant number of trips linked to funding by ACC, Workbridge and PHAB the actual destinations were varied. Likewise, the RE-LI-ON-US account holders travel to many different destinations but are sent an account each month. This makes it easier for frequent users to pay on a monthly basis rather than having to pay for each trip separately.

As the service is a mobility service, 68% of trips are by customers using wheelchairs. The destinations reflect this with medical services making up 20% of trip destinations. Other common pickup points are rest homes (6%). Disabled groups (17%) use the service to access many different social and recreational locations. The huge variety of destinations reflects that this service replaces the car for many of its customers.

Figure 5.12 RE-LI-ON-US common destinations



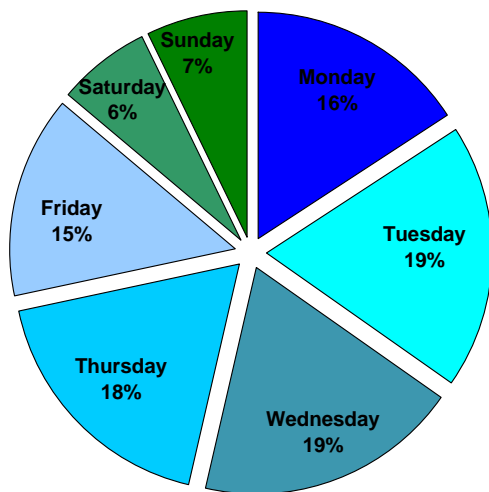
RE-LI-ON-US has had some contract work with Veolia Transport Auckland to provide services for disabled people during the double tracking projects, especially when Newmarket station was being upgraded and platform changes were required to transfer from the southern to western lines. RE-LI-ON-US wants to collaborate with event venues to provide services for the disabled linked with ticket sales. The company has a contract with Invacare to deliver oxygen cylinders and machines after hours to patients whose equipment needs replacing.

5.1.16 Service characteristics

The service is a 24-hour operation with two night shift staff. Night jobs are predominantly for disabled persons arriving at or departing from the airport, and there are also some transport requirements for those who have had a night out in the city. RE-LI-ON-US has an agreement with Invacare to provide a wheelchair at the international or domestic terminal, which can be hired for the rest of the **person's** stay in Auckland. This is a good marketing strategy as the disabled person does not have to worry about trying to find a wheelchair hire service once they arrive in the city.

Tuesdays, Wednesdays and Thursdays are the busiest days with Mondays and Fridays being slower in general. The lowest demand is in the weekends. The lowest demand weekday may have three times fewer passengers than the busiest day. This makes resourcing in terms of vehicles and drivers difficult. The peak demand during the day is also concentrated between 8am and 10am and between 2.30pm and 5.30pm.

Figure 5.13 RE-LI-ON-US jobs by day of the week



RE-LI-ON-US passengers mentioned they had stopped using some taxi companies because of the practice of starting the meter while they were loading, thus resulting in \$8 on the meter before they had even started moving. RE-LI-ON-US does not start the meter until they are ready to set off which the customers appreciate due to the longer loading times.

This loading, unloading and escorting of customers to the ward or hospital appointment venue is an important distinction between a mobility provider and a taxi service. It is something that the commercial mobility specialists and volunteer services share. They will go the extra mile by escorting the patient to the correct place for their medical appointment. The person may need to be pushed in a wheelchair, or they may have other mobility or cognitive issues that require extra assistance to manage the journey between the van and the destination. An overlooked mobility issue is getting to the station or bus stop and transferring onto the vehicle. The difficulty of this can prevent many people from using PT.

5.1.17 Summary

RE-LI-ON-US is a specialist mobility transport provider operating in Auckland. Despite being a commercial enterprise, most of its income derives from the subsidies provided to customers from the Total Mobility Scheme, ACC, getOutThere vouchers or PHAB transport with some customers receiving an entirely subsidised trip. The reliability of the service suffers during peak demand periods, which is a common problem for all PT operations. RE-LI-ON-US does not benefit from the advantages of a pre-booked system as it still uses the real-time dispatch-based system inherited from the original taxi-based operation. The customers who have a good experience with the service will remain loyal but if reliability continues to be an issue, customers will try other providers. The operation is in a transitional phase under the new owner and over time, things should improve. There is a genuine care for the disabled community and the same personal motivation to assist is present in this company as it is in the community vans studied. The service needs some cornerstone contracts with health providers to give it financial security, which will enable it to cope with the fluctuations in demand. This type of service would be viable in other cities especially if linked to hospital transport and Multiserve contracts. The service would not be viable in small towns as the number of wheelchair-dependent customers would be too small to support a commercial service.

6 Case study 3: Melbourne DRT services

Melbourne has a long history of providing DRT bus services with the first Telebus service beginning in 1977. There are now eight Telebus areas operating in north-east Melbourne. The Telebus services were introduced by Invicta United Bus Services in Croydon under John Usher. In February 2009, Grenda Transit Management acquired Invicta and now operates these Telebus services. The Melbourne DRT services are hybrids falling somewhere between a full dial-a-ride service and fixed-route bus services with some aspects of both present in the service offerings.

The use of single occupant cars as the main means of commuting is only sustainable using low-cost fuel. With higher fuel prices PT services are now being considered again including DRT services in suburban areas. In July 2008 the demand responsive route 490 began in Gowanbrae, West Melbourne. A demand responsive roaming rail feeder service GisBus (1300gisbus www.gisbus.com) was also introduced in Gisborne town in January 2009. This service links the town to the V-line train to Melbourne and is included in the V-line fare. The service only requires booking in one direction (towards the train station) and long-term bookings can be made which suits the commuter market and avoids booking every day. The buses wait for the train to arrive in the evening and drop people at their homes within the designated area.

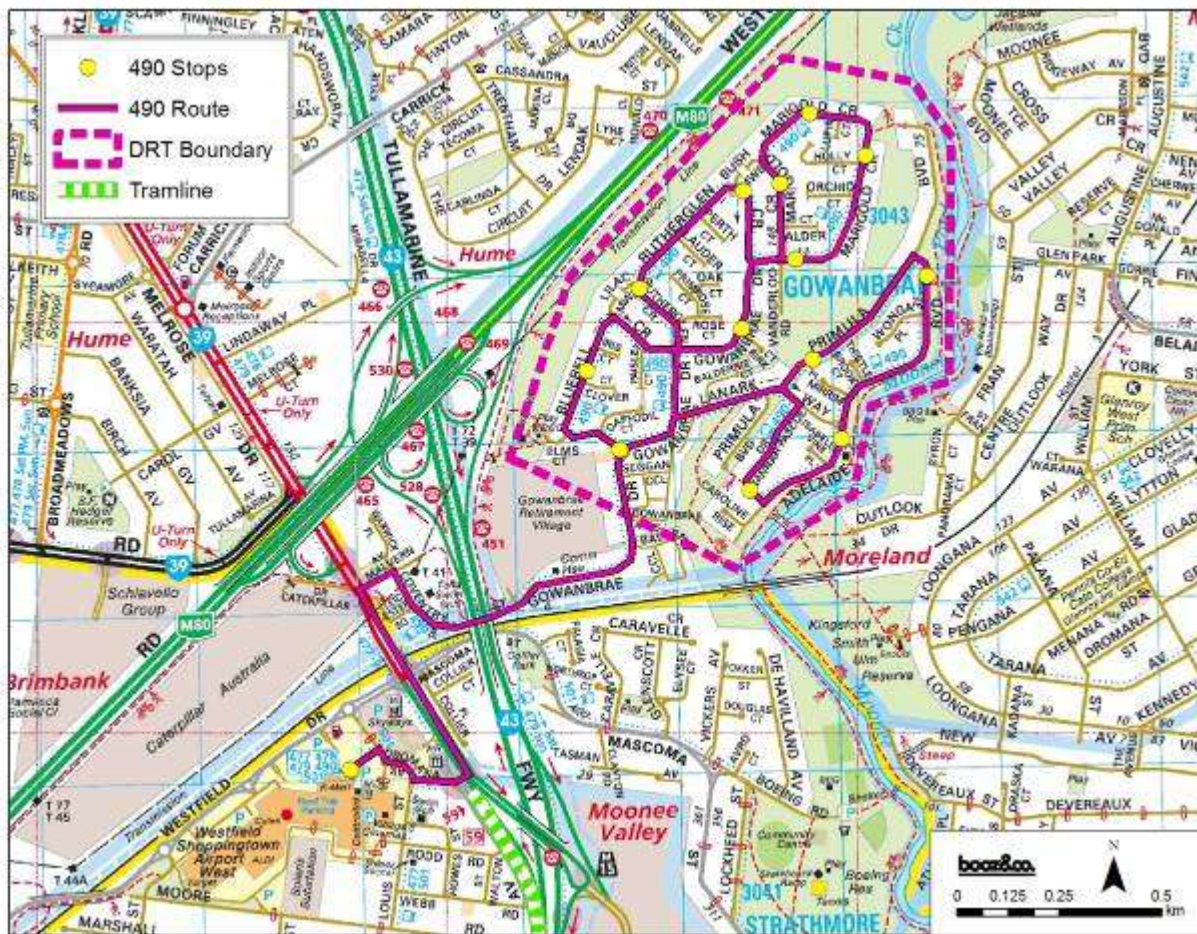
6.1 Route 490 Gowanbrae DRT service

Gowanbrae is a suburb of Melbourne located 13km north-west of the CBD. At the 2006 Census, Gowanbrae had a population of 1892 up from 400 in 2001. It is a new suburb with one third of the population born overseas (Australian Bureau of Statistics).

Route 490 bus is a DRT service introduced in July 2008; no PT had previously operated in the suburb. The area suits a demand responsive service as it has a defined catchment. Gowanbrae has motorways on both sides and a freight line to the south. There is only one road into the suburb via Coventry Street, under the Tullamarine freeway and on to Gowanbrae Rd. The suburb has over 23 dead-end or cul-de-sac streets as is typical in many modern suburbs and this makes it difficult to service efficiently with a fixed-route full-size bus. If the street network had more links, the service could have been a fixed-route service. The demand is concentrated at one end of the route at Westfield Airport West shopping centre and the terminus for tram route 59 to the CBD. The route is fixed for the initial segment until it reaches the suburb. Within the suburb, there are 12 bus stops a person can be picked up from if they have booked a minimum of 15 minutes before the scheduled start of the trip. If coming from the tram or shopping areas the customer just tells the driver which stop they want to alight at. Thus, the service is only pre-booked in one direction.

The bus services in Melbourne have been undergoing service reviews. The Gowanbrae suburb is in the city of Moreland which is one of 16 administrative cities that make up Melbourne. The Moreland Bus Service review of 2007 identified a lack of local services to Gowanbrae. Demand responsive services were considered where traditional types of services would not be suitable, due to the nature of the road network, or where demand was low such as the Gowanbrae area.

Figure 6.1 Gowanbrae Route 490 DRT service



Source: Booz & Company

Route 490 operates with a half-hour frequency during the morning and afternoon peak and hourly from 9am until 4pm. The service span is between 6am and 6.45pm Monday to Friday. There is an hourly service between 9am and 4pm on Saturday and no service on Sunday. The service has a 15-minute journey time and is not overly affected by congestion. The Airport West shopping centre has a vast supply of car parking. There is no extra fee for the DRT service unlike the Telebus operating in the north-east of Melbourne. The service was well received politically and seems to be performing well in terms of patronage. See appendix D for newspaper reports and press releases.

Figure 6.2 Route 490 timetable

Route 490 Airport West		Service operates from 14.07.2008 until further notice															
		Monday to Friday															
Wheelchair Accessible Services																	
Morning (am) / Afternoon (pm)		am	am	am	am	am	am	am	am	am	pm	pm	pm	pm	pm	pm	pm
Clover Ct/Bluebell Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Lilac Mews/Rutherglen Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Bush Mews/Rutherglen Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Alder Ct/Marigold Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Lupin Ct/Marigold Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Holly Ct/Marigold Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Vanderloo Rd/Marigold Cres (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Birk Ct/Gowanbrae Dr (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Lanark Way/Primula Bvd (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Wonga Pl/Adelaide Bvd (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Lanark Way/Adelaide Bvd (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Caroline Rise/Hannah Pascoe Dr (Gowanbrae)	H6:00	H6:33	H7:03	H7:33	H8:03	H8:33	H9:08	H10:12	H11:08	H12:08	H1:08	H2:08	H3:08	H3:55	H4:23	H4:55	H5:23
Bluebell Cres/Gowanbrae Dr (Gowanbrae)	6:00	6:33	7:03	7:33	8:03	8:33	9:08	10:12	11:08	12:08	1:08	2:08	3:08	3:55	4:23	4:55	5:23
Balerno Ct/Gowanbrae Dr (Gowanbrae)	6:02	6:35	7:05	7:35	8:05	8:35	9:11	10:15	11:11	12:11	1:11	2:11	3:10	3:57	4:25	4:57	5:25
Leicester Sq/Coventry St (Tullamarine)	6:09	6:42	7:12	7:42	8:12	8:42	9:18	10:22	11:18	12:18	1:18	2:18	3:17	4:04	4:32	5:04	5:32
Airport West Shoppingtown/Louis St (Airport West)	6:15	6:48	7:18	7:48	8:18	8:48	9:25	10:29	11:25	12:25	1:25	2:25	3:23	4:10	4:38	5:10	5:38
		Monday to Friday															
Wheelchair Accessible Services																	
Morning (am) / Afternoon (pm)		pm	pm	pm													
Clover Ct/Bluebell Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Lilac Mews/Rutherglen Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Bush Mews/Rutherglen Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Alder Ct/Marigold Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Lupin Ct/Marigold Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Holly Ct/Marigold Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Vanderloo Rd/Marigold Cres (Gowanbrae)	H5:55	H6:25	H6:45														
Birk Ct/Gowanbrae Dr (Gowanbrae)	H5:55	H6:25	H6:45														
Lanark Way/Primula Bvd (Gowanbrae)	H5:55	H6:25	H6:45														
Wonga Pl/Adelaide Bvd (Gowanbrae)	H5:55	H6:25	H6:45														
Lanark Way/Adelaide Bvd (Gowanbrae)	H5:55	H6:25	H6:45														
Caroline Rise/Hannah Pascoe Dr (Gowanbrae)	H5:55	H6:25	H6:45														
Bluebell Cres/Gowanbrae Dr (Gowanbrae)	5:55	6:25	6:45														
Balerno Ct/Gowanbrae Dr (Gowanbrae)	5:57	6:27	6:47														
Leicester Sq/Coventry St (Tullamarine)	6:04	6:34	6:54														
Airport West Shoppingtown/Louis St (Airport West)	6:10	6:40	7:00														
		Saturday															
Wheelchair Accessible Services																	
Morning (am) / Afternoon (pm)		am	am	am	pm	pm	pm	pm									
Clover Ct/Bluebell Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Lilac Mews/Rutherglen Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Bush Mews/Rutherglen Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Alder Ct/Marigold Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Lupin Ct/Marigold Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Holly Ct/Marigold Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Vanderloo Rd/Marigold Cres (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Birk Ct/Gowanbrae Dr (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Lanark Way/Primula Bvd (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Wonga Pl/Adelaide Bvd (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Lanark Way/Adelaide Bvd (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Caroline Rise/Hannah Pascoe Dr (Gowanbrae)	H9:10	H10:10	H11:10	H12:10	H1:10	H2:10	H3:10	H4:10									
Bluebell Cres/Gowanbrae Dr (Gowanbrae)	9:10	10:10	11:10	12:10	1:10	2:10	3:10	4:10									
Balerno Ct/Gowanbrae Dr (Gowanbrae)	9:12	10:12	11:12	12:12	1:12	2:12	3:12	4:12									
Leicester Sq/Coventry St (Tullamarine)	9:19	10:19	11:19	12:19	1:19	2:19	3:19	4:19									
Airport West Shoppingtown/Louis St (Airport West)	9:25	10:25	11:25	12:25	1:25	2:25	3:25	4:25									
Service Information																	
H = Requested Stops 1 to 12 - Please call 1800 898 590 to be picked up at least 20 minutes prior to bus departure from Airport West. (Please see route description for details on stops 1 to 12)																	
W = Wheelchair Accessible																	

