MANLY 2015 CONCEPT
TRAFFIC MODELLING SUMMARY REPORT

FOR

MANLY COUNCIL

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1. INTRODUCTION

In October 2010, Urbanhorizon Pty Ltd, in association with Bitzios Consulting, was commissioned by Manly Council to assess the traffic and access implications of proposed road and pedestrian network changes to the Manly CBD, as part of the 'Manly 2015' master plan concept. The implications of the changes have been assessed with the aid of a Paramics microsimulation traffic model of the CBD.

The scope of the investigation included the following:

- Assess the traffic and access implications of the 2015 master plan proposals.
- Consider the capacity of East Esplanade to accommodate increased traffic flows due to diverted traffic.
- Consider the extent of any increased traffic delays along East Esplanade and delays for traffic movement to and from the Eastern Hill area generally.
- Assess changes in traffic flow efficiency along (a traffic calmed) Belgrave Street with the introduction of one way flows in Whistler Street.
- Assess the magnitude of any reductions in pedestrian delay at the intersection of Whistler Street and Sydney Road.

The study area is shown in Figure 1.1. The focus of the investigation is on the area bounded by Sydney Road, Raglan Street, North and South Steyne, Victoria Parade, and East Esplanade.

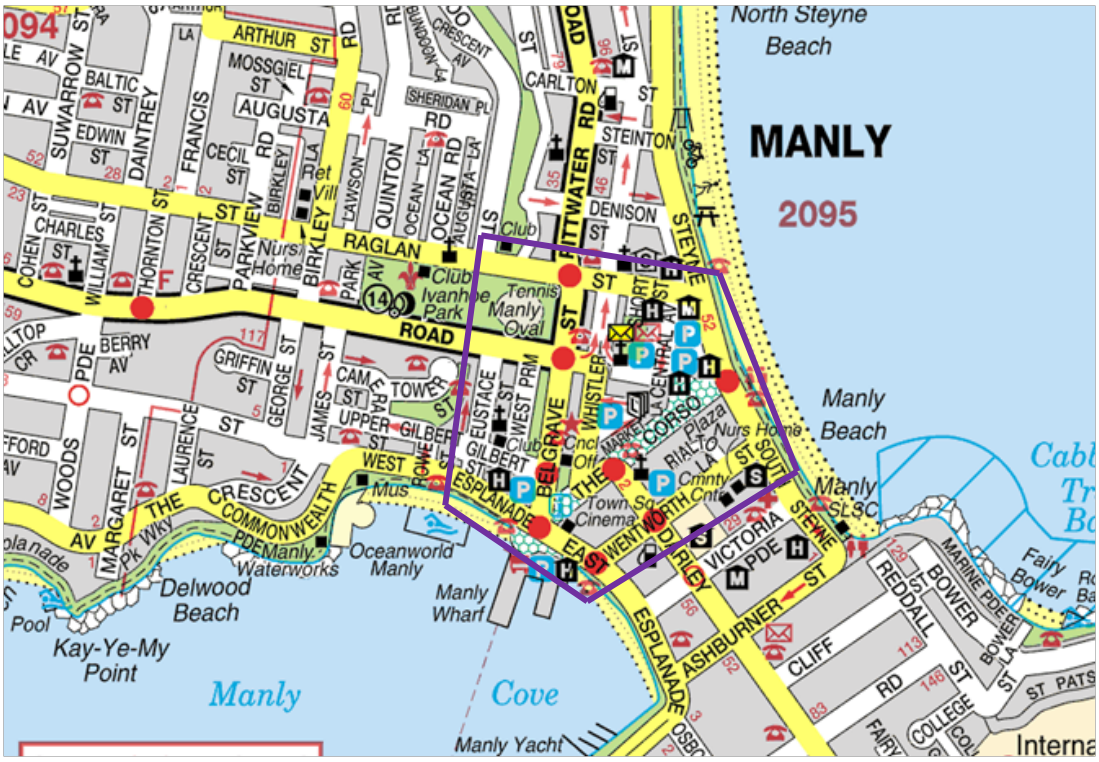


Figure 1.1: Study Area

2. PROPOSED TOWN CENTRE CHANGES

The proposed network changes as part of *Manly 2015* are summarised as follows:

- Full closure of North and South Steyne (Wentworth Street to Raglan Street).
- A new Shared Zone[1] in Henrietta Lane.
- A cul-de-sac in Central Avenue which becomes two-way with traffic calming[2].
- Close Sydney Road (Belgrave Street to Central Avenue) to create a pedestrian zone.
- Whistler Street becomes one way northbound (The Corso to Raglan Street) with a low speed crossing of the new Sydney Road pedestrian zone.
- Darley Road becomes one way northbound (The Corso to Wentworth Street) with a shared zone treatment (including the Whistler Street 'dog leg').
- Belgrave Street (Gilbert Street to East Esplanade) and East Esplanade (Belgrave Street to Wentworth Street) to be traffic calmed.
- The Whistler Street car park to be demolished and redeveloped as office or retail space.
- A new 800 space car park to be constructed underneath Manly Oval, with vehicular access from both Sydney Road and Raglan Street, and underground pedestrian links to the Sydney Road (east) pedestrian precinct.

1. Formal Shared Zones are where the speed limit is 10 km/h and pedestrians have right of way

2. Traffic Calming measures include a 30 kmh speed limit and /or road pavement treatments that imply a low speed environment.

3. EXISTING CONDITIONS

3.1 ROAD NETWORK

Sydney Road is a four lane east-west running arterial road with kerbside parking. It links the Burnt Bridge Creek Deviation at Seaforth with Pittwater Road at Manly. Pittwater Road is a north-south running arterial road linking Brookvale in the north with Manly. West Esplanade and East Esplanade run east-west along the Manly Harbour linking Balgowlah with the Eastern Hill precinct. North Steyne and South Steyne run along the Manly seafront linking Queenscliff and the Eastern Hill precinct. Raglan Street runs parallel to Sydney Road providing two way traffic flow at the northern edge of the CBD. Belgrave Street also provides two way traffic flow between Raglan Street and East Esplanade.

