MANNINGHAM

MANNINGHAM BUS NETWORK REVIEW

October 2017

CONTENTS

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EXECUTIVE SUMMARY

A review of the Manningham bus network and services has been undertaken in order to identify what improvements can be made to enhance the bus system – in how it operates to, from and within Manningham.

The *Manningham Bus Network Review 2017* has been prepared to assist Council to advocate to State Government and other relevant authorities on bus related matters. The document highlights gaps within the existing bus network, opportunities for better service provision and connections and any necessary infrastructure improvements required to support priority for buses on the road network.

This review seeks to identify and recommend suitable solutions and suggestions to improve the overall bus network, particularly frequency and reliability, with the outcome of this review providing 20 recommendations. The key findings of this Review identify:

- A considerable growth in patronage levels over five years on all four DART SmartBus services – which increased by 51% on weekdays, 79% on Saturdays and 72% on Sundays;
- Notable weekend patronage growth (over 5 years) of DART route 907 (City to Mitcham via Doncaster Road) of 150% on Saturdays and 194% on Sundays;
- Considerable overcrowding on all DART buses during the peak, with many services regularly leaving passengers behind;
- A lack of bus priority and impact of growing traffic congestion through Doncaster Hill and along Porter Street and parts of Blackburn, Thompsons and Manningham Roads;
- Growing support for a Bus Rapid Transit (BRT) solution for CBD-bound travel;
- The busiest bus stops in Manningham being the three main interchanges at Westfield Doncaster, The Pines Shopping Centre and Doncaster Park & Ride;
- Many of the busiest bus stops and bus corridors in Manningham are concentrated along Doncaster Road, Doncaster Hill and Blackburn Road;
- Population of Doncaster Hill is expected to more than quadruple over the next 20 years from 2,370 people in 2016 to 11,187 by 2036;
- Buses accommodate over one-third of all people who move along Hoddle Street – which now serves as the busiest bus corridor in Melbourne with over 925 daily bus trips;
- A general lack in police enforcement of bus lanes, compromising bus service efficiency;
- A lack of regular bus services in many parts of Bulleen and Templestowe Lower and areas east of the Mullum Mullum Creek (particularly on weekends);
- A lack of sufficient bus connections between part of Manningham and employment, health and tertiary education facilities in Heidelberg, Box Hill and Ringwood; and
- General safety and congestion issues around the Warrandyte Bridge bus terminus.

1. INTRODUCTION

The City of Manningham is the only municipality in metropolitan Melbourne to rely solely on buses for its public transport services, as the area is not serviced by either light or heavy rail. With a lack of fixed rail services and an over-reliance on the private motor vehicle, emphasis must be placed on ensuring that the existing bus network operates effectively and efficiently to provide a reliable alternative to the motor vehicle.

The *Manningham Bus Network Review 2017* (the "Review") provides an overview of the bus network in both Manningham and beyond the municipality, by assessing the existing level of service (routes, destinations and hours of operation), patronage figures, historic investment in infrastructure and services, commuter amenity (shelter, safety and pedestrian access) and the nature of existing priority for buses on the road network. The Review also explores what contributes to current bus operations and any elements that have either enabled or hindered growth in passenger patronage and/or service levels over the past five years.

The purpose of this review is to identify necessary service and infrastructure improvements, centred on the following key objectives, to:

- improve overall frequency and reliability and prioritise buses on the road network;
- provide for a Bus Rapid Transit (BRT) solution between the CBD and Manningham to meet continually growing demand;
- simplify the bus network (with more direct and less meandering routes);
- expand the frequency and hours of operation of bus services (into the evenings and weekends);
- provide for an improved standard of service to all parts of Manningham; including better connections to neighbouring major activity areas, like train stations, hospitals and tertiary education / university facilities in areas such as Box Hill, Heidelberg, Ringwood and Kew;
- identify strategic locations for new bus shelters and improved passenger facilities; and
- identify traffic pinch-points and where to consider bus priority measures (i.e. bus lanes and intersection traffic-signal enhancements).

As it is contained within the *Manningham Integrated Transport Strategy (2009),* it is Council's objective – to achieve an improvement in overall transport access and connectivity within and between the municipality and key destinations throughout metropolitan Melbourne in order to encourage a continued uptake of public transport use by the community. Adequate access to reasonable public transport services seeks to achieve social equity for our community and promote *Plan Melbourne's* concept of the '20 Minute Neighbourhood' to efficiently connect people to jobs, social services, education and recreational activities – within a 20 minute journey of their homes by public transport, walking and/or cycling.

In 2016, Infrastructure Victoria released its *'30-Year Infrastructure Strategy'*, which outlined recommendations for the Victorian State Government to consider. A key theme of many transport-related recommendations centred on the objective to focus future investment in maximising and expanding on existing assets and infrastructure. A primary focus of Infrastructure Victoria's Strategy provides for recommendations to invest more greatly in the bus network through various initiatives, namely:

- Doncaster bus improvement (recommending a BRT)
- Utilising existing assets
- Reallocation of road space (to public transport)
- Hoddle Street/Punt Road public transport prioritisation
- Metropolitan bus network reform
- SmartBus service provision increase
- Strategic transit-oriented development
- North-East Link

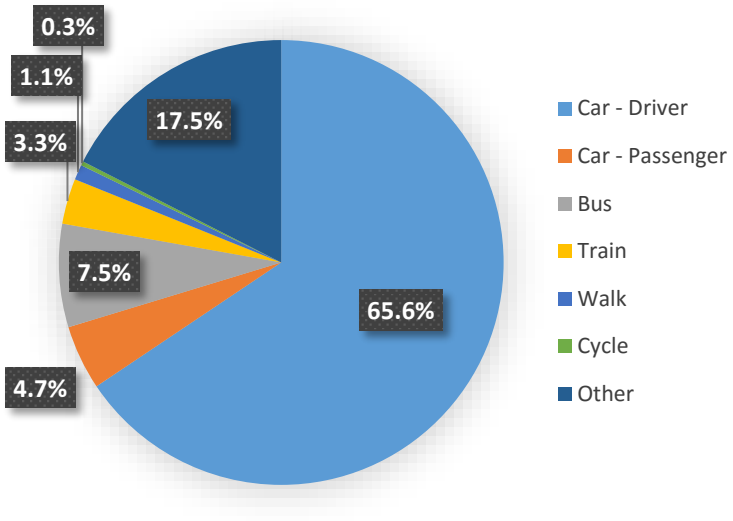
This review has been undertaken in consultation with Transdev (the company responsible for the operation of the majority of bus services in Manningham), Panorama Coaches (which operates two bus services to Warrandyte) and Ventura (which operates a service to Wonga Park). Consideration has also been given to any objectives or proposals that have been previously suggested or raised with, or by, government authorities, including Public Transport Victoria (PTV), VicRoads and the newly established Transport for Victoria.

2. OVERVIEW OF MANNINGHAM'S BUS NETWORK

A total of 27 bus routes operate to, from and within the City of Manningham, including seven (7) SmartBus routes (4 radial and 3 orbital), 17 regular local services, two (2) peak-only services and the Manningham Mover 'loop' service. In addition, two (2) NightRider services are provided from the CBD to Doncaster and Lilydale that service the Manningham area during the late-evening/early morning on weekends.

With no fixed rail or tram services provided within the City of Manningham, its 121,000 residents rely solely on buses to meet their public transportation needs within the boundaries of the municipality. This has likely contributed to a higher than average car ownership rate per household (of 2 cars owned per household in Manningham compared to 1.7 for the Greater Melbourne area) with 62% of all dwellings owning two (2) or more vehicles (compared to 51% for Greater Melbourne) [Australian Bureau of Statistics Census, 2016].

Figure 1 – Travel to Work Method (2011)



Source: Australian Bureau of Statistics. 2011.

As outlined in Figure 1 - according to the findings of the 2011 Census, 68% of the City of Manningham's working residents (36,052 people) travelled outside of the municipality to work, with 66% of employed Manningham residents travelling to work by private motor vehicle (as a driver) compared to the Greater Melbourne average of 60.5%.

Eleven per cent (11%) of all employed Manningham residents use public transport to travel to work (compared to the Greater Melbourne average of 13.5%). Of these, 7.5% travel by bus, which represents one of the highest proportions of this mode for a local government area in

metropolitan Melbourne (when compared to 1.5% for Greater Melbourne). This clearly illustrates the reliance on the bus for Manningham residents.

In recent years, there has been a growing emphasis on apartment living, urban consolidation and densification, as well as due consideration for the impact of climate change and growing traffic congestion. As such, demand for public transport use by (employed) Manningham residents has steadily grown between 2006 and 2011 from 8.5 per cent to 10.9 per cent of journeys to work being undertaken by public transport (bus, train or tram) [Australian Bureau of Statistics, 2011].

This growth can be attributed to a $350 million investment in 2009 in the Doncaster Area Rapid Transit (DART) system, which sought to upgrade four (4) existing bus routes between the CBD and Manningham to a SmartBus standard, vastly improving the frequency, reliability and prominence of the bus on these routes.

However, there is a significant contrast between east and west Manningham (divided by the Mullum Mullum Creek corridor), in relation to the extent and frequency of the bus network. The bus services in the eastern portion of Manningham in Warrandyte, Park Orchards, Wonga Park and Donvale are often sparse and infrequent when compared to the more urbanised areas in the west (Bulleen, Doncaster areas and Templestowe areas).

Bus patronage across Metropolitan Melbourne has seen a considerable increase over the past 10 years, with patronage steadily growing at 4.5% per annum from 79.13 million trips in 2005 to 122.5 million trips in 2015 [PTV, 2016]. However, during the 2015/16 financial year, bus patronage on the overall metropolitan bus network declined by 5.5 per cent to its lowest level in four years [PTV, 2016]. This may be attributed to the lack of capacity on the existing bus fleet, impact of traffic congestion on the reliability of bus services and potentially the impact of lower fuel prices in recent years.

Responsible authorities for infrastructure and services

Bus services

The majority of bus services in Manningham are privately operated by Transdev (24 routes), with two (2) routes from Warrandyte to Eltham operated by Panorama Coaches and one (1) route from Croydon to Wonga Park by Ventura.

Transdev also operates approximately one third of Melbourne's bus network and is currently contracted by the State Government to operate its bus services until August 2020, with an option to extend the contract by three (3) years to August 2023.

Bus Stops

There are 640 bus stops located throughout the municipality. The installation of bus stops is usually funded and approved by PTV and PTV usually manages issues or maintenance of major bus stops on DART or SmartBus routes (main roads). The provision of shelters and seating is

generally the responsibility of Council. Council is often responsible for maintaining bus stop infrastructure and other ground assets, along with the footpath network connecting to bus stops. Adshel is currently contracted by Council to maintain bus shelters throughout the municipality, as Adshel also manage bus shelters that display commercial advertising. This contract is due for renewal in early 2018.

Transport Planning, Responsibility and Funding

Department of Economic Development, Jobs, Transport and Resources (DEDJTR)

The State Department of Economic Development, Jobs, Transport and Resources (DEDJTR) oversees transport regulatory policy and legislation and is engaged in the delivery of a number of major transport projects, as part of the government's integrated strategies to improve public and private transport, freight and ports efficiency and other major infrastructure in urban and rural Victoria.

Transport for Victoria

Transport for Victoria (TfV) is a new State transport agency that is coordinating Victoria's growing transport system and planning for its future. The new agency brings together the planning, managing and coordinating of Victoria's transport system and its agencies. To achieve this, key functions have been transferred from Public Transport Victoria (PTV) and VicRoads to Transport for Victoria, including strategic and statutory planning, policy and legislation, budget strategy and rolling stock procurement. Transport for Victoria's role is to strategically plan for the future of Victoria's transport system, ensuring it grows as the community, economy and technology changes.

VicRoads

VicRoads is a State transport agency which plans, develops and manages the arterial road network in order to provide a more integrated and sustainable road transport system. An integral part of this objective is to provide a road network that caters for and supports buses and other modes such as cycling. VicRoads has produced the *SmartRoads Network Operating Plan* which seeks to prioritise trams and buses on key public transport routes that link activity centres.

Public Transport Victoria

Public Transport Victoria (PTV) is a statutory authority that acts as a system authority for all public transport and an advocate for public transport users – primarily responsible for the operation of public transport services. PTV is a single contact point for customers wanting information on public transport services, fares, tickets and initiatives. PTV aims to improve public transport in Victoria by ensuring better coordination between modes, facilitating expansions to the network, auditing public transport assets and promoting public transport as an alternative to the car.

Plan Melbourne 2017-2050

Plan Melbourne seeks to guide the growth of the city for the next 35 years. It sets the strategy for supporting jobs, housing and transport, while building on Melbourne's legacy of distinctiveness, liveability and sustainability.

A key transport objective of *Plan Melbourne* is to ensure that Melbourne has an integrated transport system that connects people to jobs and services and goods to market by investing in the Principal Public Transport Network (PPTN). It seeks to achieve this by promoting the concept of the '20-minute neighbourhood' which aims to give Melbournians the ability to 'live locally' through fostering most of their everyday needs within a 20-minute walk, cycle or local public transport trip of their home. It also considers improving transport connections to identified 'employment clusters' including the La Trobe National Employment and Innovation Cluster of which includes the Heidelberg activity centre.

Manningham City Council

In terms of transport, Manningham City Council is responsible for administering the local road network, provision and maintenance of walking and cycling paths, managing parking matters and some bus stop infrastructure. Council is also responsible for promoting and advocating for transport matters on behalf of its local community, as outlined in many of its transport-related strategies and policies including the *Manningham Integrated Transport Strategy 2009,* the *Manningham Link Roads Improvement Strategy 2014, Bicycle Strategy 2013* and the *Walk Manningham Plan 2011-2020.*

Although Council is not directly responsible for funding or managing the public transport system or arterial road network, it plays a pivotal role in ensuring that any State-initiated projects or proposals are considered or delivered in a manner that provides maximum benefit and minimal disruption or disadvantage to the local community.

