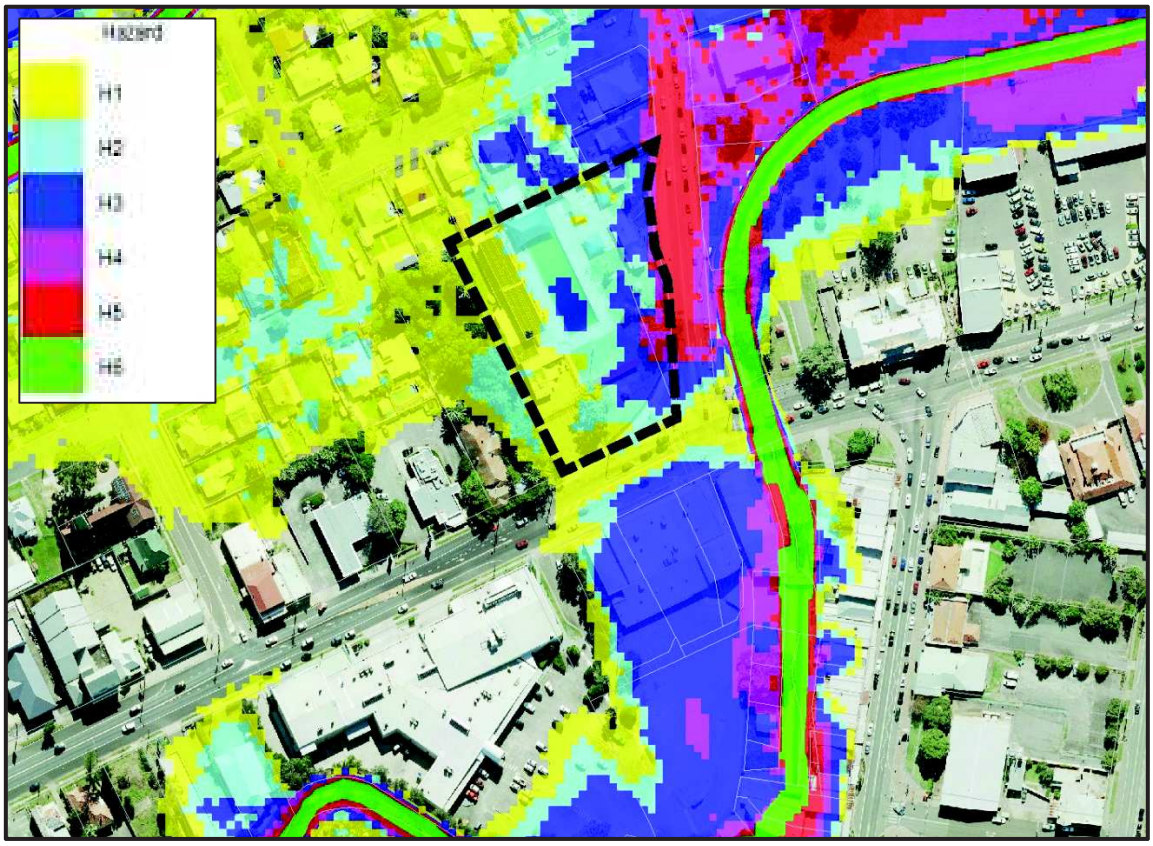
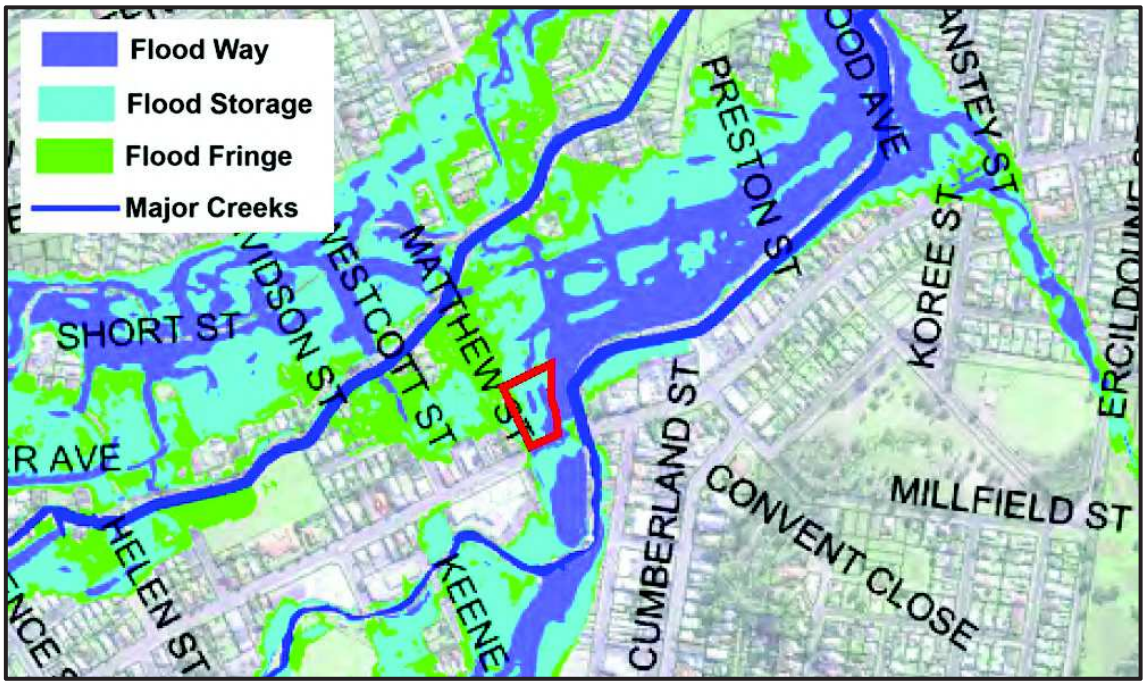
Appendix 5: Flood Mapping

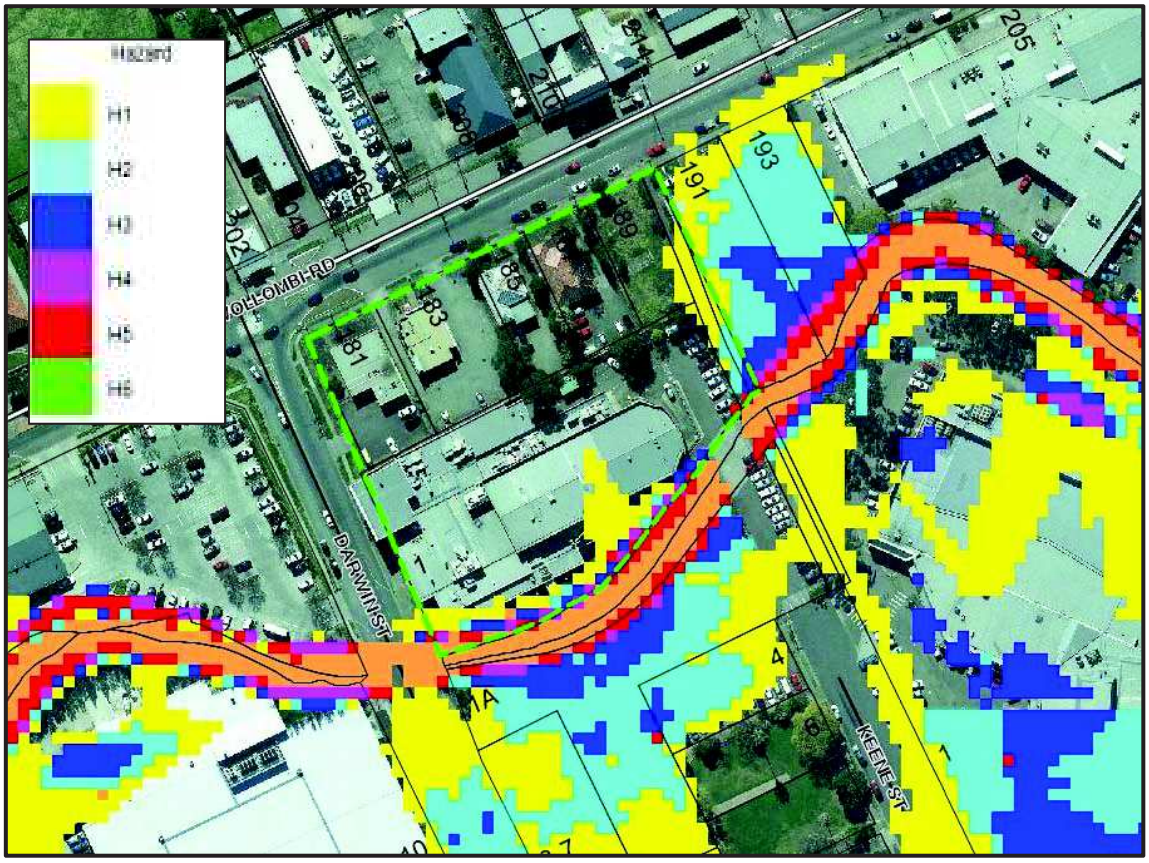
Flood Hazard Levels RE1 zoned land proposed to be zoned B4



Flood Hydraulic Categories RE1 zoned land proposed to be zoned B4



Flood Hazard Levels B4 zoned land proposed to be zoned B3



Appendix 6: Traffic Management Assessment

Issue History

File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P2225.001T Traffic Management Phase Testing Cessnock City Centre	T. Bleasdale	A. Ahmed	S. Brooke	01-05-17	Scott Christie, Cessnock City Council Scott.Christie@cessnock.nsw.gov.au
P2225.002T Traffic Management Phase Testing Cessnock City Centre	T. Bleasdale	A. Ahmed	S. Brooke	16-05-17	Scott Christie, Cessnock City Council Scott.Christie@cessnock.nsw.gov.au

Cessnock Commercial Precinct, Assessment of Traffic Management Measures

1. INTRODUCTION

Cessnock City Council has commissioned Bitzios Consulting to undertake traffic assessment of several traffic management and parking improvement measures that are identified to improve accessibility and parking within the Cessnock City Centre. This technical note summarises the findings of the assessment.

1.1 BACKGROUND

Cessnock City Council has identified several traffic management and parking improvement measures to upgrade the Cessnock Commercial Precinct. It is suggested that the measures are implemented in six different phases with each phase containing one or more measures. These phases are summarised in Table 1.1.

Table 1.1: Proposed Improvement Measures and Phasing

Phase	Improvement Measures
Phase 1	Cooper Street and Charlton Street one way including a shared zone
Phase 2	Keen Street connection from Wollombi Road (one-way traveling from Wollombi Road to Keene Street)
Phase 3	Keene Street multi-level car park
Phase 4	Charlton Street multi-level car park
Phase 5	Charlton Street connection to Allandale Road
Phase 6	Connection of South Street to James Street (Cessnock South)

Bitzios consulting previously developed the 2015 AM and PM base traffic models for the whole of the Cessnock Local Government Area (LGA) using Aimsun mesoscopic model. The base model was used to develop future year traffic models and fed into the development of a 30-year transport strategy (to 2041) for the LGA. As part of the strategy, several key infrastructure improvement measures were proposed. While the preferred improvements are required to support the 2041 projects traffic volumes, there are opportunities to implement the proposed upgrade in stages. A robust staging methodology was developed as part of the commission. It was proposed that the ultimate improvements identified to service the 2041 traffic to be implemented in two stages; in 2021 and 2031.

The assessment was undertaken for the 2031 traffic conditions. For the purposed of this assessment, the 2031 proposed road network was adopted. The 2031 proposed network includes the following key improvements:

- upgrade Wollombi Road to four lanes, two lanes in each direction;
- upgrade Maitland Road to four lanes, two lanes in each direction;
- upgrade Old Maitland Road to four lanes, two lanes in each direction;
- seal section of Old Maitland Road;
- new link between Old Maitland Road and Hunter Expressway;
- new Full interchange with Old Maitland Road and Hunter Expressway;
- Main Road upgrade to four lanes, two lanes in each direction;
- Southern Outer CBD By-Pass;
- Northern Outer CBD By-Pass;
- Oakey Creek Road and O'Conners Road upgrade; and
- New signals throughout Cessnock LGA.

The proposed infrastructure improvements are summarised in Figure 1.1.

