Gillieston Heights South (East Precinct)

Development Application (DA)

Traffic Impact Assessment

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Technical Advice No 5 – Traffic Impact Assessment

Gillieston Heights South– East Precinct Development Application (DA)

Date	13/06/2023
Revision	B
From	Arcadis Australia Pacific Pty Ltd (Arcadis)
Project Name	Gillieston Heights South – East Precinct Development Application (DA)
Subject	**Traffic impact assessment**

1 Executive Summary

This Technical Advice No 5 report has been prepared by Arcadis on behalf of Walker Gillieston Heights Pty Ltd (**Walker**) to support the Traffic Impact Assessment (TIA) of the Gillieston Heights South – East Precinct Development Application (DA) which proposes a 322 dwelling residential development.

It is proposed that traffic from Walker's development site would primarily access the Cessnock Road via a proposed 4-way signalised intersection with the development at 464 Cessnock Road 'Gillieston Heights South – Western Precinct' (McCloy site) being the 4th leg of this signalised intersection, with secondary access provided via existing Aspen Drive up through the recently completed 'Wallis Creek' development immediately north of the site.

All technical reports and models previously agreed with by Transport for NSW (TfNSW) for this development utilised a dwelling yield assumption of 324, however with this development application proposing only 322 dwellings, this results in a minor positive traffic impact outcome with regard to trip generation. For the purposes of this report, it is assumed the reduced yield of 2 dwellings has a negligible impact on all previous assumption papers, technical advice and traffic modelling and they are therefore still relevant and applicable.

Based on the analysis and discussions presented within this report, as well as previous technical advice and assumption papers, it can be concluded that the Proposal would have a minor impact on the existing Cessnock Road corridor traffic flows. Overall, the Proposal would increase traffic volumes to the Cessnock Road broader road network by about 3 per cent to 7 per cent with no upgrades to the wider road network deemed required as a result of the Walker development.

Overall, the Proposal is considered supportable from a transport, traffic and access perspective.

1.1 Background

In May 2022, Arcadis prepared a Traffic Impact Assessment (TIA) report to support a Planning Proposal for the Gillieston Height South – East Precinct. This TIA supporting the Planning Proposal included a layout for the then Walker controlled land that included 257 residential dwellings, as well as a 67 dwelling development by others on the property at 457 and 463 Cessnock Road, legally identified as Lot 1 and Lot 2 DP302745 (refer **Figure 1**) for a total yield of 324 dwellings across the site. The layout proposed a 3-way intersection with Cessnock Road in line with Maitland City Councils DCP Part F - Urban Release Area Figure 22 (refer **Figure 2**).

On 6 May 2022, Transport for NSW (TfNSW) supported this TIA document titled "*Gillieston Heights South (East Precinct), Traffic Impact Assessment*", Rev D, 4 May 2022 prepared by Arcadis. The Planning Proposal traffic assessment used the TfNSW's Main Road 195 (MR195) traffic model up-dated by Arcadis.

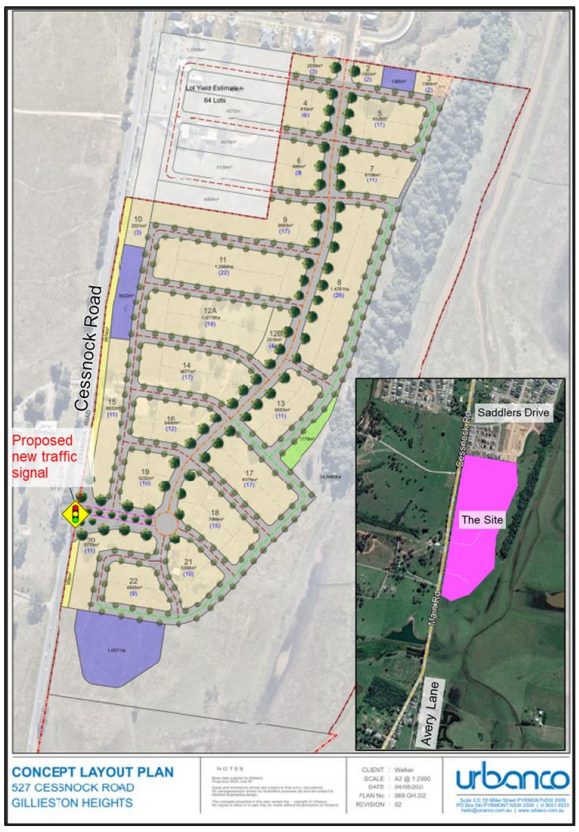

Figure 1 Original layout proposing 324 dwellings supported by Traffic Impact Assessment", Rev D, 4 May 2022 prepared by Arcadis report

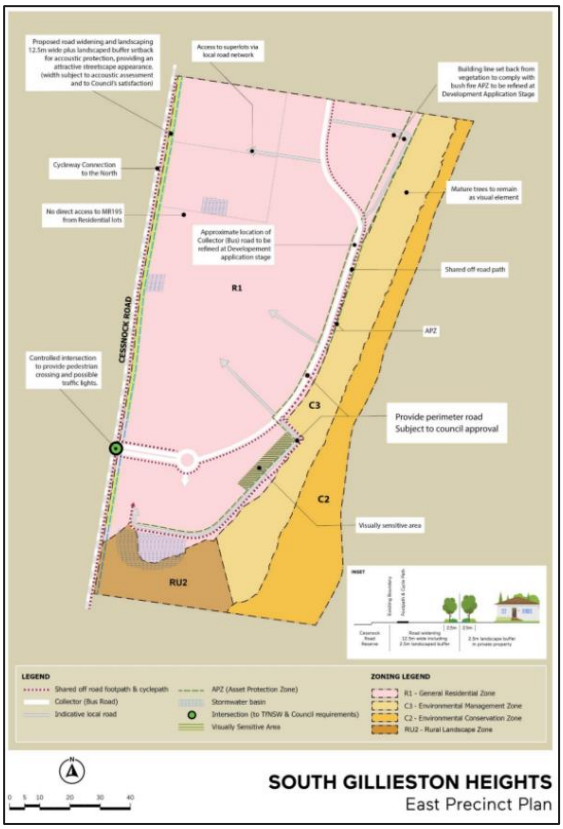

Figure 2 Council DCP Part F - Urban Release Area Figure 22

Subsequent to this, Walker acquired the property at 457 and 463 Cessnock Road. As a result of this acquisition, and with the support of TfNSW, Walker resolved to revise their masterplan layout to incorporate this land to provide a holistic design for the site identified as Gillieston Heights South - East Precinct (the Walker site), including consolidating the intersection with the McCloy site, to create a single 4-way signalised intersection. The layout that forms the Development Application for the site proposes 322 dwellings (refer **Figure 3**).

As part of this update, subsequent assumptions papers were submitted to TfNSW to verify the requirements for the 4-way intersection and the timing for its requirement to be operational to service the additional trip generation associated with the development.

In a recent meeting with TfNSW dated 15 February 2023, it was agreed to use the MR195 traffic model for this new 4-way signalised intersection.

TfNSW has assessed the submitted Draft Addendum 1 by Arcadis (refer Revision B, dated 13/9/2022) and supporting SIDRA model, and *'concurs with the conclusion that the existing Cessnock Road / Heyes Street / Redwood Drive TCS has the capacity to cater for 90 additional lots'* via Aspen Drive and the 'Wallis Creek' development prior to the proposed 4-way signalised intersection being operational.

Walker may proceed with staging the development such that the first 90 lots can be developed without the proposed new 4-way signalised intersection being operational.

Figure 3 Current layout proposing 322 dwellings the subject of this Traffic Impact Assessment (the Proposal)

1.2 Technical documents

The following is an overview of technical advice documents submitted to TfNSW previously as part of the consultation process, including:

- *Technical Advice No 1 – Traffic assumption paper, Gillieston Heights South, Rev B*, 12 November 2021, prepared by Arcadis.
- *Addendum to Traffic Assumption Paper – School traffic modelling, Gillieston Heights South*, 21 December 2021, prepared by Arcadis.
- *Technical Advice No 2 – New traffic signals layout with the Cessnock Road, Gillieston Heights South*, 8 Feb 2022, prepared by Arcadis.
- *Gillieston Heights South (East Precinct), Traffic Impact Assessment, Rev D*, 4 May 2022, prepared by Arcadis.
- *Gillieston Heights South (East Precinct), Addendum 1, Traffic impact assessment for the first 100 dwellings, Rev B*, 13 September 2022, prepared by Arcadis.
- *Technical Advice No 3 – Updated traffic assumption paper, Gillieston Heights South- East Precinct Development Application (DA)*, 13 March 2023, prepared by Arcadis.
- *Technical Advice No 4 – New 4-way signalised intersection at Cessnock Road / Walker / McCloy development site, Gillieston Heights South- East Precinct Development Application (DA), 11 May 2023, prepared by Arcadis*.

Traffic impact assessment is the focus of this Technical Advice No 5.

This Technical Advice No 5 should be read in conjunction with Technical Report No 3 and Technical Report No 4 which documented key agreed modelling assumptions with TfNSW including traffic generation, and distribution assumptions for both Walker and McCloy sites.

TfNSW accepted updated traffic assumption paper on 27th March 2023 and 4-way signalised intersection layout at Cessnock Road / Walker / McCloy development site and associated modelling outcomes on 23rd May 2023.