Source: www.metlinkmelbourne.com.au/route/view/1667

A visit was made to Gowanbrae to gain a better understanding of the issues. The suburb has been designed to maximise property sales and the streets are very narrow. Cars often have to reverse out of the way of the 30-seater minibus. This happened on each of the trips made during the visit. Even an open car door creates a problem. The weekends are worse when visitors, who are unfamiliar with the parking and access issues, park on the streets and create blockages. Cars can only be parked on one side of the road, as there is insufficient room to allow a single lane of traffic between two parked cars on most streets in the suburb. Discussions with the driver revealed that cars often block the road and the bus cannot get past until they are moved. In practice, the driver operates more of a hail and ride service with individuals often picked up from their homes or on the street, not necessarily at the defined bus stops on the route. The driver completes a circuit of the suburb for the main school run so it is, in effect, a fixed route for this particular trip. The driver, who has been running the service for the majority of the trips for the two years of the trial, considers the service could just as easily be provided as a fixed-route service. The service requires a small bus, which was sourced from Brisbane where a similar DRT service operates. There is another back up bus at the depot in case the one in service breaks down, but this is very inefficient. The need for a small bus is entirely due to the narrow streets. The Gowanbrae service is an example of a

specialised service required due to the developer's street design. The lack of links to the surrounding street network, and narrow streets with many dead ends and arcs and loops result in an inefficient transport network.

The higher cost of providing service to these types of suburbs is caused by the developer's street design but paid for by all the citizens in the region. The developer maximised their profit by selling more land as houses, with fewer unprofitable roads that leaves the residents, transport authorities, fire and ambulance services with major difficulties in accessing the suburb.

6.2 Melbourne's Telebus services

The first Telebus service began in October 1977 in **Chirnside Park, one of Melbourne's eastern suburbs.** It was a six-month experimental service introduced with funding from the Victorian Department of Transport (Usher 1978). The longevity of the Telebus service is one of the reasons for choosing it as a case study. Worldwide, many demand responsive services have come and gone – few have lasted as long as Telebus. The Victorian government has continued to subsidise Telebus for 33 years so far and has remained satisfied with the value for money of this subsidy. Many other DRT services have ceased due to funding cutbacks. There were some important decisions made in the operation design that were crucial to its success. 'To simplify operation and to control costs it was decided to limit major destinations to two, one at the Railway station and the other central to the shopping centre' (Usher 1978).

The bookings are made by phone and the dispatcher relays new bookings over the radio to the driver, who then develops a pickup order based on their knowledge of the street network. This manual booking and dispatch system has successfully operated for 33 years. The ability to make a long-term booking is important as it allows a regular route pattern to be developed for the most frequent users. Bookings can also be made right up until the bus leaves the terminus. A whiteboard is used to record the subscription bookings. The board is divided into the eight Telebus areas with the daily timetabled trips of each route represented by a square. Inside the square is written the address of the person who has made a booking. The whiteboard forms a template and provides an address list of the regular customers. Over the white board, a glass sheet is placed on which the daily bookings are recorded. The regular bookings are visible through the glass and the extra daily bookings are written on the glass itself. The driver is radioed through the list of pickups. The driver hand writes the address (two digit street number and the street name) on a piece of paper, which is held onto the electronic ticketing machine by a rubber band. This low-tech method has been in use for 18 years and despite investigating other systems, it remains a highly cost-effective option. When a person does not want to be picked up anymore they notify Telebus and their address is removed from the whiteboard.

The efficiency of the system still depends (as it did in 1978) on the skill and local knowledge of each driver as they put each tour together. A rapport soon builds up between passengers, drivers and dispatchers. Most of the passengers are regulars many making permanent or "subscription" bookings (Usher 1994)

This is user- or demand-based bus route planning. The route on a daily basis is a core route along the main arterial in the suburb with extensions to serve the regular customers with a fixed booking, and daily bookings by infrequent customers. The same dispatch and booking system is used across all Telebus areas thus sharing the operating costs across many routes.

The Telebus services are located in the low-density urban fringe of Melbourne typified by curved street networks, crescents and cul-de-sacs with limited or no footpaths. Telebus routes are semi-fixed routes,

with deviations on request. The advantages of fixed routes are that performance and bus stop visibility are retained and the door-to-door advantages of a flexible route are added for an additional fare. The surcharge is \$1 per full fare trip or 60 cents for those entitled to concessions.³ All the Telebus areas serve at least one rail station, or a large mall/shopping centre providing a many-to-one demand profile. Most also serve local schools thus capturing the three main journey purposes: work, education and shopping.

Wang (2006) in her study of Telebus found that use of the demand responsive option increased with age from 27% for the younger age group (15–54) to 43% for people aged 55–64 and to 69% for people aged 75 and over. Also, 80% of people with a health and disability condition choose the demand responsive option almost every time they use the Telebus. The Telebus service is used for shopping (31%) and personal appointments (18%). On typical bus routes, services are used for shopping (19%) and personal appointments (7%). The demand responsive services are therefore more likely to suit an aging population with higher mobility needs. The commuting public requires a fast and frequent service so the network design needs to cater for both user groups.

The catchment areas are small resulting in total journey times of fewer than 30 minutes. The areas served are aligned with the street networks and local topography with boundaries along major arterial roads. The base route design is relatively direct. The services were introduced when the suburbs were in their infancy thus allowing the residents to learn to use the services as the suburbs grew. The residents understand how to use the service and even if they only occasionally use it, they have tried it, and are familiar with how Telebus functions.

Peak operations in areas 1 to 9 are single (peak) direction services connecting to rail stations. In each case there is a single direct return trip path to enable fast turnaround for buses to return to the terminus to ensure good vehicle utilisation in the peak direction (Currie 2007).

There are eight Telebus routes operating in the Eastern suburbs Chirnside Park, Lilydale, Mooroolbark, Croydon Hills and Rowville.

- 1 Lilydale – Chirnside park (Telebus area 1)
- 2 Mooroolbark Station – Chirnside Park (Telebus area 2)
- 3 Mooroolbark Station – Chirnside Park (Telebus area 3)
- 4 Mooroolbark Station – Croydon (Telebus area 4)
- 5 Croydon Station – Chirnside Park Shopping Centre Route 672
- 6 Ferntree Gully – Stud Park Shopping Centre (Telebus area 7)
- 7 Stud Park Shopping Centre – Ferntree gully (Telebus area 8)
- 8 Stud Park Shopping Centre – Stud Park Shopping Centre (Telebus area 9)

The Telebus concept has survived the introduction of integrated fares in Melbourne. Telebus kept the surcharge to reflect the higher operating costs and at the same time allowed use of the integrated fares if boarding at one of the fixed stops on the Telebus route. If the home pickup had become included in the two-hour ticket or day pass, the service might have been swamped by demand with no fare revenue

³ www.metlinkmelbourne.com.au/fares-tickets/metropolitan-fares-and-tickets/telebus-tickets

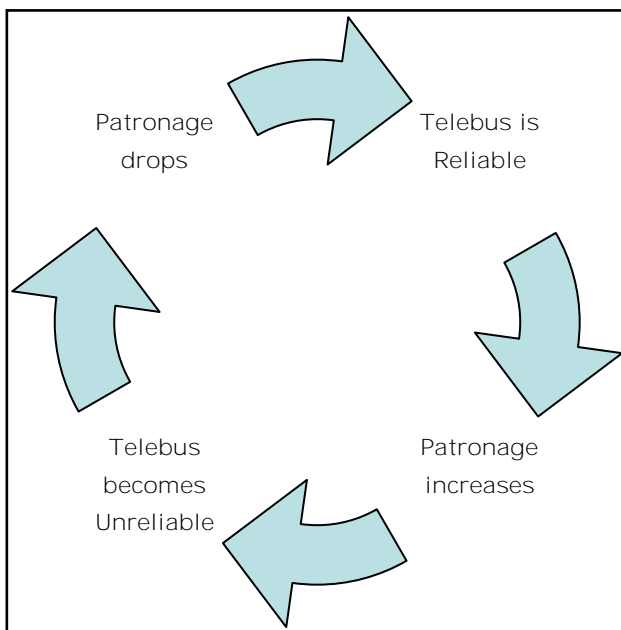
increase. Telebus customers can either board at one of the fixed stops (and pay the normal Metcard fare), or be picked up or dropped off at home (and pay a surcharge)⁴.

The operator is paid based on the km taken to drive the shortest route between the fixed bus stops as illustrated on the maps in figures 6.5, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13 and 6.14 (the red line on the maps). The extra cost of the home pickups are paid for via the fare surcharge, which is kept by the operator. Due to this arrangement, the routes can be seen as a fixed route service by the funder yet operate as a flexible service with the extra distance paid for by an additional charge. This enables the integrated tickets to be valid and an extra charge to be applied for the door-to-door service.

The drivers do offer a strictly door-to-door service; even very short cul-de-sacs are driven down despite the impact on the speed of service. Some of the cul-de-sacs in the suburbs are very short, only a few bus lengths in distance with relatively tight turning circles for the bus. The service would be faster if customers walked this small distance.

The Telebus operators have noticed a cycle of increased demand which lengthens the journey time due to more pickup or drop-off points to serve, thus reducing reliability and therefore reducing the attractiveness of the service.

Figure 6.3 The Telebus cycle of unreliability

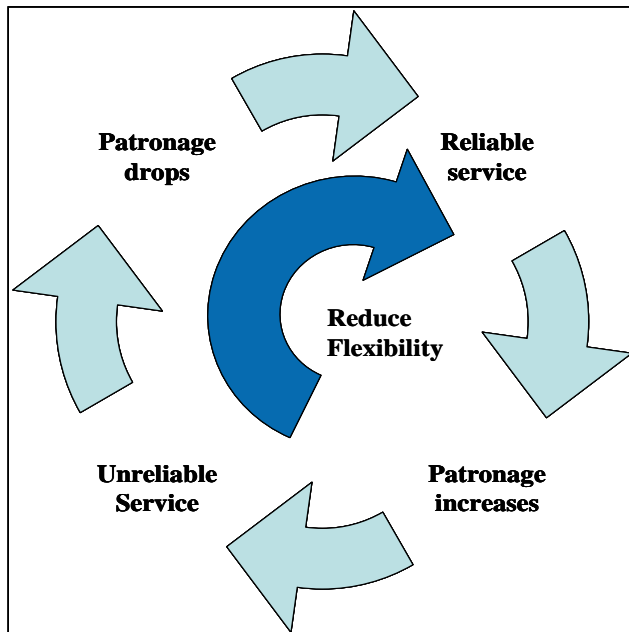


Adapted from Currie (2007)

This reliability problem is common to all flexible services where the door-to-door service is only practical in terms of journey time if the demand is low. Once demand increases, the required journey length and time become too high resulting in long and slow journeys with winding route paths.

⁴ www.metlinkmelbourne.com.au/fares-tickets/metropolitan-fares-and-tickets/telebus-tickets

Figure 6.4 Combating demand-based reliability issues



Adapted from Currie (2007)

This effect can be limited by reducing the flexibility of the service. Telebus has combated this by having some trips that are not flexible at all: the morning commute trips and the two school trips. The other strategy is to run the counter peak direction as an express using a direct route. This strategy could be used on many fixed-route bus services providing a motorway express service in the counter peak direction or a service that uses a main arterial with limited stops. Concentrating demand on high-quality centralised bus stops increases the visibility of the service and reduces the number of stops.

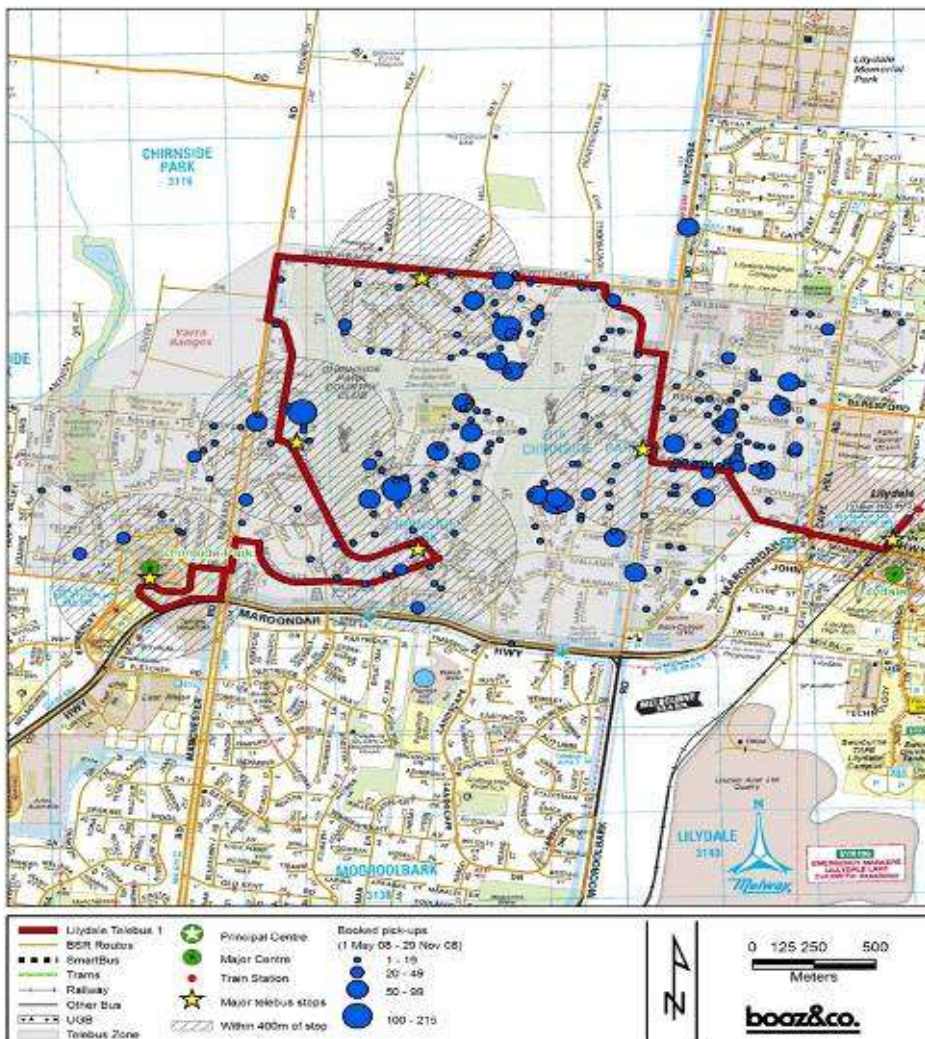
The flexible DRT service is limited to low-demand periods thus enabling the peak-demand periods to remain reliable and therefore retain passengers. Another method is to have a set number of pickup points. The DRT route 490 in Eastern Melbourne has achieved this by having 12 bus stops to choose from. Another option is to drop off or pick up at the beginning of dead-end streets (cul-de-sacs).