Manningham Bus Service Characteristics

Bus services are generally characterised into three (3) distinct levels of service, with each level serving a particular purpose in the wider public transport network. Table 1 below outlines these three levels of bus services and their common characteristics:

Table 1 – Bus Service Characteristics

Route Category	Broad Public Transport Objectives	Services in Manningham
Principal	▪ Routes are predominantly cross-town or orbital routes, which provide a level of service similar to trams or light rail. • Together with tram and train routes, they form the PPTN servicing Major and Metropolitan Activity Centres.	The seven (7) SmartBus DART & Orbital routes
Main Local	▪ Together with Principal routes account for the majority of remaining bus services.	Majority of local Manningham bus routes

Route Category	Broad Public Transport Objectives	Services in Manningham
Community Local	▪ Routes are often circuitous due to the existing street layout, and mainly serve a local area. ▪ Some bus services are operated by an on-demand 'Telebus' method, however no such service exists within the City of Manningham.	Manningham Mover (Route 280/2)

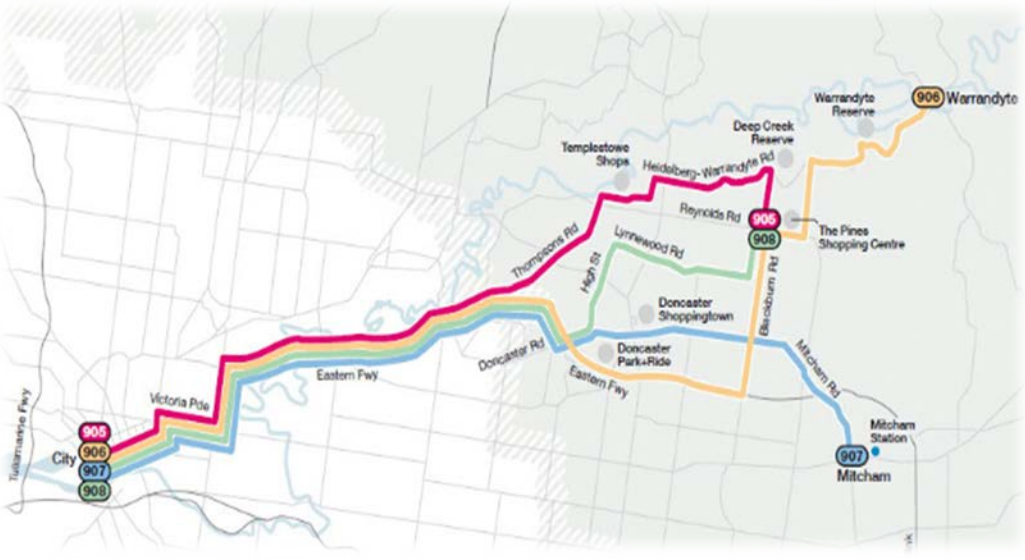
Summary of Bus Services Operating in Manningham

The following provides an overview of the variety of bus services offered in Manningham, including an assessment of the current and historical patronage figures. A map of the bus network servicing the Manningham local government area is contained in Appendix A.

DART (Doncaster Area Rapid Transit) SmartBus

In October 2010, four (4) existing local bus services were upgraded to a SmartBus standard in order to provide regular and frequent services between Manningham and the CBD. These routes are illustrated in Figure 2 below. It should be noted that all four routes were already existing services that operated along a similar route (formally operated as routes 301, 304, 307 and 319). In the first nine months of operation, DART bus patronage increased more than 30 per cent to 10,700 passengers each weekday (PTV, 2012).

Figure 2 – The Doncaster Area Rapid Transit (DART) Network



The frequency of DART services generally ranges between 5 to 10 minutes in the morning and evening peak period, 15 minutes during the rest of the day until 9.00 pm, then 30 minutes to midnight. Between 70 and 78 daily one-way services are provided by each of the four routes on an average weekday. Weekend services on routes 905 and 906 operate every 30 minutes, and on routes 907 and 908, every 20 minutes.

DART and SmartBus are successful examples that demonstrate the attractiveness of the bus network to commuters when an investment has been made to provide for bus services that are frequent, direct and prominent in nature (branding), given that all four DART services operated as regular bus routes prior to being upgraded. Furthermore, six of the nine SmartBus services throughout Manningham account for the top six most patronised bus services throughout all of metropolitan Melbourne.

As illustrated in Table 2, the number of people using the DART system approaches similar patronage experienced on the Upfield (train) Line (Infrastructure Victoria, 2016), with patronage of the DART network increasing by 51% on weekdays, 79% on Saturdays and 72% on Sundays in the five (5) years since DART was first introduced in October 2010. These four services collectively carried 16,000 passengers on an average weekday in 2015/16 (up from 10,500 in 2010/11) with DART routes 907, 906 and 905 accounting for the 6th, 11th and 19th most patronised bus routes in all of Melbourne (respectively).

Table 2: DART SmartBus Patronage (2015/16) and Growth over 5 years (Oct 2010/11 to 2015/16)

Route	Service	Growth in weekly patronage (2010/11-2015/16)	Average weekday patronage (2015/16)	Average Saturday patronage (2015/16)	Average Sunday patronage (2015/16)
905	City – The Pines (via Thompsons Rd)	**36 %**	3,416 (+36 %)	1,297 (+44 %)	869 (+24 %)
906	City – Warrandyte (via Blackburn Rd)	**59 %**	4,410 (+57 %)	1,802 (+80 %)	1,189 (+70 %)
907	City – Mitcham (via Doncaster Rd)	**78 %**	5,717 (+68 %)	3,007 (+150 %)	2,060 (+194 %)
908	City – The Pines (via King St)	**27 %**	2,382 (+32 %)	534 (-11 %)	369 (-26 %)
TOTAL:		**Avg: 54 %**	**15,925 (+51 %)**	**6,640 (+79 %)**	**4,487 (+72 %)**

Source: *Public Transport Victoria (Myki Data), 2016*

NOTE: *DART commenced operations in October 2010.*

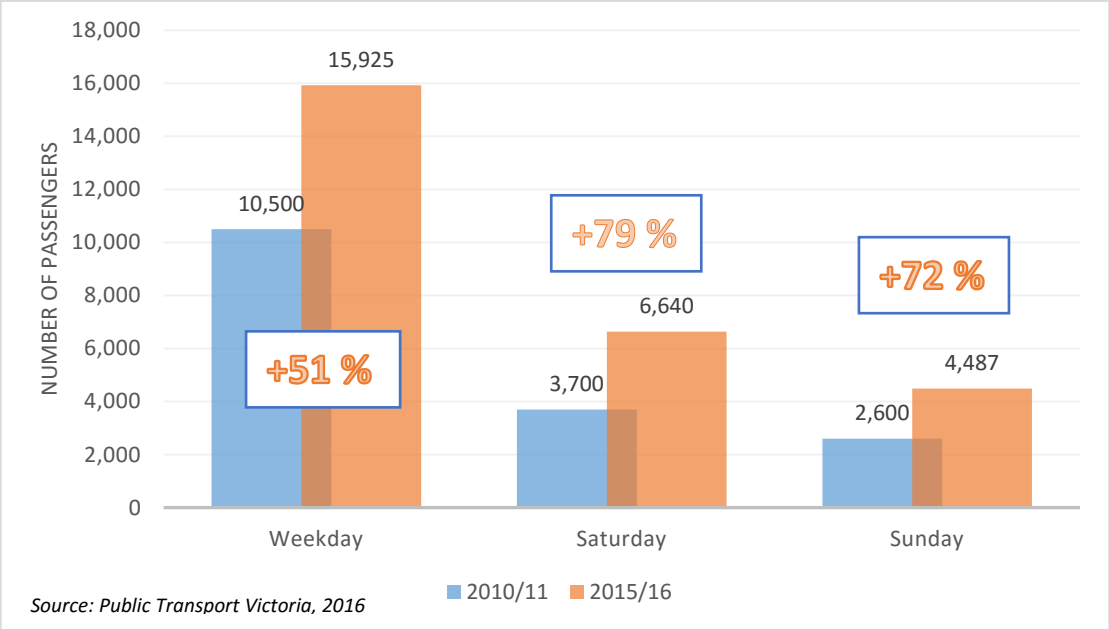
There has been notable growth in patronage on route 907 (that operates along the Doncaster Road corridor to Mitcham via Doncaster Hill), with over 1.66 million patrons per annum in 2015/16.

Overall, there was a 78% growth in weekly patronage on this route, over almost five (5) years since the route was introduced (in October 2010), with considerable growth recorded on Saturdays (up 150%) and Sundays (up 194%). The growth in DART patronage is illustrated in Figure 3. These figures confirm the observations and response from commuters regarding issues with buses being overcrowded and leaving passengers behind during peak times due to a lack of capacity on the current bus fleet.

All four DART services experienced considerable growth in the five years since introduction, with the exception of weekend patronage on the 908 service, which declined by 11% and 26% respectively on Saturdays and Sundays. However, this decline is likely attributed to changes to

the timetable implemented in 2015, as route 908 ceases to travel to the CBD on weekends and now only operates between The Pines Shopping Centre and the CBD during the peak periods. This service during the weekday off-peak period only operates between The Pines Shopping Centre and Doncaster Park & Ride – passengers are required to transfer to another bus service to access the CBD.

Figure 3: DART Weekly Patronage Growth: 2010/11 to 2015/16 (over 5 years)

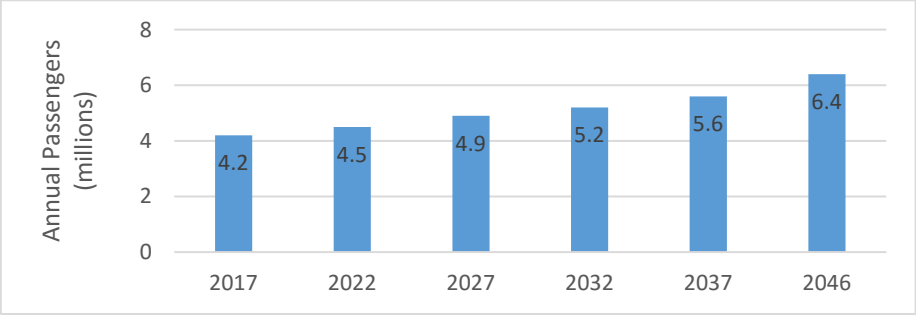


Source: Public Transport Victoria, 2016

The overall growth in DART patronage can be attributed to various improvements and investments in recent years, such as improved priority on the road network through the provision of dedicated bus lanes on major roads, priority signalling operated at major intersections, higher-capacity buses, a new Kiss & Ride facility in Bulleen and the initial promotion of DART as a premium bus service (SmartBus branding). As part of the introduction of SmartBus, all bus stops serviced by DART were upgraded to meet the requirements of the *Disability Discrimination Act 1992.* By 2022, it is policy that all bus stops in Metropolitan Melbourne meet the *Disability Standards for Accessible Public Transport, 2002.*

Transdev expects DART patronage to continue to grow at a rate of 7% per year, from 4.2 million trips in 2017 to 6.4 million trips in 2046, as illustrated in Figure 4.

Figure 4: DART Annual Patronage Growth Forecast 2017 to 2046



Source: Transdev Australasia, 2017

SmartBus Orbital

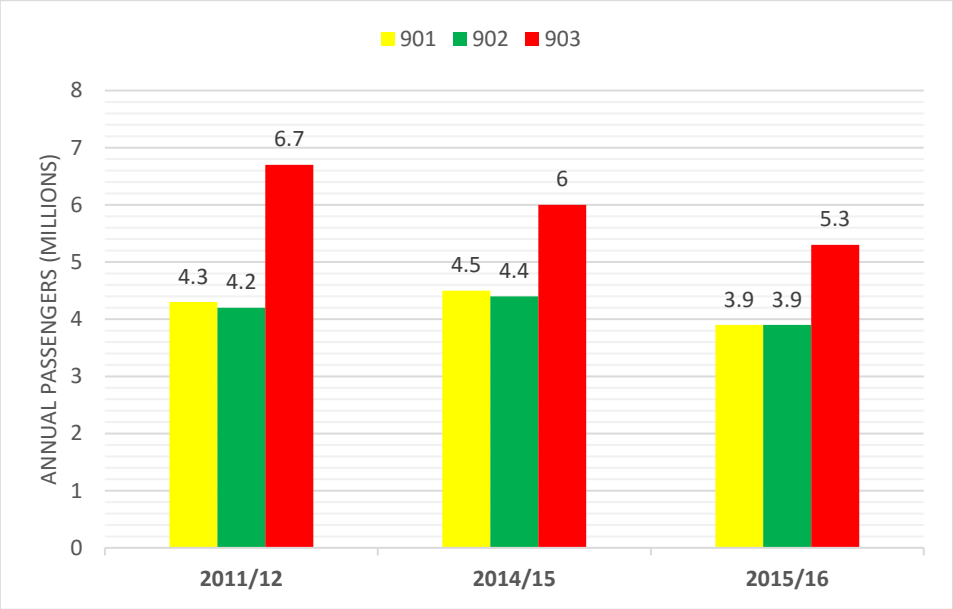
All three (3) SmartBus orbital routes service the Manningham area, providing frequent connections to wider metropolitan Melbourne and link major employment centres, tertiary institutions and activity centres. These services operate at similar frequencies to DART and all three services perform as the top three most patronised bus routes in Melbourne. The route characteristics of these three services are outlined in Table 3 below.

