

6 Description of the Existing Traffic Situation

6.1 Introduction

At the Basin, the east-west and west-east portions of State Highway 1 follow separate street systems from the southern end of the Terrace Tunnel, before merging at the Mount Victoria Tunnel. The Basin Reserve is situated some 300m west of the Mount Victoria Tunnel, and currently divides these east-west and west-east flows. The Basin also divides north-south and south-north flows between the Wellington CBD and Wellington's southern suburbs.

The street system around the Basin Reserve functions as a large square roundabout. Traffic circulates clockwise with major entry and exit points mid-side on the three northeast, eastern and southern sides and a major exit-only on the northwest corner. On a daily basis 26,000 vehicles enter the "roundabout" from Kent Terrace on the north, with 18,000 vehicles exiting towards the Mount Victoria tunnel on the eastern side. These "roundabout" flows are replenished by another 18,000 vehicles entering the "roundabout" from the Mount Victoria tunnel. Therefore an undiminished flow of 26,000 vehicles moves around the Basin's southeast and southern flanks. Of these, 8,000 vehicles exit via the southern exit into Adelaide Road, while 14,000 join the flow from that same road. The largest flow of 32,000 vehicles therefore occurs around the southwest and western sides of the Basin Reserve (Sussex Street). Of these, 22,000 exit into Buckle Street on the northwest corner, while the remaining 10,000 travel to the northern exit at Cambridge Terrace.

Planned alterations will include a new roadway mainly on the Basin's northern and north-eastern sides, and will separate the east-west / west-east flows across the area from the north-south / south-north flows. A major effect will be moving the western flow of 18,000 vehicles from the southern side of the Basin Reserve to the northern side.

During peak periods, and increasingly also during weekends, the Basin Reserve system currently operates at or above capacity. Conflicts arise due to the integration of SH1 east / west and local north / south movements. Consequently, both SH1 and local traffic face significant delays and congestion due to the limited road capacity and high demand. *Figure 6.1* and *Figure 6.2* show the number of lanes around the Basin Reserve.

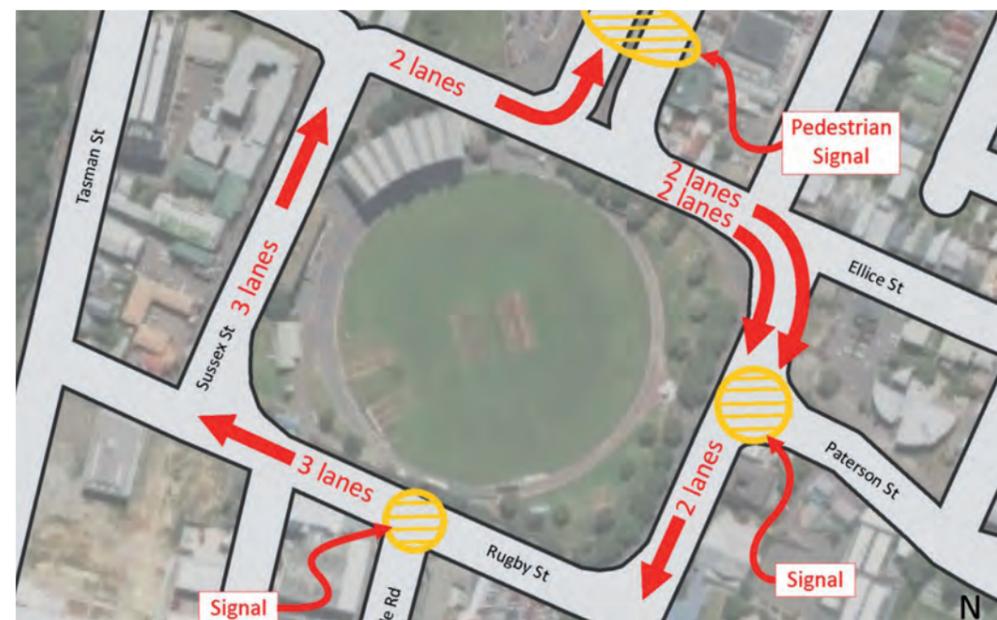


Figure 6.1: Existing Number of Lanes and Signal Locations



Corner of Kent Tce and Ellis St, looking towards Dufferin Street (4 lanes)



Dufferin Street looking south towards St Marks School, and showing school bus drop-off area (2 lanes)



Sussex Street - looking south towards Rugby Street (3 lanes)



Rugby Street looking east towards intersection with Adelaide Road (3 lanes)

Figure 6.2: Existing Lane Arrangement around the Basin Reserve

6.2 Walking and Cycling Facilities

There are pedestrian footpaths on both sides of all roads around the Basin Reserve, and on the northern side of the Mount Victoria tunnel. Signalised pedestrian crossings are located at the sites shown in *Figure 6.3*. *Figure 6.4* shows the pedestrian crossing at Rugby Street and Adelaide Road.



Figure 6.3: Pedestrian Crossing at Rugby Street and Adelaide Road



Figure 6.4: Signalised Pedestrian Crossing Locations

There are no pedestrian crossing facilities located on the western side of the Basin Reserve between Adelaide Road and Cambridge Terrace.