All of these strategies involve reducing the flexibility of the service as demand increases; keeping a fully flexible service in high demand has frequently ended in failure. Another option is to begin the service as a fully flexible DRT service and offer long-term subscriptions. This enables the route to be established by the regular users over the first one to two years, after which the route could become a fixed-route service using the established pattern of use. The service offered needs to evolve over time towards a more fixed route service with limited stops. Fixed-route services can also adopt this same changing pattern of service with the addition of peak express services and bus priority measures including bus lanes and even busways.

6.2.1 Lilydale Telebus area 1

The Lilydale Telebus shown below links the station in the east and the Chirnside Park Shopping Centre in the west. The bus can quickly get back to the Lilydale rail station using the Maroondah highway. The major roads define the northern and southern boundaries. Analysis of ticket sales shows that 36% are for off-route pickups (the location of these pickups is shown in the map below). The H-shaped golf course in the middle of the suburb limits the efficiency of the road network with no north-south or east-west road connection through the middle of the suburb.

Figure 6.5 Map 1 Lilydale Telebus area 1



Source: Booz & Company

This area suits a demand responsive service due to the difficult street network with few footpaths, in a hilly environment, causing a spread of passengers that cannot all be reached from an arterial road. This area has the advantages of a rail station and major shopping centre to provide a concentrated supply of passengers in one direction. The service range is from 6am to 7.30pm Monday to Friday and from 8.30am to 5pm on Saturday. There is no Sunday service. This service is an example of an interchange DRT service. It is only demand responsive off peak and the morning commute is a direct service using the fixed bus stops.

Table 6.6 Route area 1 Telebus timetable Lilydale station

Route Area 1 TeleBus		Lilydale Station																
Service operates from 17.07.2006 until further notice																		
Wheelchair Accessible Services		Monday to Friday																
Service Information																		
Morning (am) / Afternoon (pm)		am	am	am	am	am	am	am	am	am	pm	pm	pm	pm	M	M	M	M
Chimside Park Shopping Centre/Maroondah Hwy (Chimside Park)		H5:50	H6:15	H6:50	H7:20	7:50	8:45	9:30	10:30	11:30	12:30	1:30	2:30	3:30	K4:33	K5:05	K5:40	K6:15
Chimside Dr/Country Club Dr (Chimside Park)		H5:55	H6:20	H6:55	H7:25	7:55	8:50	9:35	10:35	11:35	12:35	1:35	2:35	3:35				
The Wallaby Run/Chimside Dr (Chimside Park)		H5:58	H6:23	H6:58	H7:28	7:58	8:53	9:40	10:40	11:40	12:40	1:40	2:40	3:40				
Switchback Rd/Polaris Way (Chimside Park)		H6:00	H6:25	H7:00	H7:30	8:00	8:55	9:45	10:45	11:45	12:45	1:45	2:45	3:45				
Peden St/Victoria Rd (Chimside Park)		H6:05	H6:30	H7:05	H7:35	8:05	9:00	9:50	10:50	11:50	12:50	1:50	2:50	3:50				
Lilydale Railway Station/Maroondah Hwy (Lilydale)		H6:10	H6:40	H7:10	H7:40	8:15	9:05	9:55	10:55	11:55	12:55	1:55	2:55	3:55	4:41	5:40	5:53	6:23

Source: www.metlinkmelbourne.com.au/timetables/telebuses/

The timetable shows the peak services between 5.50am and 7.20am and 4pm onwards operate as DRT in one direction only. They operate as an express from the station to the shopping centre and vice-versa depending on the peak-demand direction.

Table 6.7 Route area 1 Telebus timetable Chimside Park Shopping Centre

Route Area 1 TeleBus		Chimside Park SC																
Service operates from 17.07.2006 until further notice																		
Wheelchair Accessible Services		Monday to Friday																
Service Information																		
Morning (am) / Afternoon (pm)		M	M	M	M	am	am	am	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm
Lilydale Railway Station/Maroondah Hwy (Lilydale)		N6:10	N6:40	N7:10	N7:40	9:10	10:10	11:10	12:10	1:10	2:10	3:10	J4:05	J4:41	J5:15	J5:53	J6:23	J6:53
Peden St/Victoria Rd (Chimside Park)						9:15	10:15	11:15	12:15	1:15	2:15	3:15	J4:13	J4:45	J5:20	J5:57	J6:27	J6:57
Switchback Rd/Polaris Way (Chimside Park)						9:20	10:20	11:20	12:20	1:20	2:20	3:20	J4:18	J4:50	J5:25	J6:02	J6:32	J7:02
The Wallaby Run/Chimside Dr (Chimside Park)						9:25	10:25	11:25	12:25	1:25	2:25	3:25	J4:23	J4:55	J5:30	J6:06	J6:37	J7:07
Chimside Dr/Country Club Dr (Chimside Park)						9:30	10:30	11:30	12:30	1:30	2:28	3:30	J4:28	J5:00	J5:35	J6:10	J6:41	J7:11
Chimside Park Shopping Centre/Maroondah Hwy (Chimside Park)		6:15	6:50	7:20	7:50	9:35	10:35	11:35	12:35	1:35	2:30	3:35	J4:33	J5:05	J5:40	J6:15	J6:45	J7:15

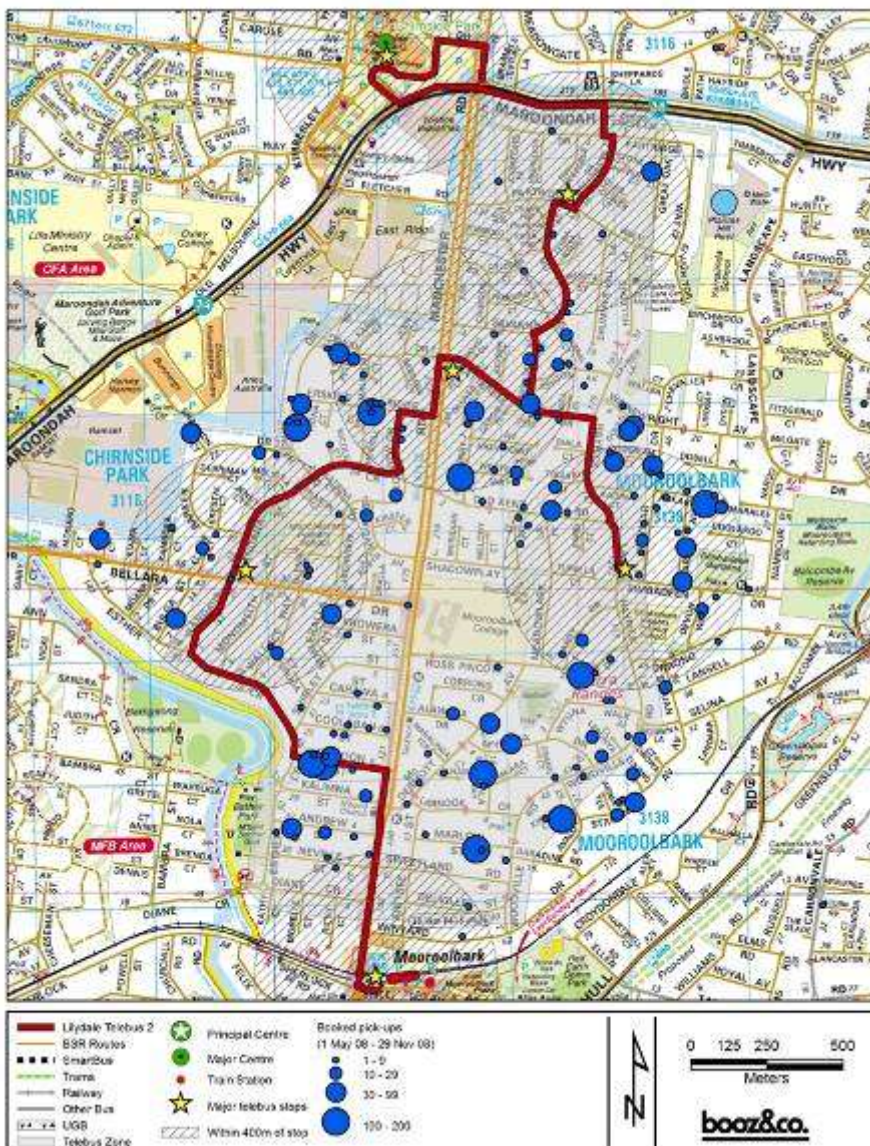
Source: www.metlinkmelbourne.com.au/timetables/telebuses/

There is no shortage of parking at Lilydale rail station with plenty of room to park in the area provided or in the surrounding streets. It is a one-hour train journey to the city by train. The suburb is on the outer edge of Melbourne on the urban growth boundary. Those who own cars have a viable option of getting to the station by car. The service is therefore used more often by children and elderly people.

6.2.2 Lilydale Telebus area 2

The Lilydale Telebus area 2 serves Mooroolbark train station and Chirnside Park Shopping Centre. The Mooroolbark station has over 200 car parks but these overflow to the grass verge and surrounding streets. The route serves two schools, one on the eastern and one on the western side. The streets do not have good north/south alignments. Thirty-three percent of sales are booked pickups or drop offs at homes off the route. The route is able to provide a link to the rail station for commuters, links to schools for children and links to the major shopping centre which helps to spread demand over the day. The service range is from 6am until 7.30pm Monday to Friday and from 8.30am to 5pm on Saturday. There is no Sunday service. Buses can deadhead in either direction during the peak using Manchester Road which provides a direct and fast link between the two main destinations served by the route. This is an important service design characteristic.

Figure 6.8 Map 2 Lilydale Telebus area 2

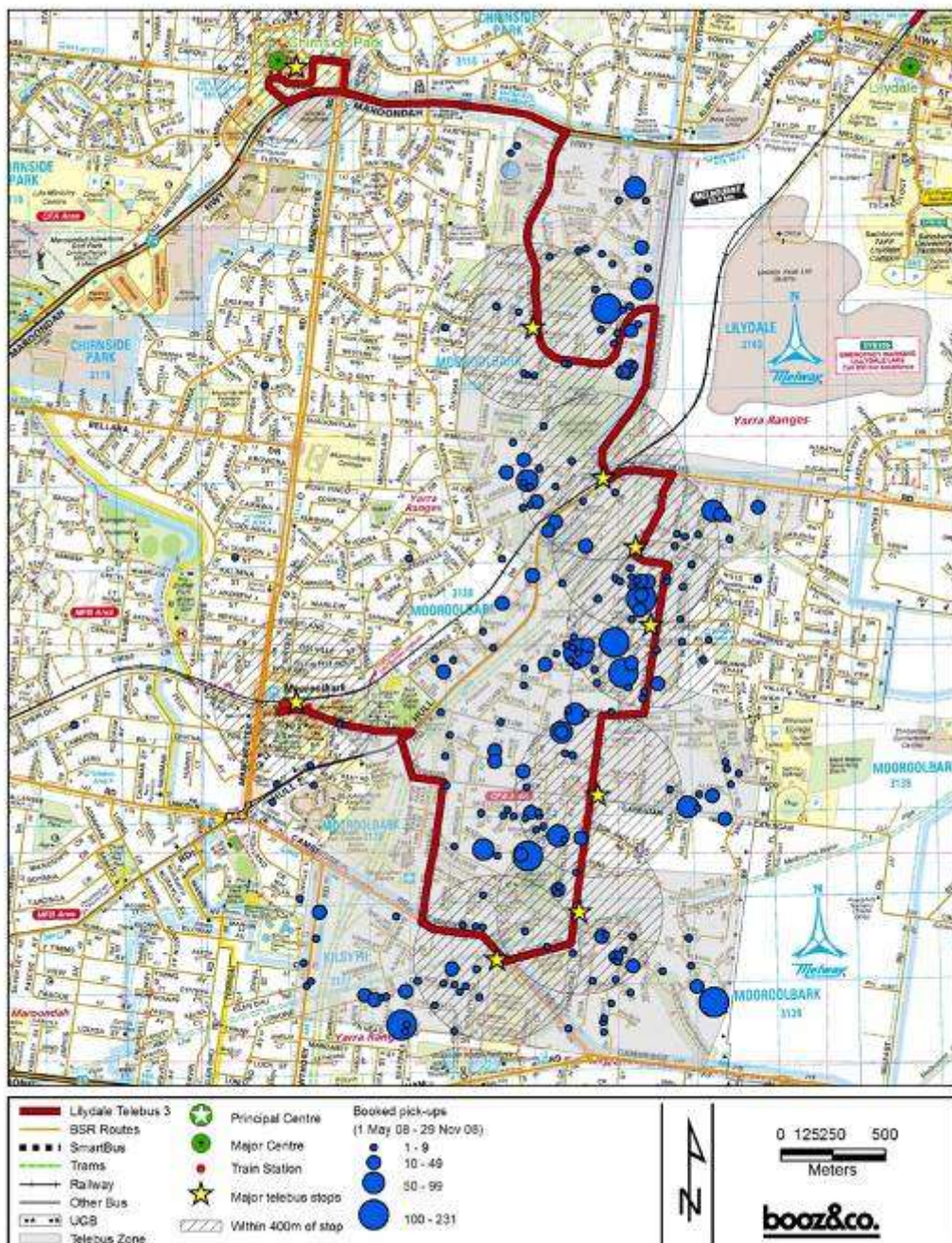


Source: Booz & Company

6.2.3 Lilydale Telebus area 3

The third Lilydale Telebus service links Mooroolbark train station and Chirnside Park Shopping Centre. There are several schools including Pembroke Primary and Secondary on the route south of Mooroolbark station and Rolling Hills Primary School at the northern part of the route. Thirty percent of fares are booked pickups or drop offs. By serving three schools, a rail station and a major shopping mall this service provides a diverse range of journey types with demand at different times of the day. The service range is from 6am until 7.30pm Monday to Friday and from 8.30am to 5pm on Saturday. There is no Sunday service.