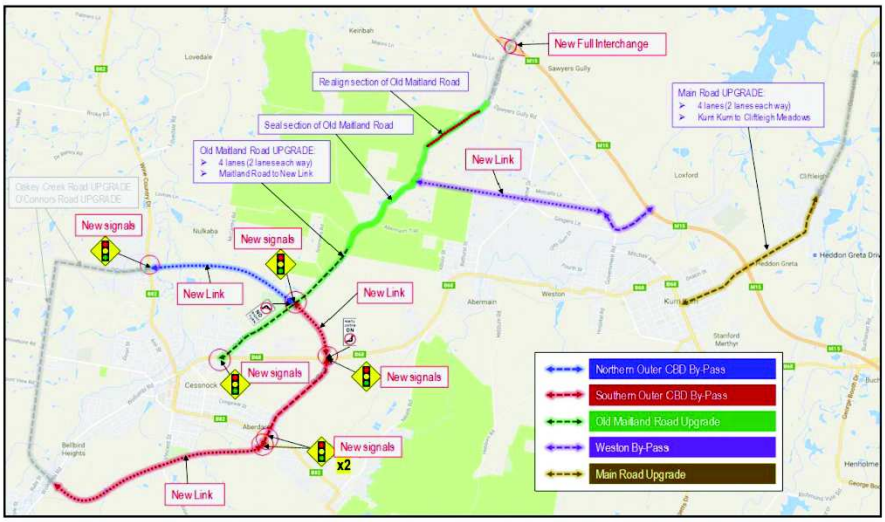


Figure 1.1: Cessnock LGA Infrastructure Improvements – 2031 Proposed Network

The proposed measures are predicted to improve traffic conditions within Cessnock City Centre. The key measures in and around the city centre include:

- the proposed upgrade of Wollombi Road to four lanes was identified in the Bellbird North development traffic impact assessment report. As part of this improvement, it is proposed to introduce traffic signals at a few intersections on Wollombi Road including Darwin Street, West Avenue and Alexander Street;
- as part of the Bellbird North development, a signalised intersection is also proposed on Wollombi Road just to the west of its intersection with Allandale Road. This intersection would service the existing car park entrance; and
- as part of the 30-year strategy, it is proposed to implement an outer CBD bypass. The bypass is expected to reduce traffic through the city centre. By 2031, it is proposed to introduce the Southern Outer CBD bypass (as shown in Figure 1.1) to connect Wollombi Road and Aberdare Road. This is also expected to reduce substantial traffic through the city centre.

2. METHODOLOGY

2.1.1 Overview

Traffic performance for phase 1 and 2 were assessed together and then sequential phases added up to Phase 4. Phases 5 and 6 were assessed as individual cases. A simple three-stage methodology was adopted for the traffic assessment:

- Network Upgrade;
- Traffic Assessment; and
- Reporting.

2.1.2 Network Update

The Aimsun model network was updated to reflect the proposed changes. These included introduction of turn bans to establish one-way streets, introduction of new signalised intersections and rationalisation of car parking spaces.

2.1.3 Traffic Assessment

The Aimsun 'Hybrid Modelling' feature was utilised to assess the traffic performance of the proposed traffic management measures. In the hybrid model, the whole network was run in mesoscopic simulator with the exception of the core Cessnock City Centre area. A microsimulation pocket was defined within the City Centre area simulator as shown in Figure 2.1. Traffic within the microsimulation pocket was modelled using the microscopic simulator. The use of microscopic simulator enables accurate assessment of the impact of the proposed traffic improvement measures.

Figure 2.1: Mesoscopic and Microscopic Areas

Traffic performance for each phase was compared with the 2031 base case using the following criteria:

- changes in traffic volumes;
- intersection Level of Service (LOS); and
- travel times.

2.1.4 Reporting

The outcomes from the network assessment was summarised briefly.

3. PROPOSED IMPROVEMENTS

Cessnock City Council provided several traffic management and parking improvement measures to be implemented in each of the six phases. Improvement measures that are identified in each phase are summarised in the following sections.

3.1 PHASE 1 AND 2

This phase involves the introduction of a shared zone around the Cessnock Town Square. Figure 3.1 shows the layout of the Town Square plan. The proposed shared zone includes a section of Cooper Street between Keene Street and Vincent Street and, an approximately 100m section of Charlton Street north and south of Cooper Street. To compliment the shared zone, Cooper Street will be restricted to one way, eastbound, between Keene Street and Vincent Street. It is also proposed to restrict the proposed shared zone on Charlton Street south of Cooper Street to one-way operation. As part of this phase it is proposed to extend Keene Street to join Wollombi Road. The new section of Keene Street will be restricted to one-way operation (southbound). This will provide a 'left-in' entry from Wollombi Road. Alterations were made to the signals at Vincent Street / Cooper Street to cater for these changes.

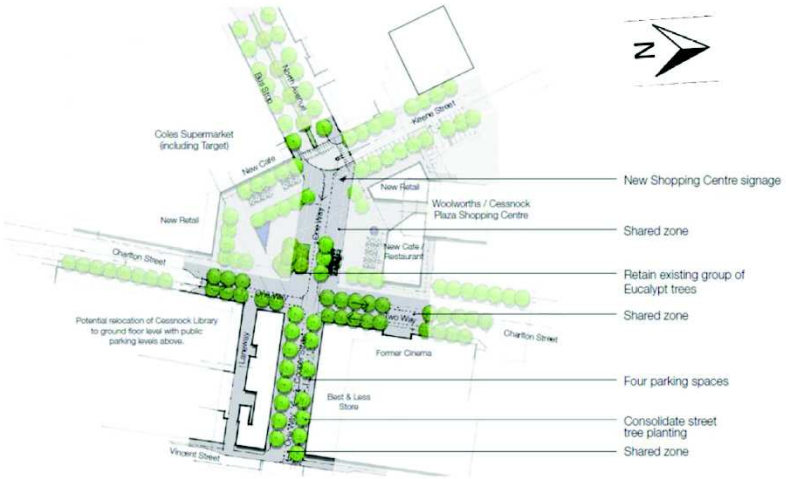


Figure 3.1: Phase 1, Town Square Shared Zone

3.2 PHASE 3

This phase involves the proposed upgrade of the existing carpark on the western side of Keene Street to a multi-level carpark with an additional 140 parking spaces. The proposed carpark would offset the potential loss of parking spaces on Cooper Street resulting from the implementation of the Town Square proposal. The proposed car park will also offset the loss of approximately 48 car parking spaces north of Cooper Street between Charlton Street and Keene Street due to the implementation of the Town Square proposal. Figure 3.2 shows the location of the proposed multi-level carpark.

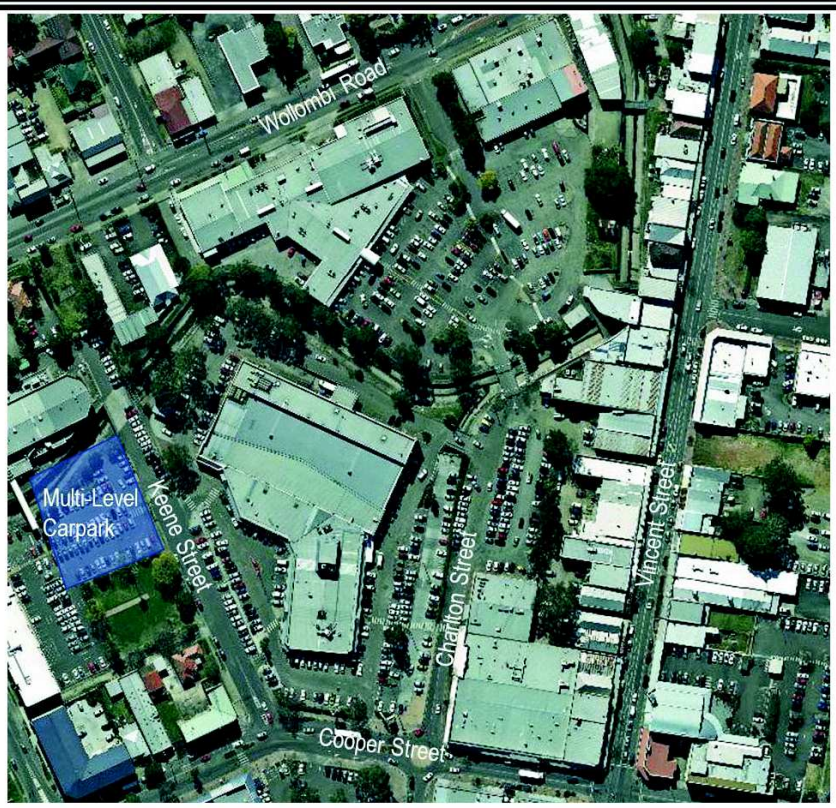


Figure 3.2: Phase 3 Carpark Location

3.3 PHASE 4

Phase 4 involves the proposed upgrade of the existing carpark on the eastern side of Charlton Street to a multi-level carpark with an additional 160 parking spaces. The proposed carpark would offset the potential loss of parking spaces on Cooper Street resulting from the implementation of the Town Square proposal. The proposed car park will also offset the loss of approximately 56 car parking spaces south of Cooper Street between Charlton Street and Keene Street due to the implementation of the Town Square proposal. Figure 3.3 shows the location of the proposed multi-level carpark. Changes to the signal phase timing at the intersection of Vincent Street / Hall Street was made to give additional green time to the Hall Street traffic movements.

Figure 3.3 Phase 3 Carpark Location

3.4 PHASE 5

As part of phase 5, it is proposed to extend Charlton Street all the way to Wollombi Road to form a fourth leg at the existing Allandale Road / Maitland Road / Wollombi Road intersection. The proposed Charlton Street extension will provide an alternative access to the car park spaces on Charlton Street via Maitland Road / Wollombi Road.

It was required to change the existing signal phasing arrangement at the intersection of Allandale Road, Maitland Road, Wollombi Road and Vincent Road. Figure 3.4 shows the proposed Charlton Street extension to Allandale Road.

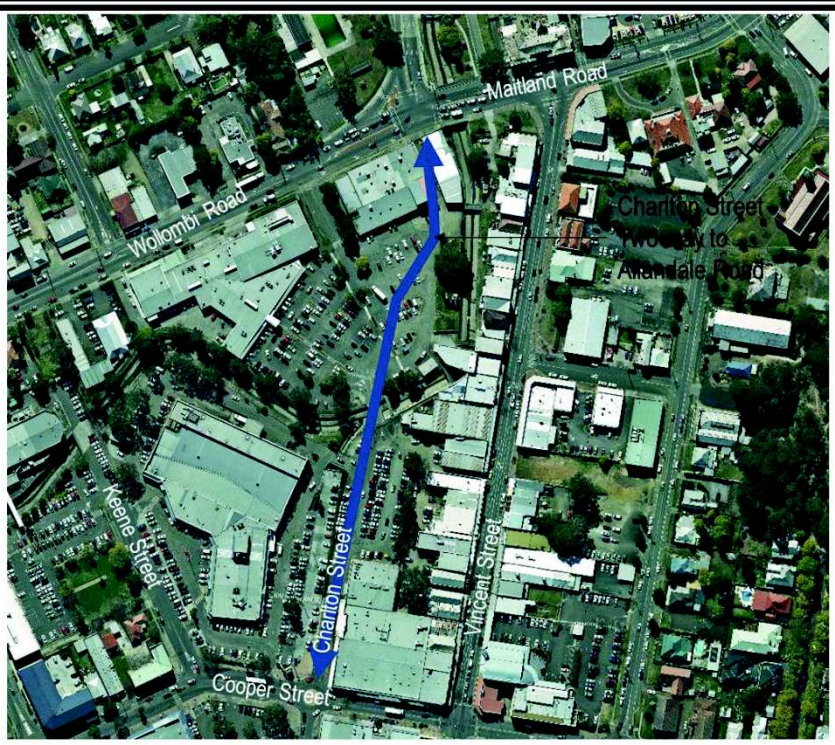


Figure 3.4: Charlton Street Two-way connection to Allandale Road

3.5 PHASE 6

This phase involves a southern inner city bypass connecting South Avenue/Snape Street in the east and James Street in the west. This would allow vehicles travelling between East and West to avoid the Cessnock City Centre. Figure 3.5 shows the proposed connection between South Avenue/Snape Street and James street.

Figure 3.5: Connection of South Street to James Street (Cessnock South)

3.6 OTHER MODIFICATIONS

During the course of the study the following improvement was identified:

- Reduction of green time on the eastbound Cooper Street at its intersection with Vincent Street. This was implemented in the model to attract less number of vehicular trips using the shared zone.

4. PHASE ASSESSMENT CRITERIA

The traffic performance of each phase was assessed and compared with the 2031 base case using the following three assessment criteria:

- traffic volumes;
- intersection level of service (LOS); and
- travel times.

4.1.1 Traffic Volumes

Traffic volumes at key intersections and along key routes for each of the proposed phases were compared with the 2031 base case.

4.1.2 Intersection Level of Service

Intersection level of service was assessed at 10 key intersections around the Cessnock City Centre. For priority intersections including roundabouts, intersections level of service was determined by the worst

approach delay, while for signalised intersections, level of service was determined through the average approach delay. Figure 4.1 shows the location of these 10 intersections. All four key intersections on Vincent Street were included in the assessment.

The intersection assessment summary is included in **Attachment A**.