Table 3: Orbital SmartBus Patronage (2011/12 to 2015/16) and Route Characteristics

Route	Service	Four-year change in annual Patronage	Total Route Distance	Percentage of the route operating through Manningham
901 (Yellow)	Frankston to Melbourne Airport	-10 %	110 km	9 % (Blackburn & Reynolds Roads)
902 (Green)	Chelsea to Airport West	-8 %	75 km	15 % (Williamsons & Doncaster Rds)
903 (Red)	Mordialloc to Altona	-22 %	84 km	8 % (Manningham and Tram Roads)

These services experienced significant patronage growth in their first few years of operation since 2006, due to considerable investment in regular bus services, dedicated bus lanes, priority signalling and state-of-the-art GPS satellite tracking systems providing customers with real-time information at most major stops. However, in the four years between 2011/12 and 2015/16, annual patronage on all three routes declined, led by a 22% decline on route 903, a 10% decline on route 901 and an 8% decline on route 902. The gradual change in patronage is further illustrated in Figure 5.

Figure 5: SmartBus Orbital Annual Patronage 2011/12 to 2015/16



Source: Public Transport Victoria, 2016

This decline may be attributed to the nature of these routes, as they each form some of the longest trips (by distance) in metropolitan Melbourne's bus network, with one-way end-to-end trips taking between three and four hours to complete. These distances compromise reliability as buses can often be held up in traffic or other delays, affecting timetable reliability along the rest of the route. This compromise in reliability may contribute to commuters avoiding the service and opting for other travel options.

Figure 6 illustrates the route map of the three SmartBus Orbital services (901, 902 and 903) along with all other SmartBus services throughout Metropolitan Melbourne.

Figure 6 – The SmartBus and Orbital Network

Image Source: PTV, 2015

Local Services

There is a total of 19 local services that operate to and from Manningham, including two (2) services that only operate during peak periods.

The primary destinations, including the CBD, Box Hill, Heidelberg, Kew and Westfield Doncaster, generate the highest level of demand for local bus services. Demand is growing for more frequent services to Box Hill to cater for a large multicultural and student population living in Manningham and to Heidelberg for access to the railway station, Austin and Mercy Hospitals and other community services in this area.

Local services experiencing the highest patronage growth over the four years between 2011/12 and 2015/16 in Manningham (in order of highest annual patronage) were Route 207 between the City and Westfield Doncaster via Kew Junction (+ 86%), route 672 between Croydon Railway Station and Chirnside Park via Wonga Park (+ 76%), Route 200 between the City and Bulleen (+64%) and Route 305 between the City and The Pines via George Street (+ 49%).

Over the same four years, there was a considerable 70% decline in annual patronage on Route 295 from Box Hill to The Pines Shopping Centre and a 28% and 27% decline respectively on the two routes that operate between Warrandyte and Eltham (Routes 578 and 579).

The table at Appendix B provides further data in relation to the level of patronage (based on Myki ticket transactions/validations) for each local route in the four (4) years between 2011/12 and 2015/16.

Annual patronage data is also provided as Appendix C, which outlines the 25 busiest bus routes in wider Metropolitan Melbourne in 2015/16. Eight of these 25 routes service the Manningham area (highlighted in green).

Manningham Mover

The Manningham Mover was first introduced in November 2008 and provides a community bus service that links many of Manningham's activity centres through a loop route network. The route (280 and 282) operates solely within Manningham, in both a clockwise and anti-clockwise direction, and is commonly patronised by senior citizens.

The service carries approximately 1,800 passengers per week, with most of the ridership concentrated around the Doncaster, Doncaster East and Bulleen Plaza areas. Patronage on the route has declined 25% in the four (4) years between 2011/12 and 2015/16, with ridership generally low in areas of Bulleen, Templestowe and Templestowe Lower.

NightRider

There are two (2) NightRider services that operate to Manningham – servicing the areas of Bulleen, Doncaster, Doncaster East, Templestowe and Templestowe Lower.

NightRider buses travel between the City (Swanston Street & Flinders Street) and Manningham's suburbs every 30 minutes, between 1.30am and 4.30am on Saturdays and 1.30am and 5.30am on Sundays.

Network Service Gaps

For a municipality like Manningham, with an aging population, and with no hospitals, tertiary institutions or rail services within its boundaries, our residents are heavily dependent on public transport and bus connections to our neighbouring municipalities to access these facilities. This includes areas such as the Latrobe Employment Cluster and Heidelberg (including the Austin and Mercy Hospitals and Heidelberg railway station) and employment, social services, health and education facilities and railway stations located in the Metropolitan Activity Centres of Box Hill and Ringwood.

Currently, there is only one bus service from Manningham to Heidelberg (the 903 SmartBus via Manningham Road) servicing the Bulleen, Templestowe Lower and Doncaster areas. There is no direct service to Heidelberg from other parts of Manningham, particularly from Templestowe and Doncaster East (including from the northern parts of Bulleen and Templestowe Lower).

Direct bus services between Doncaster East (including The Pines Shopping Centre) and Box Hill are generally lacking, especially since the discontinuation of former route 286 (from Box Hill to The Pines). Direct bus services between Manningham and Ringwood are concentrated around the one 901 SmartBus route along Blackburn and Reynolds Roads and Fitzsimons Lane. Areas in western Manningham (Bulleen, Templestowe Lower and Doncaster) are not serviced by a direct bus route to Ringwood.

There are also limited regular bus services in Bulleen and Templestowe Lower (particularly away from the Manningham and Thompsons Road corridors) and areas generally east of the Mullum Mullum Creek in Warrandyte, Park Orchards and Wonga Park.

Busiest Bus Stops in Manningham

Table 4 below identifies the 30 busiest bus stops in Manningham, according to the average number of weekday Myki transactions (touch on only) registered by GPS at these locations (PTV, 2016). A map illustrating the location of these bus stops is provided as Appendix D.

Table 4 – Most Utilised Bus Stops in Manningham

Rank	Bus Stop	Direction	Suburb
1	Doncaster Westfield Bus Interchange	Interchange	Doncaster (Hill)
2	The Pines SC Bus Interchange	Interchange	Doncaster East
3	Doncaster Park & Ride	Interchange	Doncaster
4	Doncaster Rd @ Tram Road	Eastbound	Doncaster (Hill)
5	Williamsons Rd @ Doncaster Rd	Southbound	Doncaster (Hill)
6	Doncaster Rd @ Williamsons / Tram Rd	Westbound	Doncaster (Hill)
7	Blackburn Rd @ Canopus Dr	Southbound	Doncaster East

Rank	Bus Stop	Direction	Suburb
8	Blackburn Rd @ Thomas Hardy Dr	Southbound	Templestowe
9	Park Rd @ Whitefriars College	Southbound	Donvale
10	Yarra St @ Webb St	Westbound	Warrandyte
11	Doncaster Rd @ Rose St	Westbound	Doncaster (Hill)
12	Doncaster Rd @ Clay Dr	Westbound	Doncaster (Hill)
13	Thompsons Rd @ Manningham Rd	Southbound	Templestowe Lower
14	Doncaster Rd @ Church Rd	Westbound	Doncaster
15	Heidelberg-W'dyte Rd @ W'dyte Reserve	Westbound	Warrandyte
16	Thompsons Rd @ Manningham Rd	Northbound	Bulleen
17	Blackburn Rd @ Eastern Fwy	Southbound	Doncaster East
18	Blackburn Rd @ Andersons Creek Rd	Southbound	Doncaster East
19	Elgar Rd @ Hanke Rd	Southbound	Doncaster
20	Yarra St @ Warrandyte Bridge Terminus	Southbound	Warrandyte
21	High St @ Ayr St	Northbound	Doncaster
22	Doncaster Rd @ Whittens Lane	Westbound	Doncaster
23	Doncaster Rd @ Pleasant Ave	Westbound	Doncaster
24	James St @ Templestowe Village SC	Westbound	Templestowe
25	Doncaster Rd @ Tunstall Square SC	Westbound	Doncaster East
26	Thompsons Rd @ Hugo St	Southbound	Bulleen
27	Doncaster Rd @ Jackson Ct	Westbound	Doncaster East
28	Doncaster Rd @ Blackburn Rd	Westbound	Doncaster East
29	Blackburn Rd @ Doncaster Rd	Southbound	Doncaster East
30	Blackburn Rd @ Beverley St	Southbound	Doncaster East

The three (3) busiest bus stops are the major interchanges in Manningham – at Westfield Doncaster (with an average 1,270 weekday 'touch on' Myki transactions recorded), The Pines Shopping Centre (with 743 'touch on') and Doncaster Park & Ride. It could be assumed that Doncaster Park & Ride is actually the second busiest bus stop in Manningham. However due to the inaccuracy of the Myki and GPS data and the delay in passengers 'touching on' due to the vast numbers of passengers entering the peak-hour buses, the GPS at times captures the data as passengers 'touching on' at the next bus stop located at the inbound on-ramp entrance to the Eastern Freeway from Doncaster Road (located within the City of Boroondara).

FIGURE 7 - LOCATION AREA OF 27 BUSIEST STOPS

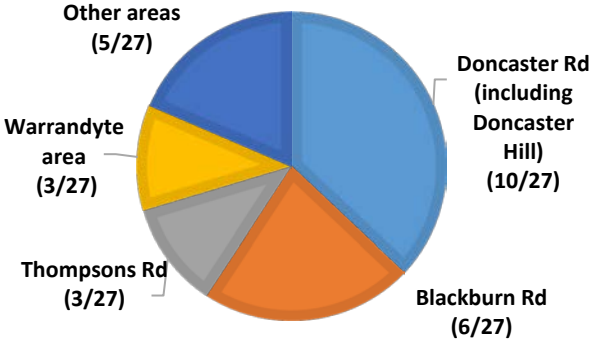


Figure 7 shows where the remaining 27 busiest bus stops are located along key corridors. It is noted that six (6) of the busiest bus stops are located within the Doncaster Hill precinct.

Busiest Bus Corridors in Manningham

Many of Manningham's arterial roads cater for a considerable number of bus services per day. Table 5 below identifies the number of services (on an average weekday) along the busiest sections of our arterial road network. This information is also represented on a map in Appendix D:

Table 5 – Top 15 Busiest Bus Corridor Sections in Manningham

Rank	Road Name	Sections between:	Number of daily bus services*	Bus Lanes Exist?	Daily vehicle Traffic Volume**
1	Williamsons Road	Westfield Doncaster (Sovereign Point Ct) & Manningham Road (400m)	602 (6 routes)	No	13,000
2	Williamsons Road	Westfield Doncaster (Sovereign Point Ct) & Doncaster/Tram Road (450m)	590 (5 routes)	No	13,000
3	Blackburn Road	King St & Reynolds Rd (1.3 km)	440 (3 routes)	No	16,800
4	Blackburn Road	George St & Andersons Creek Rd (500 metres)	432 (3 routes)	No	10,000 – 13,000
5	Williamsons Road	Porter & Foote Streets (800 metres)	392 (4 routes)	Yes	19,500
6	Doncaster Road	Church Rd & Williamsons Rd (1.2 km)	376 (4 routes)	Yes & No (Partly)	14,000
7	Fitzsimons Lane	Yarra River & Porter St (1.3 km)	352 (3 routes)	Sth – Yes Nth – No	25,500
8	Doncaster Road	Church & Wetherby Roads (500 metres)	336 (3 routes)	Yes	12,500
9	Blackburn Road	George St & Eastern Freeway (2.1 km)	300 (2 routes)	No	9,700 – 12,000
10	Doncaster Road	High St & Williamsons Rd (1.8 km)	292 (3 routes)	Yes & No (Partly)	10,000
11	Doncaster/ Mitcham Rds	Wetherby & Springvale Roads (3.5 km)	290 (2 routes)	Yes	10,000
12	Thompsons Road	Bulleen & Manningham Roads (2.1 km)	276 (3 routes)	No	8,000^
13	Manningham Road	High St & Williamsons Rd (1 km)	258 (3 routes)	Yes	13,500
14	Manningham Road	Thompsons Rd & Ayr St (550 metres)	248 (3 routes)	No	11,000 – 16,000
15	Parker/ Swilk / James Sts	High & Anderson Streets (1 km)	234 (3 routes)	No	12,100

* Per weekday in both directions (based on PTV Timetable Information, PTV 2017)
**Bidirectional (Source: VicRoads, 2017)
^Daily Traffic volumes on Thompsons Road between Bulleen Road & the Eastern Freeway (outbound onramp) is higher at 17,000 eastbound and 11,000 Westbound.

The busiest bus corridor in Manningham is on Williamsons Road at the Westfield Doncaster bus interchange (Sovereign Point Court), with around 300 daily bus trips in each direction from this point north to the Manningham Road and Doncaster Road intersections. Other busy bus corridors are concentrated along Blackburn Road, Doncaster Road and Fitzsimons Lane.

Bus lanes exist along some of Manningham's busiest bus corridors, namely along Doncaster Road and Fitzsimons Lane and in parts of Mitcham, Manningham and Williamsons Roads. There are no bus lanes along the entire Blackburn Road corridor, in particular, the area around the busy George Street intersection (Donburn Village shops). This is another identified pinch-point due to the reduced speed limit, pedestrian activity and traffic movements in and around the shopping strip (Donburn Village). There are also no bus lanes or bus priority measures where Thompsons Road approaches the Eastern Freeway on-ramp and Bulleen Road in Bulleen which is regularly plagued by traffic congestion in the morning peak period.