The 'internal' route through the Manly CBD comprises Whistler Street, The Corso and Darley Road. It should be noted that at the time of the traffic surveys (on 12 and 13 October 2010), there were major sewerage upgrade works on the western side of Darley Road between Wentworth Street and Victoria Parade. As a result, Darley Road was temporarily one way southbound in this block, with detours in place for northbound traffic.

3.2 PEDESTRIANS AND CYCLISTS

Manly is subject to heavy pedestrian flows, especially along The Corso linking the harbour side ferry terminal with Manly Beach. On the survey day (13th October 2010), around 600 pedestrians crossed East Esplanade at the Manly Wharf intersection in the AM peak hour (from 7:45 to 8:45). Flows were higher in the PM peak hour (4:00pm to 5:00pm) at around 915 pedestrians/hour. In the early AM peak and late PM peak periods, pedestrians tend to be mainly ferry commuters, while at other times they are predominantly tourists, visitors and shoppers.

Manly has several cycling routes, both on and off road. Cyclist volumes are very low, with a maximum movement of 20 per hour recorded at those intersections on the cycling routes.

3.3 BUS SERVICES

Table 3.1 shows the bus services that stop at the Manly bus interchange, located within the study area. Bus service 136 (Chatswood – Manly) and 139 (Warringah – Manly) use roads within the core of the CBD and as such traverse the study area. Most other services operate external to the study area or on its fringe. The main bus stop in Manly is located on the western side of Belgrave Street just north of Gilbert Street.

Table 3.1: Manly Bus Routes

Route	Destination
130	Late Night Pumpkin Bus
131	Manly–North Balgowlah–Manly
132	Manly–North Balgowlah–Warringah Mall
135	Warringah Mall–Balgowlah–Manly–Quarantine Station
136	Chatswood–Frenchs Forest–Dee Why–Manly
139	Warringah–Freshwater–Manly
140	Manly–Macquarie University–Epping
142	Allambie Skyline Shops–Balgowlah–Manly
143	Chatswood–St. Leonards–Manly
144	Chatswood–Royal North Shore Hospital–Manly
151	Mona Vale–Manly–Military Road–City (early AM hours only)

Route	Destination
155	Bayview Garden Village–Narrabeen Peninsula–Dee Why–Manly
156	McCarrs Creek–¬Mona Vale–Warringah Mall–Manly
158	Cromer–Dee Why–Manly
159	Dee Why–Wingala–Manly
169	Manly–Narraweena–Seaforth–City
171	Manly–Balgowlah Heights–City
E50	Manly–North Sydney–Milsons Point
E70	Manly–Balgowlah–City
E71	Manly–Balgowlah Heights–City

The Pumpkin Bus and Route 151 have been included in the list in Table 3.1 but operate outside the peak periods and as such were excluded from the traffic modelling.

3.4 CAR PARKING

The Manly CBD contains a number of public and private off street car parks. The key Council operated car parks are as follows:

- Whistler Street Car Park (357 spaces over 11 levels).
- Peninsular Car Park (300 spaces over 2 levels).
- Manly National Central Car Park (247 public and resident spaces over 6+ levels).
- Pacific Waves Car Park (162 spaces over 2 levels).

The key private car parks are as follows:

- Wharf Car Park (70 spaces).
- Novotel Beach Front Car Park (95 spaces).
- Gilbert Park Car Park (60 spaces).

One of the *Manly 2015* initiatives is to demolish the Whistler Street car park (for redevelopment to commercial space) and construct a new 800 space car park underneath Manly Oval, with vehicular access via Sydney Road and Raglan Street. The traffic and access implications of this proposal are addressed in Section 4.

4. PARAMICS MICROSIMULATION MODEL

Paramics is a traffic and pedestrian microsimulation modelling tool. It simulates the movement of individual vehicles (cars, trucks and buses) and pedestrians through a road network. In summary, the first steps of the modelling process involve:

- setting up a base road network based on aerial photography and on-site observations;
- setting up traffic flow patterns based on origins, destinations and traffic counts at key intersections in the AM and PM peak periods; and
- 'validating' the model to observed peak period traffic queues and intersection traffic counts.

Once completed, the result is a 'base' model that accurately represents existing conditions. The base model can then be modified to test proposed scenarios and/or future year estimated traffic flows.

Paramics has a range of performance measures that enable a comparison of the existing traffic conditions with future proposals. The most commonly used measures are Level of Service (LoS) and queue lengths.

Levels of Service, in terms of average delay per vehicle, are graded from A to F, in accordance with Table 4.1 below.

Table 4.1: Levels of Service

LOS	Average Delay Range (seconds)
A	0 – 10
B	10 – 20
C	20 – 35
D	35 – 55
E	55 – 80
F	>80

LoS A involves almost negligible delay, while LoS F is around one and a half minutes delay or more. In general, traffic networks are typically planned to be at LoS D or better.

Paramics also has graphical output capabilities that allow real time visualisation of traffic conditions, in either two or three dimensional views.

5. RESULTS OF THE TRAFFIC MODELLING

In the following sections, Paramics modelling results are presented for both the AM and PM peak periods. The diagrams show the LoS using coloured dots at each intersection, while the maximum traffic queues are represented by yellow lines along the roads.