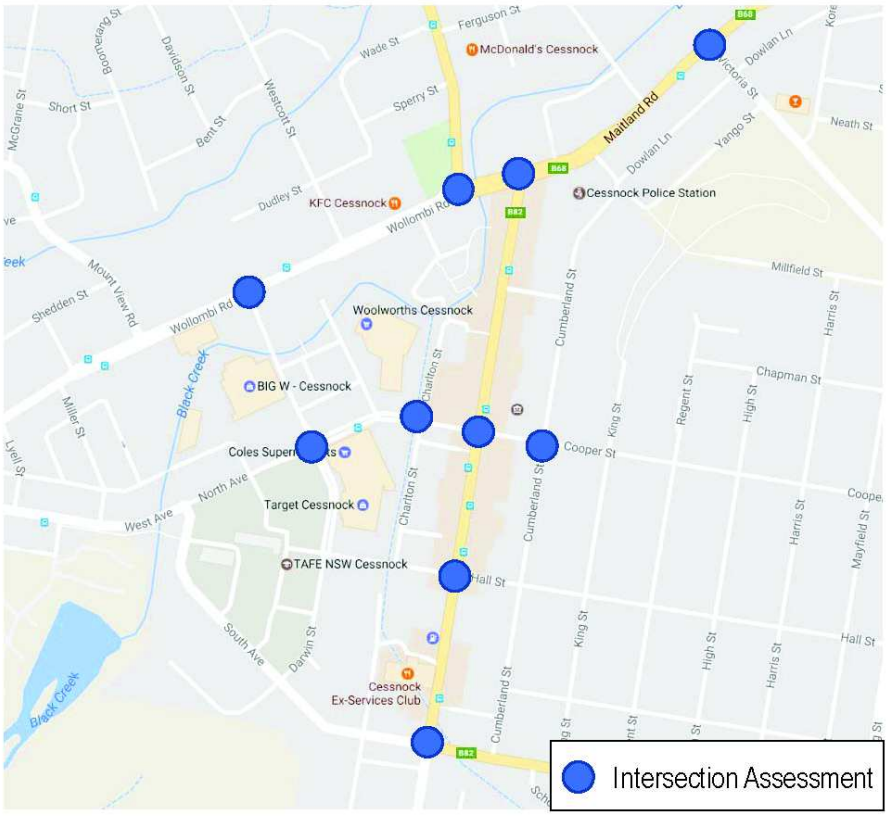


Figure 4.1: Intersections Included in the Impact Assessment

4.1.3 Travel Times

Travel times were assessed along 4 different routes around the Cessnock City Centre. The routes assessed were:

- North to South – Allandale Road to Aberdare Road Via Maitland Road and Vincent Street;
- East to West – Maitland Road / Victoria Street to Wollombi Road / Mount View Road;
- East to West – North Avenue / South Avenue to Cooper Street / Cumberland Street; and
- North to South – Wollombi Road / Darwin Street to Aberdare Road / Vincent Street.

Figure 4.2 shows the four travel times routes.

The travel time summary is included in **Attachment B**.

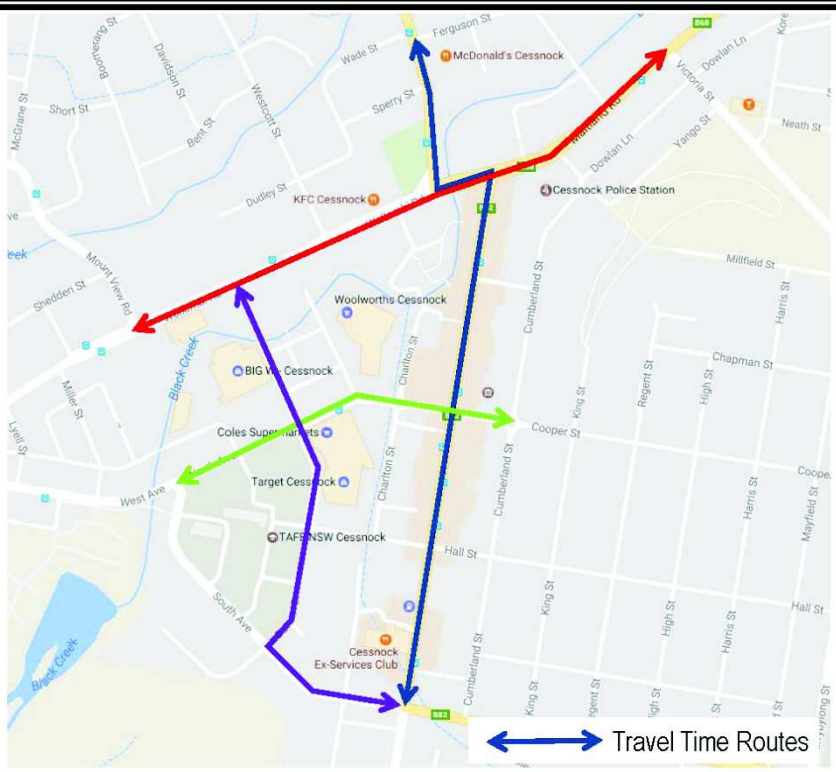


Figure 4.2: Travel Time Routes for Cessnock City Centre

5. ASSESSMENT RESULTS

5.1 OVERVIEW

As suggested by Cessnock City Council, Phase 1 and 2 were assessed together. Each of the remaining four phases was assessed as standalone phase. The assessment results are summarised below.

5.2 PHASE 1 & 2

5.2.1 Traffic Volume

The combined phase 1 and 2 is predicted to substantially alter traffic volumes at the following locations.

- the AM peak traffic volumes on the eastbound Cooper Street between Charlton Street and Vincent Street are predicted to reduce from 240 to 110 vehicles;
- during the PM peak, the eastbound traffic on Cooper Street will be reduced by 270 vehicles (from 390 to 120 vehicles), this represents a reduction of 70%. The reduction is due to proposed introduction of the shared zone and corresponding reduction of the posted speed limit to 10km/h. The slow speed environment will attract less vehicles on this section;
- the proposed extension of Keene Street to Wollombi Road is predicted to decrease eastbound traffic on Cooper Street between Darwin Street and Charlton Street. In the PM peak the eastbound traffic will be reduced by 255 vehicles, a decrease of 64%; and
- traffic at the intersection of Hall Street / Vincent Street will be increased by 270 vehicles during the PM peak, this represents an increase of 57%. The proposed closure of the westbound traffic on Cooper Street is predicted to divert majority of traffic to Hall Street.

Figure 5.1 shows the reduced traffic volumes on Cooper street and the increase in traffic along Hall Street due to the proposed town centre share zone.

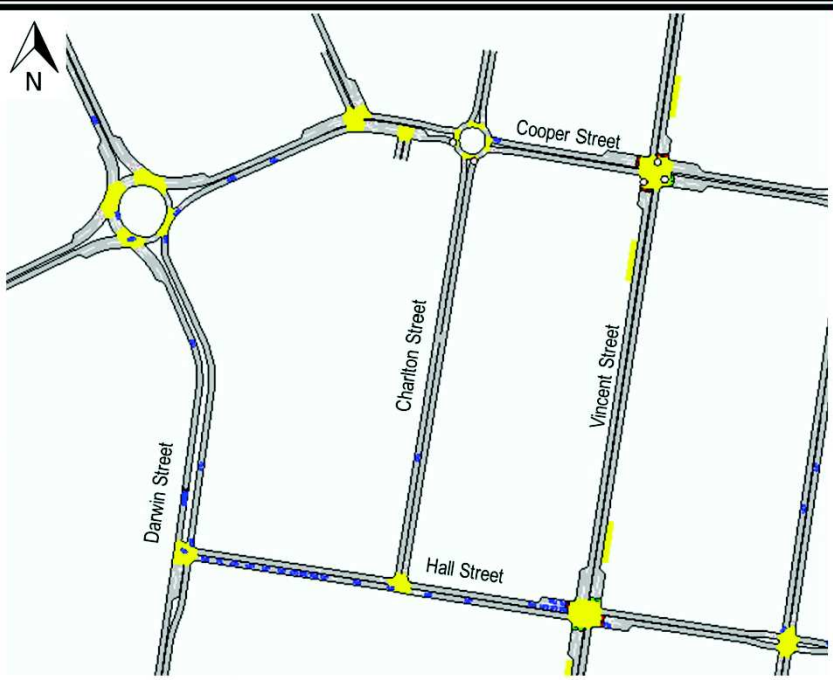


Figure 5.1: Phase 1 & 2 PM Town Centre

5.2.2 Intersection Assessment

The AM and PM peak intersection LoS results for Phase 1 & 2 are compared with the 2031 base case and presented in Table 5.1.

Table 5.1: Phase 1 & 2 LoS Results 2031 AM & PM

Intersection	AM		PM	
	Base Case	Phase 1 & 2	Base Case	Phase 1 & 2
Wollombi Road / Darwin Street	A (12)	A (14)	A (11)	A (13)
Wollombi Road / Maitland Road / Allandale Road	B (20)	B (18)	B (21)	B (19)
Maitland Road / Vincent Street	A (14)	A (13)	B (16)	B (16)
Maitland Road / Victoria Street	A (9)	A (7)	A (4)	A (6)
Darwin Street / North Avenue	A (8)	A (4)	A (10)	A (12)
Charlton Street / Cooper Street	A (10)	B (25)	A (6)	B (25)
Vincent Street / Cooper Street	B (29)	C (34)	C (33)	C (35)
Cooper Street / Cumberland Street	A (4)	A (3)	A (4)	A (3)
Vincent Street / Hall Street	B (15)	B (16)	B (16)	B (25)
Vincent Street / Aberdare Road / Snape Street	B (22)	B (23)	B (25)	B (27)

The assessment shows that during the AM and PM peak periods, the Charlton Street / Cooper Street intersection delays increase up to 19 seconds. The LoS is predicted to change from A to B. This is attributed to the introduction of shared zone and associated 10km/h speed limit along Cooper Street and Charlton Street. The intersection of Vincent Street / Cooper Street has a predicted LoS change from B to C with increase delay time of 5 seconds. This is attributed to the changed traffic signals.

Despite the predicted increase in traffic volumes at the Vincent Street / Hall Street intersection, the intersection would continue to operate at LoS B.

5.2.3 Travel Time

The proposed reduction of speed limit will increase the PM peak travel time along the eastbound Cooper Street between Charlton Street and Cumberland Street by 29 seconds as compared to the 2031 base scenario. This is shown graphically in Figure 5.2.

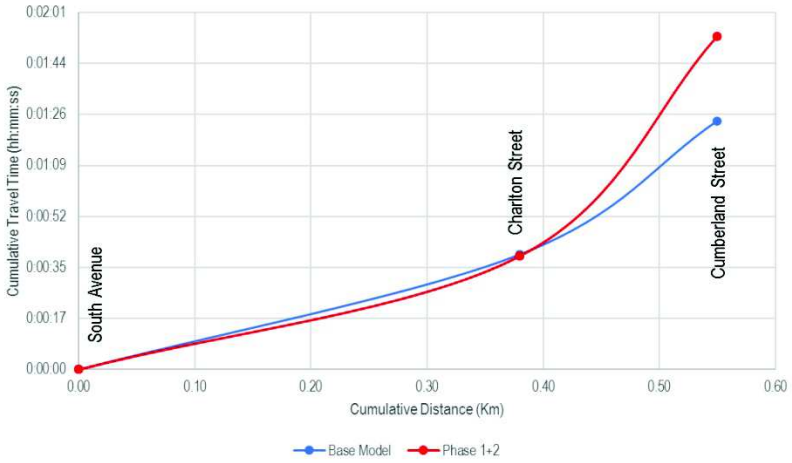


Figure 5.2: Cooper Street Eastbound Travel Time PM

Travel times on the other three routes are not predicted to changes significantly.

5.3 PHASE 1,2 & 3

5.3.1 Traffic Volumes

No significant redistribution of traffic volumes was observed due the proposed multi-level carpark on Keene Street compared to the Phase 1 & 2 scenario.

5.3.2 Intersection Assessment

The AM and PM peak LoS results for Phase 3 are compared to the Phase 1 & 2 scenario and presented in Table 5.2.