Figure 6.9 Map 3 Lilydale Telebus area 3

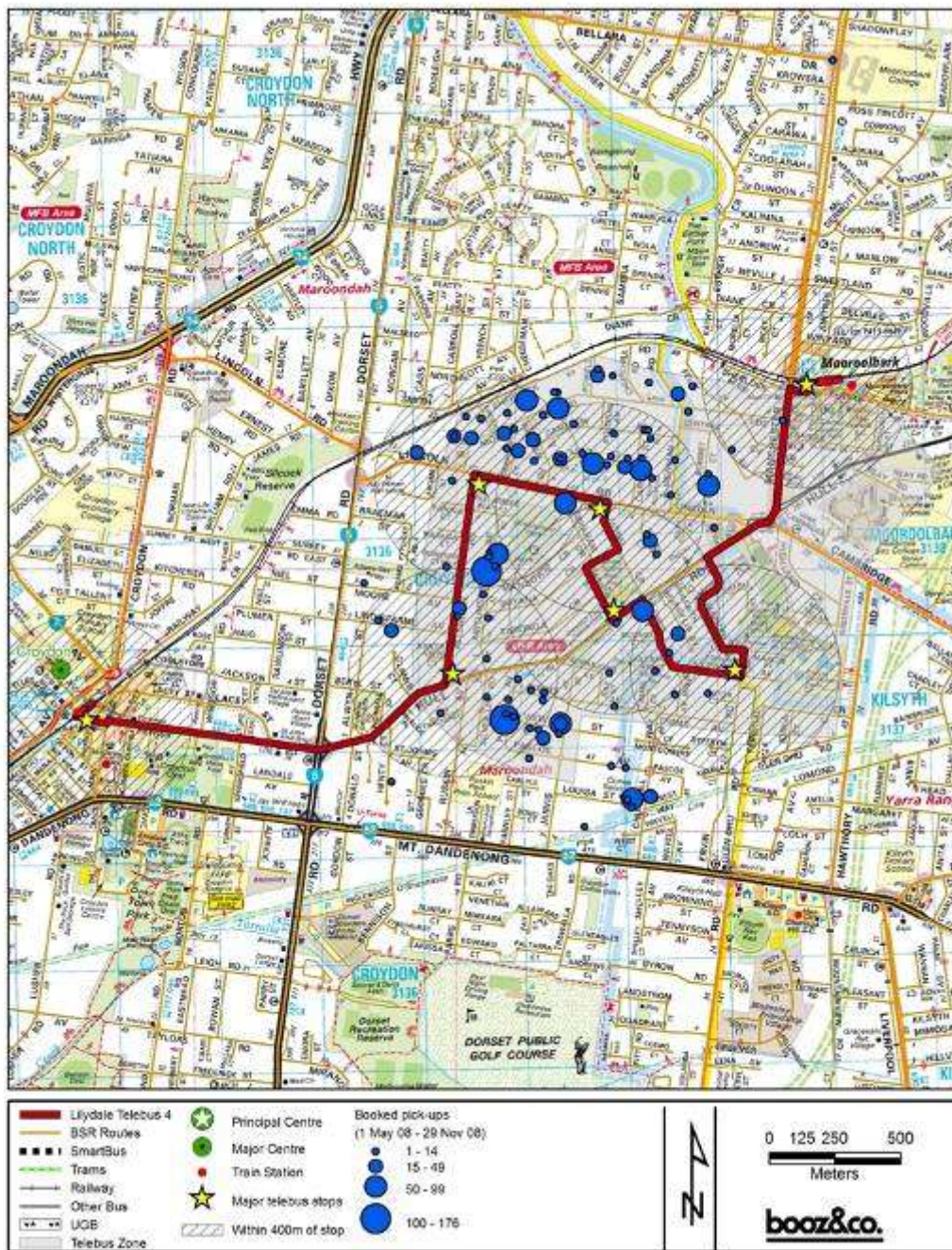


Source: Booz & Company

6.2.4 Lilydale Telebus area 4

Lilydale Telebus area 4 serves both Mooroolbark and Croydon train stations. The route is relatively direct and both stations have over 200 car parks, which are oversubscribed. Croydon is a town centre with a built-up shopping area and market. There are limited opportunities to expand the train station’s car parking area. Twenty-eight percent of sales are booked pickups or drop offs. The service range is from 6am until 7.30pm Monday to Friday and from 8.30am to 5pm on Saturday. There is no Sunday service. There is a fast link on Hull Road to allow deadhead running if required in the morning or evening peak.

Figure 6.10 Map 4 Lilydale Telebus area 4

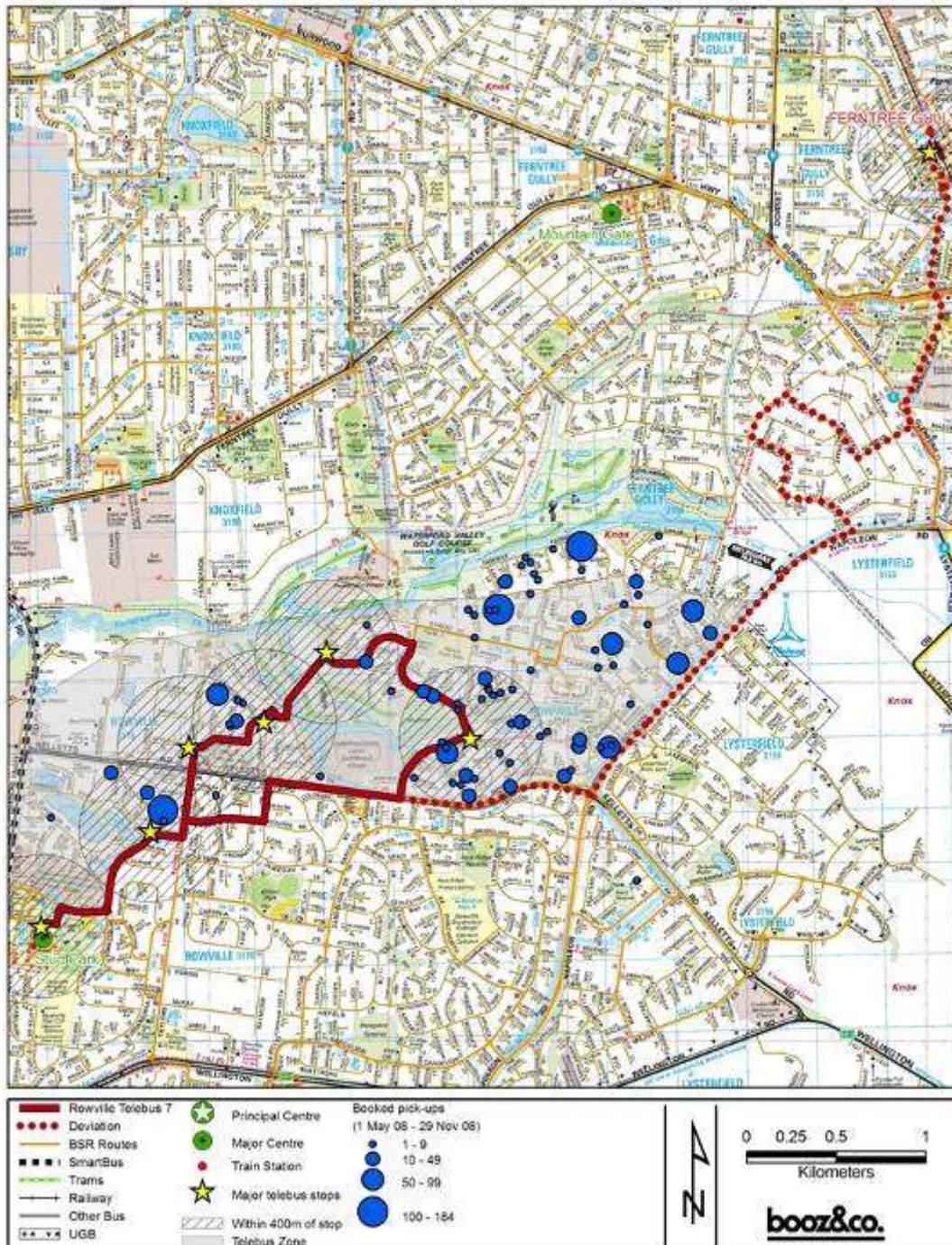


Source: Booz & Company

6.2.5 Rowville Telebus area 7

The Rowville Telebus area 7 links Rowville to the Stud Park Shopping Centre and Ferntree Gully train station. The service only serves the train station for the morning and evening peak and during the inter-peak it serves the shopping centre. Eleven percent of sales are booked pickups or drop offs at homes off the route. The service range is from 6.30am until 7.30pm Monday to Friday. There is no weekend service.

Figure 6.11 Map 5 Rowville Telebus area 7

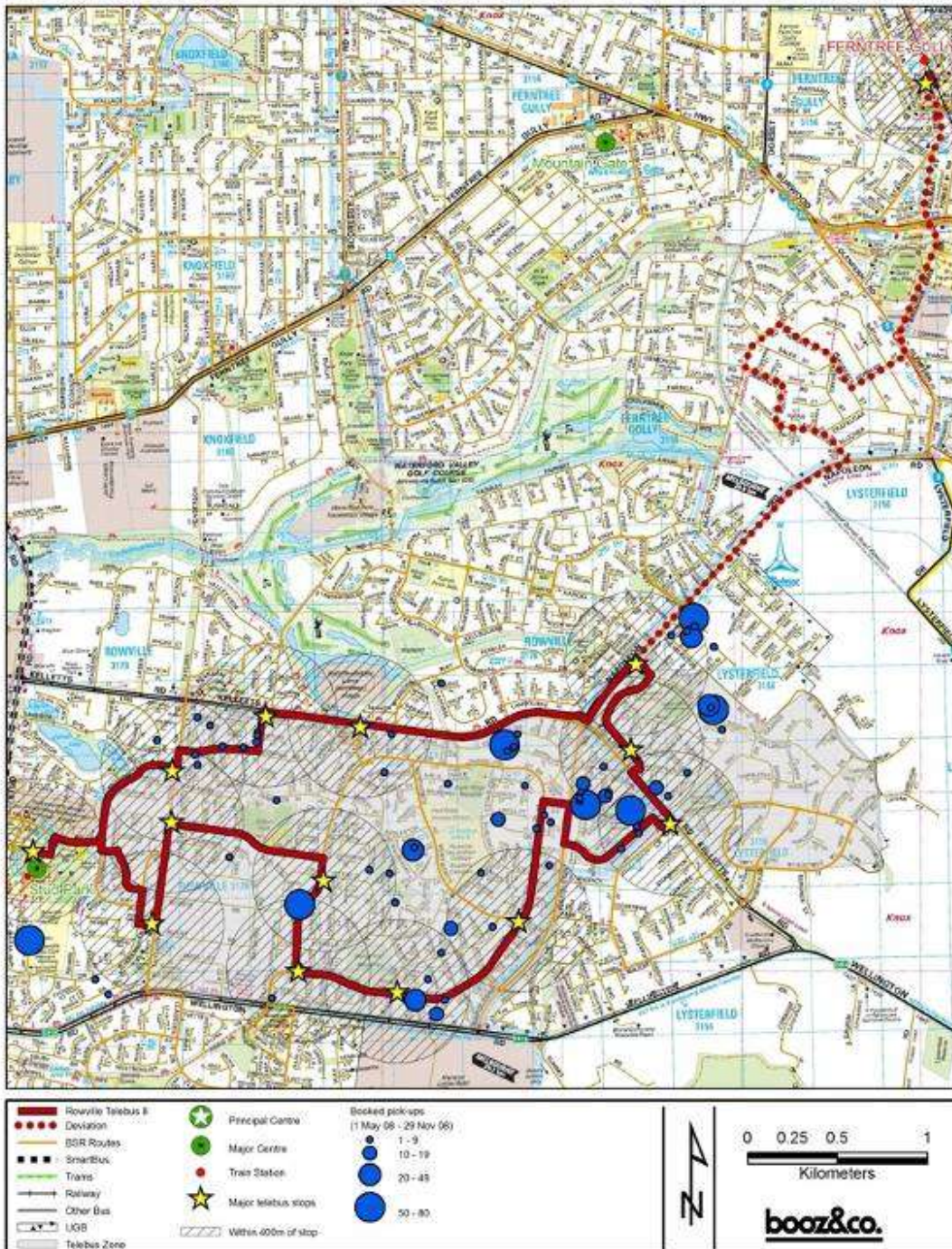


Source: Booz & Company

6.2.6 Rowville Telebus area 8

There is a demand-responsive connection between residential Rowville and activity centres at Stud Park Shopping Centre and Ferntree Gully train station. Seventeen percent of sales are booked pickups or drop offs at homes off the route. The service range is from 6am until 7.30pm Monday to Friday. There is no weekend service.