1.3 Report structure

The report is structured as follows:

- Section 2 provides an overview of the proposed development site, development yield and access arrangement. This section also documents trip generation and trip distribution assumptions for the development site
- Section 3 documents traffic modelling assumptions including background traffic growth
- Section 4 provides traffic assessment on the proposed 4-way traffic signals (TCS) at Cessnock Road / Walker / McCloy development site
- Section 5 documents traffic impact to the broader road network
- Section 6 documents conclusions from traffic modelling and assessment.

2 The proposal

The Walker site is located east of Cessnock Road between Avery Lane and Saddlers Drive, Gillieston Heights. It is proposed to be develop about 322 residential dwellings. It is proposed that traffic from Walker's development site would primarily access the Cessnock Road via the 4-way signalised intersection with McCloy site being the 4th leg of this signalised intersection (refer **Figure 4**), with secondary access via the existing Aspen Drive up through the recently completed 'Wallis Creek' development immediately north of the site.

2.1 Trip generation

The average weekday trip generation rates of 0.78 AM peak hour trips and 0.71 PM peak hour trips per dwelling are adopted based on recommended rates for residential subdivision sourced from TfNSW *Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a), August 2013*.

Table 2-1 shows the trip generation rate assumed for the residential development.

Table 2-1 Trip generation rates

Land use	Trip generation rates	
	AM	PM
Residential dwelling	0.78 peak hour vehicle trips per dwelling	0.71 peak hour vehicle trips per dwelling

2.1.1 Trip generation from Walker site

Table 2-2 shows peak hour trip generation from the Walker site. The analysis shows that Walker site would generate about 252 vehicle trips in the AM peak hour and about 229 vehicle trips in the PM peak hour.

Table 2-2 Peak hour trip generation – the Proposal

Development	Development yield	Trip generation rates (trips per dwelling)		Peak hour trip generation	
		AM	PM	AM	PM
Walker site	322 dwellings	0.78	0.71	252	229

2.2 Trip distribution

The following trip distributions are used (see **Figure 4**):

- About 40 per cent development traffic would travel towards the north via new traffic signals
- About 60 per cent development traffic would travel towards the south via the new traffic signals.

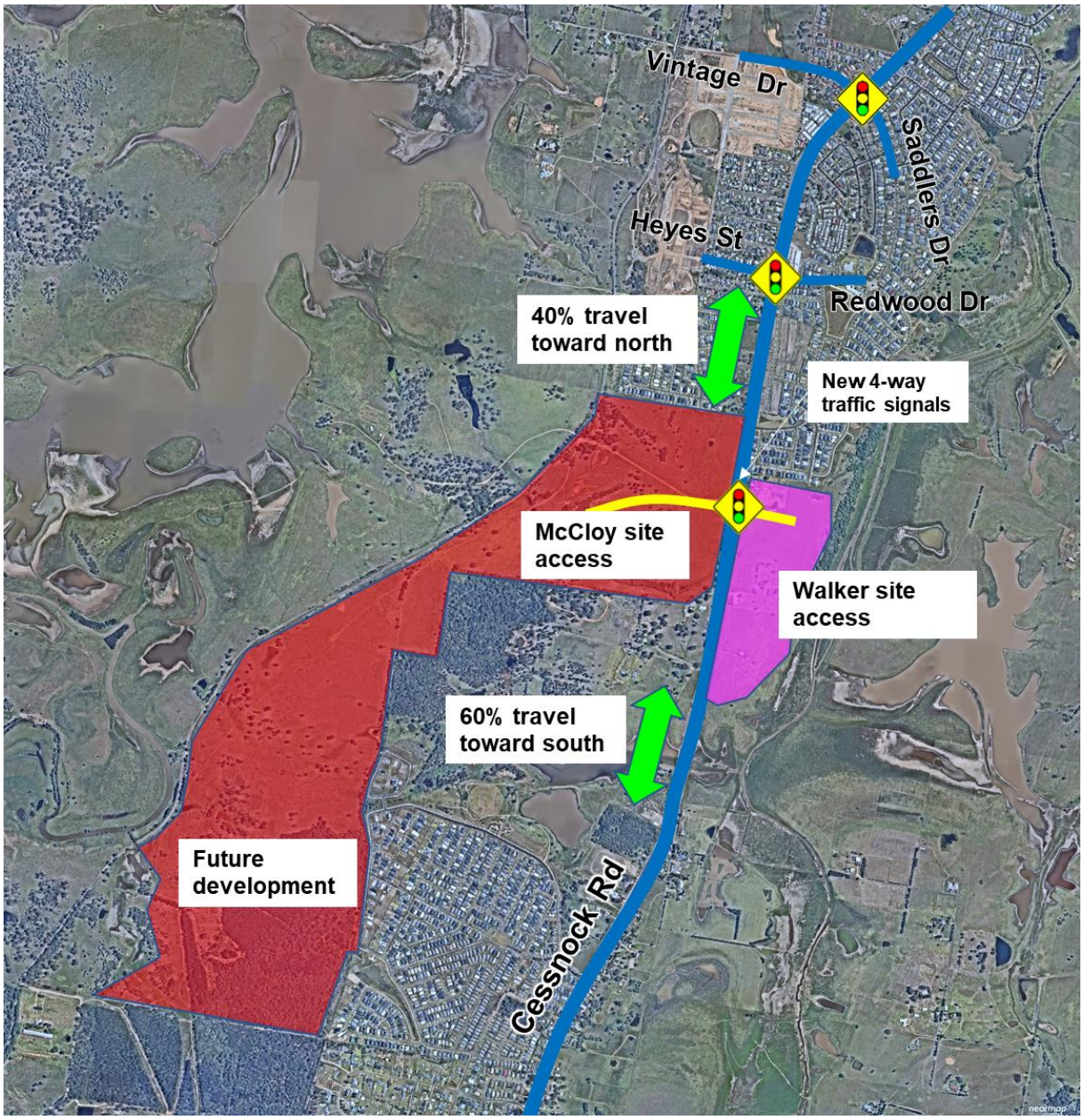

Figure 4 Assumed traffic distribution to and from Walker site

3 Traffic modelling assumptions

Key traffic modelling assumptions are documented in *Technical Advice No 3 – Updated traffic assumption paper, Gillieston Heights South- East Precinct Development Application (DA), 13 March 2023, prepared by Arcadis*. TfNSW accepted updated traffic assumption paper on 27th March 2023.

Key assumptions include:

- McCloy proposes to develop about 1,499 new residential dwellings as per assumption used in TfNSW's MR195 traffic model.
- Walker proposes to develop about 324 residential dwellings. (since revised to 322 dwellings)
- Consistent with the previously approved trip distribution for the Walker site, it is assumed that about 60 per cent of development traffic (from both Walker and McCloy sites) would travel toward the south along the Cessnock Road. The remaining 40 per cent of development traffic would travel toward the north along the Cessnock Road.
- Residential trip generation rates for both Walker and McCloy sites are assumed to be 0.78 AM peak hour trips and 0.71 PM peak hour trips per dwelling.

3.1 Background traffic growth

The background traffic growth was sourced from the MR195 Corridor Study (refer Arcadis Technical Advice No. 3, dated 13th March 2023 at **Attachment A**). Table 3-1 shows the number of residential dwellings for 2020, 2026 and 2036 assumed for background growth. The forecast number of dwellings for background growth was provided by TfNSW during the MR195 Corridor Study.

Under the background growth, about 1,350 new dwellings are projected between 2020 and 2026. Between 2020 and 2036, about 3,164 new dwellings are projected.

Table 3-1 Forecast residential dwelling

	2020	Forecast number of dwellings		Increase in dwellings	
		2026	2036	2020-2026 (6 years)	2020-2036 (16 years)
Background growth	3,494	4,844	6,658	1,350	3,164

4 Proposed 4 way traffic signals (TCS) with Cessnock Road

Detailed traffic modelling on the proposed 4 way traffic signals (TCS) with the Cessnock Road is documented in "*Technical Advice No 4 – New 4-way signalised intersection at Cessnock Road / Walker / McCloy development site, Gillieston Heights South- East Precinct Development Application (DA), 11 May 2023, prepared by Arcadis* (refer Arcadis Technical Advice No. 4, dated 11th May 2023 at **Attachment B**).

TfNSW accepted 4-way signalised intersection layout and associated modelling outcomes on 23rd May 2023.

The ultimate 4-way intersection layout at Cessnock Road / Walker / McCloy development site has considered the following lane configurations (refer **Figure 5**):

- Two through traffic lanes on Cessnock Road (in each direction)
- Two dedicated right turn lanes on Cessnock Road for about 125 metres on northern approach
- One dedicated left turn lane on Cessnock Road for about 70 metres on northern approach
- One dedicated right turn lane on Cessnock Road for about 200 metres on southern approach
- Dedicated signalised left turn slip lane on Cessnock Road for about 170 metres on southern approach
- Two dedicated right turn lanes on McCloy site access
- Shared through lane and signalised left turn slip lane on McCloy site access for about 125 metres
- One dedicated through lane on Walker site access
- One dedicated left turn lane on Walker site access for about 80 metres
- One dedicated right turn lane on Walker site access for about 80 metres
- Full pedestrian crossing on all four approaches on new 4-way signalised intersection.