Table 5.2: Phase 3 LoS Results 2031 AM & PM

Intersection	AM		PM	
	Phase 1 & 2	Phase 1, 2 & 3	Phase 1 & 2	Phase 1, 2 & 3
Wollombi Road / Darwin Street	A (14)	A (13)	A (13)	A (13)
Wollombi Road / Maitland Road / Allandale Road	B (18)	B (18)	B (19)	B (19)
Maitland Road / Vincent Street	A (13)	A (13)	B (16)	B (15)
Maitland Road / Victoria Street	A (7)	A (7)	A (6)	A (6)
Darwin Street / North Avenue	A (4)	A (10)	A (12)	A (11)
Charlton Street / Cooper Street	B (25)	B (25)	B (25)	B (25)
Vincent Street / Cooper Street	C (34)	C (33)	C (35)	C (35)
Cooper Street / Cumberland Street	A (3)	B (3)	A (3)	A (4)
Vincent Street / Hall Street	B (16)	B (17)	B (25)	B (21)
Vincent Street / Aberdare Road / Snape Street	B (23)	B (23)	B (27)	B (26)

With the introduction of the multi-level on Keene Street there are no significant increases in delays predicted. The intersection of Vincent Street / Hall Street is predicted to see a decrease in delay time of 4seconds. All the key City Centre intersections would continue to operate at LoS between A and C.

5.3.3 Travel Time

The proposed reduction of speed limit will increase the PM peak travel time along the eastbound Cooper Street between Charlton Street and Cumberland Street by 34 seconds as compared to the 2031 base scenario, this is an increase of 5 seconds from the Phase 1 & 2 scenario.. This is shown graphically in Figure 5.3.

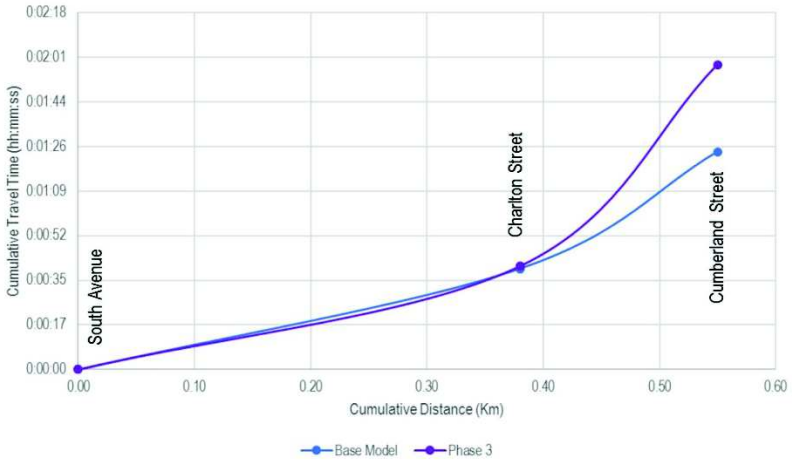


Figure 5.3: Cooper Street Eastbound Travel Time PM

Travel times on the other three routes are not predicted to changes significantly.

5.4 PHASE 1,2,3 & 4

5.4.1 Overview

The Town Square proposal will result in loss of approximately 56 parking spaces and the closure of the existing car park access in the south of Cooper Street between Charlton Street and Keene Street. The closure of the access is expected to result in additional traffic being diverted to Hall Street and Charlton Street south of Cooper Street.

5.4.2 Traffic Volume

The proposed multi-level carpark on Charlton Street is expected to contribute to an increase in traffic volumes at the following locations on Cooper Street:

- traffic volume on Hall Street eastbound between Charlton Street and Vincent Street is predicted to increase by 50 vehicles during the PM peak, representing a 16% increase, from the Phase 1,2, & 3 scenario. This is an increase of 170 vehicles from the base case during the PM peak, representing an increase of 105%. This is due to the increased capacity of the Charlton Street carpark combined with the shared zone around Cooper Street and Charlton Street; and
- traffic volume on Hall Street westbound between Cumberland Street and Vincent Street is predicted to increase by 130 vehicles during the PM peak, representing an 87% increase, from the Phase 1,2, & 3 scenario. This is an increase of 240 vehicles from the base case during the PM peak, representing an increase of 600%, as shown in Figure 5.4. This is due to the increased capacity of the Charlton Street carpark combined with the shared zone around Cooper Street and Charlton Street.

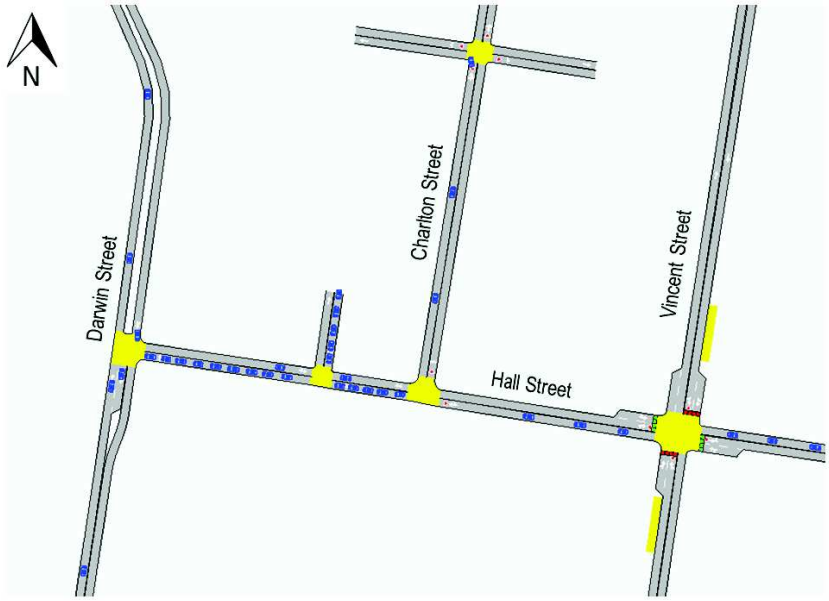


Figure 5.4: Hall Street PM Peak Traffic

5.4.3 Intersection Assessment

The AM and PM peak intersection LoS results for Phase 4 are compared with the Phase 1,2, & 3 scenario and presented in Table 5.3.

Table 5.3: Phase 4 LoS Results 2031 AM & PM

Intersection	AM		PM	
	Phase 1, 2 & 3	Phase 1, 2,3 & 4	Phase 1, 2 & 3	Phase 1, 2, 3 &4
Wollombi Road / Darwin Street	A (13)	A (13)	A (13)	A (11)
Wollombi Road / Maitland Road / Allandale Road	B (18)	B (17)	B (19)	B (16)
Maitland Road / Vincent Street	A (13)	A (11)	B (15)	B (17)
Maitland Road / Victoria Street	A (7)	B (17)	A (6)	A (7)
Darwin Street / North Avenue	A (10)	A (11)	A (11)	A (9)
Charlton Street / Cooper Street	B (25)	B (26)	B (25)	B (25)
Vincent Street / Cooper Street	C (33)	C (31)	C (35)	C (37)
Cooper Street / Cumberland Street	A (3)	A (4)	A (4)	A (4)
Vincent Street / Hall Street	B (17)	B (16)	B (21)	B (21)
Vincent Street / Aberdare Road / Snape Street	B (23)	B (24)	B (26)	B (24)

The intersection assessment shows an increase in delay at the Maitland Road / Victoria Street intersection of 10 seconds. This results in a predicted LoS change from A to B. During the PM there is no significant changes to intersection performance due to the new Charlton Street carpark.

5.4.4 Travel Time

Travel time results show that traffic on Cooper Street will experience a substantial increase in travel times:

- the eastbound traffic would experience an increase of around 33 seconds during the PM peak compared to the base case, similar to Phase 1,2, & 3 scenario, as seen in Figure 5.5.

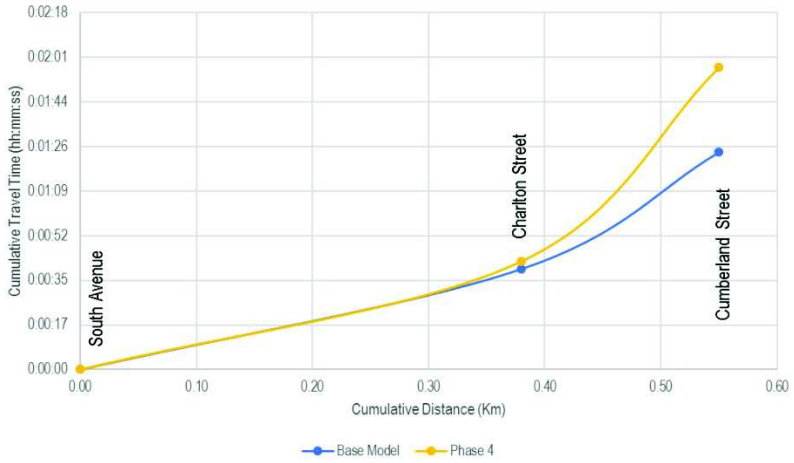


Figure 5.5: Cooper Street Eastbound Travel Time PM

5.5 PHASE 5

5.5.1 Overview

As part of the 2031 base case assessment, a signalised intersection was assumed on Wollombi Road just to the west of its intersection with Allandale Road. For the purpose of this assessment, it was assumed that the signalised intersection would be replaced by the proposed Charlton Street link.

The traffic signal phase arrangement at the Wollombi Road / Allandale Road / Maitland Road / Vincent Road was modified to incorporate the new Charlton Street link. A new phase was introduced to service vehicles on the link.

5.5.2 Traffic Volume

No significant redistribution of traffic volumes was observed due the proposed new connection of Charlton Street to Allandale Road. The Charlton Street link is predicted to service approximately 65 vehicles during the AM peak and 160 vehicles during the PM peak.

5.5.3 Intersection Assessment

The AM and PM peak intersection LoS results for Phase 5 are compared with the 2031 and presented in Table 5.4.

Table 5.4: Phase 5 LoS Results AM & PM

Intersection	AM		PM	
	Base Case	Phase 5	Base Case	Phase 5
Wollombi Road / Darwin Street	A (12)	A (13)	A (11)	A (14)
Wollombi Road / Maitland Road / Allandale Road	B (20)	B (26)	B (21)	B (24)
Maitland Road / Vincent Street	A (14)	B (18)	B (16)	B (25)
Maitland Road / Victoria Street	A (9)	A (5)	A (4)	A (2)
Darwin Street / North Avenue	A (9)	A (9)	A (10)	A (11)
Charlton Street / Cooper Street	A (10)	A (8)	A (6)	A (7)
Vincent Street / Cooper Street	B (29)	B (26)	C (33)	C (35)
Cooper Street / Cumberland Street	C (30)	C (38)	C (31)	C (38)
Vincent Street / Hall Street	B (15)	B (15)	B (16)	B (17)
Vincent Street / Aberdare Road / Snape Street	B (22)	B (21)	B (25)	B (25)

The proposed introduction of Charlton Street connection to Allandale Road is predicted to result in an increase in traffic delays at the Wollombi Road / Allandale Road / Maitland Road / Vincent Road intersection during both in the AM and PM peak periods:

- traffic at the Maitland Road / Vincent Street intersection would experience an increase of average delay during the peak periods of up to 9 seconds. Despite increase in delays, the intersection would continue to operate at LoS B; and
- traffic at the Wollombi Road / Maitland Road / Allandale Road intersection would experience an increase of average delay of 6 seconds during the AM peak. LoS will change from A to B.

5.5.4 Travel Time

Travel time results show an increase in the PM peak eastbound travel times along Wollombi Road / Maitland Road by up to 24 seconds. This is shown graphically in Figure 5.6. The increase is primarily between Mount View Road and Allandale Road. This is attributed to additional delays at the Wollombi Road / Maitland Road / Allandale Road intersection as a result of the introduction of the additional phase in the traffic signal to service the traffic at the Charlton Street connection.

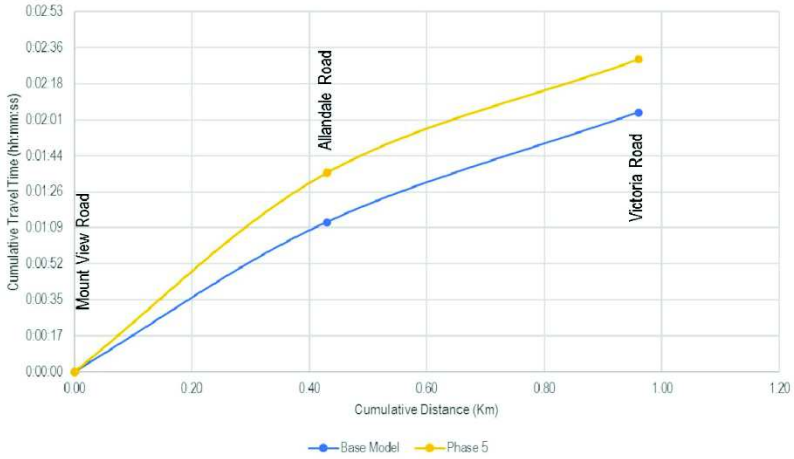


Figure 5.6: Wollombi Road / Maitland Road Travel Time Comparison PM Peak

5.6 PHASE 6

5.6.1 Overview

Figure 5.7 shows the location of the proposed southern inner city bypass.

5.6.2 Traffic Volume

It is predicted that during the AM peak approximately 300 vehicles would use the southern city bypass. In the PM peak this will increase to 360 vehicles.