There are very few facilities for cyclists around the Basin Reserve. There is a small section of marked cycle lane on the south-east corner of Rugby Street and Adelaide Road. Cyclists are able to cycle through the cricket grounds as an alternative to cycling around the Basin Reserve and may appear to use this route. Through the Mount Victoria tunnel, cyclists are encouraged to use the footpath which is shared with pedestrians. However, once cyclists exit the tunnel there are very few facilities for them on Paterson Street. As shown in Figure 6.5, cyclists are not permitted on the footpath between Brougham Street and Dufferin Street. Instead, cyclists must use Brougham Street then Ellice Street (or travel through the church car park) to access any locations west of the Mount Victoria tunnel. For a more detailed description of the pedestrian and cyclist facilities refer to the Transportation Technical Note.



Figure 6.5: No Cyclists Permitted on the Patterson Street Footpath west of Brougham Street

There are a number of factors that can influence pedestrian and cyclist demand around the Basin Reserve. People are more likely to walk or cycle during the summer months when the weather is typically warmer and the days longer.

Details of the volume of pedestrians and cyclists completing each specific movement at the various intersections are contained in the Transportation Technical Note.

Key pedestrian desire lines and the zone of high pedestrian activity are shown in Figure 6.7. Further detail regarding pedestrian desire lines are given in Figure 12.28.



Figure 6.6: Students Crossing the Road at the Basin Reserve



Figure 6.8: Mount Victoria Tunnel Footpath

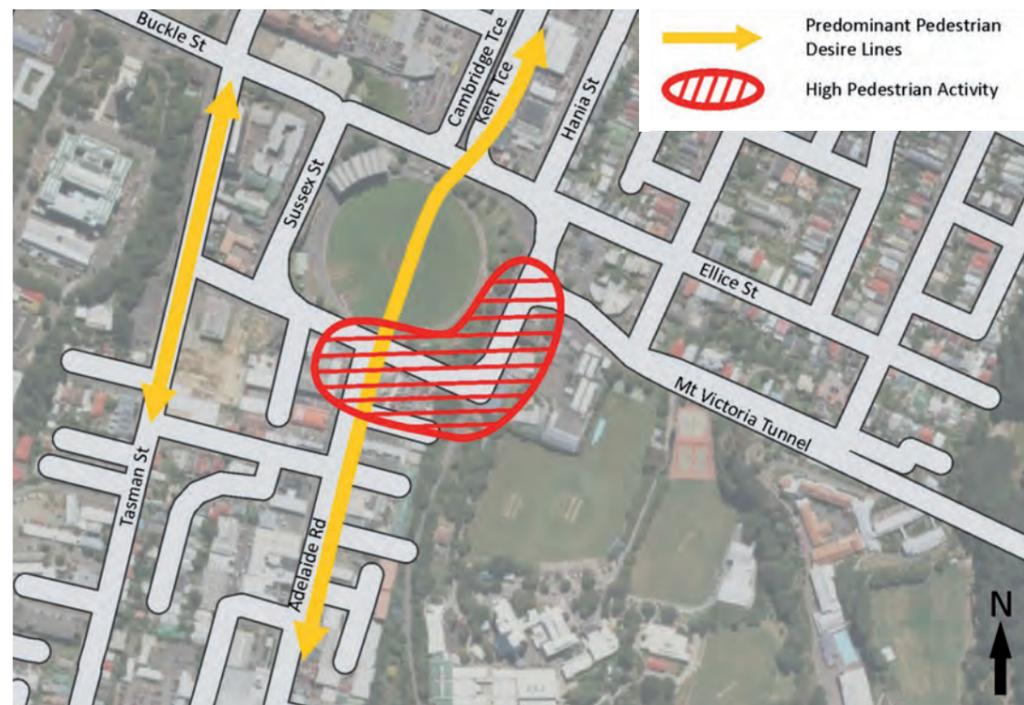


Figure 6.7: Key Pedestrian Desire Lines and High Pedestrian Activity Area

NZTA is proposing to refurbish the Mount Victoria Tunnel. This project is in the early planning stages and the scope of work currently unknown. The potential impact on pedestrians resulting from the tunnel refurbishment is uncertain (refer Figure 6.8). The project may result in more pedestrians using the tunnel, or it might result in no change to the pedestrian volumes, or pedestrians may be banned from the tunnel altogether.

6.2.1 Key Local Attractions

There are a number of current and proposed local features that attract both pedestrians and cyclists, as shown in Figure 6.9 below.



Figure 6.9: Key Local Attractions

The Basin Reserve is an attraction in itself, with national and international cricket games as well as concerts through the summer months, and club rugby on weekends. As there is very limited on-site parking, the majority of spectators arrive on foot.

There are three schools on the eastern side of the Basin Reserve, as shown in *Figure 6.9*, that attract pedestrian traffic.

Massey University's Wellington Campus is located just west of the Basin Reserve on Buckle St, and also attracts pedestrians and cyclists who would travel around the Basin Reserve to access it. There are student hostels on Sussex Street which also generate pedestrian and cyclists.

A number of bus routes pass around the Basin Reserve, with bus stops on Kent Terrace, Cambridge Terrace and Adelaide Road. These also generate pedestrians who walk between the bus stop and their destination in the area.

Foodstuffs have recently applied to Wellington City Council for resource consent to build and operate a supermarket on the block of land bounded by Rugby Street, Tasman Street, Douglas Street and Belfast Street (refer *Figure 6.10*).



Figure 6.10: Artist's Impression of the New Supermarket (source Foodstuffs)

The Ministry of Culture and Heritage is proposing a Memorial Park to be situated on land fronting the National War Memorial on Buckle Street, in between Tory and Taranaki Streets. It is intended to create a memorial precinct which joins the adjacent National War Memorial and Tomb of the Unknown Warrior. The development of the park is likely to attract pedestrians to the western side of the Basin Reserve, particularly during special events such as ANZAC Day.