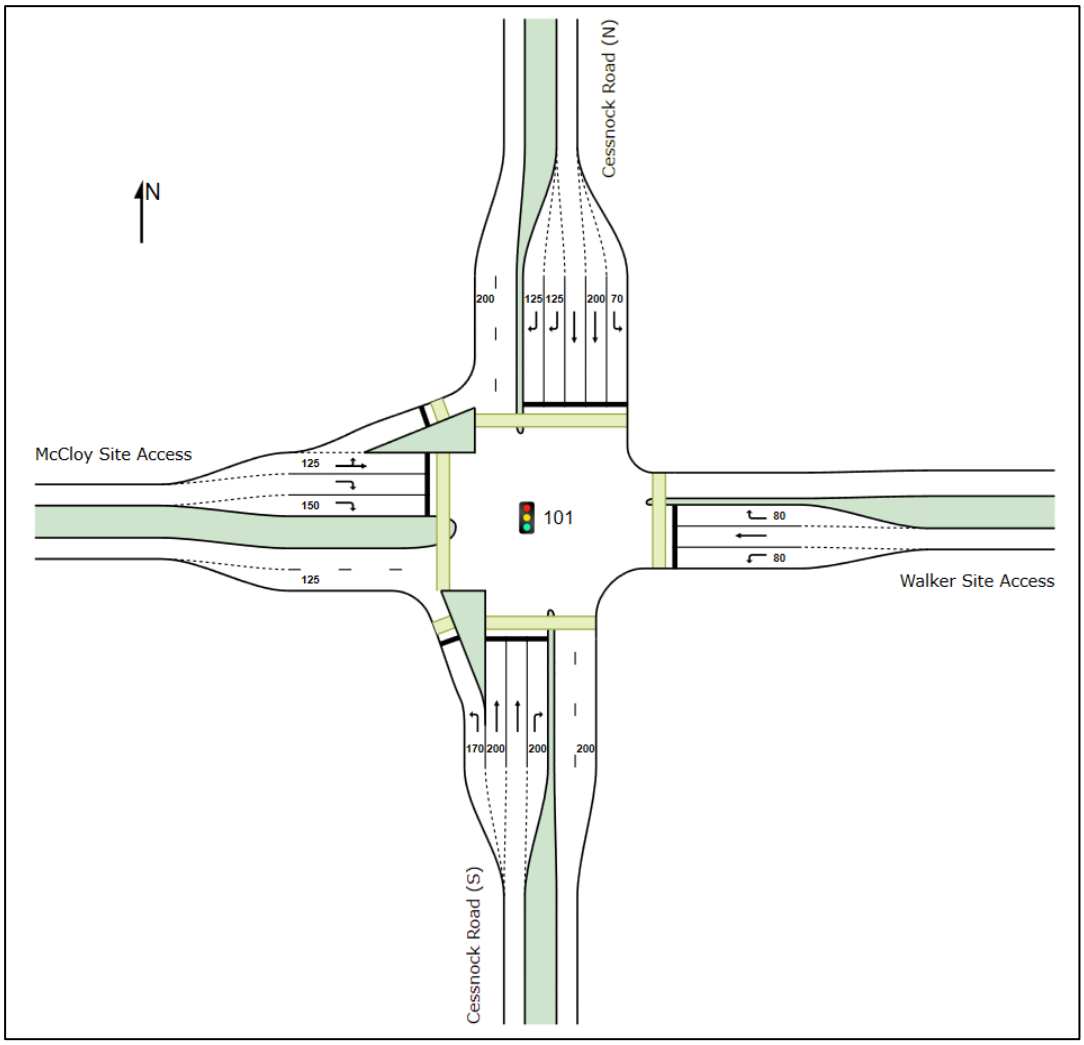

Figure 5 Proposed ultimate layout for new 4-way intersection at Cessnock Road / Walker / McCloy development site

4.1 Modelling results

Traffic performance (delays and level of service) of new 4-way intersection layout was assessed using SIDRA software.

For a signalised intersection, the level of service criteria is related to the average intersection delay measured in seconds per vehicle.

Table 4-1 below shows the TfNSW standard level of service (LoS) criteria for intersection operation.

Table 4-1 Level of service criteria for intersection

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<15	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: TfNSW' Traffic Modelling Guidelines, Version 1.0, February 2013

Table 4-2 shows delays and level of service of 4-way new signalised intersection in 2036. The modelling data shows that new 4-way signalised intersection would provide Level of Service C/D (average delays between 42 to 49 seconds per vehicle) in 2036.

Overall, the predicted queues on Cessnock Road, Walker access road and McCloy access road would contain within the provided auxiliary lanes. Model shows degree of saturation between 0.75 and 0.85 being lower than 0.90 upper limit thresholds for new traffic signals making the 4-way intersection acceptable from a performance perspective.

Table 4-2 Predicted level of service for new 4-way signalised intersection in 2036

Intersection	Approach	AM			PM		
		Delay (sec)	LoS	Queue Length (m)	Delay (sec)	LoS	Queue Length (m)
Cessnock Road/McCloy site access / Walker site access	North – Cessnock Road	49	D	150	46	D	180
	East – Walker access	43	D	35	46	D	10
	South – Cessnock Road	46	D	185	36	C	160
	West – McCloy access	54	D	130	52	D	25
	Overall intersection	**49**	**D**		**42**	**C**	

5 Traffic impact to the broader road network

This section documents traffic impact of the Proposal on the broader road network. Consistent with the approved Planning Proposal, TfNSW's MR195 VISSIM traffic model was used.

5.1 Traffic increase by the Proposal

Table 5-1 and Table 5-2 show the predicted intersection volumes for the following seven intersections for pre (background traffic growth) and post-development traffic conditions in 2026 and 2036.

The analysis shows about 3 per cent to 7 per cent traffic increase to the broader network depending on locations.

Table 5-1 Predicted intersection volumes for pre and post-development in 2026

Intersections	Pre-development (background growth)		Post-development (with Proposal)		Proposal traffic	
	AM	PM	AM	PM	AM	PM
Cessnock Road / Gillieston Street	1,988	2,196	2,075	2,278	4%	4%
Cessnock Road / Scenic Drive	1,979	2,198	2,066	2,280	4%	4%
Cessnock Road / Vintage Drive / Saddlers Drive	1,882	2,045	1,972	2,128	5%	4%
Cessnock Road / Heyes Street / Redwood Drive	1,825	1,976	1,916	2,059	5%	4%
Main Road / William Tester Drive	2,033	2,303	2,169	2,431	7%	6%
Main Road / Heddon Street	2,136	2,495	2,267	2,618	6%	5%
Hunter Expressway interchange	2,754	3,111	2,878	3,221	4%	4%

Table 5-2 Predicted intersection volumes for pre and post-development in 2036

Intersections	Pre-development (background growth)		Post-development (with Proposal)		Proposal traffic	
	AM	PM	AM	PM	AM	PM
Cessnock Road / Gillieston Street	2,479	2,677	2,566	2,759	4%	3%
Cessnock Road / Scenic Drive	2,427	2,639	2,514	2,721	4%	3%
Cessnock Road / Vintage Drive / Saddlers Drive	2,387	2,547	2,477	2,630	4%	3%
Cessnock Road / Heyes Street / Redwood Drive	2,434	2,552	2,525	2,635	4%	3%
Main Road / William Tester Drive	2,775	2,897	2,911	3,025	5%	4%
Main Road / Heddon Street	2,937	3,159	3,068	3,282	4%	4%
Hunter Expressway interchange	3,351	3,549	3,475	3,659	4%	3%

5.2 Intersection level of service with Cessnock Road

Table 5-3 and Table 5-4 show the impact on the overall intersection level of service for pre and post development conditions in 2026 and 2036. For pre-development condition (background growth alone), model shows level of service B to F depending on sites and traffic controls. For example, model shows higher delays and poor level of service (LoS F) to the side street traffic at Cessnock Road / Gillieston Street intersection and Cessnock Road / Scenic Drive intersection. The background traffic growth would impact delays and level of service at the Hunter Expressway interchange.

Model shows minor impact to the seven analysed intersections by the Proposal. The level of service for pre and post development conditions remain similar for most of the sites. The minor impact relates to development traffic increase to the broader road network by 3 per cent to 7 per cent.

Table 5-3 Intersection level of service for broader road network in 2026

Intersection	Control type	Pre-development (background growth)				Post-development (with Proposal)			
		AM peak		PM peak		AM peak		PM peak	
		Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Cessnock Road / Gillieston Street	Sign control	97	F	86	F	110	F	106	F
Cessnock Road / Scenic Drive	Seagull	15	B	18	B	16	B	25	B
Cessnock Road / Vintage Drive / Saddlers Drive	Traffic signal	36	C	29	C	38	C	31	C
Cessnock Road / Heyes Street / Redwood Drive	Traffic signal	23	B	26	B	29	C	29	C
Main Road / William Tester Drive	Traffic signal	16	B	16	B	16	B	16	B
Main Road / Heddon Street	Traffic signal	30	C	39	C	32	C	41	C
Hunter Expressway interchange	Roundabout	31	C	147	F	38	C	154	F

Table 5-4 Intersection level of service for broader road network in 2036

Intersection	Control type	Pre-development (background growth)				Post-development (with Proposal)			
		AM peak		PM peak		AM peak		PM peak	
		Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Cessnock Road / Gillieston Street	Sign controlled	240(1)	F	240(1)	F	240(1)	F	240(1)	F
Cessnock Road / Scenic Drive	Seagull	29	C	84	F	31	C	97	F
Cessnock Road / Vintage Drive / Saddlers Drive	Traffic signal	55	D	34	C	57	E	36	C
Cessnock Road / Heyes Street / Redwood Drive	Traffic signal	43	D	34	C	54	D	40	C
Main Road / William Tester Drive	Traffic signal	61	E	17	B	66	E	18	B
Main Road / Heddon Street	Traffic signal	34	C	64	E	39	C	69	E
Hunter Expressway interchange	Roundabout	217	F	240(1)	F	240(1)	F	240(1)	F

Note: In 2036, for sign control/roundabout, delay to side street/critical movement approach over 240 seconds is reported as 240 seconds

Cessnock Road / Gillieston Street and the Hunter Expressway interchange intersections have an underlying traffic Level of Service 'F' issue that is not attributable to the Proposal. Furthermore, the intersections of Cessnock Road / Scenic Drive, Main Road / William Tester Drive and Main Road / Heddon Street reaching Level of Service 'E' or 'F' by 2036 can be largely attributed to general development background growth of the wider area with the Proposal only a minor contributing factor.