The proposed bypass is predicted to reduce the PM peak westbound traffic volumes on North Avenue by 55 vehicles (or 10%).

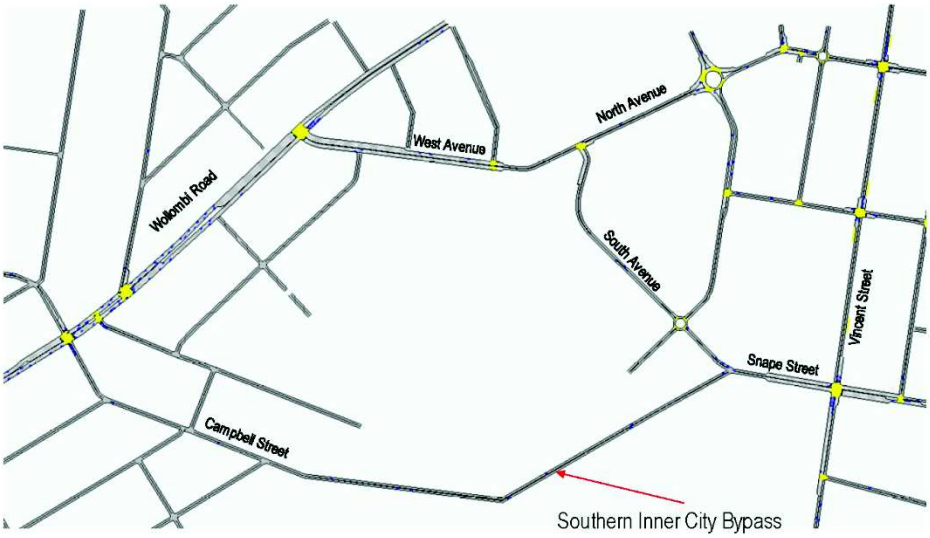


Figure 5.7: The proposed Southern Inner City Bypass

5.6.3 Intersection Assessment

The AM and PM peak LoS results for Phase 6 are compared with the 2031 scenario and presented in Table 5.5.

Table 5.5: Phase 6 LoS Results AM & PM

Intersection	AM		PM	
	Base Case	Phase 6	Base Case	Phase 6
Wollombi Road / Darwin Street	A (12)	A (13)	A (11)	A (10)
Wollombi Road / Maitland Road / Allandale Road	B (20)	B (19)	B (21)	B (17)
Maitland Road / Vincent Street	A (14)	A (14)	B (16)	B (17)
Maitland Road / Victoria Street	A (9)	B (18)	A (4)	A (4)
Darwin Street / North Avenue	A (9)	A (8)	A (10)	A (10)
Charlton Street / Cooper Street	A (10)	A (6)	A (6)	A (6)
Vincent Street / Cooper Street	B (29)	B (28)	C (33)	C (35)
Cooper Street / Cumberland Street	C (30)	C (33)	C (31)	C (34)
Vincent Street / Hall Street	B (15)	B (15)	B (16)	B (16)
Vincent Street / Aberdare Road / Snape Street	B (22)	B (22)	B (25)	B (24)

The proposed southern inner city by-pass is predicted to result in similar intersection performance as compared to the 2031 base case scenario.

5.6.4 Travel Time

The travel time results show no significant changes due to the proposed by-pass.

5.7 SHARED ZONE TRAFFIC VOLUMES

A summary of the predicted traffic volumes for the town centre shared zone up to Phase 4 can be seen in Figure 5.8 and Table 5.6.

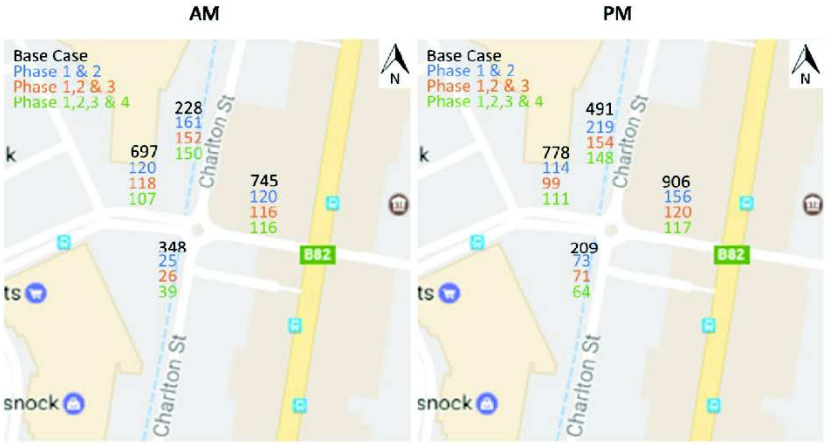


Figure 5.8: Town Centre Shared Zone Traffic Volumes

Table 5.6: Town Centre Shared Zone Traffic Volumes

	AM				PM			
	Base Case	Phase 1 & 2	Phase 1,2 & 3	Phase 1,2,3 & 4	Base Case	Phase 1 & 2	Phase 1,2 & 3	Phase 1,2,3 & 4
Cooper Street between Keene Street and Charlton Street	697	120	118	107	778	114	99	111
Cooper Street between Charlton Street and Vincent Street	745	120	116	116	906	156	120	117
Charlton Street north of Cooper Street	228	161	152	150	491	219	154	148
Charlton Street between Cooper Street and Car Park Exit	348	25	26	39	209	73	71	64

6. SUMMARY AND CONCLUSIONS

Cessnock City Council has commissioned Bitzios Consulting to undertake traffic assessment of several traffic management and parking improvement measures that are identified to improve accessibility and parking within the Cessnock City Centre. This technical note summarises the findings of the assessment.

As part of the Cessnock Commercial Precinct upgrade, a total of six phases have been identified containing one or more traffic management and parking improvement measures. As instructed by Cessnock City Council, Phase 1 and 2 were assessed together then Phase 3 and 4 added sequentially, Phase 5 and Phase were assessed as individual cases.

The assessment was undertaken for the 2031 traffic conditions. For the purposed of this assessment, the 2031 proposed road network was adopted. The 2031 proposed network includes a number key improvements in and around the city centre including Wollombi Road upgrade to four-lane, a signalised intersection just the west of Allandale Road / Maitland Road intersection and an outer CBD bypass.

A simple three-stage methodology was adopted for undertaking the traffic assessment. The Aimsun 'Hybrid Modelling' feature was utilised to assess the traffic performance of the proposed traffic management measures.

The traffic performance of each phase was assessed and compared with the 2031 base case using the following three assessment criteria: traffic volumes, intersection LoS and travel times.

Phase 1 and 2

Traffic volumes on the eastbound Cooper Street are predicted to reduce due to the introduction of shared zone and the associated 10km/h speed zone. In the AM peak, the traffic volumes would reduce from 240 to 110 vehicles. In the PM peak, it would reduce from 390 to 120 vehicles.

The proposed Keene Street extension to Wollombi Road would reduce the eastbound traffic volumes on Cooper Street between Darwin Street and Charlton Street by 255 vehicles.

The proposed closure of the westbound traffic on Cooper Street is predicted to divert majority of traffic to the Vincent Street / Hall Street intersection.

The average delay at the Charlton Street / Cooper Street intersection would increase up to 19 seconds. The LoS is predicted to change from A to B.

The proposed reduction of speed limit will increase the PM peak travel time along the eastbound Cooper Street between Charlton Street and Cumberland Street by 29 seconds as compared to the 2031 base scenario.

Phase 1,2 & 3

No significant redistribution of traffic volumes was observed due the proposed multi-level carpark on Keene Street. Generally, the intersection delays and travel times would remain similar to the Phase 1 and 2 scenario.

Phase 1,2,3 & 4

The Town Square proposal will result in loss of approximately 56 parking spaces and the closure of the existing car park access in the south of Cooper Street between Charlton Street and Keene Street.

The proposed car park additions combined with the shared zone along cooper street would increase traffic on Hall Street eastbound by 50 vehicles during the PM peak compared to the Phase 1,2 & 3 scenario and an increase of 170 vehicles from the base case.

The proposed car park additions combined with the shared zone along cooper street would increase traffic on Hall Street westbound by 130 vehicles during the PM peak compared to the Phase 1,2 & 3 scenario and an increase of 240 vehicles from the base case.

The average delay at the Maitland Road / Victoria Street intersection would increase up to 10 seconds. The LoS is predicted to change from A to B.

Phase 5

The Charlton Street link is predicted to service approximately 65 vehicles during the AM peak and 160 vehicles during the PM peak.

Traffic at the Wollombi Road / Allandale Road / Maitland Road / Vincent Road intersection would experience additional delays both in the AM and PM peak periods. The eastbound travel times along Wollombi Road / Maitland Road would go up to 24 seconds. This is attributed to additional delays at the Wollombi Road / Maitland Road / Allandale Road intersection as a result of the introduction of an additional phase in the traffic signal to service the traffic at the Charlton Street connection.

Phase 6

It is predicted that during the AM peak approximately 300 vehicles would use the southern city bypass. In the PM peak this will increase to 360 vehicles.

The proposed bypass is predicted to reduce the PM peak westbound traffic volumes on North Avenue by 55 vehicles (or 10%).

The proposed southern inner city by-pass is predicted to result in similar intersection performance as compared to the 2031 base case scenario with the travel time results show no significant changes.