Wellington City Council is currently exploring opportunities for the future growth and development of the northern end of Adelaide Road (between John Street and the Basin Reserve), which is to the immediate south of the Basin Reserve (refer *Figure 6.11*). The vision provides for significantly more residential development (to accommodate 1,550 more people by 2026), supported by good quality public amenities and streetscape, employment opportunities, and good public transport. The additional dwellings and workplaces will attract significant numbers of cyclists and pedestrians to the area in the future, given its proximity to the Wellington CBD.



Figure 6.11: Artist's Impression of the Future Development of Adelaide Road (source WCC)

6.2.2 Barriers to Walking and Cycling

There are a number of factors which act as a deterrent to walking and cycling around the Basin Reserve:

- **Traffic:** High traffic flows around the Basin Reserve are a major deterrent to both pedestrians and cyclists. Pedestrians feel unsafe crossing at informal crossing points and may have to wait (what they feel are) unreasonable times at formal crossing points (signalised and zebra crossings) before being able to cross. Traffic flows and lane configurations make less confident cyclists feel unsafe and threatened when cycling on the roads around the Basin.
- **Weather:** The area around the Basin Reserve is very exposed, with no shelter from rain or wind for pedestrians, especially when waiting to cross the road.
- **Pedestrian facilities:** There are signalised crossings across Kent and Cambridge Terraces, and at the intersections of Dufferin Street / Paterson Street and Rugby Street / Adelaide Road. However, there are no facilities on the western side of the Basin Reserve between Adelaide Road and Cambridge Terrace. This may act as a barrier for some pedestrians wishing to walk along this side of the Basin Reserve and link into facilities further west on the Inner City Bypass. However, many appear to prefer to use Tasman Street or to go through the Basin Reserve grounds.
- **Cyclist facilities:** There are very few facilities for cyclists around the Basin Reserve such as marked cycle lanes or Toucan crossings. This is a significant deterrent, especially for less confident cyclists who do not wish to cycle in heavy traffic. However, many cyclists ride through the Basin Reserve grounds rather than around the gyratory.
- **Personal safety:** Many pedestrians may not feel safe walking through either the Basin Reserve or the Mount Victoria tunnel at night time due to a lack of adequate lighting, visibility and the presence of other people. A number of new CCTV cameras have been installed recently in the vicinity of the Basin Reserve, but these focus on monitoring traffic movements and not pedestrian safety.

6.3 School Travel Patterns

Three schools are located immediately to the east of the Basin Reserve¹ (refer *Figure 6.9*):

- St Marks' School (Years 1 to 8) with 350 students and 50 staff;
- Wellington College (Years 9 to 13) with 1,530 students and 92 staff; and
- Wellington East Girls' College (Years 9 to 13) with 920 students and 115 staff².

These schools contribute significantly to the number of pedestrians, buses, and private vehicles moving into, from and within the Basin Reserve area, but the exact numbers are difficult to qualify as none of the schools hold data on vehicle movements. When analysing pedestrian counts for the Basin Reserve, there is a distinct peak in the number of pedestrians around the Basin between the hours of 3 and 4 pm, corresponding to the end of the school day. At the key intersections of Ellice Street and Dufferin Street, and Ellice Street and Paterson Street, 25 to 30 percent of the total daily pedestrians were observed between 3 and 4pm.

Cyclist counts for the area were analysed, but there was no pronounced peak between 3 and 4pm, suggesting that very few students cycle to school and most of the observed cyclists are commuters. This observation is consistent with the mode share estimates provided by the schools.

The design options need to take into account strong pedestrian, bus and vehicle desire lines and movement patterns to and from the schools. In addition to this these desire lines and key movements, it is critical that bus stop and standing provision (public and school bus) is considered and enhanced where possible. Although the provision of parking is not directly linked to the project objectives, there is a recognised need associated with the schools for parking and safe facilities for parking should be identified as part of the project, particularly short stay parking and drop off areas for St Marks School.

A more detailed analysis of the travel patterns and proportion of students and staff using each travel mode is provided in the Transportation Technical Note. None of the schools hold specific data on the travel patterns of their staff and students; instead this analysis is based on estimates of the proportion of staff and students utilising each travel mode provided by a staff member at each school.

Most staff at the three schools drive to work. There is sufficient on-site parking at each of the schools to accommodate the staff's vehicles. A small proportion of staff walk, cycle or catch a bus to work.

In terms of this project, the Project Team needs to be mindful of the need to provide for a large number of pedestrian movements and school buses.



Figure 6.12: Entrance to St. Mark's School

¹ Two other schools, Wellington High School and Mount Cook School, are located near the project area and potentially bring another 1000 pupils through the area.
² Enrolment figures provided by each school in August 2009.

Approximately 10 percent of Wellington College pupils drive to school. Year 13 students are permitted to park on school grounds, if there is sufficient space, while the remaining students use the on-street coupon parking in Mount Victoria.

Roughly 25 students use mopeds to commute to and from school. The remaining students either walk or cycle to school.