Figure 6.12 Map 6 Rowville Telebus area 8

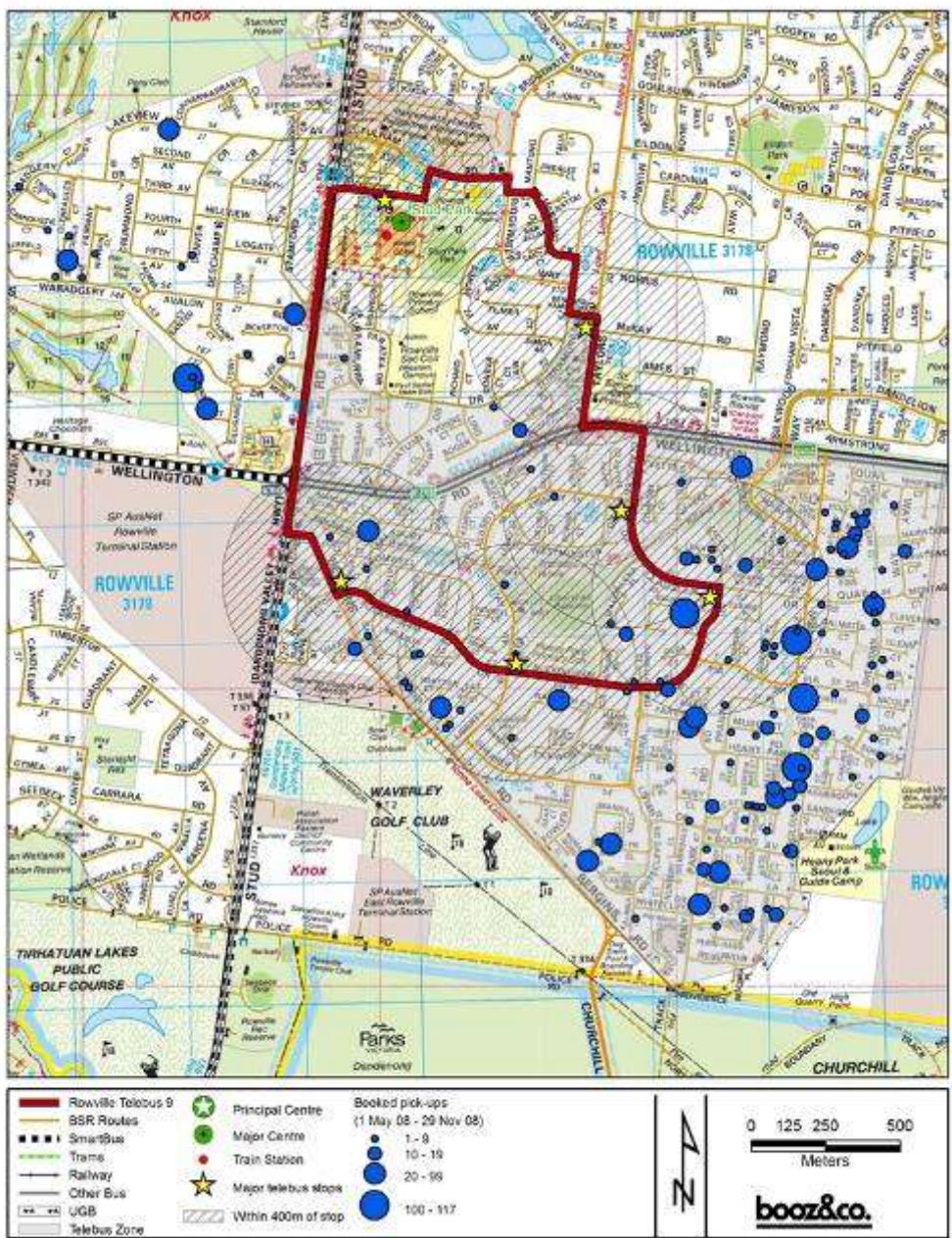


Source: Booz & Company

6.2.7 Rowville Telebus area 9

This service provides a connection between Rowville and Stud Park Shopping Centre. Twenty-five percent of sales are booked pickups or drop offs at homes off the route. The service range is from 6.30am until 6.30pm Monday to Friday and there is no weekend service. The frequency is half-hourly at peak and 50 minutes off peak. The relatively new Smartbus routes 900 and 901 provide an opportunity to link from the Telebus route to a high-frequency high-quality bus route.

Figure 6.13 Map 7 Rowville Telebus area 9



Source: Booz & Company

One of the fixed route stops is at Heany Park Primary School. The route also passes another primary school providing a good source of patronage for trips timed for the school day. The timetable below

shows there are commuter services from 6.30am until 7.25am. The two school runs scheduled at 8.05am and 3.30pm follow a different service path and operate as a fixed route with no phone bookings taken. These revert to DRT services during the school holidays. This enables schoolchildren to have a direct service without deviations and avoids a separate school bus contract. In the evening peak, the service caters for commuters once again.

Table 6.14 Route area 9 Telebus timetable Stud Park

Route Area 9 TeleBus Stud Park		Service operates from 17.07.2006 until further notice																
Wheelchair Accessible Services		Monday to Friday																
Service Information																		
Morning (am) / Afternoon (pm)		am	am	am	K	JSS	am	am	am	am	pm	pm	pm	KSH	JSS	pm	pm	pm
Stud Park Shopping Centre/Stud Rd (Rowville)		6:30	7:00	7:25	8:05	8:05	9:20	10:10	11:00	11:50	12:40	1:30	2:20	3:30	3:30	4:15	4:50	5:30
Buckingham Dr/Begins Rd (Rowville)		6:35	7:05	7:35	8:15		9:30	10:20	11:10	12:00	12:50	1:40	2:30	3:40		4:25	4:55	5:35
Heany Park Primary School/Buckingham Dr (Rowville)		6:37	7:07	7:37	8:17		9:32	10:22	11:12	12:02	12:52	1:42	2:32	3:42		4:27	4:57	5:37
Gilta Ct/Trisha Dr (Rowville)		6:39	7:09	7:39	8:19		9:34	10:24	11:14	12:04	12:54	1:44	2:34	3:44		4:29	4:59	5:39
Magdalena Pl/Clausen Dr (Rowville)		6:41	7:11	7:41	8:21		9:36	10:26	11:16	12:06	12:56	1:46	2:36	3:46		4:31	5:01	5:41
Taylor Lane/Bernard Hamilton Way (Rowville)		6:45	7:15	7:45	8:25		9:40	10:30	11:20	12:10	1:00	1:50	2:40	3:50		4:35	5:05	5:45
Stud Park Shopping Centre/Stud Rd (Rowville)		6:55	7:25	7:55	8:35	8:55	9:50	10:40	11:30	12:20	1:10	2:00	2:50	4:00	4:10	4:45	5:15	5:50

Source: www.metlinkmelbourne.com.au/timetables/telebuses/

6.2.8 Telebus summary

The longevity of the Telebus services is a result of a mixture of good route design, continued subsidy and support by users of the service. Important features of the Telebus service are:

- it serves areas that concentrate demand, train stations, large shopping centres and schools
- it encourages long-term bookings by regular commuters
- it has a direct and fast deadhead option to return to the source of peak demand
- the pickup and drop off fares are above the cost of standard bus fares to reflect the higher cost
- services are not fully flexible – there is a fixed route with relatively few stops and the majority of passengers use this fixed part of the route
- school trips are included in the timetable as fixed-route services
- pickup areas are not large, so deviations to drop off and pick up are typically within 400m–500m
- the same dispatch and booking systems are used across all nine Telebus areas thus sharing the operating costs across many routes.

Telebus serves several journey purposes: the commuter, the shopper and school goers, which have slightly offset peaks. The distance from the CBD concentrates commuters to earlier travel typically before 8.30am and to later times in the day (after 5pm) compared with the local traffic for schools 8am to 8.50am and shopping 10am which occur after the commuter peak. This enables Telebus to serve each market segment at different times of day. The street patterns are not suited to a regular bus service. If the streets had more of a grid-like pattern and footpaths perhaps there would be no need for a demand responsive service in these areas. Better urban design would avoid the problems Telebus services are trying to overcome.

7 Case study findings

The case studies identified a variety of DRT services operating in New Zealand and Melbourne. There is also a distinct urban/rural split in the service types currently operating. Community vans operate in the rural areas serving a predominantly medical appointment market. The Melbourne Telebus service has been operating for over 30 years providing a DRT link between suburbs, the rail network, schools and shopping malls. Specialist mobility services can be successful but are likely to be limited in the New Zealand context to the larger cities of Auckland, Wellington, Christchurch, Tauranga and Hamilton where sufficient demand exists. The urban environment has the advantage of providing sufficient concentrated demand enabling bookings in one direction. These services typically serve rail stations on the suburban fringe, in particular the last station on the line. The Melbourne examples could translate successfully into similar environments on the urban fringe in New Zealand.


Most services can operate successfully using a low-tech approach with a phone booking system and drivers determining the route. Manual phone and dispatch systems can operate on a large scale as demonstrated by the Telebus in Melbourne. Having a large number of subscribers who do not book every day and a majority of bookings made in one direction are important features of these services. There is potential for sophisticated systems using GPS and route optimisation software. It is easier to provide a booked system where the majority of users are commuters or schoolchildren rather than infrequent shoppers. Discounts for long-term bookings may be a suitable strategy. Each service studied, as part of either the case studies or the literature review, had their own unique attributes. Allowing a local style or brand that is generated by individuals or the community is the difference between services seen as our **bus/van rather than 'the bus'**. To avoid the self-balancing cycle between patronage growth and decline in reliability, decreasing the flexibility of the service as patronage grows and limiting the number of stops served will enable a higher level of patronage to be maintained.

8 Role and scope for DRT in New Zealand

DRT services are already widespread in New Zealand with airport shuttles and community vans the most common. There are only a few DRT services funded by regional councils: DART in Auckland and Otaihangā, and the Paekakariki shopper service in Wellington. The idea of a demand responsive bus that you phoned and booked began in 1968 (Weaver 1968) and in 1972 the Regina Telebus in Saskatchewan Canada featured in a *Time* magazine article 'Modern living – dial a bus'. **Many demand responsive services** have come and gone, the Regina Telebus was scrapped in the early 80s but there seems to be a resurgence in more recent times. As PT budgets come under increasing strain, DRT services may be trialled as a last ditch attempt to retain some service for communities. The Paekakariki shopper DRT service started in May 2009 is an example. The Levin shared taxi service subsidised by Horizons Regional Council was another attempt to provide local services at lower cost. Last resort DRT services are as likely to fail as the bus service they replace. Some of the more successful schemes studied have been the first service offered in an area and are designed for the region they serve. DRT should be selected as the most appropriate service type for an area rather than an attempt to save costs on a failing bus route.

DRT services include a range of service offerings that are suited to different demand levels. Bus-based services are suited to urban environments and should become less flexible as demand increases. Community vans in small towns may need to move from one-van to two-van operations as demand increases. Larger towns may suit a bus-based Roam Zone for local service. Having a sliding scale between commuter express services, peak fixed route, school routes and off-peak DRT enables the demand to dictate the service offering rather than having a one service type fits all approach to service design.

Table 8.1 Service offering varying on demand

Demand level	Urban	Small towns	Rural
High  Medium Low	Fixed-route bus services		
	Airport shuttle		
	DRT feeder service	Roam Zone bus service	
	Specialist mobility service	Community van 2 - local transport	
	Total mobility (subsidised) taxi service	Community van 1 - transport to regional hospital	
	DRT bus service off peak	Community van local transport and regional hospital	Community van local transport and regional hospital

8.1 Identification of DRT market niches

The market niches for DRT are different for urban and rural environments. The existing airport shuttles are a commercial niche DRT service and will not be explored further in this research. In general terms, the more personalised the service the more expensive it is to provide, so the door-to-door service of a single person is at one end of the spectrum, with mass transport on a fixed route at the other.

8.1.1 Rail/ferry feeder services

There is a place for DRT in New Zealand cities in association with commuter rail or ferry services. Both Wellington and Auckland have outlying rail corridors, which could be served with a connecting feeder bus that operates on a flexible route or semi-flexible basis. These services are operating in Melbourne (Telebus and Gisbus) and The Netherlands (Treintaxi) and typically, the price of the bus fare is included in the rail ticket or there is a minor surcharge. This service may form part of the rail contract or there may be a service agreement between the rail operator and bus operator to ensure a good service for the customer and communication about late services. Shadow fare agreements could be used to transfer rail fare revenue to the bus operating costs.

A DRT type of service could be used instead of current fixed-route service to ferries and rail stations in low-demand areas. The Half Moon Bay and Birkenhead ferry feeder bus service has a long history of high costs and low patronage so may suit a DRT service. The costs and patronage may be similar but the service would be better. The future Hobsonville development may also suit this type of service due to its defined catchment and link to a ferry service.

The advantage of these services is that bookings are required only in the morning commute direction and repeat bookings from the regular commuters can create a regular route. Passengers can simply get on the waiting bus for the evening commute and be dropped home. The timetable on the outbound journey is set by the arrival of the train so the bus waits for the commuters to load then takes them to their final destination. The inbound journey is timed to get the commuters to their scheduled morning commuter train. The local parking conditions are an important consideration, as is a limited catchment area to reduce the time it takes for the drop off. Often there are large areas of car parking available so these services may struggle to attract patronage if the route is too slow or expensive. Dead-end streets and cul-de-sacs should be avoided and when demand is high pickups and drop offs may be restricted to main streets. The route may need to be less flexible as demand increases. The bus should have a fast and direct way back, to and from the station served, as there will be minimal demand in the counter peak direction.

8.1.2 Area-based DRT services

Instead of a fixed bus route, an area-based DRT service can be implemented. The costs are similar but the customers will receive a better service and there will be slightly better patronage especially off peak. A hybrid service that provides a fixed express service for commuters, a fixed school run, and then an inter-peak DRT for shoppers seems to work well for Telebus in Melbourne and could translate into many New Zealand situations. The number of bus stops is kept low with stops only at major points such as schools, shopping centres and links to other PT. The route may have three variations:

- a less flexible route that serves the train station or CBD for the early peak 6.30am to 8am and again at 4pm to 6.30pm
- a fixed school route providing a morning and afternoon trip around 8.15am and after 3pm
- a DRT service to the main shopping area and hospital from a clearly defined zone for the period 9am until 4pm.

Other destinations might be added, such as tertiary institutions, airports, large rest homes and major employment centres but the route would need to be kept relatively short and direct and avoid trying to provide links to everywhere in the area. Depending on the street layout of the area served, the DRT service may be restricted to the end of the street for cul-de-sacs and other dead-end streets. The compromise

between journey time and door-to-door service needs to be swayed in favour of the majority to avoid a long and unreliable service. Fixed bookings by users can enable the development of a route design (by booking) which can be adjusted to reflect demand. Customers should not have to ring every day to make a booking if they make the same trip regularly.

The Adelaide Roam Zones operate after 7pm, providing a drop off near **or at the person's home. They are** like the night rider services that operate in Wellington, Auckland and Hamilton. Night rider services could become Roam Zone services in the suburbs they serve. Most night rider services operate from a central city location and link to a specific suburban area. Changing this service to a Roam Zone or city-to-home service could save costs as the DRT route might end up being shorter than the fixed route, due to the driver only needing to travel as far as the last passenger drop off before returning to the city for the next run or to the depot. A DRT nightrider bus service would be more attractive as it provides a drop off closer to home between 1am and 3am, which, after a night out, is a better customer service.

8.1.3 Community vans

Community vans are now a common part of rural communities and small towns. There are many good examples of community vans in operation throughout New Zealand. Some of the better examples are the **Wrinkles' express in Golden Bay, the Matamata community health** shuttle, the Kapati and Horowhenua community health shuttles and the case studies already described.

Most of the community vans in operation have come about through a small group of individuals identifying a local need and the service is their solution. Some of the demand is driven by the centralisation of medical services to the large regional hospitals. This increases the transport **requirements of the health system. The efficiencies gained by DHBs are paid for by small communities'** increased travel costs to obtain treatment. The community transport is volunteer based with a vehicle purchase via funding from local business, family trusts, and local groups like Lions and Rotary. In cities without PT, there may be several such vehicles in the same city. Bus contracts have been attempted in the past and have failed to generate enough patronage. A community transport fund may be an option to support already existing community vans. This could take the form of a grant towards vehicle purchase or reimbursement based on kilometres driven. Community vans travel around 50,000km per annum, which means they are at higher risk of accidents. The drivers are older and have some higher risk factors and the vans carry vulnerable passengers. Vans have a higher centre of gravity increasing the rollover risk, cross wind vulnerability and lowering stability. Safety features such as airbags, electronic stability control, anti-skid braking and roll stability control are not standard features of most vans. The external costs of accidents are not borne by manufacturers of vehicles. Without regulation or incentives, these safety features are not present in most vans in use. In the absence of regulation, linking a van purchase grant to these safety features could encourage a safer community van fleet.