5.1 EXISTING (2010) CONDITIONS

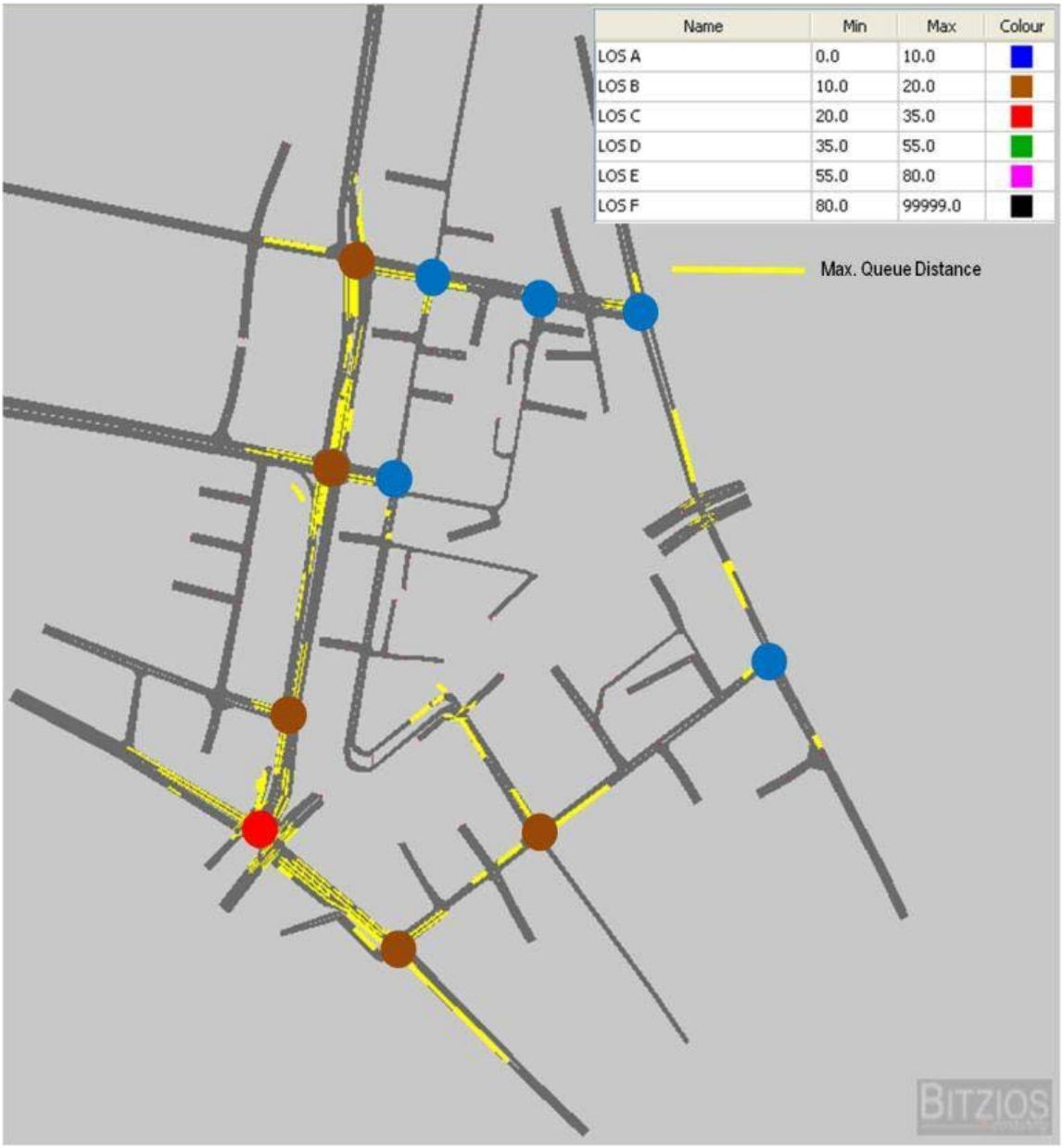


Figure 5.1: 2010 Base- AM Peak Level of Service & Maximum Queue

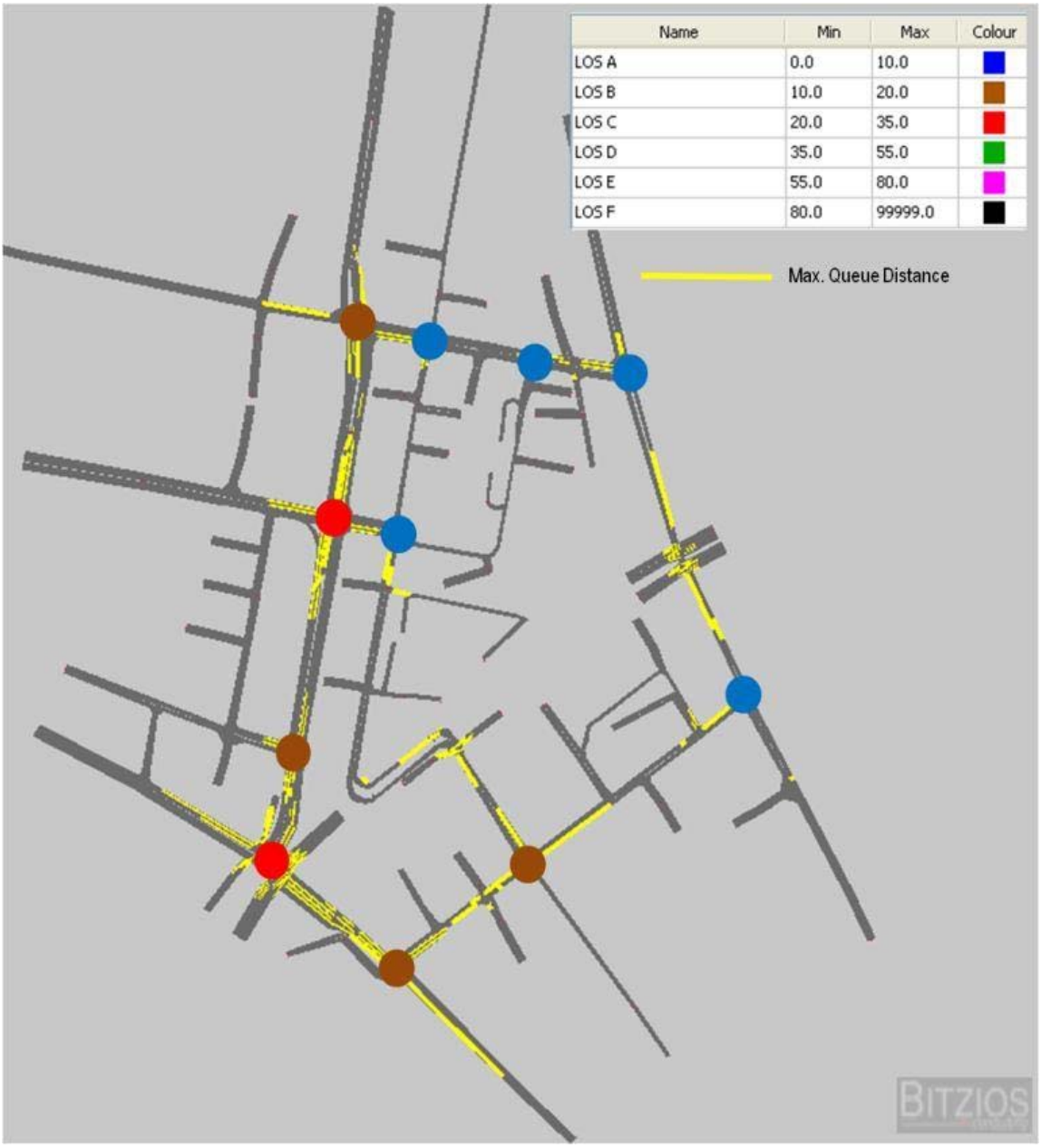


Figure 5.2: 2010 Base- PM Peak Level of Service & Maximum Queue

As shown by these outputs, the majority of intersections operate with minimal delays (LoS A or B). The results do, however, highlight key intersections where issues are emerging and likely to generate congestion with increased traffic growth. It is important to note that both site and model observations revealed that vehicles stopped at any of the traffic light intersections are mostly able to clear within a single cycle of the traffic lights.

5.2 2015 'DO NOTHING' CASE

The 2010 Base Model was used to assess likely conditions in 2015, assuming no significant changes to the network – the 'Do Nothing' case. It was, however, assumed that the Darley Road sewerage upgrade work would be completed and thus Darley Road would be restored to two way traffic. Based on NSW Transport's Bureau of Transport Statistics Journey to Work data, an overall growth rate of 3.5% over five years was adopted for the Manly LGA. This can be considered a worst case scenario because it is closest to the predicted employment growth of 3.4%, whereas the predicted population growth is 3.0%. The results of the 2015 'Do Nothing' model are shown in Figures 5.3 and 5.4.