Figure 6.13: Entrance to Wellington College



Figure 6.14: Entrance to Wellington East Girls' College

6.3.1 School Buses

School buses utilise all approaches when travelling to and from the Basin Reserve, including Ellice Street, Paterson Street, Adelaide Road and Kent / Cambridge Terrace. Many school buses drop off and pick up students on Dufferin Street south of Paterson Street as shown in *Figure 6.15*. Before and after school this area becomes very congested, with many buses, students crossing the road, and parents dropping off and picking up their children.



School Buses dropping off students



Parents Picking up their Children

Figure 6.15: Photos of the School Bus Stop and Pick-up Area of Dufferin Street

6.4 Passenger Transport

The bus route from the Wellington CBD to southern Wellington via Kent / Cambridge Terrace and Adelaide Road is a major passenger transport spine. A key outcome of the Ngauranga to Airport Strategy Study, and hence a core objective of the Basin Reserve project, is to improve passenger transport operation along this spine. The planned growth node at Adelaide Road incorporating transit oriented development further emphasises the importance of creating a high quality passenger transport link between the southern suburbs and the CBD (refer Figure 6.17).

Currently seven different bus routes operate along Adelaide Road and travel directly through the Basin Reserve. In addition to the bus services on Adelaide Road, there are 3 routes which provide service on Wallace Street then Taranaki Street. The Transportation Technical Note contains further information on the provision of bus services in the study area.

At present bus lanes are provided on Adelaide Road for northbound buses in the AM peak and on Kent Terrace for southbound buses in the PM peak (refer Figure 6.16).



Existing northbound AM Peak Bus lanes along Adelaide Road - looking south



Existing southbound PM Peak Bus lanes along Kent Terrace - looking north.

Figure 6.16: Bus Lanes on Adelaide Road and Kent Terrace



Figure 6.17: Artist's Impression of Adelaide Road with Light Rail (source: Ngauranga to Airport Strategy Study)

6.4.1 Travel Time and Reliability

Table 6.1 summarises the average travel speed of buses near the Basin Reserve during the AM, IP, PM and Saturday periods in the northbound direction. It shows that the most northbound delay between bus stops is on Cambridge Terrace, closely followed by the Basin Reserve itself. Journey times along Adelaide Road are much better.

Table 6.1: Northbound Average Journey Speeds

Section	Average Speeds (km/h)				Bus Lane	No. of Signals
	AM	IP	PM	SAT		
Adelaide Road Southern End	29.2	26.5	21.0	35.0	AM Peak only	2
Adelaide Road Northern End	29.5	27.2	20.5	26.0	AM Peak only	0
Round the Basin	19.9	19.9	17.4	23.9	No	2
Cambridge Terrace	13.8	13.1	12.3	13.8	No	1

The Basin Reserve has poor journey times because there are no bus priority facilities around the Basin and the geometric alignment / tracking is not very bus friendly. Also the buses have to switch lanes at least once during the route around the Basin; there are also lots of conflict points and poor signal interaction.

Some of the issues identified above also apply to Cambridge Terrace, but they do not fully explain why average bus speeds along Cambridge Terrace are the lowest in the northbound direction. Another contributing factor is the poor signal phasing at the Cambridge Terrace - Vivian Street intersection.

All of the peak periods show the same trend of increasing speeds as the distance from the CBD increases. The Saturday peak generally has the best journey times. The journey times along Adelaide Road in the AM peak are significantly better than in the PM peak because of the peak hour bus lanes.

The number of signals between each bus stop appears to have had little effect on the journey times. Further information is available in the Transportation Technical Note.

Reliability

Overall the journey time reliability is relatively poor, as shown in Figure 6.18, for the northbound direction. Journey times are most reliable during the Saturday / weekend peak and worst during the PM peak.

Typically, passenger transport customers will accept a slightly longer journey time provided they know when they will reach their destination. Unreliable journey times are a major cause of passenger dissatisfaction. Reducing the variability in bus journey times represents a significant opportunity for the Basin Reserve Project.