ATTACHMENT A

INTERSECTION ASSESSMENT SUMMARY

P2225 Cessnock Phasing Comparison

AIMSUN Turn Comparison

AM Peak

							Base Model			Phase 1+2			Phase 1, 2 & 3			Phase 1, 2, 3 & 4			Phase 5			Phase 6		
Time	ID	Intersection	Aimsun Code	From	To	Turn	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS
		Wollombi Road		Wollombi Road (E)	Wollombi Road (W)	T	510	20	B	491	24	B	483	23	B	487	23	B	442	24	B	492	23	B
		Darwin Street			Darwin Street (S)	L	274	20	B	258	20	B	242	22	B	228	22	B	242	21	B	287	21	B
				Darwin Street (S)	Wollombi Road (E)	R	242	20	B	204	21	B	198	19	B	218	20	B	204	19	B	258	19	B
					Wollombi Road (W)	L	213	1	A	195	2	A	199	2	A	195	2	A	230	2	A	228	2	A
				Wollombi Road (W)	Darwin Street (S)	R	124	17	B	180	23	B	191	20	B	159	19	B	138	18	B	142	15	B
					Wollombi Road (E)	T	702	3	A	722	3	A	699	3	A	729	3	A	647	4	A	754	3	A
				All			2065	12.03	A	2050	13.59	A	2012	13.24	A	2016	13.10	A	1903	13.25	A	2161	12.60	A
		Wollombi Road	130959	Allandale Road (N)	Wollombi Road (W)	R	378	49	D	354	43	D	345	40	C	337	35	C	242	59	E	352	47	D
		Maitland Road	2430241		Charlton Street (S)	T	0	0	A	0	0	A	0	0	A	0	0	A	125	76	F	0	0	A
		Allandale Road	130960		Maitland Road (E)	L	211	26	B	180	22	B	230	22	B	238	17	B	146	55	D	231	20	B
		Charlton Street	130962	Maitland Road (E)	Allandale Road (N)	R	102	25	B	168	27	B	176	27	B	123	28	B	126	32	C	108	25	B
			130961		Wollombi Road (W)	T	543	3	A	598	3	A	602	3	A	574	3	A	352	4	A	562	3	A
			2430240		Charlton Street (S)	L	0	0	A	0	0	A	0	0	A	0	0	A	149	4	A	0	0	A
			2430244	Charlton Street (S)	Maitland Road (E)	R	0	0	A	0	0	A	0	0	A	0	0	A	31	44	D	0	0	A
			2430243		Allandale Road (N)	T	0	0	A	0	0	A	0	0	A	0	0	A	23	59	E	0	0	A
			2430242		Wollombi Road (W)	L	0	0	A	0	0	A	0	0	A	0	0	A	13	41	C	0	0	A
			2430239	Wollombi Road (W)	Charlton Street (S)	R	0	0	A	0	0	A	0	0	A	0	0	A	6	150	F	0	0	A
			130963		Maitland Road (E)	T	703	21	B	704	20	B	699	20	B	715	21	B	637	20	B	745	21	B
			130965		Allandale Road (N)	L	221	3	A	190	3	A	194	3	A	214	3	A	239	2	A	233	3	A
				All			2158	20.09	B	2194	18.30	B	2246	17.78	B	2201	16.62	B	2089	26.47	B	2231	18.49	B
		Maitland Road	130939	Maitland Road (E)	Maitland Road (W)	T	502	23	B	633	22	B	632	21	B	543	19	B	498	38	C	527	22	B
		Vincent Street	130938		Vincent Street (S)	L	83	21	B	24	20	B	22	22	B	27	12	A	26	31	C	60	18	B
			130930	Vincent Street (S)	Maitland Road (E)	R	128	32	C	76	32	C	79	32	C	34	28	B	77	48	D	128	31	C
			130929		Maitland Road (W)	L	143	13	A	136	10	A	149	10	A	155	12	A	131	9	A	143	12	A
			130934	Maitland Road (W)	Vincent Street (S)	R	181	19	B	142	16	B	146	18	B	127	17	B	164	13	A	194	20	B
			130935		Maitland Road (E)	T	731	2	A	742	3	A	782	3	A	825	3	A	647	3	A	779	4	A
				All			1768	13.75	A	1753	12.93	A	1810	12.80	A	1711	10.63	A	1543	18.40	B	1831	13.55	A
		Maitland Road	131267	Maitland Road (E)	Maitland Road (W)	T	751	5	A	793	2	A	783	3	A	789	16	B	654	2	A	754	13	A
		Victoria Street	131268		Victoria Street (S)	L	7	8	A	5	5	A	5	4	A	5	19	B	3	4	A	7	18	B
			131269	Victoria Street (S)	Maitland Road (E)	R	10	29	C	6	45	D	6	58	E	3	32	C	13	15	B	13	98	F
			131270		Maitland Road (W)	L	93	21	B	89	17	B	81	13	A	91	43	C	71	10	A	84	59	E
			131266	Maitland Road (W)	Victoria Street (S)	R	69	17	B	59	17	B	55	20	B	54	28	B	46	17	B	61	28	B
			131265		Maitland Road (E)	T	784	11	A	759	9	A	799	10	A	760	15	B	706	7	A	812	17	B
				All			1714	9.19	A	1711	6.69	A	1729	7.33	A	1702	17.48	B	1493	5.22	A	1731	18.28	B
		Darwin Street	106-1	Darwin Street (N)	North Avenue (W)	R	77	5	A	43	6	A	48	5	A	45	5	A	70	3	A	31	6	A
		North Avenue	106-2		Darwin Street (S)	T	223	5	A	324	8	A	323	7	A	288	7	A	206	5	A	268	7	A
			2420208		North Avenue (E)	L	123	2	A	84	2	A	67	1	A	68	1	A	124	2	A	126	2	A
			106-4	North Avenue (E)	Darwin Street (N)	R	112	7	A	21	9	A	26	10	A	27	11	A	101	22	B	102	8	A
			106-5		North Avenue (W)	T	137	5	A	23	11	A	26	9	A	26	9	A	100	5	A	105	8	A
			2420214		Darwin Street (S)	L	348	0	A	532	0	A	532	0	A	547	0	A	308	0	A	359	0	A
			106-7	Darwin Street (S)	North Avenue (E)	R	2	1	A	42	2	A	37	2	A	30	2	A	2	1	A	28	2	A
			106-8		Darwin Street (N)	T	220	5	A	272	2	A	264	2	A	275	2	A	215	16	B	270	3	A
			2420216		North Avenue (W)	L	23	3	A	92	2	A	94	3	A	99	2	A	17	4	A	9	4	A
			106-10	North Avenue (W)	Darwin Street (S)	R	24	8	A	205	7	A	205	7	A	257	7	A	19	14	A	91	7	A
			106-11		North Avenue (E)	T	290	4	A	93	5	A	83	4	A	83	5	A	236	14	A	273	5	A
			2420206		Darwin Street (N)	L	142	3	A	141	1	A	163	2	A	167	2	A	131	3	A	141	2	A
				All			1721	8.04	A	1872	3.53	A	1868	9.51	A	1912	10.91	A	1529	21.56	B	1803	8.36	A
		Charlton Street	CE 19-1	Charlton Street (N)	Cooper Street (W)	R	28	2	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	34	2	A
		Cooper Street	CE 19-2		Charlton Street (S)	T	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	2	0	A
			CE 19-3		Cooper Street (E)	L	63	1	A	68	10	A	62	10	A	60	10	A	27	2	A	66	1	A
			CE 19-4	Cooper Street (E)	Charlton Street (N)	R	52	10	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	38	7	A	69	6	A
			CE 19-5		Cooper Street (W)	T	127	9	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	106	7	A	108	6	A
			CE 19-6		Charlton Street (S)	L	154	9	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	162	8	A	72	6	A
			CE 19-7	Charlton Street (S)	Cooper Street (E)	R	39	2	A	17	24	B	17	24	B	25	21	B	52	3	A	25	2	A
			CE 19-8		Charlton Street (N)	T	4	4	A	8	25	B	9	25	B	14	26	B	7	3	A	6	4	A

P2225 Cessnock Phasing Comparison

AIMSUN Turn Comparison

AM Peak

1

							Base Model			Phase 1+2			Phase 1, 2 & 3			Phase 4			Phase 5			Phase 6		
Time	ID	Intersection	Aimsun Code	From	To	Turn	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS
			CE19-9		Cooper Street (W)	L	4	7	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	1	3	A	10	3	A
			CE19-10	Cooper Street (W)	Charlton Street (S)	R	147	4	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	123	4	A	63	4	A
			CE19-11		Cooper Street (E)	T	310	3	A	35	6	A	37	6	A	31	5	A	279	3	A	263	3	A
			CE19-12		Charlton Street (N)	L	81	4	A	85	15	A	81	15	B	76	15	B	3	2	A	88	4	A
				All			1009	9.93	A	213	25.38	B	206	24.73	B	206	26.06	B	798	8.16	A	806	6.29	A
		Vincent Street	130992	Vincent Street (N)	Cooper Street (W)	R	104	36	C	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	39	29	C	84	35	C
		Cooper Street	130990		Vincent Street (S)	T	127	31	C	112	21	B	115	21	B	108	19	B	123	25	B	127	33	C
			130991		Cooper Street (E)	L	27	35	C	31	27	B	31	27	B	27	19	B	29	25	B	36	41	C
			130994	Cooper Street (E)	Vincent Street (N)	R	26	30	C	28	23	B	38	28	B	6	23	B	35	30	C	28	25	B
			130995		Cooper Street (W)	T	145	24	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	166	28	B	153	24	B
			130993		Vincent Street (S)	L	34	22	B	98	29	B	75	22	B	118	24	B	42	27	B	27	20	B
			130988	Vincent Street (S)	Cooper Street (E)	R	2	48	D	6	36	C	6	26	B	4	32	C	3	26	B	0	-1	#N/A
			130987		Vincent Street (N)	T	103	23	B	143	25	B	147	24	B	107	21	B	136	23	B	99	23	B
			130989		Cooper Street (W)	L	10	27	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	13	17	B	12	21	B
			130996	Cooper Street (W)	Vincent Street (S)	R	2	26	B	21	65	E	23	66	E	14	69	E	1	65	E	4	40	C
			130998		Cooper Street (E)	T	90	27	B	54	67	E	46	67	E	42	62	E	107	28	B	84	26	B
			130997		Vincent Street (N)	L	149	31	C	38	68	E	40	70	F	54	60	E	36	28	B	146	29	B
				All			819	28.80	B	531	34.01	C	521	32.52	C	480	30.63	C	730	26.45	B	800	28.19	B
		Cumberland Street	CE20-1	Cumberland Street (N)	Cooper Street (W)	R	0	-1	#N/A	74	2	A	72	2	A	94	3	A	0	-1	#N/A	72	26	B
		Cooper Street	CE20-2		Cumberland Street (S)	T	212	3	A	235	2	A	222	2	A	293	3	A	197	4	A	150	4	A
			CE20-3		Cooper Street (E)	L	232	3	A	265	2	A	250	2	A	322	3	A	24	5	A	27	6	A
			CE20-4	Cooper Street (E)	Cumberland Street (N)	R	21	3	A	41	3	A	41	3	A	42	3	A	9	3	A	23	4	A
			CE20-5		Cooper Street (W)	T	54	3	A	81	3	A	57	3	A	71	4	A	31	24	B	112	25	B
			CE20-6		Cumberland Street (S)	L	56	4	A	97	3	A	81	3	A	79	4	A	1	3	A	15	4	A
			CE20-7	Cumberland Street (S)	Cooper Street (E)	R	1	2	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	1	2	A	1	3	A
			CE20-8		Cumberland Street (N)	T	151	2	A	152	3	A	143	3	A	178	3	A	186	4	A	114	5	A
			CE20-9		Cooper Street (W)	L	201	2	A	164	3	A	170	3	A	182	3	A	48	25	B	24	33	C
			CE20-10	Cooper Street (W)	Cumberland Street (S)	R	54	4	A	39	3	A	32	3	A	30	3	A	54	6	A	45	5	A
			CE20-11		Cooper Street (E)	T	123	4	A	72	3	A	65	3	A	58	3	A	77	6	A	48	5	A
			CE20-12		Cumberland Street (N)	L	142	4	A	91	3	A	83	3	A	74	3	A	18	6	A	27	5	A
				All			1247	4.22	A	1311	3.06	A	1216	3.37	A	1423	3.99	A	646	25.05	B	658	32.52	C
		Vincent Street	134967	Vincent Street (N)	Hall Street (W)	R	35	13	A	121	16	B	99	15	B	132	22	B	39	14	A	31	13	A
		Hall Street	134965		Vincent Street (S)	T	127	8	A	109	11	A	114	9	A	105	14	A	127	10	A	126	7	A
			134966		Hall Street (E)	L	1	17	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	1	17	B
			134972	Hall Street (E)	Vincent Street (N)	R	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A
			134973		Hall Street (W)	T	105	22	B	102	24	B	123	23	B	186	16	B	120	20	B	85	20	B
			134971		Vincent Street (S)	L	6	24	B	9	29	C	9	27	B	13	19	B	14	18	B	6	32	C
			134963	Vincent Street (S)	Hall Street (E)	R	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A
			134962		Vincent Street (N)	T	99	9	A	124	9	A	126	9	A	107	14	A	127	9	A	99	10	A
			134964		Hall Street (W)	L	54	9	A	45	11	A	52	10	A	0	-1	#N/A	48	10	A	41	14	A
			134968	Hall Street (W)	Vincent Street (S)	R	10	36	C	11	34	C	11	49	D	11	24	B	9	32	C	11	31	C
			134970		Hall Street (E)	T	100	23	B	145	20	B	150	22	B	186	14	A	93	23	B	90	22	B
			134969		Vincent Street (N)	L	17	26	B	30	21	B	33	22	B	9	14	A	26	21	B	12	27	B
				All			554	15.34	B	696	16.29	B	717	16.55	B	749	16.10	B	603	15.33	B	502	14.78	A
		Vincent Street	134983	Vincent Street (N)	Snape Street (W)	R	9	17	B	12	25	B	8	31	C	14	24	B	4	17	B	9	18	B
		Aberdare Street	134981		Vincent Street (S)	T	61	19	B	61	23	B	65	24	B	58	24	B	66	15	B	69	25	B
		Snape Street	134982		Aberdare Street (E)	L	60	6	A	43	7	A	47	7	A	44	6	A	55	7	A	48	5	A
			134979	Aberdare Street (E)	Vincent Street (N)	R	79	25	B	56	22	B	62	21	B	26	21	B	86	23	B	55	24	B
			134980		Snape Street (W)	T	149	22	B	177	24	B	177	25	B	145	22	B	188	23	B	180	23	B
			134978		Vincent Street (S)	L	116	31	C	122	31	C	112	30	C	120	29	B	126	31	C	117	32	C
			134975	Vincent Street (S)	Aberdare Street (E)	R	94	29	C	110	30	C	110	29	C	111	29	B	86	28	B	91	25	B
			134976		Vincent Street (N)	T	88	23	B	125	23	B	126	24	B	100	23	B	88	23	B	95	18	B
			134977		Snape Street (W)	L	113	13	A	134	14	A	136	14	A	115	15	B	196	12	A	107	13	A
			134984	Snape Street (W)	Vincent Street (S)	R	57	30	C	50	24	B	54	26	B	54	30	C	54	22	B	57	29	B
			134985		Aberdare Street (E)	T	112	21	B	196	24	B	197	24	B	186	27	B	131	23	B	171	23	B

P2225 Cessnock Phasing Comparison

AIMSUN Turn Comparison

AM Peak

							Base Model			Phase 1+2			Phase 1, 2 &			Phase 1, 2, 3 & 4			Phase 5			Phase 6		
1																								
Time	ID	Intersection	Aimsun Code	From	To	Turn	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS
			134086	Vincent Street (N)		L	0	-1	#N/A	1	19	B	1	19	B	1	19	B	2	19	B	0	-1	#N/A
				All			938	22.28	B	1087	23.27	B	1095	23.27	B	974	23.77	B	1082	21.06	B	989	22.13	B