Figure 5.3: 2015 Do Nothing - AM Peak Level of Service & Maximum Queue

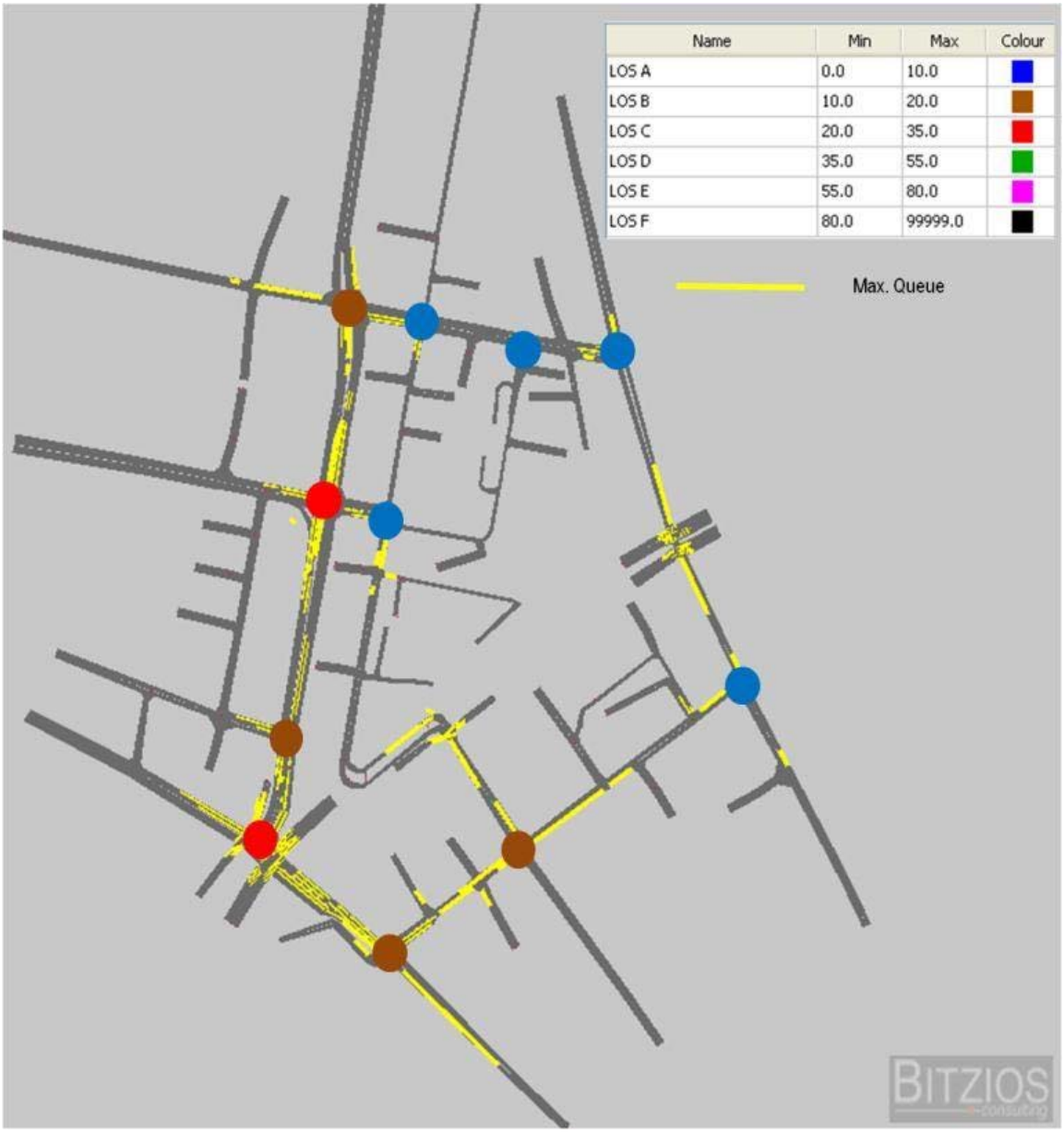


Figure 5.4: 2015 Do Nothing - PM Peak Level of Service & Maximum Queue

The model outputs show that that the network would operate with minimal change in the LoS at most intersections under 2015 traffic loads. The exception is the Manly Wharf intersection where the LoS is forecast to deteriorate from C to D in the AM peak period.

5.3 2015 PROPOSED CASE

The 2010 Base Model was modified to incorporate the road network changes proposed as part of the *Manly 2015* Master Plan. The key traffic demand assumptions used in this scenario were as follows:

- The traffic generation of the new development at Whistler Street was assumed to be 100 vehicles in the peak hour.
- The majority of traffic demand of the Whistler Street parking was moved to the new car park at Manly Oval.
- The majority of traffic destined for the study area from Sydney Road was assumed to use the new Manly Oval Car Park.

Some key issues foreseen with the proposed future road network were:

- The concentration of almost all of the through traffic via East Esplanade and Belgrave Street, which conflict with the main pedestrian flows near Manly Wharf.

- The diversion of the southbound legs of bus routes 136 and 139 away from North and South Steyne, and the resultant concentration of buses on Stands B and C near Manly Wharf.
- The importance of 'capturing' inbound traffic on Sydney Road to the new underground car park, thus minimising undesirable additional traffic travelling through the CBD seeking out parking opportunities.

The results of the 2015 Master Plan model are shown in Figures 5.5 and 5.6.