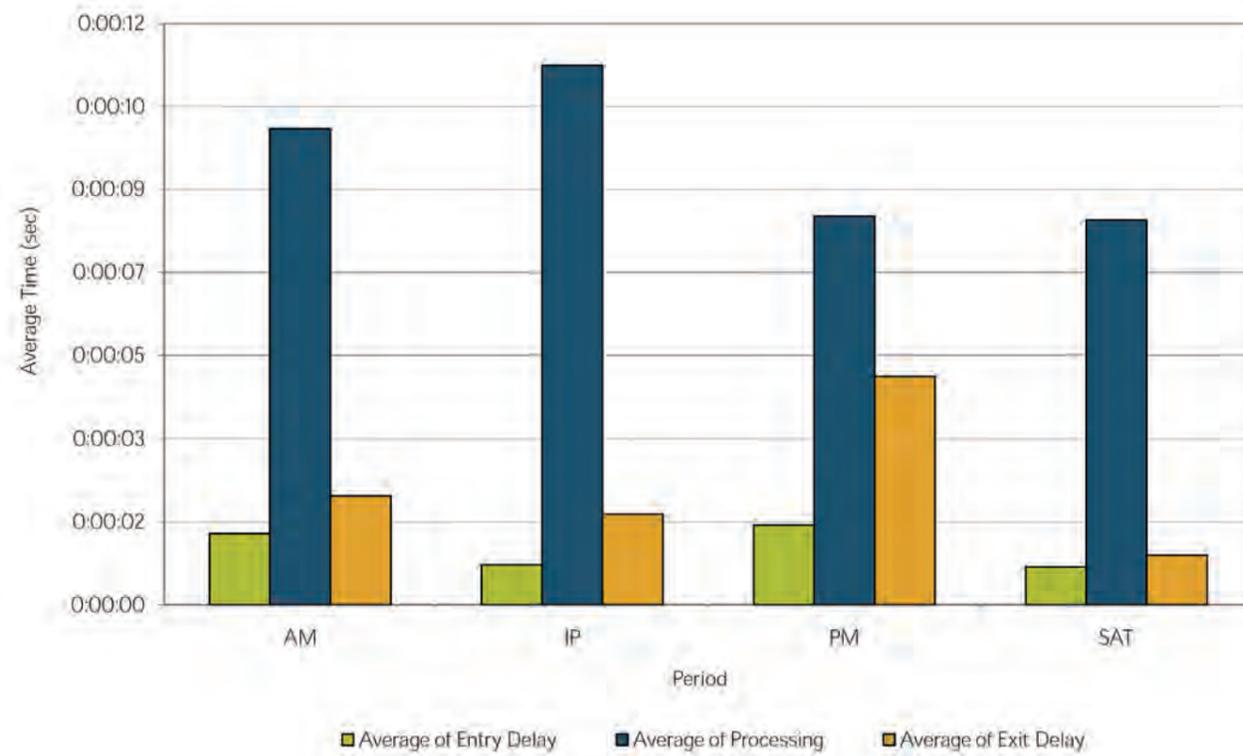


Figure 6.18: Northbound Journey Time Reliability

6.4.2 Bus Stop Locations

Figure 6.19 and Figure 6.20 show the locations of the bus stops in the vicinity of the Basin Reserve, the distance between each stop and a 200m radius zone for each stop.

The stops immediately south of the Basin on Adelaide Road are the busiest stops in the study area both for boarding and alighting. One reason for this is because these stops are the closest stops to the schools in the area and a significant number of students travel to school via public buses as opposed to school buses. This is reflected in the high number of alighting passengers in the AM peak in both directions. Another reason for the high usage of these stops is because this stop is the limit of the fare boundary for a city section. Passengers who travel south of this point in either direction pay an increased fare, consequently some passengers with destinations south of this point are likely to get off here and complete their journeys on foot and vice versa for northbound journeys.

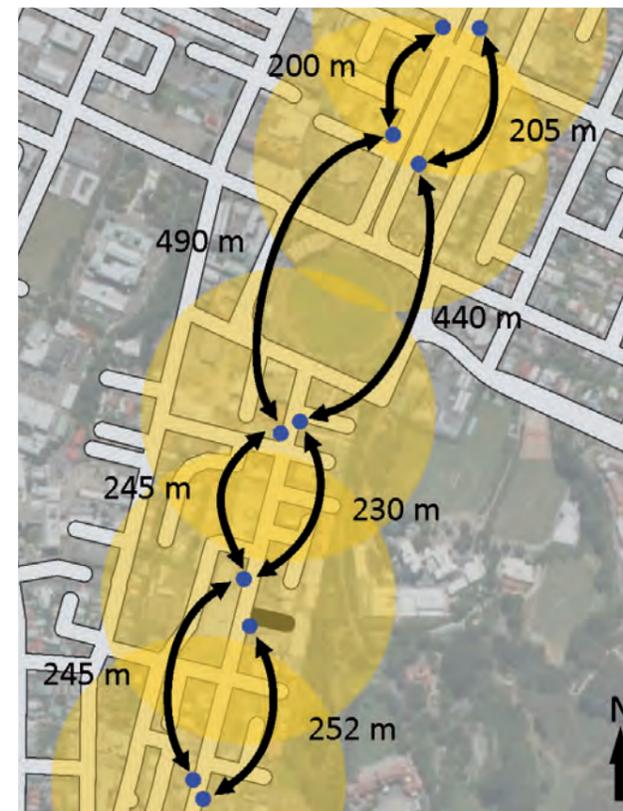


Figure 6.19 (left): Bus Stop Locations and 200m Radius Zones



Adelaide Road northbound south of the Basin Reserve



Adelaide Road southbound south of the Basin Reserve

Figure 6.20: Bus Stops in the vicinity of the Basin Reserve

6.4.3 Bus Occupancy

Buses are most crowded during the Friday PM peak in the southbound direction and in the AM and Saturday peaks in the northbound directions. Generally the key strategic bus routes (1 and 3) were more crowded than the non-strategic bus routes (22, 23, 43 and 44)³.

³ Strategic routes 1 and 3 serve Island Bay and Lyall Bay respectively. The non-strategic routes serve Southgate, Houghton Bay, Strathmore.