Therefore, no upgrades to the wider area network are deemed required to form part of this proposal as a result of the Walker development.

5.3 Impact on local roads

The local traffic impact by the Proposal development was assessed for the following three intersections with the Saddlers Drive including:

- Saddlers Drive / Scenic Drive (sign controlled)
- Saddlers Drive / Redwood Drive (roundabout)
- Saddlers Drive / Aspen Drive (roundabout)

Table 5-5 and Table 5-6 show the predicted level of service for three local road intersections in 2026 *and 2036.*

All three intersections with the Saddlers Drive would operate with level of service A in 2026 and 2036.

Table 5-5 Intersection level of service for local road network in 2026

Intersection	Control type	Post-development			
		AM peak		PM peak	
		Delay (sec)	LoS	Delay (sec)	LoS
Saddlers Dr / Scenic Dr	Sign controlled	5(1)	A	5(1)	A
Saddlers Dr / Redwood Dr	Roundabout	5	A	5(1)	A
Saddlers Dr / Aspen Dr	Roundabout	5(1)	A	5(1)	A

Note: Delay below 5 seconds for local road intersections is reported as 5 seconds

Table 5-6 Intersection level of service for local road network in 2036

Intersection	Control type	Post-development			
		AM peak		PM peak	
		Delay (sec)	LoS	Delay (sec)	LoS
Saddlers Dr / Scenic Dr	Sign controlled	5(1)	A	5(1)	A
Saddlers Dr / Redwood Dr	Roundabout	6	A	7	A
Saddlers Dr / Aspen Dr	Roundabout	5(1)	A	5(1)	A

Note: Delay below 5 seconds for local road intersections is reported as 5 seconds

6 Conclusions

This report documents a traffic impact assessment undertaken to support a Development Application (DA) for Gillieston Heights South – East Precinct. The Site is located east of Cessnock Road between Avery Lane and Saddlers Drive, Gillieston Heights. It is proposed to be develop about 322 residential dwellings.

It is proposed that traffic from Walker's development site would primarily access Cessnock Road via the 4-way signalised intersection with McCloy site with secondary access provided via existing Aspen Drive up through the recently completed 'Wallis Creek' development immediately north of the site.

Transport for NSW has assessed the submitted Draft Addendum 1 by Arcadis (refer Revision B, dated 13/9/2022) and supporting SIDRA model, and '*concurs with the conclusion that the existing Cessnock Road / Heyes Street / Redwood Drive TCS has the capacity to cater for 90 additional lots.'*

Walker may proceed with staging development such that the first 90 lots can be developed without the proposed new 4-way signalised intersection being operational.

A consultation process involving Transport for NSW (TfNSW) and Maitland City Council (MCC) constituted an important element of this study. Key traffic modelling assumptions were consulted and agreed with TfNSW and MCC with technical advice, assumption papers and previous iterations of a traffic impact assessment for the Walker site attached to this report.

Based on the analysis and discussions presented within this report as well as previous technical advice and assumption papers it can be concluded that the Proposal would have a minor impact on the existing Cessnock Road corridor traffic flows. Overall, the Proposal would increase traffic volumes to the Cessnock Road broader road network by about 3 per cent to 7 per cent with no upgrades to the wider road network deemed required as a result of the Walker development.

The Proposal is considered supportable from a transport, traffic and access perspective.

Attachments:

Attachment A *-Technical Advice No 3 – Updated traffic assumption paper, Gillieston Heights South- East Precinct Development Application (DA), 13 March 2023, prepared by Arcadis.*

Attachment B *- Technical Advice No 4 – New 4-way signalised intersection at Cessnock Road / Walker / McCloy development site, Gillieston Heights South- East Precinct Development Application (DA), 11 May 2023, prepared by Arcadis.*

Attachment A

Technical Advice No 3 – Updated traffic assumption paper
Gillieston Heights South– East Precinct Development Application (DA)

Date	13/03/2023
Revision	C
To	Transport for New South Wales (TfNSW)
From	Arcadis Australia Pacific Pty Ltd (Arcadis)
Project Name	Gillieston Heights South – East Precinct Development Application (DA)
Subject	**Updated traffic assumption paper, Gillieston Heights South – East Precinct Development Application (DA)**

1 Report purpose

This Technical Advice No 3 has been prepared to document updated traffic assumption proposed to be used for the Gillieston Height South – East Precinct Development Application (DA).

This updated assumption paper has been prepared by Arcadis on behalf of Walker Gillieston Heights Pty Ltd (**Walker**) to document the updated traffic modelling assumption proposed to be used for the new 4-way signalised intersection. It is proposed that traffic from Walker's development site would access the Cessnock Road via the 4-way signalised intersection with McCloy site being the 4th leg of this signalised intersection.

Figure 1-1 shows the subdivision layout prepared by Walker for the residential development and indicative location of site access on the Cessnock Road.

1.1 Background

In May 2022, Arcadis prepared a Traffic Impact Assessment (TIA) Report to support a Planning Proposal for the Gillieston Height South – East Precinct. On 6 May 2022, Transport for NSW (TfNSW) supported the traffic impact assessment (TIA) revision D document, titled "*Gillieston Heights South (East Precinct), Traffic Impact Assessment", Rev D*, 4 May 2022 prepared by Arcadis. The Planning Proposal traffic assessment used the TfNSW's Main Road 195 (MR195) traffic model updated by Arcadis.

In a recent meeting with TfNSW dated 15 February 2023, it was agreed to use the MR195 traffic model for this new 4-way signalised intersection.

1.2 Key assumption changes

The following assumptions are proposed:

- A new 4-way signalised intersection is proposed for the Walker site. McCloy site would form the fourth leg of this new 4-way signalised intersection (refer to Figure 1-1).
- McCloy proposes to develop about 1,499 new residential dwellings as per assumption used in TfNSW's MR195 traffic model. Section 3.1.2 documents further details on McCloy land use assumptions used in the MR195 traffic model.
- Walker proposes to develop about 324 residential dwellings.

- Consistent with the previously approved trip distribution for the Walker site, it is assumed that about 60 per cent of development traffic (from both Walker and McCloy sites) would travel toward the south along the Cessnock Road. The remaining 40 per cent of development traffic would travel toward the north along the Cessnock Road.
- Residential trip generation rates for both Walker and McCloy sites are assumed to be 0.78 AM peak hour trips and 0.71 PM peak hour trips per dwelling.
- Transport for NSW has assessed the submitted Draft Addendum 1 by Arcadis (refer Revision B, dated 13/9/2022) and supporting SIDRA model, and *concurs with the conclusion that the existing Cessnock Road / Heyes Street / Redwood Drive TCS has the capacity to cater for 90 additional lots.'*
- Walker would proceed with staging development such that the first 90 lots would be developed without the proposed new 4-way signalised intersection.

1.3 Technical documents

The following is an overview of technical advice documents submitted to TfNSW previously as part of the consultation process, including:

- *Technical Advice No 1 – Traffic assumption paper, Gillieston Heights South, Rev B*, 12 November 2021, prepared by Arcadis.
- *Addendum to Traffic Assumption Paper – School traffic modelling, Gillieston Heights South*, 21 December 2021, prepared by Arcadis.
- *Technical Advice No 2 – New traffic signals layout with the Cessnock Road, Gillieston Heights South*, 11 March 2022, prepared by Arcadis.
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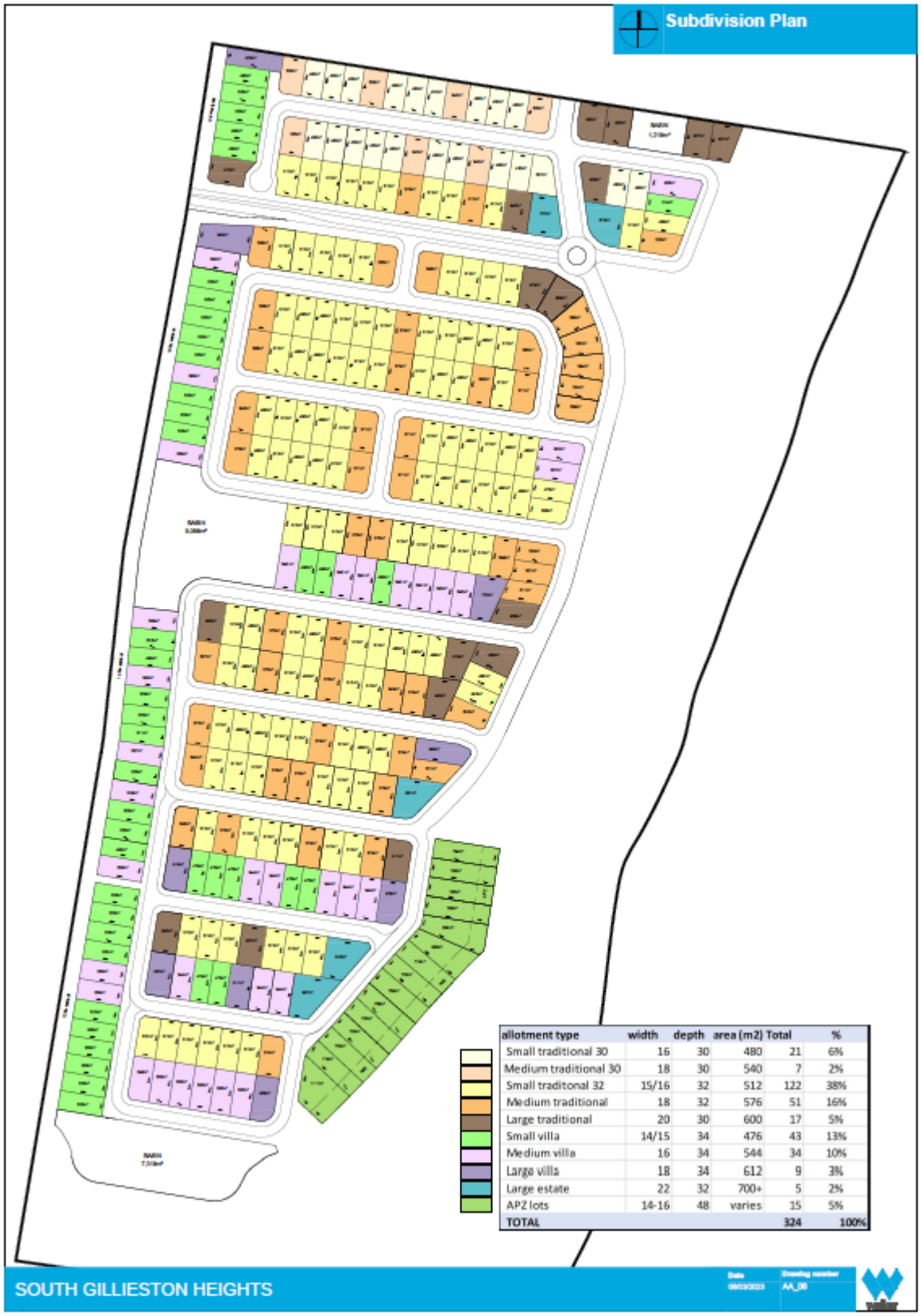


Source: Draft Subdivision Plan (Option 5) dated 8 March 2023

Figure 1-1 Gillieston Heights South development proposal and proposed site access

2 Traffic modelling

In 2020, Arcadis undertook a traffic modelling study for the Main Road 195 (MR195) corridor between Mitchell Avenue/Victoria Street at Kurri Kurri and the New England Highway (*2020 Study*). The 2020 Study was undertaken for TfNSW. The MR195 is about 11-kilometre section of the Cessnock Road, Main Road and Lang Street from the northern boundary at Swamp Creek, south of New England Highway in Maitland to the southern boundary at Lang Street/Mitchell Avenue/Victoria Street roundabout in Kurri Kurri. As part of the MR195 corridor 2020 study, an operational model was developed using VISSIM software.

Arcadis updated MR195 corridor traffic model for the purpose of Walker's Planning Proposal. Detailed updates including background traffic growth assumptions used in the MR195 traffic model were documented in the following technical documents including:

- *Technical Advice No 1 – Traffic assumption paper, Gillieston Heights South, Rev B*, 12 November 2021, prepared by Arcadis.
- *Addendum to Traffic Assumption Paper – School traffic modelling, Gillieston Heights South*, 21 December 2021, prepared by Arcadis.

For VISSIM scenarios modelling in 2026 and 2036, updated traffic modelling proposes to assume the 4-way signalised intersection with Walker and McCloy sites.

Figure 2-1 shows an indicative location of 4-way traffic signals with the Cessnock Road.

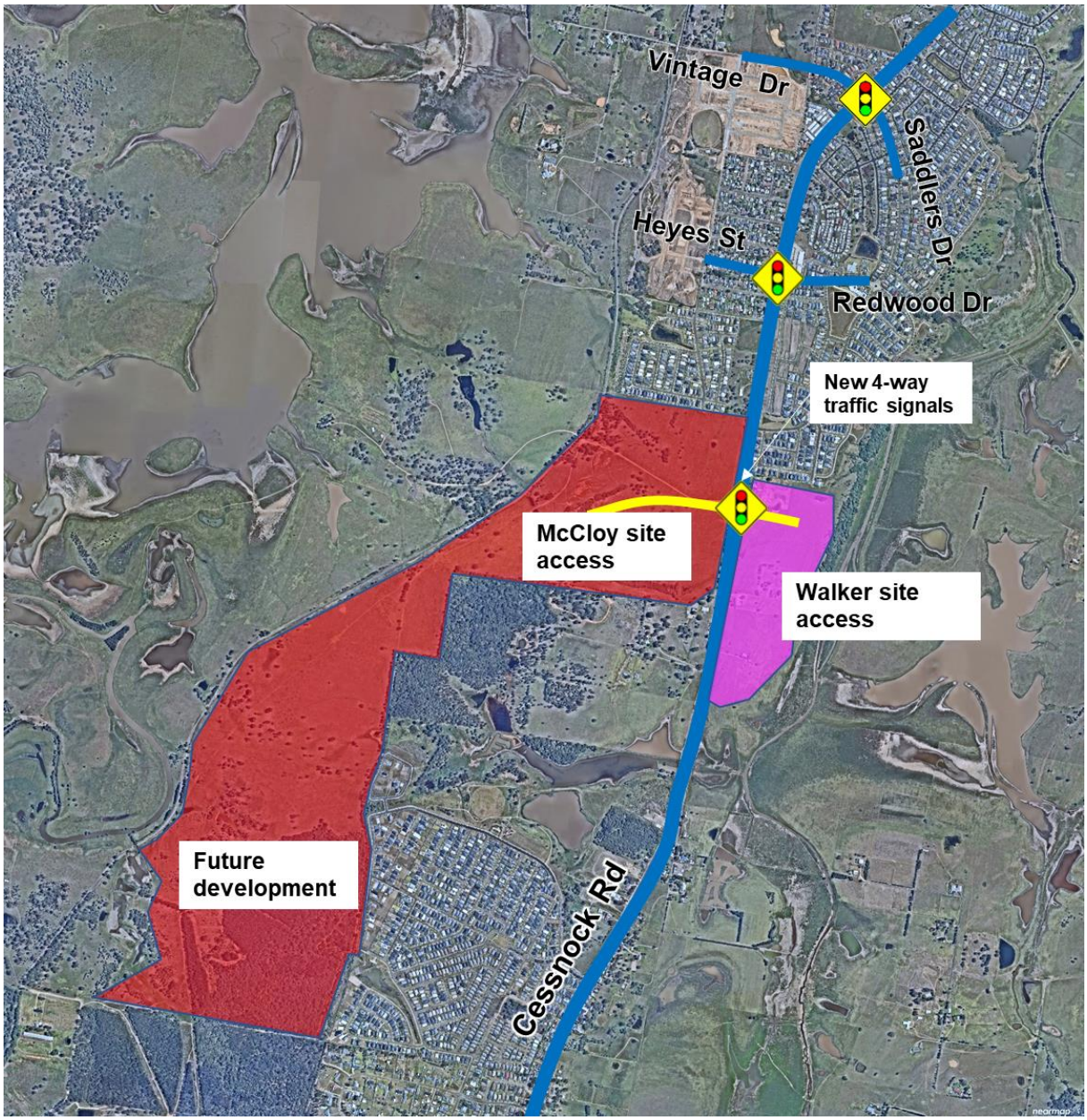


Figure 2-1 Indicative location of 4 way traffic signals on Cessnock Road

3 Trip generation and distribution assumptions

The following trip generation and distribution assumptions are proposed to be used for the 4-way signalised intersection with Walker and McCloy sites.

3.1 Trip generation

The average weekday trip generation rates of 0.78 AM peak hour trips and 0.71 PM peak hour trips per dwelling are adopted based on recommended rates for residential subdivision sourced from TfNSW *Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a), August 2013*.

Table 3-1 shows the trip generation rate assumed for the residential development.

Table 3-1 Trip generation rates

Land use	Trip generation rates	
	AM	PM
Residential dwelling	0.78 peak hour vehicle trips per dwelling	0.71 peak hour vehicle trips per dwelling

3.1.1 Trip generation from Walker site

Walker site is proposed to provide about 324 residential dwellings.

Table 3-2 shows peak hour trip generation from the Walkecorp site. The analysis shows that Walker site would generate about 253 vehicle trips in the AM peak hour and about 230 vehicle trips in the PM peak hour.

Table 3-2 Peak hour trip generation – the Proposal

Development	Development yield	Trip generation rates (trips per dwelling)		Peak hour trip generation	
		AM	PM	AM	PM
Walker site	324 dwellings	0.78	0.71	253	230

3.1.2 Trip generation from McCloy site

McCloy development yield was sourced from TfNSW's MR195 traffic model (see Table 3-3). It was assumed to develop about 1,827 residential dwellings across Gillieston Heights, Cliftleight and Loxford sites.

Table 3-3 McCloy development yield assumed in MR195 traffic model

McCloy site	Yield
Gillieston Heights site	545
Cliftleight site	954
Loxford site	328
Total McCloy yield	**1,827**
Gillieston Heights and Cliftleight	**1,499**

Of the total yields, about 1,499 dwellings from Gilleston Heights and Cliftleight would entry and exit the site via Cessnock Road new 4-way traffic signals (see Figure 3-1).