Community vans are heavily dependent on their volunteer base to be successful. The community can provide sufficient funding to purchase the vehicles but the day-to-day running costs are the main expense. The two community vans studied in Katikati and Te Aroha are mostly patronised by elderly people attending medical appointments. Neither service has an age restriction but most demand comes from those no longer able to drive. The community vans operate in towns without taxi services and therefore without any Total Mobility Scheme funding. Direct support of community vans via regional, and local and central government would be a cost-effective alternative to providing bus services, or Total Mobility taxi services. Joint funding agreements can reduce the costs to everyone and avoid the fears of service abandonment or cost transfer from one agency to another. Inclusive eligibility enables a wider use of the services rather than a narrow focus. The funding can come after the service has been operating by

itself. This way the service is already owned by the community, has its own support networks and the funding can come as an additional stream of funding rather than the only funding source. The community begins the service with funding based on its own community effort, rather than an idea imposed from outside the local community. The service can be sustained by long-term additional funding sought from DHBs and regional and local councils. A fixed \$ annual grant system would have low administration costs and spread funding across a wide range of communities in New Zealand.

More community vans could be started with a kick-start grant for the vehicle purchase and by combining Multiserve, local authority funding and medical appointment subsidies. Local community vans could be funded via a community mobility fund where the kilometres are subsidised at a set rate (via the regional council) with funding from rates and the health, education and transport sectors. Wellington Regional Council makes a small contribution to the Wairarapa Red Cross community van. An annual grant could assist local communities without having to take control of the service. Many DHBs fund transport to medical appointments as this is a cost-effective way of reducing non-attendance. As hospital services have become centralised in large regional centres and with the increasing use of outpatient services, there **has been a rise in travel to hospital appointments. Rather than reimbursing many individuals' travel** expenses, Health Waikato DHB has funded the operating costs of the Te Aroha Red Cross community van and the Matamata Health shuttle community van.

The use of community vans, especially for health-related transport, is continuing to grow and seems to be relatively simple to implement using a charity and volunteer driver system. There is, however, a risk of insufficient volunteers for the rapidly growing aging population. Currently, the more able bodied are driving their peers who are less able and this may in fact be a sustainable system. Pressure can be taken off the volunteer driver/coordinator by having a centralised booking system run by a community centre. Having a large pool of drivers means each driver is on duty one day each week making it a manageable and enjoyable task rather than an onerous one. Simple reimbursement systems can make for less administration for both funders and the operators of the community service and less cash handling also reduces the already low risk of fraud. Reimbursement of kilometres by funders such as DHBs on a six-monthly or annual basis reduces cash handling. There is a lack of integration between funders who are overly concerned about cross subsidy and cost shifting. Shared funding from local authorities, health, education and transport sectors would enable efficient use of the multiple vehicles available. Restrictions on eligibility should be kept to a minimum to maximise the use of the vehicles.

The NZTA and regional councils could provide hoist funding as a one-off contribution towards the community vans without the ongoing administration costs. A fixed value grant paid on certification of the hoist may be an acceptable way to run such a scheme. Financial support of community vans that have been operating successfully for several years could be made as recognition of the PT they have provided to local communities. A community van fund could be used with an annual application process. A community van award with prize money could be a way of publically recognising the value that these services provide to the local communities and to the transport sector. This may also encourage best practice (see appendix F) to develop and to disseminate information between providers throughout the country.

8.1.4 Specialised mobility providers

RE-LI-ON-US Mobility Services is a New Zealand example of the specialised mobility service that operates in other cities such as the Berlin Telebus, or the many paratransit operations in the USA. Despite being a commercial operation, the majority of its customers are using a subsidy to pay for the service. The Total Mobility Scheme makes this type of service possible. The additional subsidy provided by disabled groups/societies and ACC means that those using the service may be paying only a small proportion of

the cost themselves. Despite subsidy, the cost of mobility transport for users is still higher than PT costs and can represent a significant proportion of their household budgets. The purchase and operating costs of a wheelchair hoist equipped van is higher than a standard taxi service and the customers using the service may have a lower than average income or be a beneficiary. If Total Mobility funding is insufficient for both the users of the service and for the operators, this type of service will not be viable on a commercial basis and regional councils will end up contracting a citywide service.

The lack of coordination between the many Total Mobility providers in a city means that users of the service may have to ring several providers to find one that has a vehicle available, or suffer from unreliable service from operators who claim to be able to pick people up without the resources to do so. Operating efficiencies would be gained by having all mobility vehicles dispatched using the same system. This is unlikely however, in the competitive taxi environment that exists in New Zealand. A natural oligopoly may eventuate with three or four large providers having the natural advantage of more vehicles on the road and closer to customers thus reducing wait times and operating costs.

8.1.5 Mobility parking for commercial mobility vehicles

Those using mobility vans who are unable to drive or walk are more in need of good access than those who can drive a modified vehicle and park. The current mobility parking system does not cater well for mobility vehicles used by people in wheelchairs. Having a register of mobility vehicles and a card system, eg blue cards instead of orange ones that enable use of disabled parking areas, would assist in providing a better service for mobility customers. Often if the drivers leave the vehicles to escort their patients to the ward or outpatients appointment they are liable to get a ticket, as the customer may not be a current holder of the parking permit or have it in their own car at home. In Queensland, organisations involved in transporting persons who would normally be eligible for a disability-parking permit, can obtain a parking permit for their vehicle (Queensland Government 2009). A drop-off area that enables a rear hoist to be lowered safely (no protruding into the traffic lane) would also be a better use of scarce parking areas than a permanent park, which once filled can remain so for long periods. Mobility vans dropping off their customers and moving on to their next job will return for the person later.

9 Critical issues in the DRT sector

DRT services cover a diverse range of service offerings that attempt to solve the access and mobility issues of communities with varying levels of demand. In areas of low demand, several issues influence the service that can be offered.

9.1 High cost and low revenue

9.1.1 Low-demand operating areas

An on-demand service from door to door operating in a sparsely populated region with limited concentrated demand locations will have high costs and low revenue. Services will typically have either high fares or volunteer drivers. Low-demand areas in cities are predominantly in the outer suburbs where car ownership rates are high and development patterns are low density and based on car travel. Street patterns may be curving and cul-de-sac based instead of grid like. PT may be infrequent, with limited destination options.

9.1.2 Cost of DRT service compared with fixed route services

An on-demand service that travels door to door will travel more kilometres per passenger and have higher administration/booking costs than a fixed timetable fixed route service. Adding a premium service within a flat fare or zonal system may also be difficult. A fare surcharge may be appropriate for the extra service to the door that many DRT services offer. Flat fare systems such as the Christchurch single city zone and **Hamilton's** two-hour fare can also be problematic for the introduction of a premium (door-to-door) service for which a surcharge is usually added.

9.2 Lack of risk-taking/service innovation by conventional bus operators

The DRT type services studied in New Zealand were operated by community groups or began from taxi operations. Bus operators in New Zealand are not experienced with DRT type services yet the Melbourne Telebus shows that a bus-based operation is feasible. New Zealand bus operators are familiar with a flexible route structure from the night-rider concept with route deviations made to confined suburban areas. While a fixed timetable basis, it is an introduction of a many-to-one flexible route service that could extend to rail and ferry feeder/distributor operations. The operators are unlikely to try a DRT-based service as a commercial start up. Exploring alternatives to fixed-route fixed timetable services may need to come from the transport authorities. There has not been an operator-based initiative using midi buses or full-size buses launched on a commercial basis and this is unlikely to happen due to the subsidy requirements typical of DRT services. Funding will remain the largest constraint on the introduction of DRT services and new PT services in general. The funding available is being used to keep existing levels of service and innovation and is less likely under constrained budgets. Some fixed-route services that act as rail and ferry feeders could be converted to a DRT style of operation.

9.3 Lack of understanding of DRT models

The regulatory regime does not seem overly restrictive for DRT services and there are many community vans operating under the current legislation. There is no actual barrier to a bus-based DRT service being contracted by regional councils. The Dial a Ride transport service in Auckland has been operating since 1982 and has been contracted by ARC/ARTA since 1991. Regional councils take their lead from NZTA policy directions. Funding is set by financial assistance ratios and councils usually match NZTA funding on a 50:50 basis for PT initiatives.

Operators used to running traditional fixed-route fixed-schedule bus services need to learn to operate them more like taxi companies. Taxi companies used to providing personal service to individuals or groups need to operate more like bus companies through reducing flexibility of schedules and concentrating demand and the destinations served. DRT services are a hybrid between bus and taxi operating systems but the natural operational skills are either taxi based or bus based and a hybrid set of these skills is required.

DRT services introduced by regional councils have until recently seldom been used. DRT services have recently been introduced in Wellington and were trialled in Levin. The Horizons Regional Council introduced the Levin Dial a Ride using a shared taxi system in April 2008. The service failed to attract patronage and has since been cancelled. In the larger cities, bus operators and regional councils have begun innovating in service delivery. The DRT bus service in Paekakariki is an example of this. Both the Levin and Paekakariki services were introduced instead of cancelling community services altogether. These were a last ditch attempt to keep some service in the communities, so were not chosen as ideal candidates for DRT but as attempts to try DRT as a cost-effective alternative to a full bus service. Introducing a DRT service as a first choice due to suitable conditions may prove more effective than implementing it as a last resort. Regional councils appear to be willing to fund long-term fixed bus routes that run with low patronage at high costs per passenger but are less likely to commit to long-term funding of DRT services with similar costs despite the customer benefits.

9.4 Emerging issues

9.4.1 Aging population and the SuperGold card

The population over the age of 65 is already rapidly growing in New Zealand. The demand for PT mobility services for the 65+ age group will increasingly require a door-to-door type of service. The SuperGold card entitles all New Zealand citizens over the age of 65 to free off-peak PT. Public pressure to add services will come from SuperGold cardholders who live in areas that do not have PT. Usually these door-to-door services attract a surcharge to reflect the extra cost. If users are predominantly SuperGold card holders, regional councils may be reluctant to implement DRT services, as they will have high levels of demand from passengers who do not pay anything for the service. Ironically, one of the main constraints to the introduction of DRT bus service in urban areas will be the SuperGold card. The services that are implemented may increase the subsidy costs without generating additional fare revenue.

A SuperGold scheme that offers free PT even if restricted to off-peak travel may not be sustainable within the context of an aging population and increased demand for accessible PT as fuel prices rise. The inequity in subsidy for those over 65 compared with those who are unable to drive due to disability is

simply unfair and funding allocated to SuperGold may be better spent on increasing funding of Total Mobility and community transport.

9.4.2 Fuel price increases

Fuel prices have risen rapidly since 2003 linked to peak oil on the supply side and increasing demand from the motorisation of China and India. Other factors likely to increase the cost of fuel are carbon taxes and tolls or congestion charging. The increased cost of personal travel will lead to increased demand for PT and shared travel options. Those people with further to travel face the highest costs so have the most to gain from sharing their transport costs with others. The outer suburbs will face these price pressures earlier than the inner city areas which already have PT alternatives. Public and political pressure to provide PT in the outer suburbs is increasing. Providing links to rail or busway services from these outer suburbs may be increasingly viable.

9.4.3 Urban sprawl and urban design.

Some of the need for DRT in urban areas can be avoided by good street design. Many of the DRT services have only been introduced in an attempt to provide service in outer-fringe suburbs with narrow curving street networks characterised by cul-de-sacs and dead-end streets (and in some cases a lack of footpaths). This type of street design makes it difficult to walk to a main road and is even difficult to navigate by car. Street design that causes dispersed travel patterns is difficult to serve with PT that requires mass transport using concentrated travel patterns. Permeable neighbourhoods, good arterial networks and providing priority for mass transport over individuals in cars will enable the provision of cost-effective PT services.

9.5 DRT design strategies

DRT services can be successful in New Zealand. DRT services are more complex to manage compared with fixed-route services, hence costs tend to be higher. A critical requirement for DRT is therefore management of cost performance though reduced complexity, reducing costs and increasing revenue.

9.5.1 Reducing complexity

To avoid an overly complex operational requirement or potential service area and route path, several DRT services have used techniques such as

- 1 Confined operating area – the Telebus and Gowanbrae services use a defined operating area which reduces the scale of deviation and enables single-vehicle operation (in the case of Gowanbrae) or manageable operating requirements as with Telebus. By limiting the operating area, drivers can easily manage route optimisation using local knowledge rather than having to use computer-based real-time vehicle scheduling software. Passengers can be dropped at their destinations without the long journey times needed to drop off a single passenger who lives a long way from everyone else.
- 2 Many-to-one operations – the most common examples are airport shuttles but this can also be effective in train-based systems such as the Trein taxis in The Netherlands or the GISbus in Gisborne, Victoria. The community vans that service hospitals also have this advantage. Serving areas of concentrated demand can be applied to any service by including rail stations, hospitals, schools,

shopping centres and universities where possible. Operating in the peak direction to the door also reduces routing complexity and enables counter-flow trips to be direct.

- 3 Reduced demand – low demand is easier to manage operationally than high volume. High levels of demand create longer service paths and more complex pickup and set down requirements. Route deviation services are commonly found in outer suburbs with a low-demand profile. High-volume door-to-door services will end up with very long route paths that suppress demand. Reducing the flexibility of the service may be required as demand grows. Offering different services at different times of the day can allow a commuter focus for peak trips with less route flexibility and express counter flow. Off-peak services can be shopper focused and allow more of a door-to-door service.
- 4 Repeat bookings – while not strictly demand-responsive, repeat bookings allow those regular commuters to be the backbone of a DRT service. Enabling repeat bookings reduces administration, time and costs, and makes the service path easier to define for drivers. Repeat bookings suit commuters who habitually travel at the same time each day. DRT services that link homes to other modes such as train stations, busways or ferries can use a subscription approach. The regulars establish a base route path from which deviations are made for one-off bookings.
- 5 Low-cost booking technologies – low-tech booking systems involving a phone and paper-based records have been effective for many years in the case of Telebus. Other services that have relied on complex computer systems have faced high costs. Serving areas of concentrated demand in one direction reduces bookings to that direction. DRT services that drop people home from shopping centres and train stations only require a booking on the inbound journey as the outbound journey is from the main bus stop at the major destination. AVL and GPS technology has become less expensive over time reducing some of the cost barriers that existed when these technologies were new.