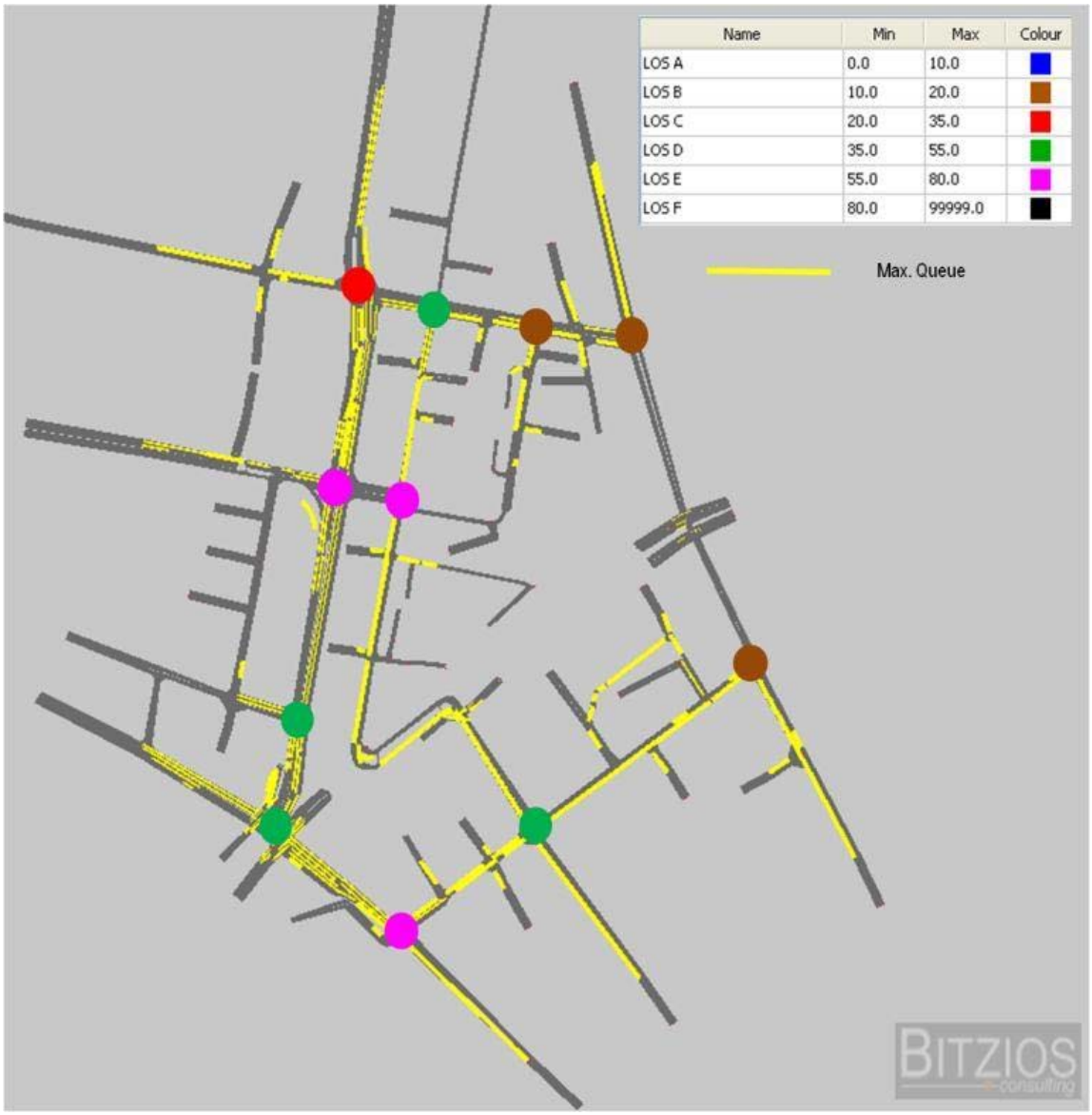


Figure 5.5: 2015 Proposed - AM Peak Level of Service & Maximum Queue

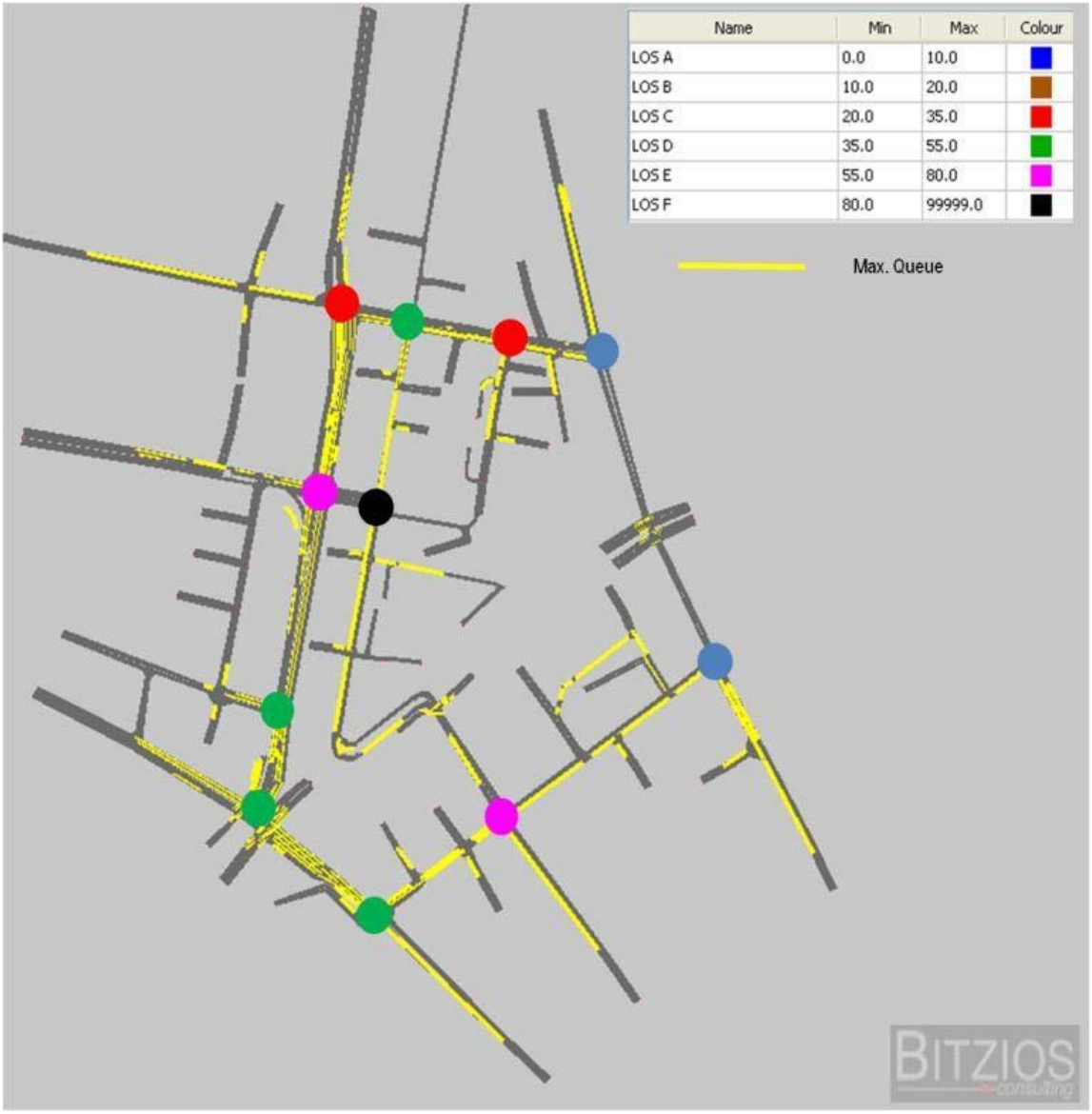


Figure 5.6: 2015 Proposed - PM Peak Level of Service & Maximum Queue

The closure of North and South Steyne would have a significant impact on the performance of the network. The additional traffic in Belgrave Street as a result of the closure would exceed the capacity and eventually the network 'grid locks'. This results from, amongst other things, the queuing in Belgrave Street extending into Raglan Street, in turn blocking Whistler Street.

5.4 2015 With Two-Way Traffic in North and South Steyne

As an alternative to the proposed full closure of North and South Steyne, the model was modified to allow two-way traffic, but in a 10 km/h Shared Zone. All other aspects of the *Manly 2015* proposal remained the same. The results are shown in Figures 5.7 and 5.8.