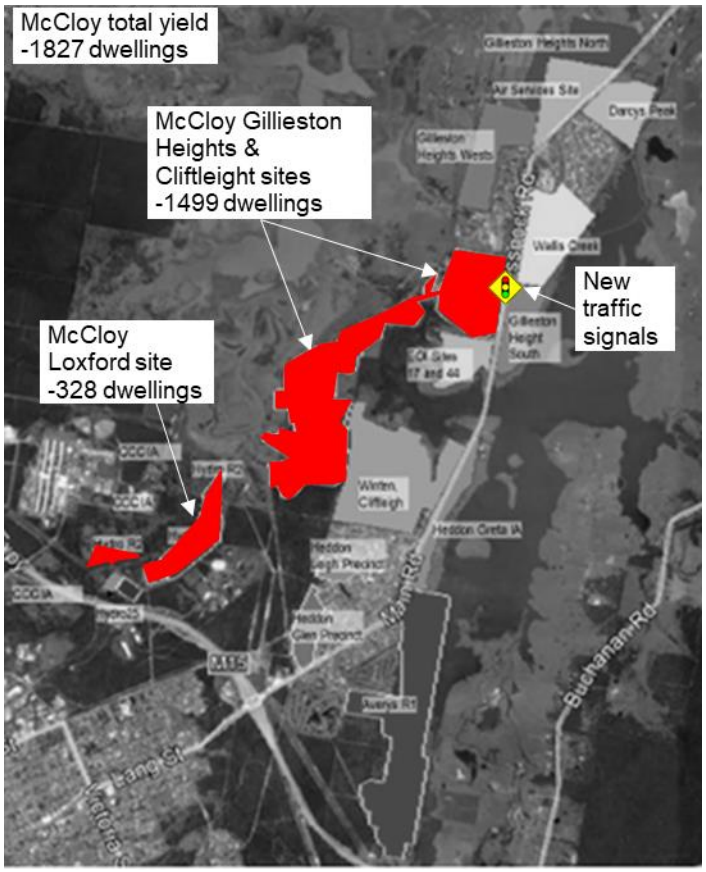


Figure 3-1 Indicative location of 4 way traffic signals on Cessnock Road

Table 3-4 shows peak hour trip generation from McCloy site which would access via the 4-way traffic signals. The analysis shows that McCloy site would generate about 1,169 vehicle trips in the AM peak hour and about 1,064 vehicle trips in the PM peak hour.

Table 3-4 Peak hour trip generation – McCloy site

Development	Development yield	Trip generation rates (trips per dwelling)		Peak hour trip generation	
				AM	PM
McCloy site	1,499 dwellings	0.78	0.71	1,169	1,064

3.2 Trip distribution

The following trip distributions are proposed for both Walker and McCloy sites (see Figure 3-2):

- About 40 per cent development traffic would travel towards the north via new traffic signals
- About 60 per cent development traffic would travel towards the south via the new traffic signals.

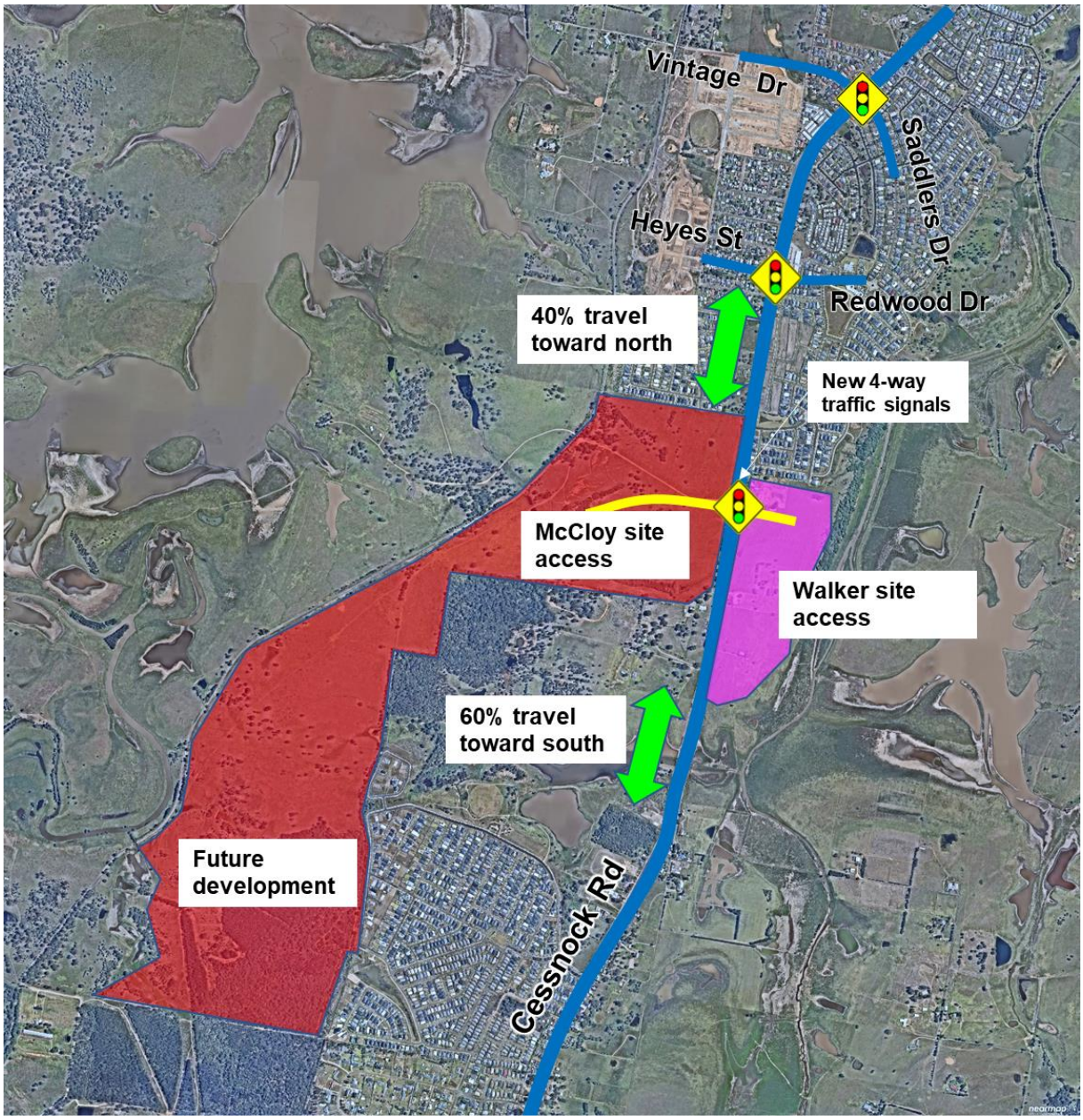


Figure 3-2 Assumed traffic distribution to and from Walker and McCloy sites

Table 3-5 shows the inbound and outbound trip distribution for both Walker and McCloy sites in AM and PM peak hours. Of the total trips generated by residential developments, it is assumed that 80 per cent of trips are outbound and 20 per cent are inbound in the AM peak hour. In the PM peak hour, it is assumed that 20 per cent of trips are outbound and 80 per cent of trips are inbound.

Table 3-5 AM and PM peak one hour trip distribution for Walker and McCloy sites

Development	AM peak			PM peak		
	Inbound	Outbound	Two-way	Inbound	Outbound	Two-way
Walker site	51	202	253	184	46	230
McCloy site	234	935	1169	851	213	1,064

Figure 3-3 shows development trips to and from both Walker and McCloy sites in AM and PM peak hours (as flow diagram). The background through traffic volumes on the Cessnock Road is not shown.

The analysis assumes about 10 per cent of the development trips would travel between Walker and McCloy sites (east–west through movements).

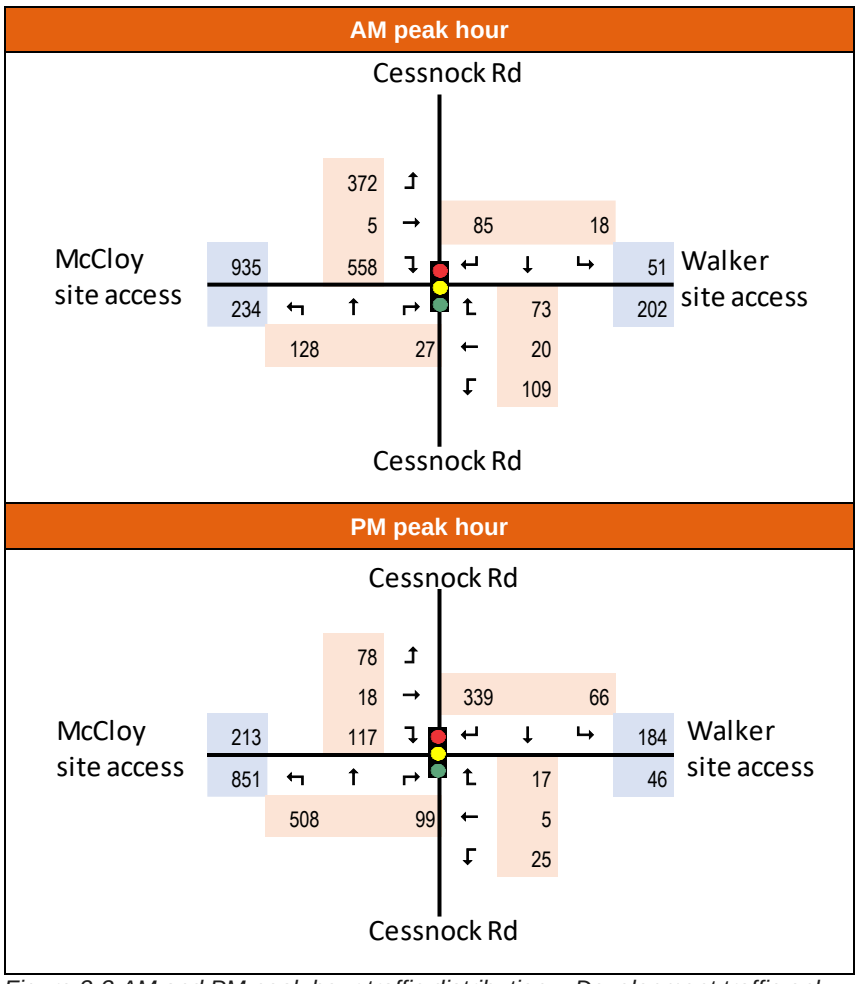


Figure 3-3 AM and PM peak hour traffic distribution – Development traffic only

Attachment B

Technical Advice No 4 – New 4-way signalised intersection at Cessnock Road / Walker / McCloy development site