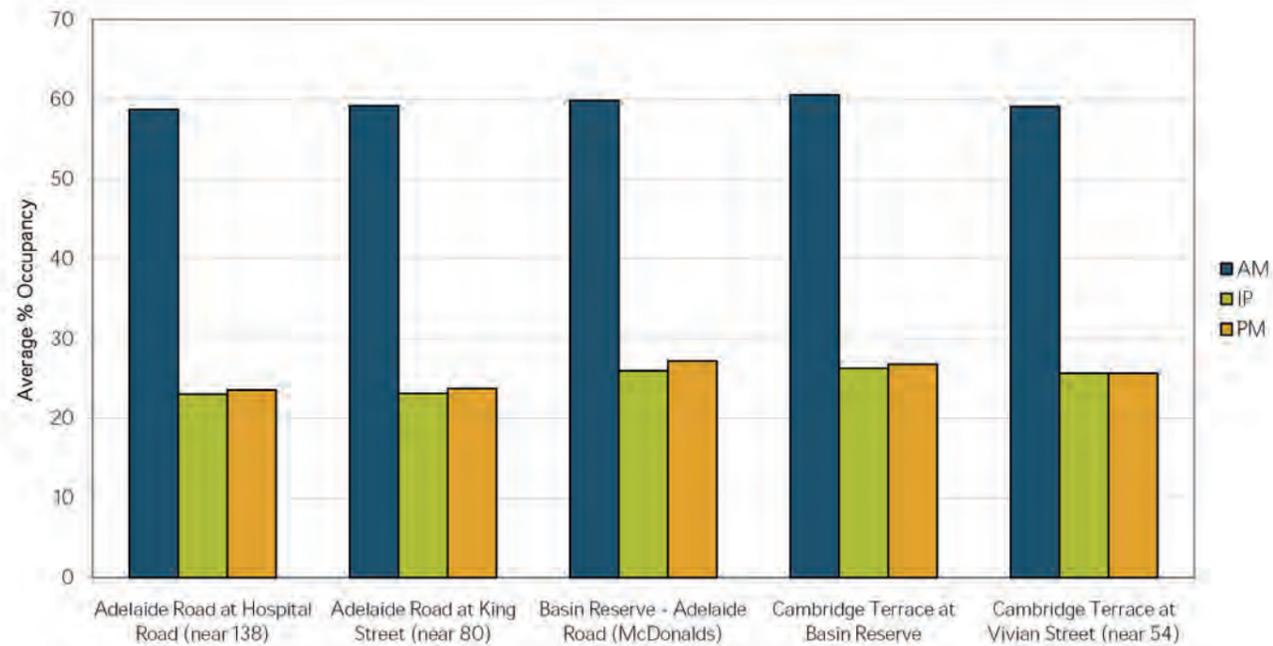


Figure 6.21: Northbound Bus Occupancy (average)

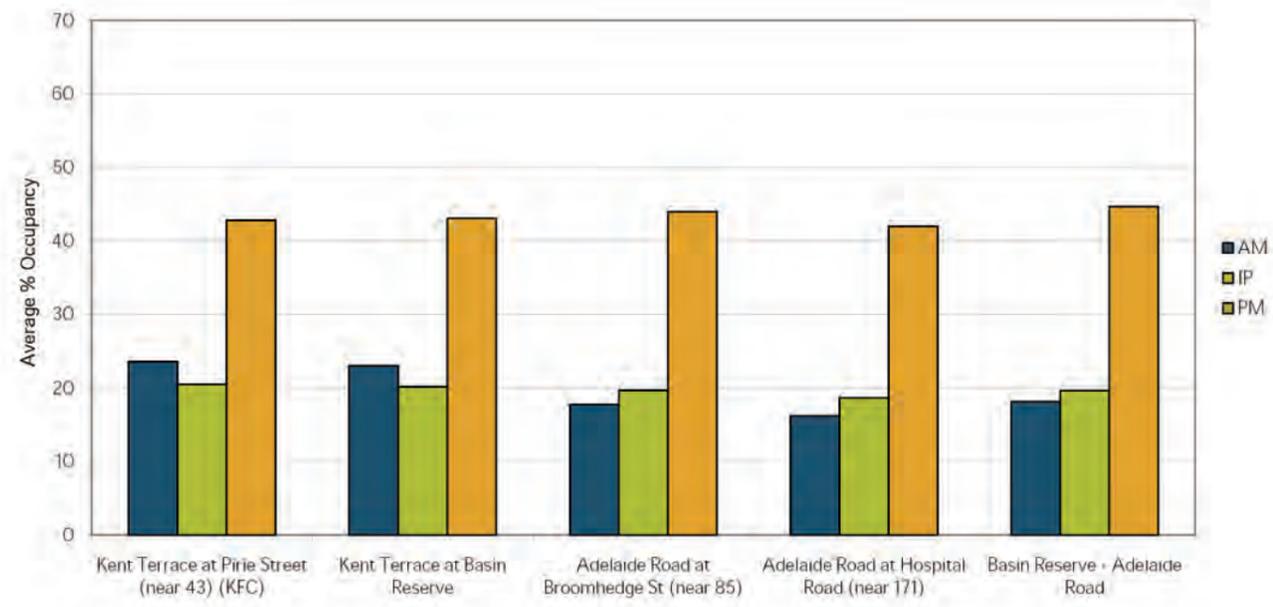


Figure 6.22: Southbound Bus Occupancy

Figure 6.21 and 6.22 above clearly show the high occupancy rates associated with the commuter peaks (i.e. northbound in the AM and southbound in the PM).

The average bus capacity during the survey is approximately 65 persons⁴.

⁴ Note that the information presented is for the two hour peak period.

6.4.4 Forecast Passenger Transport Demand

In the future passenger transport demand is predicted to increase by 25 to 30 percent in the peak direction during peak periods (northbound towards the city in the AM and southbound towards the suburbs in the PM) by the WTSM Saturn Model between 2006 and 2016. During the other time periods the number of passengers is predicted to increase by 10 to 15 percent.

6.5 General Vehicles

6.5.1 Existing Trip Distribution around the Basin

Figure 6.23 below, summarises the general trends of where motorists are travelling to and from when utilising the Basin Reserve. Many of the motorists travelling from the eastern suburbs along SH1 through the Mount Victoria tunnel continue on SH1 through the Terrace Tunnel. About 25 percent of these motorists head into the CBD and the remaining few are headed to Willis Street or The Terrace.