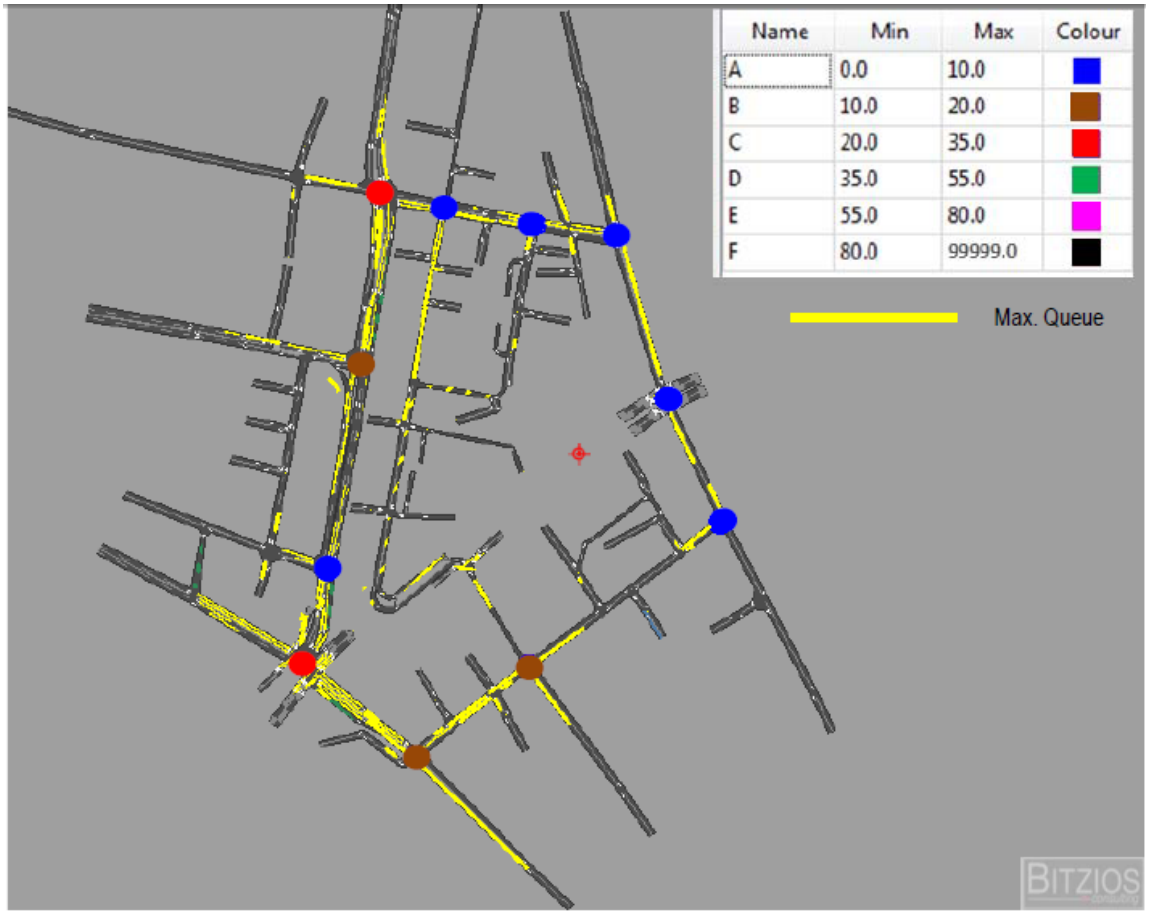


Figure 5.9: 2015 Two-Way Option - AM Peak Level of Service and Maximum Queue

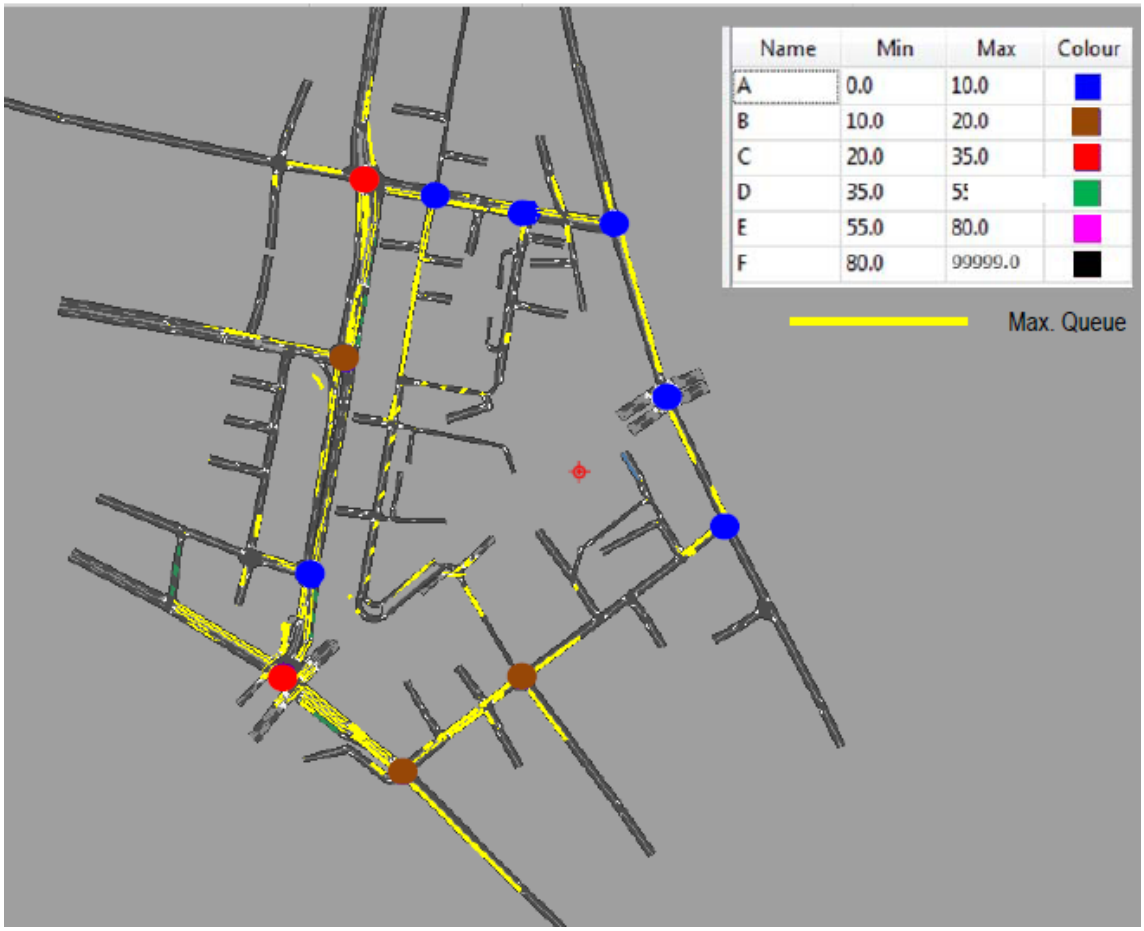


Figure 5.10: 2015 Two-Way Option - PM Peak Level of Service and Maximum Queue

It can be seen that keeping South Steyne open to traffic, even in a 10 km/h shared zone arrangement, results in significant improvement in LoS, and in reduced queue lengths. The worst LoS is C, whereas it was F in the full closure case. This option would relieve some of the traffic pressure on the Manly Wharf intersection and on the Whistler Street route, at the expense of some pedestrian amenity at the eastern end of The Corso.