Doncaster / Mitcham Road Corridor

The Doncaster / Mitcham Road corridor (8.4 km between the Eastern Freeway and Park Road) is one of the busiest bus corridors in Manningham (by number of commuters), catering for two highly-patronised SmartBus services (the 907 DART and 902 Orbital), along with several local services. Eleven (11) of the 30 busiest bus stops in Manningham are located along this corridor (including the Doncaster Park & Ride). This corridor also intersects with a number of other busy bus corridors or destinations, including Blackburn Road, Williamsons Road and Mitcham railway station.

A bus trip on DART route 907 between Mitcham Station and Doncaster Park & Ride (a distance of 10 kilometres) can generally take 28 minutes on an average weekday (varies between 22 and 33 minutes depending on the time of day), travelling at an average speed of 21kph.

Currently, there is a 550 metre gap where bus lanes do not exist along Doncaster Road through Doncaster Hill (between Beaconsfield and Council Streets) which is an identified pinch-point for buses (due to traffic volumes and signal phasing at the various intersections at Elgar, Williamsons and Tram Roads).

There are 52 bus stops along this corridor (27 outbound, 25 inbound) spaced on average 320 metres apart, with almost two-thirds containing a bus shelter (namely at bus stops on the inbound route – 22 out of the 25). However, less than half (11 of the 27) of the bus stops on the outbound route contain a bus shelter. Six of the 52 stops contain an electronic real-time information board, providing up-to-date bus arrival times based on GPS data.

Blackburn Road Corridor

The Blackburn Road corridor (5.7 km between the Eastern Freeway and Heidelberg-Warrandyte Road) is another busy bus corridor in Manningham, catering in parts for four SmartBus services (the 905, 906 and 908 DART and 901 Orbital), along with several local services. Six of the 30 busiest bus stops in Manningham are located along this corridor (not including The Pines Bus Interchange).

A bus trip on DART route 906 between The Pines Bus Interchange and the Eastern Freeway (a distance of 4.3 kilometres) can generally take 14 minutes on average (varies between 12 and 16 minutes depending on the time of day). Currently, there are no bus lanes along the entire length of Blackburn Road, although some sections are identified pinch-points for buses (due to traffic congestion), notably at the George Street and Doncaster Road intersections.

There are 33 bus stops along this corridor (16 northbound/outbound, 17 southbound/city-bound) spaced on average 340 metres apart, with just over half containing a bus shelter. Eighty-two per cent of bus stops on the city-bound approach contain a shelter (14 of 17). Only 19% (3 of 16) of outbound stops contain a shelter.

Manningham Road Corridor

Only a one kilometre section of Manningham Road between High Street and Williamsons Road (an area which forms as the thirteenth busiest bus corridor in Manningham) provides dedicated bus lanes (in both directions) There are no bus lanes provided along the remaining 3.8 kilometres between High Street and the Yarra River bridge crossing to Heidelberg.

There are 28 bus stops along this 4.8 kilometre corridor between the Yarra River and Williamsons Road (14 in each direction) spaced on average 340 metres apart, with half containing a bus shelter – being 57% of the eastbound stops (8 of 14) and 43% of the westbound stops (6 of 14).

Characteristics of Bus Corridors outside of Manningham

Given the significant level of demand for bus services between Manningham and the CBD, a large majority of Manningham's bus routes travel via the Eastern Freeway, Hoddle Street, Victoria Parade and Lonsdale Street corridors, including all four (4) DART services.

The following outlines some characteristics of the Eastern Freeway and Hoddle Street corridors, in how they relate to bus services.

Eastern Freeway

- Carries between 135,000-160,000 vehicles (volume) per day [VicRoads, 2017].
- Slowest freeway in Melbourne – average speed in AM peak: 9 km/h [VicRoads, 2015].
- Eleven (11) different bus routes use the Freeway during the weekday peak.
- Approximately 756 bus trips along the Eastern Freeway (in both directions) per day (378 in each direction).

Hoddle Street

- Serves as the busiest bus corridor in Melbourne.
- Bus commuters account for one-third (36 %) of all people who move along Hoddle Street.
- Approximately 932 bus trips each weekday (in both directions).

- Two-thirds of buses using Hoddle Street are destined for Manningham.
- In the peak, one bus every minute exits the Eastern Freeway onto Hoddle Street [VicRoads, 2017].
- In the PM peak, buses can take up to 25 minutes to reach the Eastern Freeway from the CBD (Spring Street) – a distance of less than 4 km.

In late 2017, VicRoads is due to commence construction of the Streamlining Hoddle Street project – which will include the upgrade of the Johnston Street and Hoddle Street, and Eastern Freeway and Hoddle Street intersections to improve the movement of people, buses and vehicles along the Hoddle Street and Punt Road corridors. This project will also implement 24/7 Clearways along the entire length of Hoddle Street in order to enable the provision of dedicated bus lanes in both directions. VicRoads predict that the project will improve travel time for buses travelling the 1.5 kilometres between the Eastern Freeway and Victoria Parade by up to five minutes [Streamlining Hoddle Street Information Update – September 2017, VicRoads].

Pedestrian Access to Bus Stops

In 2016, the RACV undertook a review of missing footpath connections to low and high use bus stops throughout outer metropolitan Melbourne. The findings are contained in the Association's *'Footpath Connect: Outer Melbourne Footpaths'* document.

The RACV's assessment of footpaths and bus stops within the City of Manningham concluded that there are three (3) high-use stops that do not provide footpath access (totalling 300 metres in missing paths) and 65 low-use bus stops that are missing footpath links (totalling 10.2 kilometres of missing path).

The three (3) high-use bus stops missing a connecting footpath are:

1. Templestowe Lower: Parker Street (south side of road) between Omar and High Streets (165 metres);
2. Templestowe: Heidelberg-Warrandyte Road (south side of road) and east of Rosco Drive (35 metres); and
3. Doncaster: Victoria Street (west side of road) between Owens Street and southern entrance to the Ruffey Lake Park carpark (105 metres).

Council has also identified, through its own assessments, opportunities to improve pedestrian access and safety around bus stops as part of the *Principal Pedestrian Network (PPN), Walk Manningham Plan 2011-2020, Safe Pedestrian Crossing Points Plan (2015)* and the *Bicycle Strategy (2013).* Actions included in these strategies will be progressively delivered by Council over coming years, through its annual Capital Works Program.

It is generally considered that the footpath network in Manningham is currently well developed in areas west of the Mullum Mullum Creek, with the exception of the Templestowe area, but is limited in areas east of the Mullum Mullum Creek, including Park Orchards, Warrandyte and Wonga Park. In order to deliver further improvements for pedestrians, Council has allocated a

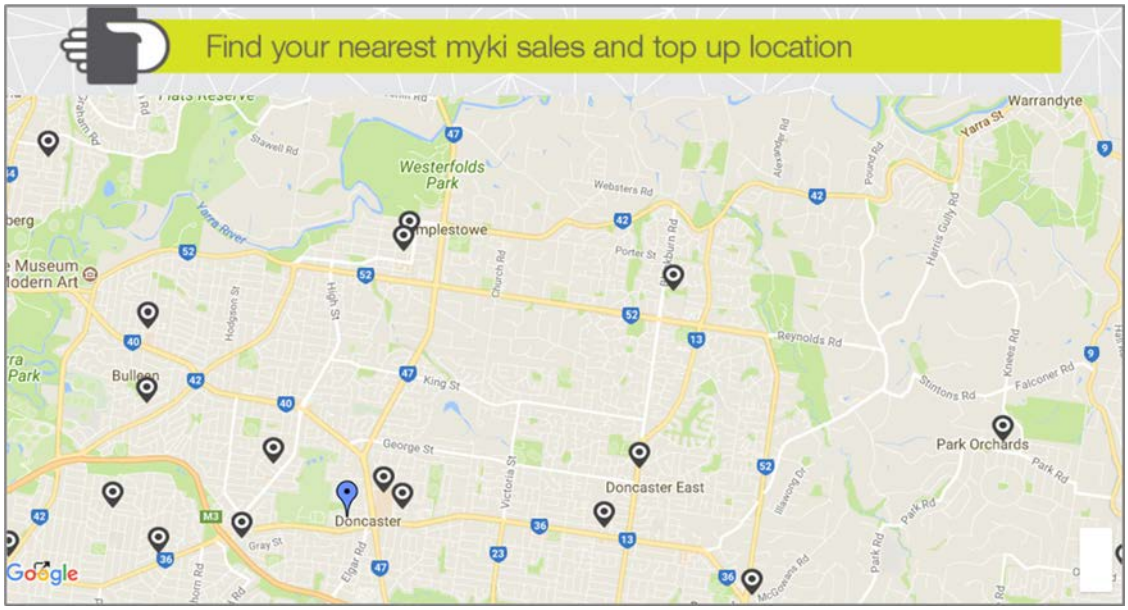
significant annual budget through its 10 year Capital Works program, subject to an annual assessment of project priorities, to deliver the PPN, which includes 564 kilometres of footpaths. Collectively, these plans also identify locations in which to provide safe pedestrian crossing points – particularly across arterial roads, where long sections of arterial roads do not provide a safe point of crossing for pedestrians (up to, and at times exceeding, one kilometre in parts – See Figure 8, *Walk Manningham Plan 2011-2020)*.

Myki

In order to travel on public transport in Victoria, one must carry a valid Myki card for ticket transactions. Myki cards can be purchased online or via the call centre, premium train stations, from ticket vending machines at some tram or bus hubs or from participating retailers (such as newsagencies, pharmacies and some local milk bars and all 7-eleven stores). You can also buy a myki on board a bus within the myki area and top up to a maximum of $20.00.

Figure 8 illustrates locations around Manningham to buy or top up a Myki. As illustrated, you can do this at all three major bus interchanges at Westfield Doncaster, The Pines Shopping Centre and Doncaster Park & Ride, including several retailers and 7-eleven stores. However, you are unable to do this in the areas of Templestowe Lower, Warrandyte, Warrandyte South or Wonga Park.

Figure 8 – Locations in Manningham to buy or top up Myki



Source: PTV, 2017

3. OTHER RELEVANT BUS NETWORK REVIEWS

This current Review has been prepared with consideration of the objectives and recommendations of previous bus network reviews that have been undertaken by either State Government (i.e. PTV), Transdev or Manningham City Council. Some of the recommendations highlighted by those reviews are still deemed appropriate and contribute to this review.

Public Transport Victoria: A New Bus Network for the Eastern Suburbs (2015)

The most significant of these earlier reviews was undertaken by PTV in consultation with Transdev and Council in 2014 and 2015, whereby the existing eastern suburbs bus network was subject to a Greenfields Timetable Review to identify opportunities to enhance the network by increasing service frequencies (particularly on DART and SmartBus), re-routing or truncating services to provide more direct routes and, in some cases, introducing a new route altogether.

However, these changes were intended to be implemented on cost-neutral and no-additional-kilometre basis, which would have meant the loss of services to other parts of Melbourne. Subsequently, in late 2015, most of these suggested changes were scrapped by the incoming government at the time (although a few changes have since been implemented, such as improved weekend services on DART route 907). Many of those suggested changes are still generally supported by both Council and Transdev, pending further consultation with the community. These include the following improvements:

DART:

- Routes 905 and 906: significantly increase capacity and frequency of peak weekday services with the introduction of greater-capacity buses
- Route 907: significantly increase capacity of all weekday and weekend services (with the introduction of greater-capacity buses) and boost frequency from every 15 to 10 minutes off-peak on weekdays and from every 30 to 20 minutes on weekends
- Route 908: increase weekend frequency from every 30 to 20 minutes
- All DART routes: Generally improve the frequency of evening and weekend services on all routes, and provide late-night services (midnight to sunrise) on Friday and Saturday nights

SmartBus Orbital:

- SmartBus orbital Routes 901 and 902: increase weekday peak frequency from every 15 to 10 minutes and weekend frequency from every 30 to 20 minutes

- SmartBus orbital route 903: boost weekday peak frequency from 10 to every 7.5 minutes, Saturday services from every 30 to 10 minutes and Sunday services from every 30 to 20 minutes
- Further investigate opportunities to truncate the three orbital routes to improve overall reliability and travel times

Local Routes:

- Reintroduce a direct bus service between The Pines SC and Box Hill (in place of the former route 286)
- Introduce a new regular (weekday and weekend) service between Templestowe Village (or possibly The Pines SC) and Heidelberg Station along Templestowe Road in Bulleen
- Route 271 (Box Hill to Ringwood): provide a more direct service and introduce a Sunday service (with a minimum frequency of every 30 minutes)
- Route 309 (The Pines SC to City): expand to a regular weekly service (by introducing weekend services)
- Route 318 (Deep Creek Reserve to City): increase peak services from four to 18 per weekday
- Route 364 (Ringwood to Warrandyte): increase weekend frequency from hourly to half-hourly and extend this service to The Pines SC.

It should be noted that further consultation will need to be undertaken with Council, commuters and the local community if and when these changes are further explored or reconsidered.

Manningham Local Bus Services Review (2012)

This current review is intended to update the recommendations of an earlier and similar review conducted by Council in 2012. Some of the outstanding recommendations are proposed to be carried over to this current review in the context of a revised assessment of patronage, service levels, bus shelter priorities and identification of issues.

Manningham/Whitehorse/Monash Metropolitan Bus Services Review (2010)

In 2010, the former Department of Transport released its *Manningham/Monash/Whitehorse Bus Services Review*. That review was one of 16 to be conducted across Melbourne and was a key action of the then Victorian Government's Transport Plan *'Meeting our Transport Challenges',* released in 2006.

A number of key recommendations of that review should also be carried forward as recommendations of this current review. These include:

- To ensure that a bus stop is provided within 400 metres, or a 5 minute walk of 90% of every Manningham household; and
- To achieve minimum service standards to provide a bus service at a minimum frequency of every 30 minutes between 6.00am and 9.00pm on weekdays, 8.00am and 9.00pm on Saturdays and 9.00am and 9.00pm on Sundays, particularly on local suburban routes.