Based on AADT traffic flows⁵, approximately 60 percent of the motorists on Kent Terrace heading towards the Basin Reserve go through the Mount Victoria Tunnel while the remaining 40 percent are headed to the southern suburbs via Adelaide Road.

Motorists approaching the Basin Reserve from Adelaide Road are evenly split between continuing to head north on Cambridge Terrace and heading towards the Inner City Bypass.

During all three peak periods the movements from Kent Terrace to the Mount Victoria Tunnel and from the Mount Victoria Tunnel to Buckle Street are the busiest. Very few motorists travel between Adelaide Road and the Mount Victoria Tunnel in either direction. The traffic volumes between Kent Terrace and Buckle Street are also very low.

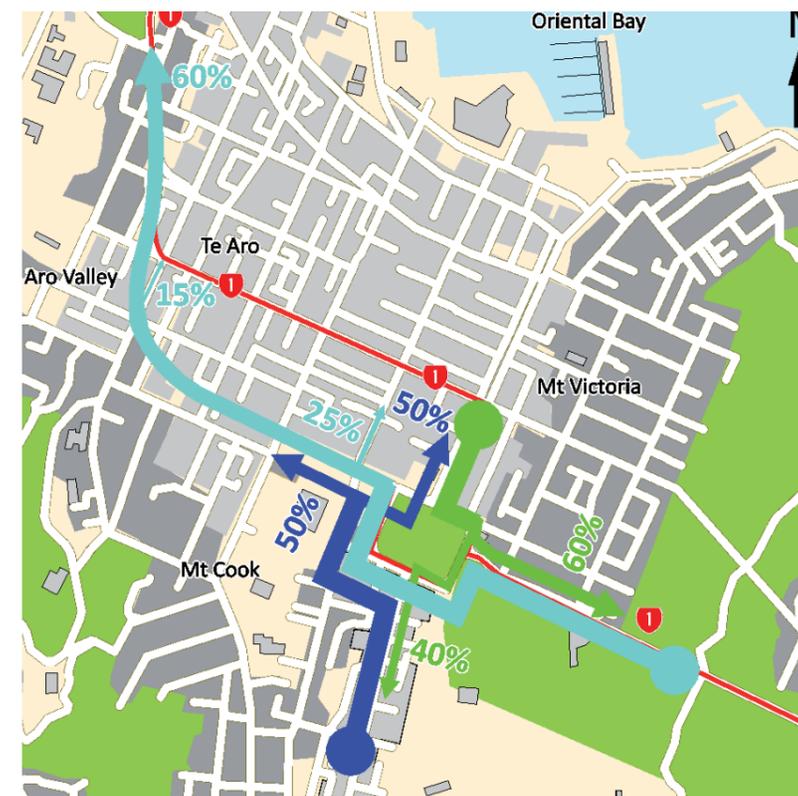


Figure 6.23: Origins and destinations for existing trips travelling through the Basin Reserve

⁵ Estimated AADT calculated by doubling the AM and PM peak hourly flows, and multiplying the Interpeak by eleven.

6.5.2 Screen Lines

Three screenlines were created to gain an understanding of the traffic volumes approaching and leaving the Basin Reserve as shown in *Figure 6.24*. The average annual daily traffic (AADT) volumes for 2006 and 2026 are shown on the diagram along with the total percent change in traffic between the two years.

Between 2006 and 2026 there is a 14 percent increase in the volume of traffic approaching the CBD from the southern and eastern suburbs (across the blue screenline in *Figure 6.24*), while there is an 18 percent increase in the volume of traffic travelling away from the CBD across this same screenline.

The western screenline (shown in green on the figure) experiences a 13 percent increase in traffic volumes in both directions. In the westbound direction (away from the Basin Reserve) Courtenay Place experiences the largest percentage change in daily traffic volumes (21 percent) while the smallest increase occurs on Buckle Street (10 percent). In the eastbound direction (heading towards the Basin Reserve) SH1 (Vivian Street) again experiences the smallest percentage increase in traffic volumes (9 percent) while both Courtenay Place and Jervious Quay experience similar growth (15 to 17 percent).

The northern screenline (shown in dark blue on the figure) experiences the most growth relative to the other screenlines with 28 percent more traffic heading towards the Basin Reserve in 2026 than in 2006 and a 19 percent increase heading away from the Basin Reserve. Heading towards the Basin Reserve (southbound) the most growth occurs on Taranaki Street and Kent Terrace with 37 and 31 percent increases respectively. Heading away from the Basin Reserve (northbound) the most growth occurs on Taranaki Street (32 percent) while traffic on Tory Street and Cambridge Terrace only grows by 15 percent. The AADT for each screenline is summarised in the transportation technical note.

The higher growth rate percentage shown in the dark blue line is due to a number of factors including higher rates of development in the CBD and along the Adelaide Road growth spine. The Mount Victoria Tunnel and Inner City Bypass also act as constraints on future traffic increases and growth east and west bound resulting in lower growth percentages on the green and light blue lines.

Once all projects forming part of the RoNS are completed, including duplication of the Mount Victoria Tunnel, we can expect more vehicles using SH1 in future years that what is shown in *Figure 6.24*.