P2225 Cessnock Phasing Comparison

AIMSUN Turn Comparison

PM Peak

1

							Base Model			Phase 1+2			Phase 1, 2 & 3			Phase 1, 2, 3 & 4			Phase 5			Phase 6		
Time	ID	Intersection	Aimsun Code	From	To	Turn	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS
		Wollombi Road	[illegible]	Wollombi Road (E)	Wollombi Road (W)	T	669	9	A	677	12	A	680	14	A	566	10	A	652	19	B	653	8	A
		Darwin Street	[illegible]		Darwin Street (S)	L	313	14	A	320	17	B	331	18	B	307	15	B	259	16	B	326	11	A
			[illegible]	Darwin Street (S)	Wollombi Road (E)	R	294	24	B	380	23	B	367	23	B	422	21	B	290	24	B	296	25	B
			[illegible]		Wollombi Road (W)	L	388	2	A	377	2	A	383	1	A	344	1	A	324	2	A	366	2	A
			[illegible]	Wollombi Road (W)	Darwin Street (S)	R	170	34	C	151	26	B	156	26	B	103	21	B	139	33	C	169	32	C
			[illegible]		Wollombi Road (E)	T	506	3	A	550	8	A	550	8	A	614	8	A	499	3	A	520	3	A
				All			2330	10.79	A	2455	12.63	A	2467	13.24	A	2379	11.21	A	2162	14.14	A	2330	10.37	A
		Wollombi Road	120855	Allandale Road (N)	Wollombi Road (W)	R	398	49	D	402	48	D	411	45	D	339	36	C	218	43	D	366	34	C
		Maitland Road	2429406		Charlton Street (S)	T	0	0	A	0	0	A	0	0	A	0	0	A	101	46	D	0	0	A
		Allandale Road	120869		Maitland Road (E)	L	188	19	B	161	17	B	157	18	B	145	15	A	140	29	C	172	15	A
		Charlton Street	120862	Maitland Road (E)	Allandale Road (N)	R	149	22	B	119	29	B	122	28	B	102	22	B	161	34	C	169	23	B
			120861		Wollombi Road (W)	T	549	3	A	661	4	A	654	4	A	669	4	A	474	5	A	585	3	A
			2429405		Charlton Street (S)	L	0	0	A	0	0	A	0	0	A	0	0	A	157	8	A	0	0	A
			2429409	Charlton Street (S)	Maitland Road (E)	R	0	0	A	0	0	A	0	0	A	0	0	A	66	75	F	0	0	A
			2429429		Allandale Road (N)	T	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A
			2429407		Wollombi Road (W)	L	0	0	A	0	0	A	0	0	A	0	0	A	95	53	D	0	0	A
			2429404	Wollombi Road (W)	Charlton Street (S)	R	0	0	A	0	0	A	0	0	A	0	0	A	2	75	F	0	0	A
			120863		Maitland Road (E)	T	537	26	B	604	22	B	621	23	B	616	25	B	540	26	B	554	25	B
			120865		Allandale Road (N)	L	205	3	A	230	2	A	225	2	A	317	3	A	227	3	A	202	2	A
				All			2026	20.85	B	2177	19.35	B	2190	19.07	B	2177	16.10	B	2191	23.89	B	2049	17.02	B
		Maitland Road	120859	Maitland Road (E)	Maitland Road (W)	T	550	26	B	619	27	B	616	26	B	522	32	C	525	53	D	593	27	B
		Vincent Street	120858		Vincent Street (S)	L	78	19	B	86	23	B	86	19	B	51	30	C	77	40	C	95	26	B
			120860	Vincent Street (S)	Maitland Road (E)	R	165	29	C	119	29	B	120	28	B	97	26	B	99	45	D	152	30	C
			120859		Maitland Road (W)	L	148	13	A	162	10	A	160	11	A	149	9	A	267	9	A	161	10	A
			120864	Maitland Road (W)	Vincent Street (S)	R	135	19	B	120	18	B	121	18	B	111	16	B	135	15	B	123	18	B
			120855		Maitland Road (E)	T	588	3	A	642	3	A	654	3	A	650	3	A	609	5	A	601	3	A
				All			1664	16.34	B	1746	15.79	B	1757	15.22	B	1670	17.24	B	1702	24.94	B	1735	16.48	B
		Maitland Road	12-1367	Maitland Road (E)	Maitland Road (W)	T	692	1	A	715	3	A	710	2	A	701	1	A	666	1	A	733	1	A
		Victoria Street	12-1364		Victoria Street (S)	L	5	4	A	5	5	A	5	5	A	5	5	A	5	5	A	5	5	A
			12-1369	Victoria Street (S)	Maitland Road (E)	R	7	19	B	8	26	B	7	47	D	10	43	C	19	20	B	15	17	B
			12-1370		Maitland Road (W)	L	57	10	A	68	18	B	67	17	B	56	22	B	49	10	A	54	10	A
			12-1366	Maitland Road (W)	Victoria Street (S)	R	57	12	A	54	18	B	54	19	B	70	19	B	46	10	A	47	16	B
			12-1365		Maitland Road (E)	T	837	5	A	830	7	A	827	7	A	746	10	A	714	2	A	764	6	A
				All			1695	3.93	A	1690	6.09	A	1670	5.59	A	1599	7.07	A	1500	2.42	A	1618	4.20	A
		Darwin Street	NK-1	Darwin Street (N)	North Avenue (W)	R	15	5	A	16	3	A	16	4	A	12	6	A	43	5	A	15	4	A
		North Avenue	NK-2		Darwin Street (S)	T	310	6	A	367	6	A	373	5	A	286	6	A	256	7	A	312	6	A
			2429248		North Avenue (E)	L	169	2	A	67	1	A	76	1	A	93	1	A	151	1	A	177	1	A
			NK-4	North Avenue (E)	Darwin Street (N)	R	229	9	A	169	10	A	153	10	A	132	7	A	220	7	A	212	7	A
			NK-5		North Avenue (W)	T	176	8	A	94	12	A	126	11	A	137	7	A	213	7	A	137	7	A
			2429214		Darwin Street (S)	L	393	0	A	530	0	A	524	0	A	398	0	A	327	0	A	367	0	A
			NK-7	Darwin Street (S)	North Avenue (E)	R	13	5	A	18	6	A	29	4	A	59	4	A	15	4	A	20	4	A
			NK-8		Darwin Street (N)	T	246	5	A	343	4	A	324	4	A	377	4	A	231	5	A	291	4	A
			2429216		North Avenue (W)	L	130	3	A	169	3	A	187	3	A	215	3	A	129	4	A	87	3	A
			NK-10	North Avenue (W)	Darwin Street (S)	R	83	10	A	156	10	A	149	8	A	112	9	A	70	11	A	55	10	A
			NK-11		North Avenue (E)	T	215	7	A	57	7	A	60	6	A	51	7	A	273	8	A	212	6	A
			2429196		Darwin Street (N)	L	121	3	A	137	1	A	139	1	A	105	2	A	117	4	A	113	3	A
				All			2100	9.51	A	2143	12.24	A	2156	10.56	A	1967	9.04	A	2045	11.40	A	1998	9.61	A
		Charlton Street	CE15-1	Charlton Street (N)	Cooper Street (W)	R	106	2	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	121	3	A	109	3	A
		Cooper Street	CE15-2		Charlton Street (S)	T	1	2	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	85	4	A	3	1	A
			CE15-3		Cooper Street (E)	L	228	2	A	89	10	A	52	10	A	45	10	A	258	3	A	230	2	A
			CE15-4	Cooper Street (E)	Charlton Street (N)	R	82	6	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	67	7	A	81	6	A
			CE15-5		Cooper Street (W)	T	182	6	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	187	7	A	154	5	A
			CE15-6		Charlton Street (S)	L	67	6	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	59	7	A	75	6	A
			CE15-7	Charlton Street (S)	Cooper Street (E)	R	36	3	A	26	25	B	26	25	B	23	23	B	34	4	A	36	3	A
			CE15-8		Charlton Street (N)	T	0	-1	#N/A	47	24	B	45	24	B	41	25	B	6	5	A	0	-1	#N/A
			CE15-9		Cooper Street (W)	L	44	4	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	60	4	A	25	4	A
			CE15-10	Cooper Street (W)	Charlton Street (S)	R	61	4	A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	61	5	A	61	4	A
			CE15-11		Cooper Street (E)	T	311	3	A	41	7	A	42	6	A	49	7	A	356	4	A	307	3	A
			CE15-12		Charlton Street (N)	L	74	4	A	73	16	B	57	15	A	62	14	A	61	4	A	74	4	A
				All			1192	5.93	A	276	24.61	B	222	24.60	B	220	24.64	B	1394	6.97	A	1155	6.14	A

P2225 Cessnock Phasing Comparison

AIMSUN Turn Comparison

PM Peak

							Base Model			Phase 1+2			Phase 1, 2, & 3			Phase 1, 2, 3, & 4			Phase 5			Phase 6		
Time	ID	Intersection	Aimsun Code	From	To	Turn	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS	Modelled	Delay (s)	LoS
		Vincent Street	130992	Vincent Street (N)	Cooper Street (W)	R	136	55	D	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	99	53	D	113	59	E
		Cooper Street	130990		Vincent Street (S)	T	122	47	D	174	26	B	175	26	B	129	26	B	121	46	D	126	52	D
			130991		Cooper Street (E)	L	37	55	D	31	31	C	33	29	C	37	33	C	43	52	D	41	56	D
			130994	Cooper Street (E)	Vincent Street (N)	R	22	36	C	48	27	B	44	29	C	40	23	B	61	45	D	28	40	C
			130995		Cooper Street (W)	T	173	23	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	189	31	C	159	29	B
			130993		Vincent Street (S)	L	11	33	C	6	39	C	0	-1	#N/A	10	34	C	10	39	C	10	36	C
			130988	Vincent Street (S)	Cooper Street (E)	R	2	39	C	2	33	C	2	32	C	1	21	B	0	-1	#N/A	2	49	D
			130987		Vincent Street (N)	T	128	27	B	137	26	B	140	25	B	99	29	B	137	26	B	122	26	B
			130989		Cooper Street (W)	L	22	21	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	27	37	C	36	26	B
			130996	Cooper Street (W)	Vincent Street (S)	R	8	29	B	6	56	D	9	57	E	8	62	E	6	36	C	7	21	B
			130998		Cooper Street (E)	T	232	26	B	44	57	E	48	61	E	49	56	D	251	27	B	218	25	B
			130997		Vincent Street (N)	L	148	26	B	68	68	E	63	68	E	60	68	E	129	27	B	156	25	B
				All			1041	33.12	C	516	34.85	C	514	35.17	C	432	36.99	C	1073	34.50	C	1000	34.53	C
		Cumberland Street	CED0-1	Cumberland Street (N)	Cooper Street (W)	R	15	2	A	0	-1	#N/A	0	-1	#N/A	2	2	A	19	35	C	21	34	C
		Cooper Street	CED0-2		Cumberland Street (S)	T	117	3	A	146	2	A	145	2	A	187	2	A	102	4	A	93	4	A
			CED0-3		Cooper Street (E)	L	151	3	A	169	2	A	190	2	A	229	3	A	60	6	A	48	5	A
			CED0-4	Cooper Street (E)	Cumberland Street (N)	R	8	4	A	11	3	A	11	4	A	13	4	A	15	6	A	14	5	A
			CED0-5		Cooper Street (W)	T	127	2	A	32	2	A	30	2	A	32	3	A	155	39	C	116	32	C
			CED0-6		Cumberland Street (S)	L	146	2	A	51	2	A	49	2	A	56	3	A	17	4	A	11	3	A
			CED0-7	Cumberland Street (S)	Cooper Street (E)	R	4	3	A	3	3	A	4	2	A	6	1	A	4	10	A	11	5	A
			CED0-8		Cumberland Street (N)	T	155	3	A	183	2	A	172	2	A	207	2	A	123	5	A	151	4	A
			CED0-9		Cooper Street (W)	L	227	3	A	212	2	A	197	2	A	236	2	A	87	36	C	59	32	C
			CED0-10	Cooper Street (W)	Cumberland Street (S)	R	55	3	A	29	3	A	24	3	A	34	3	A	51	5	A	40	4	A
			CED0-11		Cooper Street (E)	T	232	4	A	84	3	A	71	3	A	77	4	A	199	6	A	189	6	A
			CED0-12		Cumberland Street (N)	L	271	4	A	100	3	A	83	3	A	86	4	A	39	6	A	32	6	A
				All			1508	4.13	A	1040	3.46	A	976	4.06	A	1165	4.17	A	870	37.95	C	779	33.97	C
		Vincent Street	131007	Vincent Street (N)	Hall Street (W)	R	49	13	A	85	13	A	84	12	A	36	12	A	32	11	A	43	11	A
		Hall Street	131005		Vincent Street (S)	T	89	9	A	97	11	A	99	10	A	109	13	A	104	11	A	94	9	A
			131004		Hall Street (E)	L	0	-1	#N/A	2	1	A	2	2	A	1	33	C	1	30	C	2	7	A
			131002	Hall Street (E)	Vincent Street (N)	R	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A
			131003		Hall Street (W)	T	25	19	B	121	23	B	131	22	B	265	16	B	41	19	B	23	20	B
			131001		Vincent Street (S)	L	13	18	B	15	20	B	15	24	B	15	12	A	14	21	B	14	17	B
		270	131006	Vincent Street (S)	Hall Street (E)	R	9	20	B	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A	0	-1	#N/A
			131008		Vincent Street (N)	T	97	12	A	89	13	A	68	14	A	67	18	B	110	14	A	118	12	A
			131004		Hall Street (W)	L	24	17	B	52	11	A	48	11	A	10	20	B	30	19	B	24	20	B
			131005	Hall Street (W)	Vincent Street (S)	R	10	23	B	7	56	F	7	55	D	55	41	C	5	23	B	5	33	C
			131010		Hall Street (E)	T	100	22	B	220	38	C	217	28	B	259	25	B	107	23	B	111	21	B
			131009		Vincent Street (N)	L	56	24	B	74	40	C	77	31	C	34	30	C	57	23	B	46	27	B
				All			472	16.45	B	742	25.13	B	747	20.79	B	851	20.79	B	501	16.95	B	480	16.01	B
		Vincent Street	131013	Vincent Street (N)	Snape Street (W)	R	6	25	B	6	25	B	6	24	B	6	38	C	6	26	B	6	24	B
		Aberdare Road	131011		Vincent Street (S)	T	83	31	C	93	34	C	91	32	C	100	33	C	92	33	C	86	29	B
		Snape Street	131012		Aberdare Road (E)	L	31	11	A	28	5	A	30	5	A	31	11	A	32	5	A	30	6	A
			131015	Aberdare Road (E)	Vincent Street (N)	R	43	20	B	37	28	B	37	27	B	14	16	B	50	25	B	44	19	B
			131010		Snape Street (W)	T	111	24	B	127	25	B	126	24	B	161	23	B	114	22	B	127	21	B
			131014		Vincent Street (S)	L	116	25	B	118	26	B	120	24	B	122	28	B	111	26	B	112	27	B
			131015	Vincent Street (S)	Aberdare Road (E)	R	104	30	C	110	30	C	112	28	B	127	29	C	109	30	C	100	29	B
			131016		Vincent Street (N)	T	86	25	B	87	21	B	85	22	B	66	23	B	87	19	B	96	20	B
			131017		Snape Street (W)	L	128	14	A	140	13	A	142	13	A	193	11	A	130	11	A	116	14	A
			131018	Snape Street (W)	Vincent Street (S)	R	223	29	C	229	33	C	230	32	C	219	28	B	224	29	C	204	29	B
			131005		Aberdare Road (E)	T	162	26	B	218	31	C	223	31	C	162	27	B	177	29	C	167	26	B
			131006		Vincent Street (N)	L	8	30	C	7	33	C	7	33	C	6	30	C	9	32	C	6	36	C
				All			1101	24.93	B	1200	26.86	B	1209	26.05	B	1257	23.81	B	1141	24.92	B	1114	23.68	B