Gillieston Heights South– East Precinct Development Application (DA)

Date	11/05/2023
Revision	B
To	Transport for New South Wales (TfNSW)
From	Arcadis Australia Pacific Pty Ltd (Arcadis)
Project Name	Gillieston Heights South – East Precinct Development Application (DA)
Subject	**New 4-way signalised intersection at Walker / McCloy development sites**

1 Report purpose

This Technical Advice No 4 has been updated addressing comments from TfNSW dated 9 May 2023. Sidra traffic model has been updated for the following two items:

- Double diamond phase
- Cycle time of 120 seconds.

This Technical Advice No 4 has been prepared to document traffic modelling outcomes of a new 4-way signalised intersection proposed at Cessnock Road / Walker / McCloy development site.

This report has been prepared by Arcadis on behalf of Walker Gillieston Heights Pty Ltd (**Walker**) as part of the Gillieston Heights South – East Precinct Development Application (DA).

It is proposed that traffic from Walker's development site would access Cessnock Road via the 4-way signalised intersection with McCloy site being the 4th leg of this signalised intersection.

It is recommended that Transport for NSW (TfNSW) reviews intersection footprints and associated traffic modelling results prepared for the new 4-way traffic signals at Cessnock Road / Walker / McCloy development site.

1.1 Background

In May 2022, Arcadis prepared a Traffic Impact Assessment (TIA) Report to support a Planning Proposal for the Gillieston Height South – East Precinct. On 6 May 2022, Transport for NSW (TfNSW) supported the traffic impact assessment (TIA) revision D document, titled "*Gillieston Heights South (East Precinct), Traffic Impact Assessment", Rev D*, 4 May 2022 prepared by Arcadis. The Planning Proposal traffic assessment used the TfNSW's Main Road 195 (MR195) traffic model updated by Arcadis.

In a recent meeting with TfNSW dated 15 February 2023, it was agreed to use the MR195 traffic model for this new 4-way signalised intersection.

Transport for NSW has assessed the submitted Draft Addendum 1 by Arcadis (refer Revision B, dated 13/9/2022) and supporting SIDRA model, and *concurs with the conclusion that the existing Cessnock Road / Heyes Street / Redwood Drive TCS has the capacity to cater for 90 additional lots.'*

Walker would proceed with staging development such that the first 90 lots would be developed without the proposed new 4-way signalised intersection.

2 Reference traffic model and data

This Technical Advice No 4 should be read in conjunction with *Technical Advice No 3 – Updated traffic assumptions paper* which documented key modelling assumptions including traffic generation, and distribution assumptions for both Walker and McCloy sites. TfNSW accepted updated traffic assumption paper on 27th March 2023.

The 4-way signalised intersection modelling has used background traffic growth on Cessnock Road as per Base VISSIM model. The 4-way signalised intersection has been modelled for ultimate development year (assumed to be 2036 as per base VISSIM model). The new traffic signal at Cessnock Road / Walker / McCloy development site has considered pedestrian legs on all four approaches.

SIDRA software has been used to determine the intersection footprints and level of service outcome.

2.1 Technical documents

The following is an overview of technical advice documents submitted to TfNSW previously as part of the consultation process, including:

- *Technical Advice No 1 – Traffic assumption paper, Gillieston Heights South, Rev B*, 12 November 2021, prepared by Arcadis.
- *Addendum to Traffic Assumption Paper – School traffic modelling, Gillieston Heights South*, 21 December 2021, prepared by Arcadis.
- *Technical Advice No 2 – New traffic signals layout with the Cessnock Road, Gillieston Heights South*, 11 March 2022, prepared by Arcadis.
- *Gillieston Heights South (East Precinct), Traffic Impact Assessment, Rev D*, 4 May 2022, prepared by Arcadis.
- *Gillieston Heights South (East Precinct), Addendum 1, Traffic impact assessment for the first 100 dwellings, Rev B*, 13 September 2022, prepared by Arcadis.
- *Technical Advice No 3 – Updated traffic assumption paper, Gillieston Heights South- East Precinct Development Application (DA)*, 13 March 2023, prepared by Arcadis.

2.2 Background traffic growth

The background traffic growth was sourced from the MR195 Corridor Study. Table 2-1 shows the number of residential dwellings for 2020, 2026 and 2036 assumed for background growth. The forecast number of dwellings for background growth was provided by TfNSW during the MR195 Corridor Study.

Under the background growth, about 1,350 new dwellings are projected between 2020 and 2026. Between 2020 and 2036, about 3,164 new dwellings are projected.

Table 2-1 Forecast residential dwelling

	2020	Forecast number of dwellings		Increase in dwellings	
		2026	2036	2020-2026 (6 years)	2020-2036 (16 years)
Background growth	3,494	4,844	6,658	1,350	3,164

3 New traffic signals footprints

The ultimate footprint for the new 4-way signalised intersection considered the following key assumptions including:

- A new 4-way signalised intersection is proposed for the Walker site. McCloy site would form the fourth leg of this new 4-way signalised intersection (refer to Figure 3-1).
- The development yield for McCloy site is assumed to be 1499 residential dwellings. The development yield for Walker site is assumed to be 324 residential dwellings.

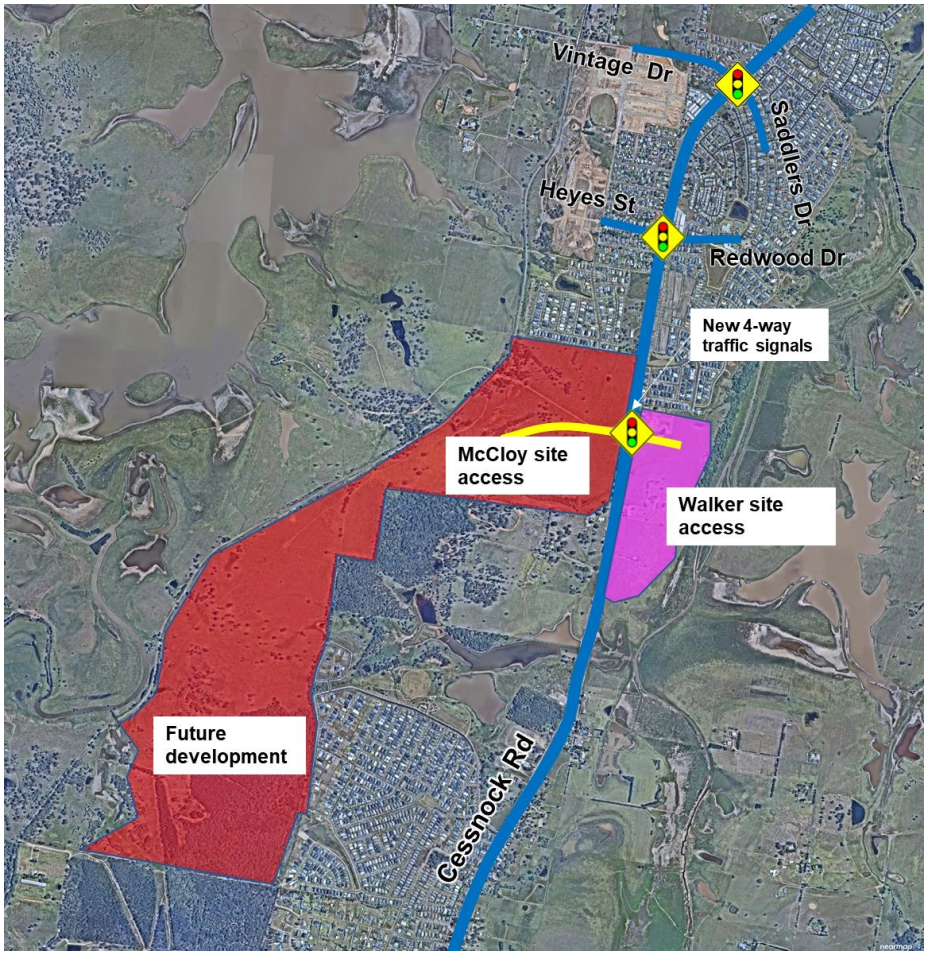


Figure 3-1 Indicative location of 4 way traffic signals on Cessnock Road

The ultimate 4-way intersection layout at Cessnock Road / Walker / McCloy development site has considered the following lane configurations (refer to Figure 3-2):

- Two through traffic lanes on Cessnock Road (in each direction)
- Two dedicated right turn lanes on Cessnock Road for about 125 metres on northern approach
- One dedicated left turn lane on Cessnock Road for about 70 metres on northern approach
- One dedicated right turn lane on Cessnock Road for about 200 metres on southern approach
- Dedicated signalised left turn slip lane on Cessnock Road for about 170 metres on southern approach
- Two dedicated right turn lanes on McCloy site access
- Shared through lane and signalised left turn slip lane on McCloy site access for about 125 metres
- One dedicated through lane on Walker site access
- One dedicated left turn lane on Walker site access for about 80 metres
- One dedicated right turn lane on Walker site access for about 80 metres
- Full pedestrian crossing on all four approaches on new 4-way signalised intersection.