4. INFLUENCES AND OBSERVATIONS

In the five years since the last Review was conducted, a number of changes to the bus and public transport network have occurred, contributing in some way to the current state of the bus network.

Issues surrounding a lack of reasonable public transport and access are commonly the most raised concerns that Manningham residents have regarding the local area, in particular, the lack of frequent and high-capacity public transport options available to many parts of the municipality [1000s of Voices = 1 Manningham, Manningham City Council, 2016]. There is strong community support for improved public transport options to the City of Manningham, either through a heavy rail line to Doncaster, greater capacity of DART or generally more frequent and reliable bus services.

The following are some of the influences that have contributed to the nature of the existing bus network over the past five years:

- The significant growth in DART patronage and ability of the network to cope with the demand (capacity constraint of the existing bus fleet and road network);
- A change to ticket fare zoning in 2015 (which applied a Zone 1 fare to the entire municipality);
- The loss of the direct Box Hill to The Pines bus service (route 286) in 2015;
- The ongoing impact of growing traffic congestion to bus reliability;
- Higher density development – particularly around Doncaster Hill (referred to on page 33 of this report) and along the Doncaster Road corridor;
- A decline in the number of young Victorians who have a driving licence;
- A softening in the average cost of fuel, with the average price per litre falling from $1.40 in 2011 to $1.12 in 2016 [RACQ, 2016].

According to data provided by VicRoads and analysed by Monash University, the proportion of young Victorians who have a driving license has continued to decline. In 2001, 75% of 18 to 23 year olds and 93% of 24 to 30 year olds had a provisional or full driving licence. In 2016, this declined to 62% and 82% respectively [VicRoads/Monash University, 2016]. These figures may indicate that more and more younger people are reliant on public transport for their travel needs.

Since 2012, a number of infrastructure improvements have also been made, including the construction of the new Kiss & Ride facility in Bulleen, provision of bus lanes along Fitzsimons Lane and Williamsons Road in Templestowe and Victoria Parade in East Melbourne and bus

priority improvements at many key intersections, including High Street / Doncaster Road, Williamsons Road / Foote Street and Williamsons Road / Porter Street. These projects have all collectively contributed to improving bus priority and reliability on these roads.

The change in the ticket fare zone pricing across Melbourne has also led to a reduced demand and patronage at bus stops in Zone 1 which, in the City of Manningham, are all located in Bulleen within the vicinity of Thompsons Road near the Eastern Freeway interchange. Given this, the streets around this precinct have experienced less demand for commuter parking as commuters are no longer attracted to these bus stops in order to pay a lower ticket fare. In addition, patronage at the new Kiss & Ride facility, which was completed in mid-2016, has also been lower than expected. However, the change to the fare arrangements has also benefited Manningham commuters, as the cost of a trip between Manningham and the CBD has effectively halved in price.

Table 6 (overleaf) lists some of the identified issues that exist with the current bus network and services and provides suggestions for how to address these issues. The majority of suggestions outlined in this table form the key recommendations of this Review. A map illustrating the location of suggested bus lanes in Manningham is provided as Appendix E.

Some improvements may require further advocacy by Manningham City Council to secure priority and funding to implement, as the responsibility may lie with various agencies or authorities. Many of these changes will also require consultation with existing commuters and the general community.

These issues have been identified through various methods of feedback received from the community and public transport users through community consultation forums, correspondence to Council and one-on-one discussions between Council officers and community members. These issues have also been identified through the observations made by Council, Public Transport Victoria, VicRoads, Transdev (corporate and drivers) and other local bus operators.

Table 6 – Observations, issues and suggestions

Issue Topic	Issue	Suggestion	Responsible Authority
GENERAL SERVICE LEVELS			
Overcrowded DART services	DART services 905, 906 and 907 experience regular overcrowding during peak periods. This is most significant at bus stops located closest to the Eastern Freeway (Doncaster, Blackburn and Thompsons Roads), as buses are usually already full by this stage in the AM peak.	▪ Boost frequency of DART buses in the peak and provide higher capacity buses to cater for growing demand.	PTV / TfV
Manningham Mover services	Services cease in the early evening and buses face delays in the PM peak at Manningham and Bulleen Roads.	▪ Extend Manningham Mover (route 280/2) hours of operation to at least 8pm on weekdays. ▪ Re-route service 282 through Noelle Street in Bulleen, to avoid the Bulleen/Manningham Road intersection.	PTV / TfV / Transdev
Lack of regular frequency and weekend bus services	Many local bus routes do not operate regular services on weekends (mainly Sundays) and often cease to operate early on weekday evenings.	▪ Improve frequency of all services to provide a minimum 30 minute frequency every day of the week. ▪ Provide a Sunday service to routes 271 and 285. ▪ Consider the implementation of 'on-demand bus services' for areas that currently lack adequate and regular bus services (including the Warrandyte, Park Orchards, Donvale and Wonga Park areas).	PTV / TfV / Transdev
Review meandering bus routes	Some routes that service Manningham are not direct and meander through a number of local streets, increasing travel times and discouraging potential commuters due to the time it takes to get between their origin and destination.	▪ Investigate opportunities to simplify local bus routes by making them more direct and easier to understand by the general community – namely on routes 271, 273, 279 and 295.	PTV / TfV / Transdev
Lack of adequate bus services to Box Hill	Inadequate frequency of some services between Manningham and Box Hill including no direct service between The Pines SC and Box Hill.	▪ Re-introduce a direct service between The Pines SC and Box Hill (formally route 286).	PTV / TfV

Lack of regular bus services in Bulleen and Templestowe Lower	There is a lack of a regular and direct bus service operating throughout Bulleen and western parts of Templestowe Lower in the area bounded by Templestowe, Bulleen and Thompsons Roads (away from the Thompsons and Manningham Road corridors). In particular, a connection between this area and Heidelberg (including the Latrobe Employment Cluster). Some of this area is currently only serviced by the Manningham Mover.	▪ Consider implementing a direct bus service along Templestowe Road between Templestowe Village or The Pines SC to Heidelberg Station. ▪ Investigate opportunities to provide a bus service along Bulleen Road.	PTV / TfV
BUS LANES			
Bus delays through Doncaster Hill	The impact of traffic congestion to bus reliability (delays) on Doncaster Hill due to the lack of a dedicated bus lane on Doncaster Road through the Williamsons/Elgar/Tram Road intersections and vehicle queue lengths on the Williamsons Road right-turn lanes for westbound traffic.	▪ Provide a continued and dedicated bus lane (~550 metres) along Doncaster Road (in both directions) between Beaconsfield and Council Streets. ▪ Provide bus priority treatment through the Williamsons/Elgar/Tram Road intersections (a bus queue-jump lane on Williamsons Road).	VicRoads / TfV / PTV
Lack of bus priority on Hoddle Street	A lack of bus priority on Hoddle Street is compromising travel times and the reliability of bus routes – due to the lack of 24/7 bus priority and no bus lane on the outbound/northbound approach of Hoddle Street.	▪ Provide a dedicated bus lane on the outbound / northbound approach of Hoddle Street. ▪ Expand the hours of operation of inbound bus lanes to provide for 24/7 bus priority (including to the future outbound bus lane as well). ▪ Collaborate with VicRoads to consider appropriate public transport solutions as part of the Streamlining Hoddle Street Project.	PTV / TfV / VicRoads
Porter Street / Williamsons Rd roundabout	A lack of bus priority along Porter Street and traffic congestion at the roundabout in the PM peak is affecting reliability of the 905 DART (city-bound/westbound).	▪ Provide a 750 metre bus lane on Porter Street (westbound) between Williamsons and Church Roads. ▪ Advocate for VicRoads to consider a full signalisation of the existing roundabout intersection.	VicRoads / TfV / PTV

Traffic congestion on Manningham Road / Banksia Street impacting bus reliability	Delays to Melbourne's most patronised bus service – the 903 SmartBus Orbital – across the Yarra River Bridge on Manningham Road / Banksia Street. Buses are often caught in traffic at this point, where traffic volumes often exceed 32,000 vehicles per day (VicRoads, 2017) – affecting the reliability of this service.	▪ Provide a bus lane along both sides of Manningham Road / Banksia Street across the Yarra River Bridge (1.5 kilometres in length, each way) between Noelle Street and Rosanna Road in Heidelberg. ▪ Provide bus priority at the Bulleen Road intersection (Bulleen).	VicRoads / TfV / PTV
Delays at the Lynnwood Parade / Williamsons Road intersection	The 908 DART outbound services during the evening peak often experience delays of up to three minutes at the Lynnwood Parade and Williamsons Road intersection. Buses often need to wait up to three cycles in the traffic signals to cross Williamsons Road, as north-south traffic flow along Williamsons Road is prioritised during the PM peak.	▪ Provide a bus lane along Lynnwood Parade (eastbound) and bus-priority at the signals to allow buses to jump the traffic queue and clear the intersection with minimal delay.	VicRoads / TfV / PTV
Limitation in efficiency of existing bus lanes	Some existing bus lanes are not operating as efficiently as intended. Left-turning vehicles are permitted to enter a bus lane up to 100 metres prior to an intersection, however, they hold up buses as general vehicles are not permitted to turn left whilst a B-lantern signal is activated for buses – effectively delaying buses behind them as they miss the opportunity to jump the queue.	▪ B-lanterns at intersections need to include a green-arrow to permit vehicles ahead of a bus to turn left to clear the path for waiting buses to cross the intersection. ▪ Signal phasing duration should be extended to allow time for left turning vehicles and waiting buses to cross the intersection.	VicRoads / PTV / TfV
Enforcement of bus lane rules	A lack of enforcement of bus lane rules is compromising the effectiveness of their operation due to illegal stopping or parking (particularly on Victoria Parade and Lonsdale and Hoddle Streets).	▪ Ensure that Victoria Police regularly enforce road rules pertaining to bus lanes. ▪ Consider operating all bus lanes on a 24/7 basis to avoid confusion and provide priority for buses at all times.	Victoria Police / PTV

BUS INTERCHANGES			
Doncaster Park & Ride	Existing traffic arrangements hinder the operation of the P&R as there is a conflict between commuter vehicles & buses at the entrance to the P&R, a limited number of bus bays and overall congestion at the facility. Buses are also delayed in exiting the P&R due to existing signal phasing, short 'green time' and general traffic congestion on Doncaster Road.	▪ Consider providing a bus bay on Doncaster Road for 907 DART services (to avoid entering the P&R). ▪ Consider separating bus and general commuter vehicle movements within the P&R. ▪ Improve priority for buses entering and existing the facility to/from Doncaster Road.	VicRoads / PTV / TfV / Transdev
Westfield Doncaster Bus Interchange	Excessive bus/vehicle conflict with shared entry and exit to the interchange – particularly at the exit and traffic lane arrangement from the carpark to Williamsons Road. A lack of suitable weather protection and general passenger amenity for waiting commuters.	▪ Requires a review of existing bus and general vehicle traffic arrangements, including priority for buses exiting the interchange onto Williamsons Rd. ▪ Collaborate with Westfield to improve the facility as part of the Doncaster Westfield Master Plan and any future redevelopment of the facility.	Westfield / PTV / VicRoads
The Pines Shopping Centre Bus Interchange	A general conflict in movement of buses, private vehicles and pedestrians compromising safety for all users. Poor sightlines of the zebra crossing through the interchange and poor commuter amenity due to the lack of bus shelters and pedestrian safety (lighting). Illegal parking in the bus zone, particularly near the bank ATMs and a lack of toilet facilities for bus drivers once the Centre closes.	▪ Consider separating / removing general vehicle access from the bus interchange. ▪ Provide a safer pedestrian crossing with better lighting and more shelter for commuters. ▪ Enforce road and parking rules to minimise illegal parking, or provide an alternative short-stay stopping bay for general vehicles. ▪ Provide accessible toilet facilities for bus drivers.	Stockland The Pines / PTV
Box Hill bus Interchange	Many Manningham residents commute to Box Hill and experience delays due to the inefficient operation of the Box Hill bus interchange. The feedback that Whitehorse Council has received from residents, public transport users and business is that the interchange is hard to use, especially when changing from trams to buses or buses to trains. The bus interchange is old and needs better places to wait. Disability and pram access is poor and buses often experience significant delays in entering and exiting the interchange.	▪ Advocate for funding to improve and upgrade the bus interchange.	PTV / TfV / Whitehorse City Council

GENERAL INFRASTRUCTURE			
Lack of adequate bus stop facilities (including shelters)	Many stops which are highly patronised lack adequate passenger infrastructure and facilities such as shelters, seating, up-to-date timetable information and safe pedestrian access.	▪ Audit the existing pedestrian accessibility to all bus stops and improve DDA accessibility and footpaths to all bus stops. ▪ Install a bus shelter at all 31 priority locations (as identified by this Review).	Manningham City Council / Adshel / PTV
Genera lack of Myki ticket facilities	There are no Myki facilities (machines or retail outlets) in the suburbs of Templestowe Lower, Warrandyte, Warrandyte South or Wonga Park, leaving potential passengers unable to access the only valid means of travelling on public transport.	▪ Provide myki facilities in these suburbs, particularly in the Warrandyte Township (Yarra Street), given this area services four bus routes, including as the terminus of the 906 DART.	PTV
ROAD NETWORK IMPACTS			
Eastern Freeway bus services	More than 378 buses use the Eastern Freeway in each direction per day, competing for road space with general traffic. Buses often need to negotiate through stopped traffic in the peak periods (primarily at each of the freeway off-ramps) to proceed along the emergency lane – compromising passenger safety, bus speed and reliability.	▪ Consider greater prioritisation of buses along the Eastern Freeway and at freeway on/off ramps. ▪ Implement BRT along the corridor with dedicated 'stations' at key interchanges (Chandler Hwy, Burke Road and Bulleen Road), with priority entry/exit onto the local road network.	Vicroads / PTV/ TfV / Transdev
Safety issues at Warrandyte Bridge	Traffic congestion created by numerous buses overlaying at the Warrandyte Bridge roundabout / terminus is compromising the safety of bus passengers, motorists and emergency services – particularly in the PM peak.	▪ Investigate opportunities to relocate the existing bus terminus or appropriate kerb-side parking for a bus zone at Warrandyte Bridge (on the Warrandyte side of the Yarra River).	PTV / TfV / VicRoads
Safety at the Croydon Road & R'wood-W'dyte Road intersection	Safety issues for route 364 buses travelling north as they need to negotiate the right-turn from Croydon Road into Ringwood-Warrandyte Road.	▪ Provide a set of traffic signals at this intersection to regulate safer traffic flow.	VicRoads

5. BUS RAPID TRANSIT (BRT)

In recent years, there has been a significant growth in demand for bus and public transport services between Manningham and the CBD, with demand expected to continue to rise. DART buses that travel along the busy Doncaster Road, Eastern Freeway, Hoddle Street, Victoria Parade and Lonsdale Street corridors have experienced overcrowding and saturation, with their reliability compromised by growing traffic congestion on the local road and freeway network.