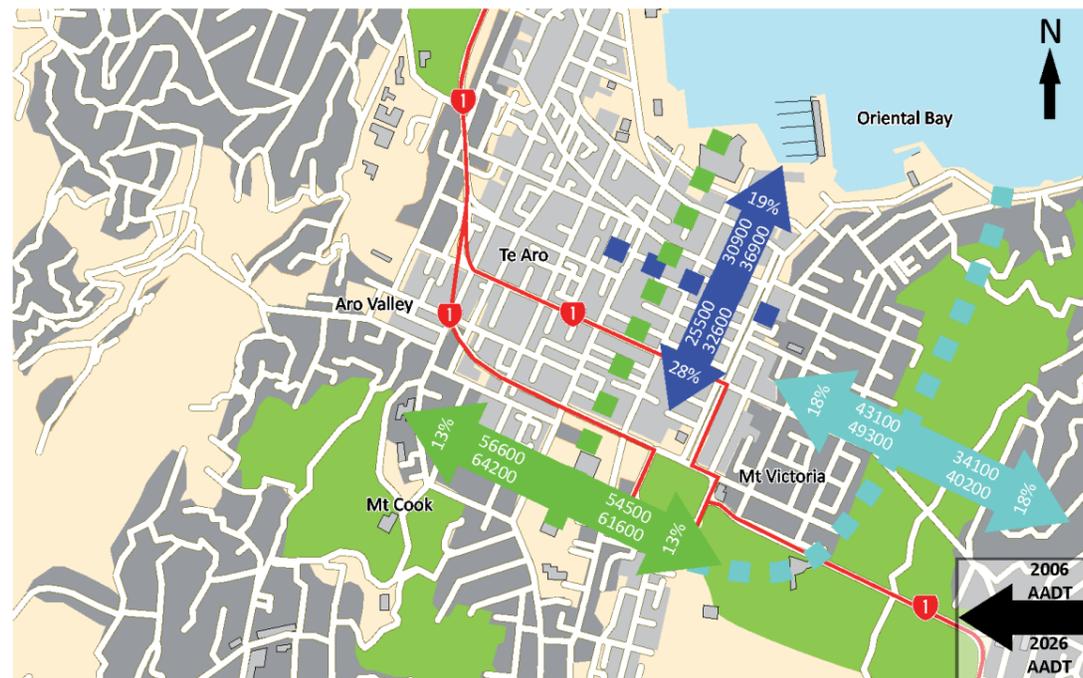


Figure 6.24: AADT Crossing the Screenlines and Percent Growth

6.6 Forecast Road Network Performance

The Level of Service (LOS) on key links within Wellington City shows that during the AM peak in 2006, most roads are operating with a LOS of C or better; however, SH1 and Adelaide Road heading towards the Basin Reserve, the Mount Victoria Tunnel (in both directions) and eastbound on John Street all have an LOS of E or worse. In 2016 and 2026 the AM peak performance continues to degrade with more links (including Tory Street) approaching capacity.

During the PM peak period the Wellington road network is busier than the AM peak with more links approaching capacity or experiencing significant delays including SH1 (in both directions), Adelaide Road (northbound), Cambridge Terrace, Oriental Parade (eastbound), Willis Street (southbound), Victoria Street (southbound), and the Mount Victoria Tunnel (in both directions). The congestion on these routes continues to increase in 2016 and 2026. The transportation technical note contains a summary of the volume to capacity ratios for key links.

Some of the major capacity constraints in the Wellington road network include the Mount Victoria Tunnel and the intersection of Taranaki Street with Buckle Street. A high number of weaving manoeuvres occur around the Basin Reserve as both vehicles and buses try to get to the correct lane to reach their destination. Weaving manoeuvres are especially high on Sussex Street. *Table 6.2*, below summarises percent increase in the journey time for some key routes through the Basin Reserve for 2009 to 2016 and 2009 to 2026⁶. Through to 2016 the network continues to operate reasonably well with journey time increases of 15 percent or less. However, by 2026 the performance of the network has significantly deteriorated with journey time increases of 50 to 60 percent on many routes.

Table 6.2: Percent Increase in Journey Times for the Do-Minimum Scenario (maximum across all time periods)

Route	By 2016	By 2026
SH1 WB (Evans Bay Parade to Willis Street)	10%	60%
SH1 EB (Willis Street to Evans Bay Parade)	Minimal Change	15%
NB Adelaide Road to Cambridge Terrace	30%	50%
SB Kent Terrace to Adelaide Road	6%	50%
Bus NB through the Basin Reserve	15%	25%
Bus SB through the Basin Reserve	Minimal Change	25%

In the future if nothing is done, queues on SH1 are likely to extend from the Basin Reserve all the way past Evans Bay Parade in the AM peak period due to insufficient capacity at both the Mount Victoria Tunnel and the Basin Reserve. Due to these queues on SH1 more vehicles are expected to use Evans Bay Parade and Oriental Parade to travel into the city. This will significantly increase the delay on this route.

Also, the southern end of Taranaki Street and Wallace Street are likely to become highly congested. Improvements to the Basin Reserve will help reduce this congestion since Adelaide Road will become a more attractive route.

Improving traffic operations at the Basin Reserve will help ensure the road network will function effectively now and into the future. By providing sufficient capacity on key strategic routes such as SH1 any growth in regional traffic will use these routes which will reduce the pressure on key local routes. This will result in more efficient movement for regional traffic, passenger transport, and local traffic.

⁶ Based on the Paramics model outputs using a medium growth scenario as shown in Figure 5.2.