5.5 2015 With One-Way Southbound Traffic in North and South Steyne

The 2015 Master Plan Option was modified in order to minimise the impacts on bus routes 136 and 139, and to reduce the delays and congestion at the Manly Wharf intersection as much as possible, while still maximising pedestrian amenity. Key changes were:

- North and South Steyne to be one-way southbound between Raglan Street and Wentworth Avenue, in a 10 km/h single lane, Shared Zone configuration.
- Associated changes to the origin-destination traffic pattern to reflect the potential for southbound traffic to use the above route.

The LoS results of this simulation are shown in Figures 5.9 and 5.10. It can be seen that while there is still some queuing and delay, there is minimal blocking back through upstream intersections and the LoS is C or better. The opening of North and South Steyne southbound eases traffic activity at Belgrave Street, thus making this option work better than the option in section 5.3 above. This one-way option has the advantage of allowing footpath widening in North and South Steyne to create more space for pedestrians.

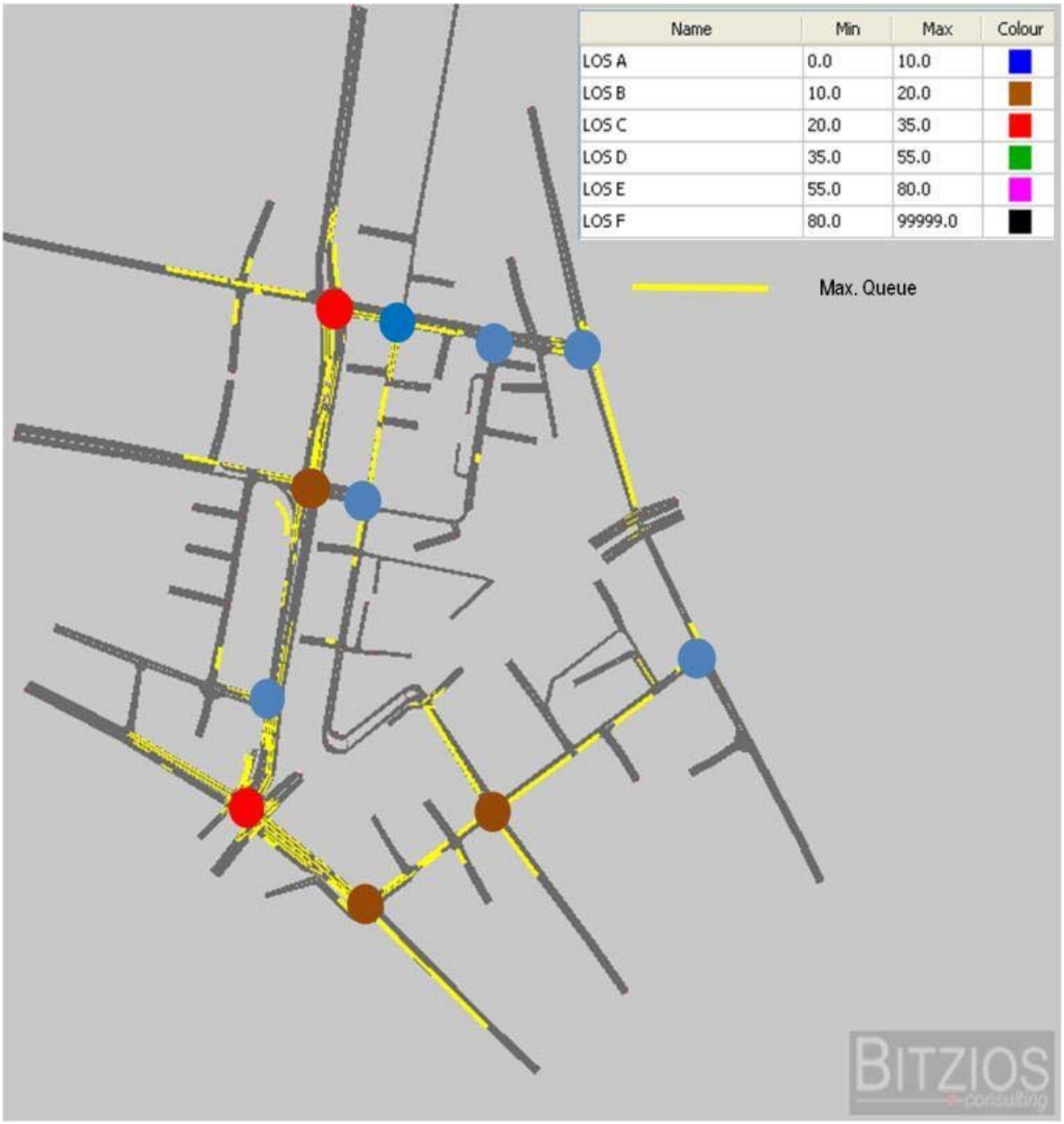


Figure 5.9: 2015 One-Way Option - AM Peak Level of Service and Maximum Queue



Figure 5.10: 2015 One-Way Option - PM Peak Level of Service and Maximum Queue

6. CONCLUSION

Traffic modelling of the *Manly 2015* Master Plan, using the Paramics traffic micro-simulation program, has shown that full closure of North and South Steyne between Raglan and Wentworth Streets would cause unacceptable delays and queuing within the Manly CBD in peak periods. However, most of the benefits of the Manly 2015 Master Plan can be achieved by keeping the same section of road open to southbound traffic only, in a single lane, 10km/h Shared Zone arrangement. This option has the added advantage of not disrupting two significant bus routes in the Manly area.