Therefore, it is recommended that this corridor is upgraded to provide a Bus Rapid Transit (BRT) network between Manningham and the CBD – in order to prioritise buses along this corridor and increase capacity of buses to cater for the expected growth in patronage.

What is BRT?

Figure 9 – Key Features of BRT

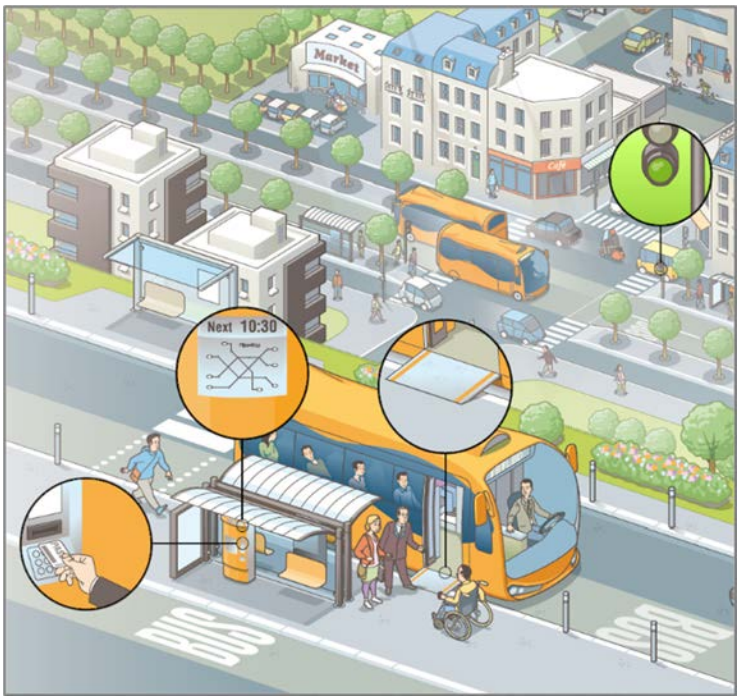


Image Source: Transdev, 2017

BRT is a bus-based public transport system that combines the recognised features of rail with the flexibility and cost advantages of road transport. The key differentiator of BRT is that buses travel within their own dedicated right-of-way, along either a busway or via bus lanes on existing roads, with exclusive priority operating 24 hours a day, seven days a week. BRT networks are often symbolised by bus 'stations' rather than regular bus stops. It is considered that busways can reduce travel time by 0.9-1.25 minutes per kilometre when compared with conventional buses [Transit Capacity and Quality of Service Manual, 2003].

How can BRT be applied in Victoria (Manningham)?

The conversion of the existing 907 DART route (27 kilometres in length) to a BRT standard could provide a dedicated 24/7 busway between the CBD and Manningham with a recognised 'brand' to distinguish it from a regular bus (much in the same way as the SmartBus brand). The potential route and suggested stations are illustrated in Figure 10 (overleaf). Some of the suggested key features of a BRT line could be:

- Utilising the 11 kilometre Eastern Freeway median-strip as a dedicated busway;
- 'Stations' at each overpass (Chandler Highway, Burke Road and Bulleen Road);
- A major new interchange at Victoria Park Station, giving passengers a choice to travel directly to the central city or to transfer to Carlton/Melbourne University and Parkville;
- Priority for buses along Doncaster Road and Hoddle Streets (including continuous bus-only lanes from the end of the Eastern Freeway into the CBD).
- A transition of Lonsdale Street in the CBD to a prioritised BRT corridor.
- Dedicated access on and off the Eastern Freeway (via grade-separated infrastructure) from both Hoddle Street and Doncaster Road;
- Rationalising the spacing of bus stops/stations (to at least 500-800 metres apart) with improved passenger facilities at each station such as bus shelters, seating, lighting, real-time information, footpath access and accessibility and off-board ticketing facilities; and
- Expanded Park & Ride facilities, to include additional parking spaces and commercial / retail development and support future Transit Oriented Development.

Along the Doncaster and Mitcham Road corridors, a BRT line should provide a 'station' (similar to 'super-stops' such as what is provided on the inner-city tram network) at almost every 800 metres and/or at all activity centres and major intersecting roads. The location of these 'stations' should consider rationalising the number of existing stops, as currently, there are 47 stops between the CBD and Mitcham. The time it takes for a bus to stop in order to load and unload passengers (dwell time) can constitute up to a third of bus travel time [Better Boarding, Better Buses: Streamlining Boarding and Fares, NACTO 2017]. Therefore, in order to improve travel time and vehicle speeds along the route, BRT should consider eliminating the number of stops by at least half (to around 20-25 stops) to maintain a minimum 800 metre spacing between stops/stations.

Figure 10 – What a potential BRT network from the CBD to Mitcham could look like

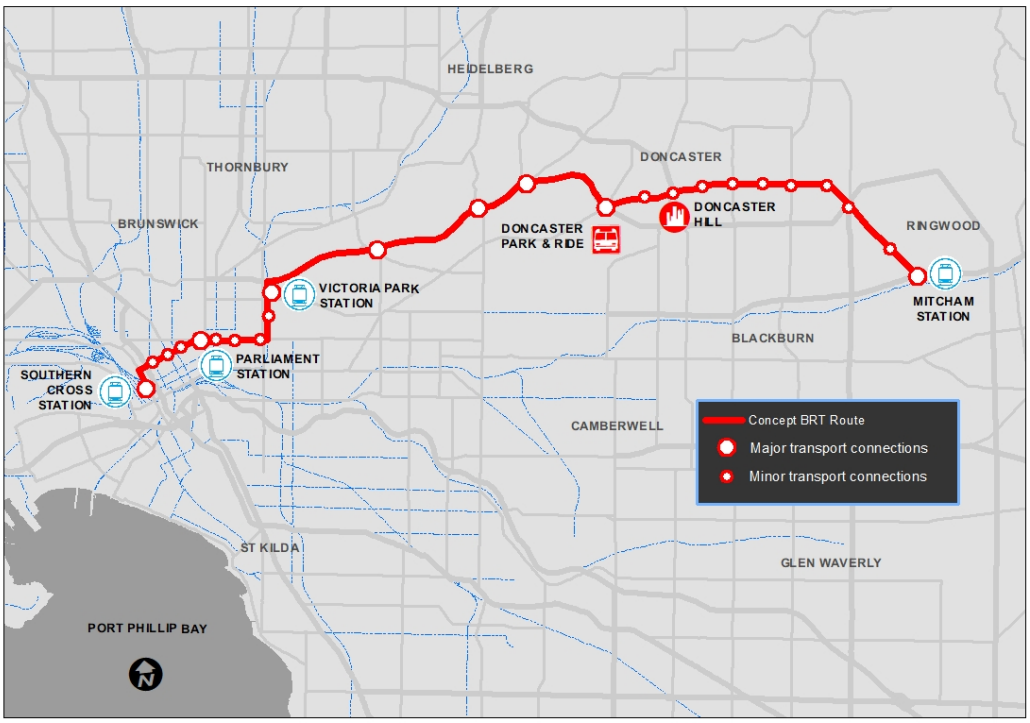


Image Source: Manningham City Council, 2017

In Victoria, dwell times are further exacerbated by passengers as they 'touch on and off' their Myki on-board the bus. A key aspect of BRT would be to provide off-board ticketing facilities to allow passengers to 'touch on or off' on the station platform.

The design of BRT along this corridor should also be sympathetic to the urban aesthetic and protect the 'boulevard' feature of this corridor by preserving the trees along the centre median divide of Doncaster and Mitcham Roads.

A BRT line has the capacity to provide bus services (headways) every two to three minutes and could reduce the travel time between Doncaster Hill and Southern Cross Station from 47 to 30 minutes during the peak. The bus fleet would need to cater for a capacity of at least 150 passengers and be designed for easy and quick egress and alighting.

Currently, the existing 907 DART crosses through 45 sets of signalised intersections along the entire length of the route (including 23 sets of lights between Mitcham Station and the Eastern Freeway at Doncaster Road and 22 sets of lights between the Hoddle Street/Eastern Freeway exit and King Street in the CBD). Therefore, the entire corridor should be upgraded to a BRT standard, including the Mitcham Road section between Mitcham railway station and Tunstall Square Village in Doncaster East, in order to provide for a complete and effective BRT corridor with priority to BRT at every intersection.

BRT has the added benefit of maximising the use of existing infrastructure (by reallocating road space to public transport) to improve the efficiency of an already existing bus service. A BRT corridor along the Eastern Freeway can also serve to retain the median-strip of the freeway for future transition to a heavy rail line, if and when required.

BRT infrastructure may also have the ability to accommodate other non-BRT bus services (i.e. such as DART buses not on the 907 route) – serving a benefit and priority for the wider bus network in the region.

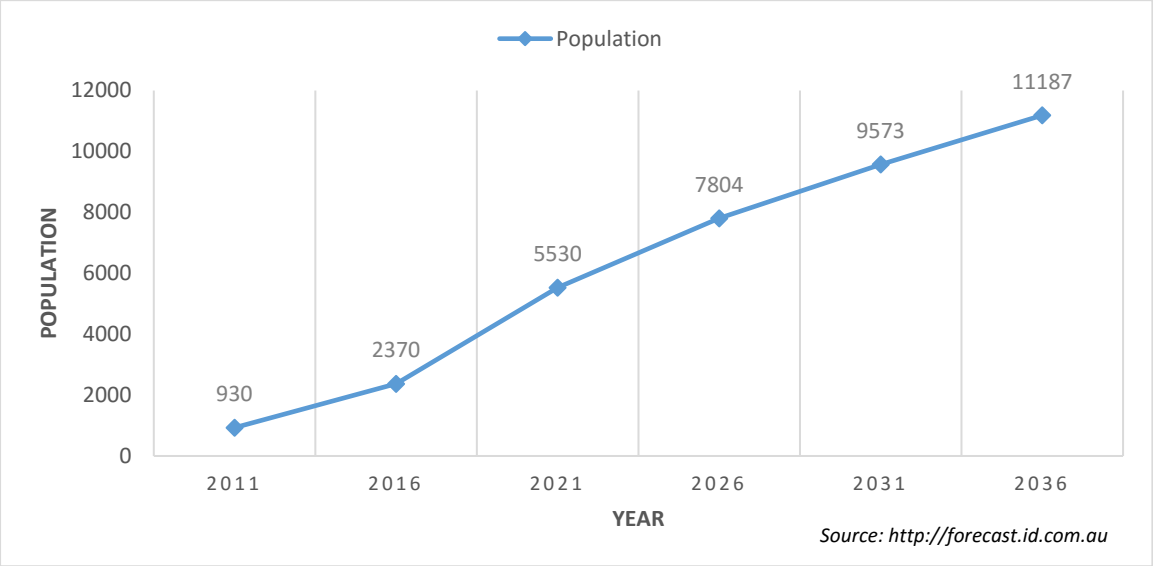
Doncaster Hill

A BRT service can support the growing Doncaster Hill Major Activity Centre as projections indicate that the population of Doncaster Hill will continue to grow significantly over the next 20 years, as presented in Table 7 below.

Over the next 20 years, the population of Doncaster Hill is expected to more than quadruple (+372%) from 2,370 residents in 2016, to 11,187 by 2036 – to grow at an annual rate of 10.46%. This growth is supported by an expected 350% increase in the number of dwellings during this time (from 1,232 to 5,505 dwellings).

It should be noted that the number of dwellings and population between 2011 and 2016 has already almost tripled [Manningham City Council, 2016] and the population between 2016 and 2021 is expected to grow at almost 20% every year.

Table 7 – Doncaster Hill Population Projections



There is already an existing high demand from Doncaster Hill residents to travel to work by public transport, with 14.3% of residents within the locality travelling by bus (double the wider Manningham average of 7.5%). With walking, cycling and public transport combined – currently 19% of all travel journeys in Doncaster Hill are undertaken by sustainable transport modes.

With the projected population growth and boom in apartment living outlined above, it is expected that demand for bus services will continue to rise. It is therefore Council's objective to seek a 30% mode-shift to public transport or other sustainable modes (i.e. cycling, walking) by 2030, as supported by the *'Doncaster Hill Mode Shift Plan 2014'*.