9.5.2 Reducing cost

The higher costs of providing a service to the door can be reduced in several ways.

- 1 Volunteer labour – community vans use this approach, as do other volunteer organisations that use vans to provide transport. Vans that serve the whole community can be more resource efficient than targeted services to exclusive groups, where vans lay idle most of the time. A large pool of volunteers reduces the time commitment per person, making the task enjoyable.
- 2 Simple vehicle allocation – having a dedicated bus or van for the service makes timetabling easier. The timetable may be limited to the return journey time of the vehicle. Extra vehicles are added if demand grows beyond the capacity of the first vehicle. An incremental approach to services and resources avoids oversupply.
- 3 Marginal off-peak costs – using excess peak vehicles during the off peak to provide local shopping services reduces costs and enables capital to be deployed for more of the day.
- 4 Taxi contracting – contracting local taxi services may cost less than using bus operators in situations where demand is low enough to be covered by cars and small vans instead of buses. Taxi overheads are lower especially at remote locations as the vehicle may not need to be returned to a depot. This may be appropriate for late evening services from rail, ferry or busway stations to homes when extra shifts may be necessary for bus drivers and demand is low. Taxi companies may have capacity at times when bus operators have a limited number of drivers available.

9.5.3 Increasing revenue

DRT services often have fare surcharges or shadow fares to recover some of the extra cost of providing a better service. The 30 years of Telebus surcharges show there is a willingness to pay extra for the convenience of being dropped closer to home especially in suburbs with hilly terrain, without footpaths and curving street patterns. Night rider buses in Auckland and Wellington also have this higher cost, higher fare approach with the after midnight buses having a higher fare than the equivalent distance during daytime hours. The premiums are small, however, so care needs to be taken in getting this price right. In the case of community vans, fares need to cover the running costs of the vans. Some of the users, especially for medical appointments, may be able to access funding from other organisations for their costs so operators should be able to set fares that cover costs without causing hardship for users. Community vans have a more flexible approach for frequent users who may have high health needs requiring frequent treatment and some cross subsidy could occur in these cases. Other revenue streams may also be available from DHBs and local community grants.

9.6 Conclusion

Demand responsive services have had a history of mixed success especially in low-demand situations. Many DRT services have failed to learn lessons from previous discontinued DRT services. Unrealistic expectations of the costs and patronage relative to other options have resulted in services being discontinued. Services that have continued have been able to reduce complexity and cost. Communities, transport planners and operators should imitate successful services in operation elsewhere with adjustment for local conditions. Service offerings may change by time of day or be customised to the market (commuter, school, shopper) enabling different market segments to be served in an appropriate manner. By matching the service to the market niche and starting with a simple operating system, higher cost options can be added once patronage demands and revenue are established. Being willing to change the service enables different approaches to be used for peak and off-peak periods. DRT and other bus services cannot operate cost effectively on inefficient road networks so the design of suburban streets needs to account for transport efficiency rather than maximum revenue for developers. Community van operations have been operating in many small towns and can be a suitable way to provide access in areas of low demand.

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Appendix A: Roam Zone Adelaide

Sources: Currie (2007), Ministry of Transport (2007), Booz Allen Hamilton (2004)

Roam Zone, Adelaide

Roam Zone is an evening DRT bus service operating in the middle/outer suburbs of southern Adelaide, Hallett Cove and Sheidow Park. The service commenced in Sept 2001 and involves:

- Standard fixed route bus services operate during the day.
- In the evening (after 7pm) services depart railway stations and will drop off as close to doorsteps as possible.
- There is no fare surcharge.
- Headways are broadly 30 minutes. Services operate up to midnight (and some beyond) on week nights and weekend nights.
- Three routes operate the service; 681P, 682 and 683.

Figure A1 shows the alignment of the services.

Figure A1 Roam Zone services and catchment

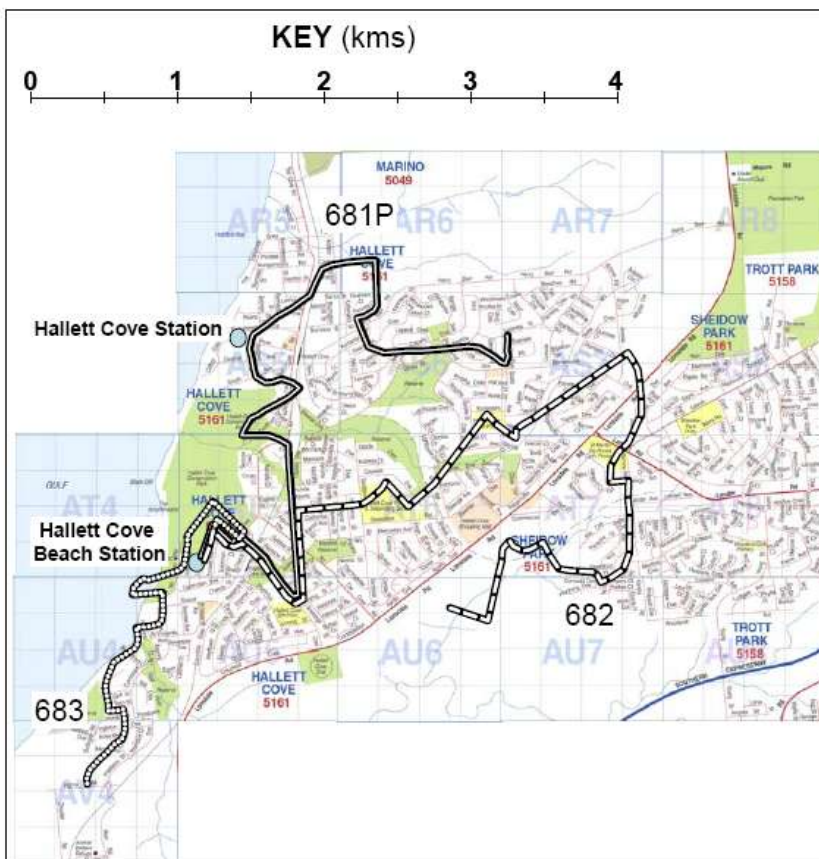


Figure A1 indicates that:

- all routes operate within a well defined and confined catchment
- the 683 service terminates only 2km south of Hallett Cove Beach Station
- as an evening service, each operates on a many-to-one (or one-to-many basis)
- there are no booking needs since drivers stop to let passengers get off as requested when they boarded the bus.

An analysis of the operating schedules indicates that:

- each route is operated by a single bus doing cycles between the termini
- more in-service trips are provided from Hallett Cove Beach Station than to the station again emphasising the one-to-many evening nature of the service
- service spans are very long (by Melbourne standards) ie past midnight
- all evening services operate at weekends (again a high service level compared with Melbourne).

Analysis of available patronage data⁵ has established that:

- usage on the system is very low; probably of the order of 5.2 boardings per vehicle hour
- on a per km basis the system carries some 0.2 boardings per vehicle km.

Sinclair Knight Merz (2005) noted the following background to the service:

- it was designed to replace relatively low patronage routes at night
- patronage is believed to have increased since its introduction. Personal safety after dark is probably an impetus here.

Discussion with the Office of Public Transport (OPT) established that half the services carry zero passengers. At the time of discussion, OPT was considering reducing service levels on the Roam Zone. The view was that good marketing rather than the DRT elements of the service was creating market growth.

Discussions with the Roam Zone contract operator also established that:

- the service is operated using a fleet of four minibus services (ie including one maintenance spare)
- they do not use the minibuses during the day
- technically this would suggest that a fully allocated set of peak bus costs should be attributed to Roam Zone. However, in practice the minibuses were available and had not been purchased specifically for Roam Zone (they were a hand down from previous operations)
- the minibuses enable better suburb penetration for DRT trips.

⁵ Data is for April 2005 (sourced from Sinclair Knight Merz 2005)

By applying standard unit costs⁶ to the estimated resources we have established that:

- the three routes cost some \$250,000 pa to operate at Roam Zone times
- this suggests a unit cost per boarding of around \$8.90/ trip.

Although this seems high it is technically the same price as the fixed-route equivalent evening service, ie the DRT elements of this service probably have no significant additional costs.

Overall the main logic of the Roam Zone concept is additional passenger utility at no significant additional cost. It is expensive to provide, but not more expensive than fixed-route alternatives at this time.

The number of Roam Zones has increased to six.

The low/zero cost of the DRT element of Roam Zone occurs because the service design minimises costs and ensures there are no overloading issues. This is achieved by:

- the one-to-many nature of the service
- fixed vehicle allocation
- no booking systems required – driver/passenger interaction for DRT elements
- short confined route catchments
- evening/low density suburb operation to ensure low levels of demand (five passengers per vehicle hour)
- vehicles are at marginal cost (because the operator already had them available).

A particular benefit of Roam Zone service concept is the appeal to passenger safety by taking people home to their doors at night.

Roam Zone would be expensive to provide as a new service to fill in evening service span gaps. However, it would be a better service than a fixed-route alternative since the doorstep drop-off element of the service would have patronage appeal at no significant additional cost (assuming vehicles required are marginal to existing operations).

With patronage at five boardings per hour, and with half-hour headways the service could be run as a taxi contract. Historically this occurred around a decade ago as a trial. It was abandoned although the reasons for this are not clear.

⁶ This is comparable to the costing for Telebus. No adjustment for overtime rates is included.

Appendix B: Katikati bus services

Environment Bay of Plenty regional council funds two bus routes from Katikati to Tauranga. The Katicoach commuter service would not be suitable for an elderly patient as the bus leaves at 7.05am and returns at 6.05p.m – an 11-hour outing. The Katicoach Shopper on Tuesdays and Thursdays leaves at 9am and gets a patient to Tauranga hospital by 10.10am. It begins the return journey at 1.50pm and arrives back in Katikati by 3pm – a less gruelling six-hour outing.

Table B1 Katicoach commuter service: Monday to Friday except public holidays

	Departs Katikati Main Road bus stop	Aongatete Wright Rd	Hamurana shops Omokoroa	Te Puna 4 Square	Wharf St City Centre Tauranga	Arrives Tauranga Hospital
am	7.05	7.10	7.25	7.35	7.50	8.00
pm	3.20	3.25	3.40	3.50	4.05	4.15

	Departs Tauranga Hospital	Wharf St City Centre Tauranga	Te Puna 4 Square	Omokoroa (turn off only)	Hamurana shops Omokoroa	Aongatete Wright Rd	Arrives Katikati Main Road bus stop
am	8.00		8.20	8.30		8.45	9.00
pm	5.00	5.15	5.40		5.50	6.00	6.05

Table B2 Katicoach Shopper: Tuesday and Thursday only, does not run on public holidays

	Lexham Park Binnie Rd	Katikati Main Road bus stop	Aongatete Wright Rd	Hamurana shops Omokoroa	Te Puna 4 Square	Wharf St Tauranga	Tauranga Hospital	Gate Pa shopping centre
am	9.00	9.10	9.20	9.35	9.45	10.00	10.10	10.15

	Gate Pa shopping centre	Departs Tauranga Hospital	Wharf St City Centre Tauranga	Te Puna 4 Square	Hamurana shops Omokoroa	Aongatete Wright Rd	Lexham Park Binnie Rd	Arrives Katikati Main Road bus stop
pm	1.40	1.50	2.00	2.15	2.25	2.40	2.50	3.00

The Tuesday and Thursday bus may be better suited for hospital visits but would still require a six-hour outing.

The fares at \$7 one way or \$14 return are much cheaper than the Katikati community van fare of \$30. Most of the Katikati community van users would be eligible for a concession so would pay \$4.50 one way or \$9 return if they used the bus instead of the community van. The community van is a door-to-door service and eliminates waiting time after the appointment.

Table B2 Katikati bus fares

Adult fares						
	Katikati	Aongatete Wrights Rd	Omokoroa shops	Te Puna 4 Square	Wharf St Tauranga	Tauranga Hospital*
Katikati		\$2.00	\$4.00	\$5.00	\$6.50	\$7.00
Aongatete Wrights Rd	\$2.00		\$2.50	\$4.00	\$5.50	\$6.00
Omokoroa shops	\$4.00	\$2.50		\$2.00	\$3.50	\$4.00
Te Puna 4 Square	\$5.00	\$4.00	\$2.00		\$2.50	\$3.00
Wharf St	\$6.50	\$5.50	\$3.50	\$2.50		
Tauranga Hospital*	\$7.00	\$6.00	\$4.00	\$3.00		
Concession						
	Katikati	Aongatete Wrights Rd	Omokoroa shops	Te Puna 4 Square	Wharf St Tauranga	Tauranga Hospital
Katikati		\$1.00	\$2.50	\$3.00	\$4.00	\$4.50
Aongatete Wrights Rd	\$1.00		\$1.50	\$2.50	\$3.00	\$3.50
Omokoroa shops	\$2.50	\$1.50		\$1.50	\$2.00	\$2.50
Te Puna 4 Square	\$3.00	\$2.50	\$1.50		\$1.50	\$2.00
Wharf St	\$4.00	\$3.00	\$2.00	\$1.50		
Tauranga Hospital	\$4.50	\$3.50	\$2.50	\$2.00		

Appendix C: Operator Licensing Rule

The Operator Licensing Rule specifies the passenger services that are exempt from holding a passenger service licence. Passenger services operated by or under the control of a district health board, local authority, an incorporated charitable organisation, or an incorporated organisation registered under the Charities Act 2005 where:

a) the vehicles used are designed or adapted to carry 12 or fewer persons (including the driver); and

b) the vehicle used is provided by the organisation or the driver; and

c) the driver is either a volunteer or a staff member of the organisation whose primary responsibility is not driving; and

d) the only payments made by the organisation to a driver who provides the vehicle is for reimbursing the organisation or the driver for the running cost of the vehicle and does not include payment for the driver's service; and

e) the only payment made by the passenger is for reimbursing the organisation or the driver for the running cost of the vehicle, and does not include payment for the driver's service.

Drivers of vehicles used in an exempt passenger service do not require a P endorsement and vehicles used only require a warrant of fitness (not a certificate of fitness).

Other exempt passenger services include:

- car pooling under a cost-sharing arrangement between occupants of a vehicle designed or adapted to carry 12 or fewer persons (including the driver) – cost-sharing arrangement includes fuel costs and wear and tear of a vehicle
- passenger service provided by a person providing a home or community support service, where:
 - the vehicle used is designed or adapted to carry 12 or fewer persons (including the driver), and
 - transport is provided to clients as an incidental part of the service, and
 - a fee or fare is not required of the client for the provision of transport.
- the transporting of school children by parents or caregivers in a vehicle designed or adapted to carry 12 or fewer persons (including the driver) in return for a Ministry of Education private transport allowance
- the transporting of pupils and their escorts to or from any activity of a school, kindergarten, play-centre or other institution providing pre-school education, where:
 - the vehicles used are designed or adapted to carry 12 or fewer persons (including the driver), and
 - the vehicle used is provided by the institution or the driver, and
 - the driver is a staff member of the institution, or a person approved by the institution, or a parent or caregiver of one of the children being carried, and

- the only payment made by the institution to a driver who provides the vehicle is for reimbursing that person for **the cost of the running the vehicle, and does not include payment for the driver's service**
- passenger service provided by an organisation offering liquor, meals or refreshments for consumption on licensed premises, where a fee or fare is not required of its passengers.