ATTACHMENT B

TRAVEL TIME SUMMARY

P2225 Cessnock Phasing Comparison

AIMSUN Travel Time Comparison

AM Peak

Southbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Ferguson Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Vincent Street	0.3	0.30	0:01:02	0:01:02	0:00:57	0:00:57	0:00:55	0:00:55	0:00:50	0:00:50	0:01:25	0:01:25	0:00:57	0:00:57
Cooper Street	0.37	0.67	0:01:08	0:02:10	0:00:55	0:01:52	0:00:55	0:01:51	0:00:52	0:01:42	0:00:59	0:02:24	0:01:10	0:02:07
Aberdare Street	0.47	1.14	0:01:04	0:03:14	0:01:10	0:03:02	0:01:09	0:02:59	0:01:12	0:02:55	0:01:05	0:03:29	0:01:07	0:03:14

Northbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Aberdare Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Cooper Street	0.47	0.47	0:01:15	0:01:15	0:01:17	0:01:17	0:01:16	0:01:16	0:01:19	0:01:19	0:01:13	0:01:13	0:01:15	0:01:15
Maitland Road	0.37	0.84	0:00:56	0:02:11	0:00:52	0:02:10	0:00:52	0:02:09	0:00:50	0:02:09	0:00:57	0:02:10	0:00:55	0:02:10
Ferguson Street	0.31	1.15	0:00:46	0:02:57	0:00:49	0:02:58	0:00:49	0:02:57	0:00:50	0:02:59	0:00:54	0:03:04	0:00:46	0:02:56

Eastbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Mountview Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Allandale Road	0.53	0.53	0:01:26	0:01:26	0:01:20	0:01:20	0:01:23	0:01:23	0:01:28	0:01:28	0:01:25	0:01:25	0:01:26	0:01:26
Victoria Road	0.43	0.96	0:00:45	0:02:11	0:00:40	0:02:00	0:00:41	0:02:04	0:00:47	0:02:15	0:00:44	0:02:09	0:00:59	0:02:25

Westbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Victoria Road	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Allandale Road	0.43	0.43	0:01:19	0:01:19	0:01:15	0:01:15	0:01:18	0:01:18	0:01:29	0:01:29	0:01:27	0:01:27	0:01:23	0:01:23
Mountview Street	0.53	0.96	0:01:05	0:02:24	0:01:05	0:02:20	0:01:05	0:02:23	0:01:08	0:02:37	0:00:59	0:02:26	0:01:07	0:02:30

Eastbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
South Avenue	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Charlton Street	0.38	0.38	0:00:38	0:00:38	0:00:38	0:00:38	0:00:39	0:00:39	0:00:37	0:00:37	0:00:38	0:00:38	0:00:37	0:00:37
Cumberland Street	0.17	0.55	0:00:44	0:01:23	0:01:19	0:01:57	0:01:24	0:02:03	0:01:20	0:01:57	0:00:46	0:01:24	0:00:44	0:01:20

Westbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Cumberland Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Charlton Street	0.17	0.17	0:00:43	0:00:43	#######	##########	#######	##########	#######	##########	0:00:48	0:00:48	0:00:43	0:00:43
South Avenue	0.38	0.55	0:00:35	0:01:18	#######	##########	#######	##########	#######	##########	0:00:33	0:01:22	0:00:34	0:01:18

Southbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Wollombi Road	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
North Avenue	0.22	0.22	0:00:22	0:00:22	0:00:24	0:00:24	0:00:23	0:00:23	0:00:22	0:00:22	0:00:22	0:00:22	0:00:22	0:00:22
South Avenue	0.37	0.59	0:00:30	0:00:52	0:00:31	0:00:54	0:00:31	0:00:53	0:00:31	0:00:53	0:00:29	0:00:51	0:00:29	0:00:51
Aberdare Street	0.24	0.83	0:00:43	0:01:35	0:00:43	0:01:37	0:00:43	0:01:37	0:00:46	0:01:40	0:00:42	0:01:33	0:00:49	0:01:40

Northbound

Sections	Distance (Km)	Cumulative Distance (Km)	Base Model	Base Cumulative Model	Phase 1+2 Model	Phase 1+2 Cumulative Model	Phase 1, 2 & 3 Model	Phase 1, 2 & 3 Cumulative Model	Phase 1, 2, 3 & 4 Model	Phase 1, 2, 3 & 4 Cumulative Model	Phase 5 Model	Phase 5 Cumulative Model	Phase 6 Model	Phase 6 Cumulative Model
Aberdare Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
South Avenue	0.24	0.24	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:22	0:00:22	0:00:26	0:00:26
North Avenue	0.36	0.60	0:00:30	0:00:51	0:00:28	0:00:49	0:00:28	0:00:49	0:00:28	0:00:49	0:00:30	0:00:52	0:00:29	0:00:55
Wollombi Road	0.22	0.82	0:00:48	0:01:38	0:00:47	0:01:37	0:00:47	0:01:36	0:00:47	0:01:36	0:00:50	0:01:41	0:00:47	0:01:42

P2225 Cessnock Phasing Comparison

AIMSUN Travel Time Comparison

PM Peak

Southbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Ferguson Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Vincent Street	0.3	0.30	0:00:55	0:00:55	0:00:53	0:00:53	0:00:53	0:00:53	0:00:50	0:00:50	0:01:03	0:01:03	0:00:52	0:00:52
Cooper Street	0.37	0.67	0:01:22	0:02:17	0:01:00	0:01:53	0:01:00	0:01:53	0:01:01	0:01:51	0:01:21	0:02:24	0:01:01	0:01:54
Aberdare Street	0.47	1.14	0:01:19	0:03:36	0:01:23	0:03:15	0:01:19	0:03:12	0:01:23	0:03:14	0:01:21	0:03:45	0:01:22	0:03:16

Northbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Aberdare Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Cooper Street	0.47	0.47	0:01:21	0:01:21	0:01:26	0:01:26	0:01:24	0:01:24	0:01:31	0:01:31	0:01:26	0:01:26	0:01:19	0:01:19
Maitland Road	0.37	0.84	0:00:57	0:02:18	0:00:54	0:02:19	0:00:54	0:02:17	0:00:50	0:02:21	0:00:54	0:02:20	0:00:55	0:02:14
Ferguson Street	0.31	1.15	0:00:44	0:03:02	0:00:51	0:03:10	0:00:50	0:03:07	0:00:44	0:03:05	0:00:57	0:03:17	0:00:49	0:03:03

Eastbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Mountview Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Allandale Road	0.53	0.53	0:01:35	0:01:35	0:01:32	0:01:32	0:01:31	0:01:31	0:01:36	0:01:36	0:01:26	0:01:26	0:01:41	0:01:41
Victoria Road	0.43	0.96	0:00:37	0:02:12	0:00:37	0:02:09	0:00:37	0:02:08	0:00:43	0:02:19	0:00:38	0:02:05	0:00:39	0:02:20

Westbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Victoria Road	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Allandale Road	0.43	0.43	0:01:12	0:01:12	0:01:17	0:01:17	0:01:21	0:01:21	0:01:21	0:01:21	0:01:36	0:01:36	0:01:22	0:01:22
Mountview Street	0.53	0.96	0:00:53	0:02:04	0:00:56	0:02:12	0:00:58	0:02:19	0:00:51	0:02:12	0:00:54	0:02:30	0:00:55	0:02:17

Eastbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
South Avenue	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Charlton Street	0.38	0.38	0:00:39	0:00:39	0:00:38	0:00:38	0:00:40	0:00:40	0:00:42	0:00:42	0:00:40	0:00:40	0:00:38	0:00:38
Cumberland Street	0.17	0.55	0:00:45	0:01:24	0:01:15	0:01:53	0:01:18	0:01:58	0:01:15	0:01:57	0:00:46	0:01:26	0:00:48	0:01:26

Westbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Cumberland Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
Charlton Street	0.17	0.17	0:00:43	0:00:43	#######	##########	#######	##########	#######	##########	0:00:51	0:00:51	0:00:42	0:00:42
South Avenue	0.38	0.55	0:00:37	0:01:19	#######	##########	#######	##########	#######	##########	0:00:36	0:01:28	0:00:35	0:01:18

Southbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Wollombi Road	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
North Avenue	0.22	0.22	0:00:22	0:00:22	0:00:21	0:00:21	0:00:22	0:00:22	0:00:22	0:00:22	0:00:21	0:00:21	0:00:21	0:00:21
South Avenue	0.37	0.59	0:00:29	0:00:51	0:00:30	0:00:52	0:00:30	0:00:52	0:00:30	0:00:51	0:00:29	0:00:51	0:00:29	0:00:50
Aberdare Street	0.24	0.83	0:00:48	0:01:39	0:00:52	0:01:44	0:00:51	0:01:43	0:00:47	0:01:39	0:00:49	0:01:40	0:00:50	0:01:41

Northbound			Base		Phase 1+2		Phase 1, 2 & 3		Phase 1, 2, 3 & 4		Phase 5		Phase 6	
Sections	Distance (Km)	Cumulative Distance (Km)	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model	Model	Cumulative Model
Aberdare Street	0.00	0.00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00
South Avenue	0.24	0.24	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:21	0:00:23	0:00:23
North Avenue	0.36	0.60	0:00:31	0:00:52	0:00:30	0:00:50	0:00:29	0:00:49	0:00:30	0:00:51	0:00:30	0:00:51	0:00:30	0:00:53
Wollombi Road	0.22	0.82	0:00:57	0:01:49	0:01:04	0:01:55	0:01:05	0:01:54	0:01:05	0:01:56	0:00:58	0:01:50	0:00:58	0:01:51