Implementation

The recommendation for a BRT line to Manningham (Doncaster) is supported by Infrastructure Victoria's *'30-Year Infrastructure Strategy'* (recommendation 10.6.4, page 126) as it can carry more people far more quickly between Doncaster and the City at a moderate cost to deliver – thereby adequately meeting the travel needs of the Doncaster corridor in the short to medium term.

It is considered that if project planning and funding (of approximately $500 million) can be provided in the immediate future, a BRT line between the CBD and Doncaster/Mitcham could be operational by 2021 (in four years), as recommended by Infrastructure Victoria. Further details of the BRT ('Doncaster Bus Improvement') proposal is provided in Infrastructure Victoria's *'Options Book: A supporting Document for Victoria's 30-Year Infrastructure Strategy, December 2016' [page 240].*

6. MEANDERING BUS ROUTES

When determining the route of a local bus service, it is often a fine balance between providing a direct service between an origin and destination and providing a service that is within walking distance of where commuters live or wish to travel to.

As such, a route may provide a bus service within a short walking distance of most households (for example, within 400 metres of 90% of Manningham households), however, may result in a convoluted and circuitous bus route being offered at the expense of a more direct route, particularly through typical residential subdivision road networks – common across the City of Manningham. This can contribute to slower and indirect services and at times, an uncomfortable experience for commuters.

A route directness ratio measures the directness of a bus route by calculating the ratio of the actual route distance compared to the direct distance (as 'crow flies') between the start and end points. A lower ratio closer to 1.0 indicates the most direct route.

Some of the more indirect sections of local bus routes that service Manningham, include:

- Route 295 as it navigates its way through Templestowe
- Route 271 through parts of Ringwood North
- Route 273 through Nunawading
- Route 279 as it deviates through Templestowe and Doncaster

The route directness ratio of each of Manningham's bus routes is listed in the table at Appendix B. Although the Manningham Mover (Route 280/2) has a high ratio of 2.5, the service has been deliberately designed to loop around Manningham to link between key activity centres.

As part of any future reviews of the local bus network, consideration should be given to determining the appropriateness and currency of the route deviations on the aforementioned bus routes, in order to determine if they can become more direct and avoid unnecessary deviations. Any suggested changes should involve thorough consultation with commuters and residents along the particular route to ascertain their level of support and impact to their travel needs of any changes.

Some alterations to these routes were suggested by PTV in their 2015 *'New Bus Network for the Eastern Suburbs'* proposal and should be further explored as part of any future government review.

7. PROVISION OF BUS SHELTERS

Due to ongoing demand for bus services, requests from local Manningham residents to provide bus shelters and improved bus stop facilities has increased substantially. Traditionally, bus shelters were mostly provided at city-bound (inbound) bus stops. However due to commuters' changing travel needs demand for bus shelters on outbound stops has considerably increased in recent years.

There are approximately 640 bus stops in Manningham. Of the busiest 20% (128 stops), just over three quarters (99 of 128) have a bus shelter provided. The remaining 29 do not have a bus shelter, and therefore, along with other considered locations, form the priority on this list. It is a preference to prioritise locations that are serviced by one or more SmartBus routes along major arterial roads where medium to higher density development is continuing to occur.

The majority of priority locations are along the corridors of Blackburn Road (5), Thompsons Road (5), Manningham Road (4), and Doncaster Road (4) and concentrated around Doncaster Hill (4). The remaining nine (9) are at other various locations throughout the municipality (i.e near schools).

In order to assist Council to determine priorities for the location of future shelters, Table 8 provides a list of the top 31 locations to consider (shelters also include associated provision of seating). An accompanying map showing the location of these bus stops is provided in Appendix E.

This list has been compiled by assessing the level of passenger patronage (based on Myki 'touch-on' data), proximity of the bus stop to local community amenities (such as schools, retirement villages and local activity centres), and any historical requests from local residents.

The order of delivery of the bus shelters would also need to take into account any necessary planning or other approvals required to install bus shelter infrastructure.

Given that many bus commuters are often required to wait for more than 10 minutes for their service to arrive, it is considered necessary to provide them with suitable and comfortable passenger facilities, such as seating and protection/shelter from the weather.

The orientation and location of future bus shelters need to have regard for prevailing weather impacts to waiting passengers. The bus shelter orientation should consider facing bus shelters in a manner that protects waiting passengers from west-prevailing weather.

It is generally the responsibility of Manningham Council (through their current contract with Adshel), to install and maintain bus shelters throughout the municipality. As a general indication, the cost to supply and install a 'Manningham-Standard' bus shelter is in the order of $25,000, plus $10,000 in on-going maintenance costs over 10 years ($35,000 in total per shelter).

Table 8 – Bus Shelter Priority List

Map Ref	Address	Suburb	Stop ID	Direction
A	North-East Corner Williamsons/ Doncaster Roads (Westfield)	Doncaster (Hill)	3989	Southbound
B	168-178 Yarra Street (Library)	Warrandyte	4407	Westbound
C	794 Elgar Road	Doncaster	4935	Southbound
D	25 High Street	Doncaster	5551	Northbound
E	742 Doncaster Road	Doncaster	4355	Westbound
F	52 Thompsons Road	Bulleen	988	Southbound
G	129 Thompsons Road	Bulleen	1035	Northbound
H	659 Doncaster Road	Doncaster (Hill)	3988	Eastbound
I	80 Thompsons Road	Bulleen	989	Southbound
J	88 Tram Road	Doncaster (Hill)	46566	Southbound
K	89 Tram Road	Doncaster (Hill)	46567	Northbound
L	71-89 Williamsons Road (School)	Doncaster	3570	Northbound
M	226 Blackburn Road	Doncaster East	4381	Southbound
N	175 Blackburn Road	Doncaster East	4013	Northbound
O	243 Blackburn Road	Doncaster East	4015	Northbound
P	1-11 Thompsons Road	Bulleen	843	Northbound
Q	1055 Doncaster Road	Doncaster East	3977	Eastbound
R	771 Doncaster Road	Doncaster	3986	Eastbound
S	348 Thompsons Road	Templestowe Lower	5537	Southbound
T	417 Park Road	Donvale	4852	Northbound
U	193-195 Reynolds Road	Doncaster East	4021	Eastbound
V	42 High Street	Doncaster	5597	Southbound
W	115-119 Manningham Road	Bulleen	5607	Eastbound
X	10 Manningham Road	Bulleen	5547	Westbound
Y	11 Lynnwood Parade	Templestowe Lower	5171	Eastbound
Z	1039 Doncaster Road	Doncaster East	3978	Eastbound
AA	533 Blackburn Road	Doncaster East	5518	Northbound
BB	241 Heidelberg-Warrandyte Rd (School)	Warrandyte	4027	Eastbound
CC	147 Blackburn Road	Doncaster East	4012	Northbound
DD	298 Manningham Road	Templestowe Lower	3284	Westbound
EE	22 Manningham Road	Bulleen	5546	Westbound

8. RECOMMENDATIONS

Based on the overall assessment and review of the existing bus network and identification of gaps and opportunities, 20 key recommendations, (as shown in Tables 9 and 10) are proposed. They are equally divided between recommendations for a) service and b) infrastructure improvements. These recommendations have been derived from the various observations, issues and suggestions (outlined in table 6).

The recommendations generally seek to ensure greater prioritisation of buses on the road network, and an overall investment to boost capacity, frequency and reliability on popular and at-capacity bus services, such as DART. Pursuing a Bus Rapid Transit (BRT) solution between the CBD and Manningham also forms as a key recommendation of this Review.

Many of these recommendations will require ongoing advocacy to the relevant authority, in most cases, the State Government departments of Public Transport Victoria and the newly established Transport for Victoria, and should involve all necessary consultation with Manningham City Council, the community and any other affected stakeholders.

Table 9 – Service Improvement Recommendations

		Route Number	Recommendation
SERVICE RECOMMENDATIONS	**1**	905, 906, 907 & 908	Boost frequency of all DART SmartBus services in the peak and off-peak periods and provide a fleet of higher capacity buses.
	2	All Services	Provide a minimum 30 minute service frequency between 6.00am – 9.00pm Monday to Fridays and 9.00am – 9.00pm on weekends.
	3	901, 902 & 903	Boost frequency of all Orbital SmartBus services in the peak and off-peak periods and provide a fleet of higher capacity buses.
	4	New Service	Introduce a direct bus service between The Pines Shopping Centre and Heidelberg Station via Templestowe Village and Bulleen.
	5	New Service	Re-introduce a bus service from The Pines Shopping Centre to Box Hill (to replace the former 286 service).
	6	271 & 285	Provide a Sunday service to the minimum standards as per recommendation two.
	7	280 / 282	Extend Manningham Mover weekday services to at least 8.00pm and re-route the 282 service through Noelle Street in Bulleen.
	8	271, 273, 279 & 295	Simplify these bus routes to provide a more direct and frequent service, notably on route 273 to the new Mullum Mullum Stadium on Springvale Road, Donvale.
	9	364	Increase weekend frequency from hourly to half-hourly and extend the service to The Pines Shopping Centre.
	10	'On-demand' services	Encourage further investigation of 'on-demand bus services' for areas that currently lack adequate and regular bus services (particularly in the Warrandyte, Park Orchards, Donvale and Wonga Park areas).

Table 10 – Infrastructure Improvement Recommendations (for PTV and/or Transport for Victoria)

		Recommendation	Responsibility
INFRASTRUCTURE RECOMMENDATIONS	**11**	Implement a BRT network (service and infrastructure) between the CBD and Mitcham via Doncaster (DART 907).	TfV / VicRoads / PTV
	12	Provide dedicated bus lanes (~550 metres) in both directions along Doncaster Road in Doncaster Hill and bus priority through the Williamsons/Doncaster/Tram Road intersection.	VicRoads / PTV / TfV
	13	Provide an outbound bus lane on Hoddle Street (Collingwood), improve general bus priority on Hoddle Street, and convert all existing Hoddle Street and Victoria Parade bus lanes to operate at all times (24/7).	VicRoads / PTV / TfV
	14	Improve the Doncaster Park & Ride interchange to provide for exclusive bus priority and access to and from the facility onto Doncaster Road, High Street and the Eastern Freeway.	VicRoads / PTV / TfV
	15	Provide bus lanes along identified sections of Blackburn Road, Thompsons Road, Porter Street, Lynnwood Parade and Manningham Road.	VicRoads / PTV / TfV
	16	Collaborate with Westfield Doncaster to improve the layout, access, safety and passenger amenity at the bus interchange.	Westfield Doncaster / PTV / TfV
	17	Review the existing layout and bus priority at The Pines bus interchange and provide safer and improved passenger amenity	PTV / TfV / Stockland The Pines
	18	Deliver all 31 priority bus shelters.	Manningham City Council / Adshel
	19	Upgrade all existing bus queue-jump lanterns to provide a left-turn green arrow and extend traffic signal phase timing.	VicRoads / PTV / TfV
	20	Improve the current traffic and bus vehicle arrangement at the Warrandyte Bridge bus terminus on Yarra Street.	VicRoads / PTV / TfV