Section 12 of the Operator Licensing Rule contains the full list of exempt passenger services.

Appendix D: Route 490 newspaper reports and press releases

15 July 2008

GOWANBRAE BUS ON CALL

by Bridie Byrne STAR News Group

GOWANBRAE residents now have a bus service at the tips of their fingers. During the past week, finishing touches were put on the new bus stops around Gowanbrae for the on-demand service, which began yesterday (Monday).

Public Transport Minister Lynne Kosky said travellers were simply required to call and book the service at least 15 minutes prior to travel.

“Over the next fortnight, residents will see works happening throughout Gowanbrae as 12 bus stops are installed to cater for the new Route 490 service,” Ms Kosky said.

“I’m delighted that we have been able to find such an innovative way to bring public transport to Gowanbrae and I’d like to invite all local residents to take advantage of this fantastic new service.”

The new bus will operate to a set timetable between Airport West and the Gowanbrae shops.

It will then divert to pick up passengers from a number of designated stops throughout Gowanbrae, according to passenger demand.

It will travel to Westfield Shopping Centre at Airport West, where passengers can connect to the Route 59 tram to the City or the Route 477 bus running between Essendon and Broadmeadows.

Regular travellers will also be able to make a recurring booking for the service, eliminating the need to make a separate booking for each trip.

Pascoe Vale MP Christine Campbell said Gowanbrae was a special case in that its narrow streets were not suited to conventional buses.

“The new on-demand bus is a small, low-floor, stepless entry vehicle which can easily manoeuvre through the area and provides accessible entry for all passengers,” Ms Campbell said.

“This innovative service is among the first of its kind in Melbourne and will allow frequent and reliable access to local amenities and transport links for the people of Gowanbrae.

“At a time of rising fuel costs, this should help all family budgets and minimise car costs.”

From the Minister for Public Transport

Monday 7 July 2008

NEW BUS SERVICE TO CONNECT GOWANBRAE STARTS SOON

From next week, Gowanbrae residents will benefit from a new demand responsive bus service, with travellers simply required to call and book the service at least 15 minutes prior to travel, Public Transport Minister Lynne Kosky announced today.

“The bus will provide Gowanbrae residents with public transport for the first time, with access to Westfield Shopping centre at Airport West, where they can transfer to the Route 59 tram to the City or the route 477 bus running between Essendon and Broadmeadows,” Ms Kosky said.

Christine Campbell, Member for Pascoe Vale, said Gowanbrae is a special case in that its narrow streets are not suited to conventional buses.

“The new on-demand bus is a small, low-floor, step-less entry vehicle which can easily manoeuvre through the area and provides accessible entry for all passengers,” Ms Campbell said. “This innovative service is among the first of its kind in Melbourne and will allow frequent and reliable access to local amenities and transport links for the people of Gowanbrae.”

“I am delighted the Brumby Government has listened to and acted on requests by Gowanbrae residents for public transport. The greater the patronage, the greater the services and at a time of rising fuel costs, this **should help all family budgets and minimise car costs.”**

The new Route 490 bus will operate to a set timetable between Airport West and the Gowanbrae shops, where the bus will then divert to pick up passengers from a number of designated bus stops throughout Gowanbrae, according to passenger demand. Passengers are required to book the bus up to 15 minutes prior to the scheduled trip departure time. Regular travellers will also be able to make a recurring booking for the service, eliminating the need to make a separate booking for each trip.

Ms Kosky said the new service was a great example of how the Brumby Government was working to improve bus services throughout suburban Melbourne.

“As part of the 10-year, \$10.5 billion Meeting Our Transport Challenges action plan, we committed \$650 million to improving local bus services across the city,” Ms Kosky said.

Improvements have already been implemented on 68 bus routes with longer operating hours and more frequent services. Another 58 upgrades will be completed this year and planning is underway for future improvements.

“I’m delighted that we have been able to find such an innovative way to bring public transport to Gowanbrae and I’d like to invite all local residents to take advantage of this fantastic new service,” Ms Kosky said.

From the Minister for Public Transport 23/2/2009

GOWANBRAE BUS A GREAT SUCCESS

After six months on the road, the new Route 490 Gowanbrae bus service is proving very popular with local residents, Minister for Public Transport Lynne Kosky said today. **The “on demand” Route 490 bus service** began operating in July last year and now carries around 70 passengers each day. **“The popularity of the new Gowanbrae bus shows that it is meeting a transport need and offering real convenience for local residents,” Ms Kosky said.** Christine Campbell, Member for Pascoe Vale, said that the new bus service had been a hit with local residents.

“I am very pleased that residents have taken advantage of their new public transport option and used this one of a kind bus service,” Ms Campbell said.

Gowanbrae is a special case in that its narrow streets are not suited to conventional **buses**,” Ms Campbell said.

“We have provided a bus that is a small, low-floor and with a stepless entry, so it can easily manoeuvre through the area and provide accessible entry for all passengers,” Ms Campbell said. “For older passengers and those with disabilities, as well as people with children, shopping bags and luggage, this type of vehicle is particularly welcomed,” Ms Campbell said.

The Route 490 bus travels to and from Airport West, stopping at designated bus stops throughout Gowanbrae at the request of passengers. Ms Campbell said the Gowanbrae demand responsive bus service is among the first of its kind in metropolitan Melbourne. This bus service provides access to shopping, medical facilities, schools and connects to tram route 59 to the City and buses at Airport West. Travellers are simply required to call and book the service at least 15 minutes prior to travel.

To book the bus from any of the designated stops, call Tullamarine Bus Lines toll free on 1800 898 590 at least 15 minutes prior to travel. When returning home, simply tell the driver which stop you wish to go to.

Appendix E: The getOutThere programme

List of Taxi Co
[Click Here](#)

getOutThere
Programme

For Criteria and Terms [Click Here](#)

The Cerebral Palsy Society launched their getOutThere programme on the 1st September 2007. The getOutThere programme is being rolled out around NZ. It is operating in all major cities and a number of regional towns.

This programme is designed to get people with cerebral palsy engaging with their community.

It is a voucher system that helps fund that part of the taxi fare that is not covered by the Total Mobility Scheme



The Society intends to supply vouchers to the value of approximately \$200 per person per 6 months to approved applicants. The vouchers can be used for transport at the user's discretion.

The Society has entered into agreement with selected taxi companies to accept these vouchers. [Click here to see the list](#) [Click Here](#) and areas covered (ie. If there is a taxi company in your area accepting our vouchers, then the programme is operating there :) If there isn't, then contact us and we can assess whether to approach a taxi company in your area to join our programme).

From analysis of data this will equate to the average user being able to double the number of trips currently taken each year.

The criteria for joining the programme is as follow:

- You must have Cerebral Palsy (The Society may request proof that you have had a clinical diagnosis of Cerebral Palsy)
- You belong to the Total Mobility program in your area
- You must be a current financial member of the Cerebral Palsy Society of NZ Inc.



Appendix F: Best practice for community vans

- Driver training including first aid, defensive driving, and where hoists are fitted tie-down procedures
- Handrails and foot stools or step to enable access (if no hoist fitted)
- Phone bookings via information centre, citizens advice bureau, disability centre
- Clear expectation of fare/donation with discretionary flexibility
- A large pool of drivers which enables half-day duties avoiding driver fatigue
- Regular vehicle maintenance and safety checks, weekly checks of oil and tyre pressure
- Shopping trips can be provided on Saturdays when medical appointments are rare
- Cell phones kept in van for emergency communication
- Driver identification useful at hospitals to assist with parking and drop off
- Bunching of appointment times by patients and hospitals enables transport efficiency
- Escorting patients to the ward or appointment (may be assistant instead of driver)
- Wheelchair kept in van. Long walks often required to get to appointments
- Fire extinguisher and first aid kit kept in vehicle (defibrillator also an option)
- Km-based contract with DHB enables lower fares and funding certainty
- Involvement of local community in funding and operation creates ownership and community spirit
- Van replacement strategy and savings scheme
- Vans should have high safety ratings 3 ANCAP stars or better
- Broad funding base including Rotary, Lions, sports groups, DHB, local council, regional council, local business, family trusts. These provide financial security and enable faster vehicle replacement or two-vehicle fleet.

Appendix G: Glossary

All definitions are from the Public Transport Management Act 2008 (PTMA), unless otherwise stated.

Commercial public transport service means a public transport service, or part of that service, for the supply of which the regional council has not contracted to pay

Contracted public transport service means a public transport service that is described in the regional public transport plan of a regional council, and for the supply of which a regional council has contracted to pay in whole or in part. It does not include anything done under an agreement between a regional council and an operator for the purpose of reducing passenger fares or installing equipment (including information technology systems and computer software)

Deadhead – a bus returning without any passengers (not in service) to the beginning of the route or depot (R Scott)

Dial-a-driver service means a passenger service in which the carriage of passengers is made using the vehicle provided by one of the passengers or any accompanying vehicle and the driver is paid for the carriage or vehicle transfer; but does not include a service in which a vehicle is driven by a private chauffeur. (Part 2 of the Land Transport Rule 81001: Operator Licensing 2007)

Large passenger service vehicle means any passenger service vehicle that is designed or adapted to carry more than 12 persons including the driver (Land Transport Act 1998)

Operator, in relation to a public transport service or proposed public transport service, means the person who carries on the public transport service

Passenger service means—

- (i) the carriage of passengers on any road for hire or reward by means of a motor vehicle; and
- (ii) the carriage of passengers on any road, whether or not for hire or reward, by means of a large passenger service vehicle; and
- (b) includes the carriage of passengers on any road—
 - (i) that involves a specific charge on passengers for transport, including part payments to cover fuel and donations (which are expected as a condition of carriage); or
 - (ii) by a person or an organisation that is funded by another person or organisation specifically for the provision of transport; or
 - (iii) in which the carriage of passengers is an integral part of, or reasonably necessary to provide, another service or activity (other than a transport service) for which payment is made
 - (iv) in which the carriage of passengers is made using the vehicle provided by one of the passengers and the driver is paid for the carriage; or
 - (v) that involves the letting on hire of a vehicle by a person who drives the vehicle or provides a driver for the vehicle if, during the hiring, the vehicle is used for the carriage of passengers; but
- (c) does not include—

(i) private ambulance services provided by organisations primarily for their employees, being ambulance services that are available to the general public in an emergency only when public ambulance services cannot provide a service; or

(ii) any service using a vehicle that is specified as an exempt passenger service vehicle in the regulations or the rules; or

(iii) any service specified as an exempt passenger service in the regulations or the rules (Land Transport Act 1998)

Passenger service licence (see s12 Operator Licensing Rule). While this is a complex area of law, in general, there are two fundamental criteria that determine whether a passenger service is exempt from holding a passenger service licence, regardless of the purpose of the service:

vehicle size: able to carry 12 or fewer people (including the driver),

payment: the driver is not paid for his or her time and the passengers are not charged a fare.

If these two criteria are met, the service is likely to be an exempt passenger service

Passenger service vehicle means a vehicle used or available for use in a passenger service for the carriage of passengers; but does not include—

(i) a vehicle designed or adapted to carry 12 or fewer persons (including the driver) provided by one of the passengers being carried; or

(ii) a vehicle specified as an exempt passenger service vehicle in the regulations or the rules (Land Transport Act 1998)

Private hire service means a passenger service carried on by means of a private hire vehicle or vehicles. (Land Transport Rule: Operator Licensing 2007)

Private hire vehicle means a motor vehicle that: is a small passenger service vehicle, carries passengers for hire or reward, and is pre-booked on an agreed fare basis. (Land Transport Rule: Operator Licensing 2007)

Public transport service means the carriage of passengers for hire or reward by means of

(i) a large passenger service vehicle; or

(ii) a small passenger service vehicle; or

(iii) a ferry; or

(iv) a hovercraft; or

(v) a rail vehicle; or

(vi) any other mode of transport (other than air transport) that runs to a schedule and is available to the public generally.

It does not include—

(i) a taxi service:

(ii) a dial-a-driver service:

(iii) a shuttle service:

(iv) an ambulance service:

(v) a private hire service:

(vi) a service—

(A) that is contracted or funded by the Ministry of Education for the purpose of transporting school children to and from school:

(B) carrying passengers that is operated to transport all those passengers to a predetermined event:

(C) that is operated primarily for the purpose of providing a tourism experience, rather than for transporting people from place to place:

(D) carrying passengers that is not available to the public generally:

(vii) any service excluded by the Governor-General by Order in Council from the definition of public transport service for the purposes of this Act

Registered commercial public transport service means a commercial public transport service that is registered under section 35 (PTMA), but excludes:

(i) a commercial public transport service that is varied after it has been registered under section 35, if the details of the variation are not recorded in the register under section 39:

(ii) a commercial public transport service that is deregistered under section 42(1) or 46(5)

Registered service means a registered commercial public transport service; and in respect of a public transport service that is described in a regional public transport plan, any part of the service that is a registered commercial public transport service; and includes a contracted public transport service.

Shuttle means a motor vehicle that is a small passenger service vehicle that was originally designed to carry no fewer than eight persons and no more than 12 persons (including the driver); and is used for hire or reward for the carriage of passengers who must begin or end their journey at an airport, or a bus or ferry terminal, or a railway station. (Land Transport Rule: Operator Licensing 2007)

Shuttle service means a passenger service carried on by means of a shuttle or shuttles. (Land Transport Rule: Operator Licensing 2007)

Small passenger service vehicle means a vehicle used or available for use in a passenger service for the carriage of passengers; but does not include a vehicle designed or adapted to carry 12 or fewer persons (including the driver) provided by one of the passengers being carried; or a vehicle specified as an exempt passenger service vehicle in the regulations or the rules (Land Transport Act 1998)

Taxi means a motor vehicle that is—

(a) a small passenger service vehicle; and

(b) fitted with a sign on its **roof displaying the word “taxi” and any other signs required by the regulations** or the rules; and

(c) in use or available for use for hire or reward for the carriage of passengers other than on defined routes (Land Transport Act 1998)

Taxi service means a passenger service carried on by means of a taxi or taxis (Land Transport Act 1998)

Transport service means any goods service, passenger service, rental service, or vehicle recovery service; but does not include a rail service and any service specified as an exempt transport service in the regulations or the rules transport service driver means any person who is, or is from time to time, employed or engaged in driving a vehicle being used in a transport service other than a rental service, whether or not that person is licensed or required to hold a licence to drive such a vehicle (Land Transport Act 1998).