APPENDIX A – CITY OF MANNINGHAM BUS NETWORK MAP

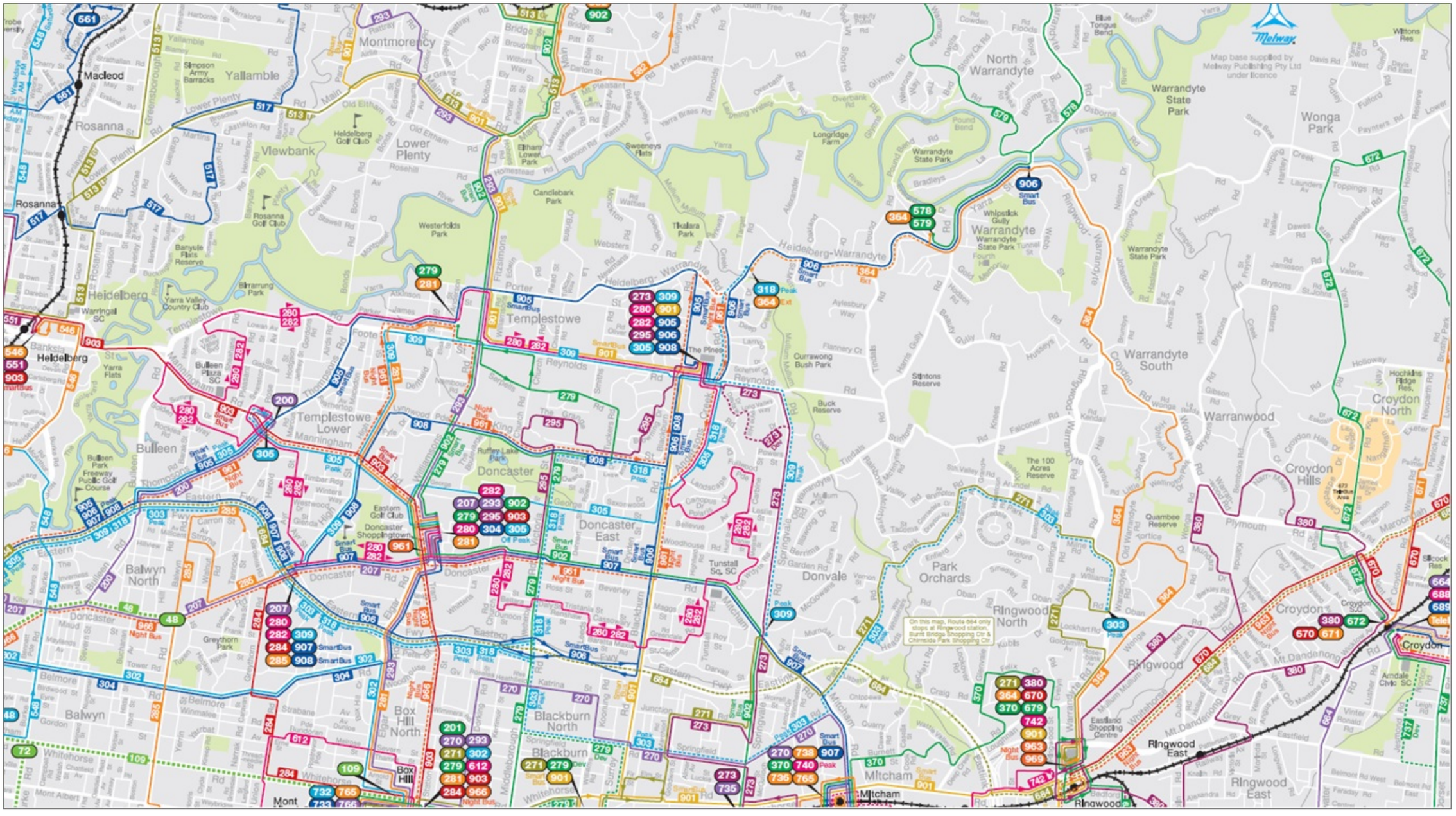


Image Source: PTV, 2016

APPENDIX B – MANNINGHAM BUS SERVICES PATRONAGE DATA

Route Number	Route Description	Annual Patronage 2015/2016	Average Weekday Patronage 2015/2016	Average Saturday Patronage 2015/2016	Average Sunday Patronage 2015/2016	Percentage of route through M'ham	Route Directness Ratio	Annual Patronage 2011/2012	Growth Rate 2011/12 to 2015/16
200	City (Queen St) - Bulleen	847,698	2,993	1,487	1,104	13%	1.2	518,387	64%
207	City - Doncaster SC via Kew Junction	999,607	3,418	1,915	1,374	13%	1.1	538,006	86%
271	Box Hill - Ringwood via Park Orchards	308,557	1,235	492	-	48%	2.3	380,415	-19%
273	The Pines - Nunawading	77,328	317	-	-	52%	1.7	82,661	-6%
279	Box Hill - Doncaster SC via Middleborough Rd	506,744	1,821	906	554	78%	2.6	502,829	1%
280	Manningham Loop via Tunstall Square SC, Doncaster SC	43,548	158	-	-	100%	2.5	56,272	-23%
281	Templestowe - Deakin University	366,304	1,462	410	-	41%	1.4	370,215	-1%
282	Manningham Loop via Templestowe Village SC, Doncaster SC	43,465	155	-	-	100%	2.5	59,532	-27%
284	Doncaster Park & Ride - Box Hill via Union Road	65,282	257	110	-	<5%	1.1	138,874	-53%
285	Doncaster Park & Ride - Camberwell via North Balwyn	93,307	384	124	-	<5%	1.4	111,255	-16%
293	Box Hill - Greensborough via Doncaster SC	283,069	1,100	373	174	39%	1.3	311,873	-9%
295	Doncaster SC - The Pines SC via Templestowe	63,636	231	103	-	79%	1.2	213,353	-70%
303	City - Ringwood North via Park Rd	60,351	256	-	-	21%	1.4	46,725	29%
304	City - Doncaster SC via Belmore Rd and Eastern Fwy	437,403	1,551	743	409	8%	1.2	n/a	n/a
305	City - The Pines SC via Eastern Fwy	446,102	1,721	417	295	48%	1.2	521,518	-14%
309	City - Donvale via Reynolds Rd	168,719	700	-	-	46%	1.5	113,331	49%
318	City - Deep Creek	76,172	321	-	-	29%	1.3	66,960	14%
364	Warrandyte - Ringwood Station via Croydon, Warrandyte Rd, Eastland SC	242,334	960	262	184	42%	1.9	231,192	5%
578	Eltham - Warrandyte via Research, Kangaroo Ground, Warrandyte Road	93,477	409	-	-	14%	2.5	129,027	-28%
579	Eltham - Warrandyte via Research, Research Warrandyte Road	73,096	293	-	-	16%	2.1	99,534	-27%
672	Croydon - Chirnside Park via Wonga Park, Croydon Hills	76,315	322	-	-	47%	2.7	43,479	76%
901	Frankston - Melbourne Airport (SMARTBUS Service)	3,862,873	13,231	7,007	4,812	9%	1.9	4,315,891	-10%
902	Chelsea - Airport West (SMARTBUS Service)	3,858,392	13,123	7,203	5,332	15%	1.7	4,196,707	-8%
903	Altona - Mordialloc (SMARTBUS Service)	5,252,192	17,616	10,514	7,387	8%	3.1	6,739,436	-22%
905	City - The Pines SC via Eastern Fwy, Templestowe (SMARTBUS Service)	942,699	3,416	1,297	869	46%	1.2	827,213	14%
906	City - Warrandyte via The Pines SC (SMARTBUS service)	1,222,189	4,410	1,802	1,189	41%	1.4	924,443	32%
907	City - Mitcham via Doncaster Rd (SMARTBUS service)	1,661,914	5,717	3,007	2,060	31%	1.2	1,135,963	46%
908	City - The Pines SC via Eastern Fwy (SMARTBUS Service)	611,932	2,382	534	369	34%	1.2	633,324	-3%
961	Night Bus - City - Collingwood - Eastern Fwy - Templestowe - Doncaster	9,806	14	-	-			13,110	-25%
966	Night Bus - City - Kew - Doncaster Rd - Box Hill	2,940	5	-	-			27,781	-89%

Data Source: PTV Touch On Rate Survey [Public Transport Victoria, 2016]

DISCLAIMER

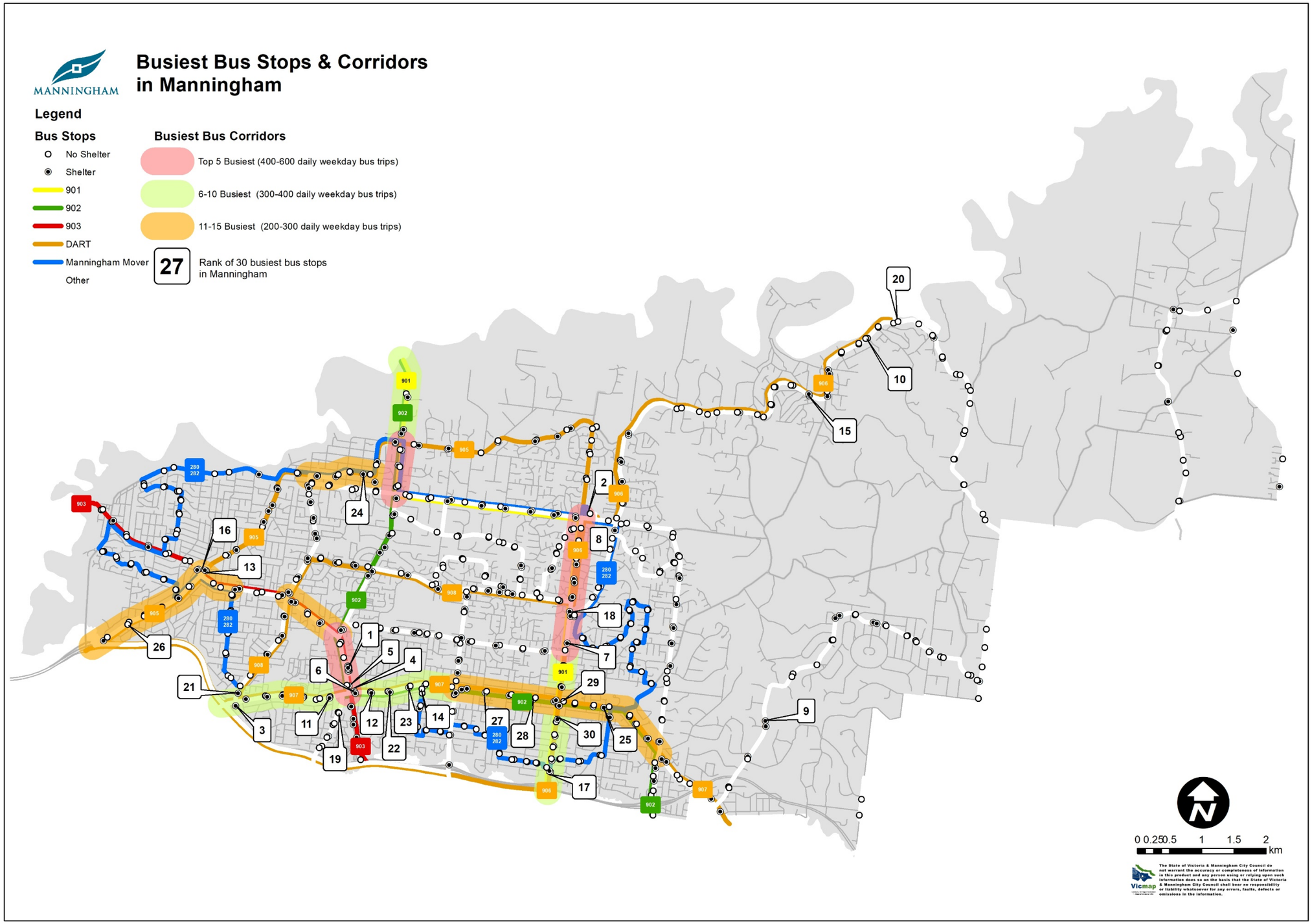
- *Bus Patronage is determined by applying a factor to ticket transactions in order to account for passengers who do not transact with the system when using the bus. This factor is inferred through observational counts and statistical analysis.*
- *An improved methodology of calculating the touch on rate has been introduced to bus patronage from 2015-16. This method more accurately represents differences touch on rate behaviour including between route operators, Day types such as Weekends and School and Public Holidays, and time periods such as the AM or PM Peak. Due to this methodology change, comparing individual Bus Patronage with previous years may result in confusion or incorrect conclusions.*
- *Weekday averages represent "Normal Weekdays" and as such, School Holiday periods and Public Holidays are excluded. University Holiday periods are not excluded. Additionally, Weekly estimates only include "Normal Weekdays".*
- *Average Daily and Weekly estimates are based on the total transactions in a given period divided by the number of days in that period.*

APPENDIX C – TOP 25 MOST PATRONISED METROPOLITAN BUS ROUTES (2015/2016)

Rank	Route Number	Route Description	Annual Patronage	Avg W'day Patronage	Avg Sat Patronage	Avg Sun Patronage
1	903	Altona - Mordialloc (SMARTBUS Service)	5,252,192	17,616	10,514	7,387
2	901	Frankston - Melbourne Airport (SMARTBUS Service)	3,862,873	13,231	7,007	4,812
3	902	Chelsea - Airport West (SMARTBUS Service)	3,858,392	13,123	7,203	5,332
4	703	Middle Brighton - Blackburn via Bentleigh, Monash University (SMARTBUS Service)	2,162,328	7,825	3,817	2,075
5	900	Rowville - Caulfield via Monash University, Chadstone (SMARTBUS Service)	1,904,615	6,146	4,422	3,239
6	907	City - Mitcham via Doncaster Rd (DART SMARTBUS service)	1,661,914	5,717	3,007	2,060
7	220	Sunshine - City - Gardenvale	1,465,801	4,659	3,724	2,100
8	828	Hampton - Berwick Station via Southland SC, Dandenong	1,420,457	4,996	2,306	1,505
9	246	Elsternwick - Clifton Hill via St Kilda	1,394,130	4,767	2,707	1,702
10	513	Eltham - Glenroy via Greensborough or Lower Plenty	1,371,607	4,952	1,930	1,579
11	906	City - Warrandyte via The Pines SC (DART SMARTBUS service)	1,222,189	4,410	1,802	1,189
12	401	North Melbourne Station - University of Melbourne via Royal Melbourne Hospital	1,185,821	5,062	-	-
13	733	Oakleigh - Box Hill via Clayton, Monash University, Mt Waverley	1,160,509	4,010	2,665	1,400
14	737	Croydon - Monash University via Boronia, Knox City Shopping Centre, Glen Waverley	1,148,719	4,059	2,033	1,513
15	732	Box Hill - Upper Ferntree Gully via Vermont South, Knox City, Mountain Gate	1,090,879	3,769	2,183	1,318
16	767	Southland - Box Hill via Chadstone, Jordanville, Deakin University	1,058,203	3,568	2,196	1,616
17	207	City - Doncaster SC via Kew Junction	999,607	3,418	1,915	1,374
18	408	St Albans Station - Highpoint SC via Sunshine Station	960,211	3,128	2,486	981
19	905	City - The Pines SC via Eastern Fwy, Templestowe (DART SMARTBUS Service)	942,699	3,416	1,297	869
20	402	Footscray - East Melbourne via North Melbourne	942,091	3,321	1,622	827
21	406	Keilor East - Footscray via Avondale Heights and Maribyrnong	935,114	3,254	1,997	862
22	508	Alphington - Moonee Ponds via Northcote & Brunswick	916,459	3,101	1,853	1,305
23	200	City (Queen St) - Bulleen	847,698	2,993	1,487	1,104
24	216	Caroline Springs - Brighton Beach	846,378	2,830	1,716	1,058
25	601	Huntingdale - Monash University (Clayton)	830,599	3,784	-	-

**Green ranking denotes metropolitan bus routes that service Manningham*
Data Source: Public Transport Victoria, 2016

APPENDIX D – MAP OF TOP 20 BUSIEST BUS STOPS AND CORRIDORS IN MANNINGHAM



APPENDIX E – MAP OF PRIORITY BUS SHELTER AND NEW BUS LANE INFRASTRUCTURE