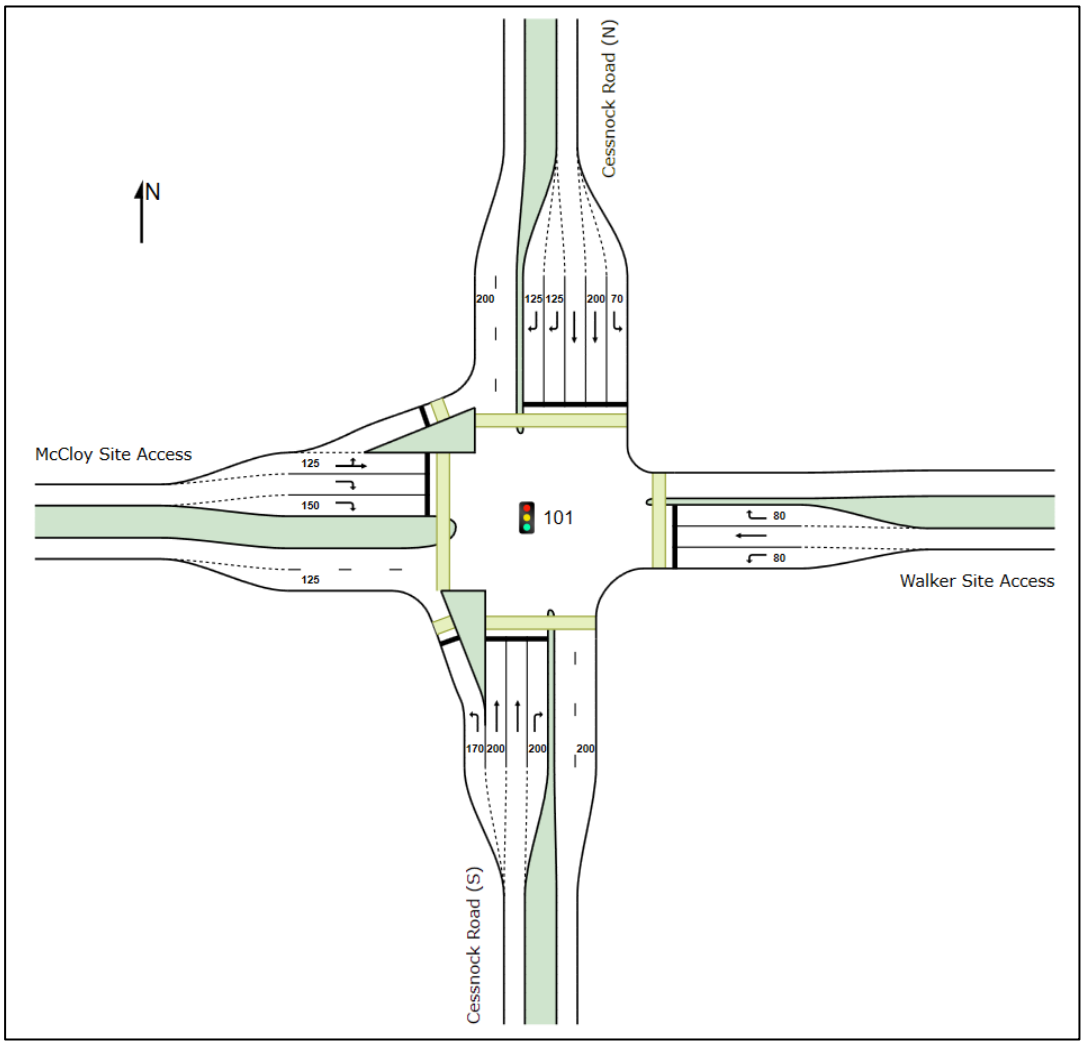


Figure 3-2 Proposed ultimate layout for new 4-way intersection at Cessnock Road / Walker / McCloy development site

3.1 Modelling results

Traffic performance (delays and level of service) of new 4-way intersection layout was assessed using SIDRA software. SIDRA modelling was undertaken for the future year in 2036.

The LoS is reported as per TfNSW's traffic modelling Guide. The Guide recommends that, for priority intersections such as a roundabout and sign-controlled intersections, the level of service value is determined by the critical movement with the highest delay. With these type of intersection controls (roundabout, Stop and Give Way sign controls), some movements may experience high levels of delay while other movements may experience minimal delay.

For a signalised intersection, the level of service criteria is related to the average intersection delay measured in seconds per vehicle.

Table 3-1 below shows the TfNSW standard level of service (LoS) criteria for intersection operation.

Table 3-1 Level of service criteria for intersection

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<15	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: TfNSW' Traffic Modelling Guidelines, Version 1.0, February 2013

Figure 3-3 shows forecast traffic volumes in 2036 AM and PM peak hour at Cessnock Road / Walker / McCloy development site.

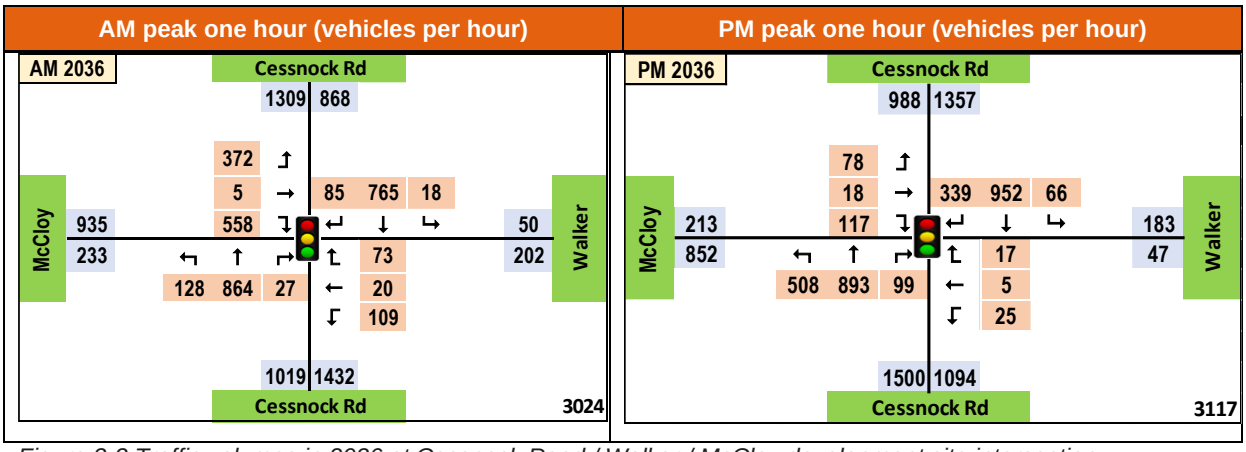


Figure 3-3 Traffic volumes in 2036 at Cessnock Road / Walker / McCloy development site intersection

Table 3-2 shows delays and level of service of 4-way new signalised intersection in 2036. The modelling data shows that new 4-way signalised intersection would provide Level of Service C/D (average delays between 42 to 49 seconds per vehicle) in 2036. Overall, the predicted queues on Cessnock Road, Walker access road and McCloy access road would contain within the provided auxiliary lanes. Model shows degree of saturation between 0.75 and 0.85 being lower than 0.90 upper limit thresholds for new traffic signals.

Table 3-2 Predicted level of service for new 4-way signalised intersection in 2036

Intersection	Approach	AM			PM		
		Delay (sec)	LoS	Queue Length (m)	Delay (sec)	LoS	Queue Length (m)
Cessnock Road/McCloy site access / Walker site access	North – Cessnock Road	49	D	150	46	D	180
	East – Walker access	43	D	35	46	D	10
	South – Cessnock Road	46	D	185	36	C	160
	West – McCloy access	54	D	130	52	D	25
	Overall intersection	**49**	**D**		**42**	**C**	

Appendix A documents detailed delays, queue length results by movements as per SIDRA model.

Appendix B documents signal phasing assumed for the New 4-way signalised intersection.

4 Conclusions

This Technical Advice No 4 has been prepared to document traffic modelling outcomes of a new 4-way signalised intersection proposed at Cessnock Road / Walker / McCloy development site.

The new 4-way signalised intersection was modelled using SIDRA software. Traffic modelling was undertaken for future year in 2036 assuming background traffic growth from MR195 VISSIM model.

The proposed layout would provide Level of Service C/D (average delays between 42 to 49 seconds per vehicle) in 2036. Model shows degree of saturation between 0.75 and 0.85 being lower than 0.90 upper limit thresholds for new traffic signals.

The following layout is recommended for Cessnock Road /Walker site access / McCloy site access intersection (refer to Figure 4-1).

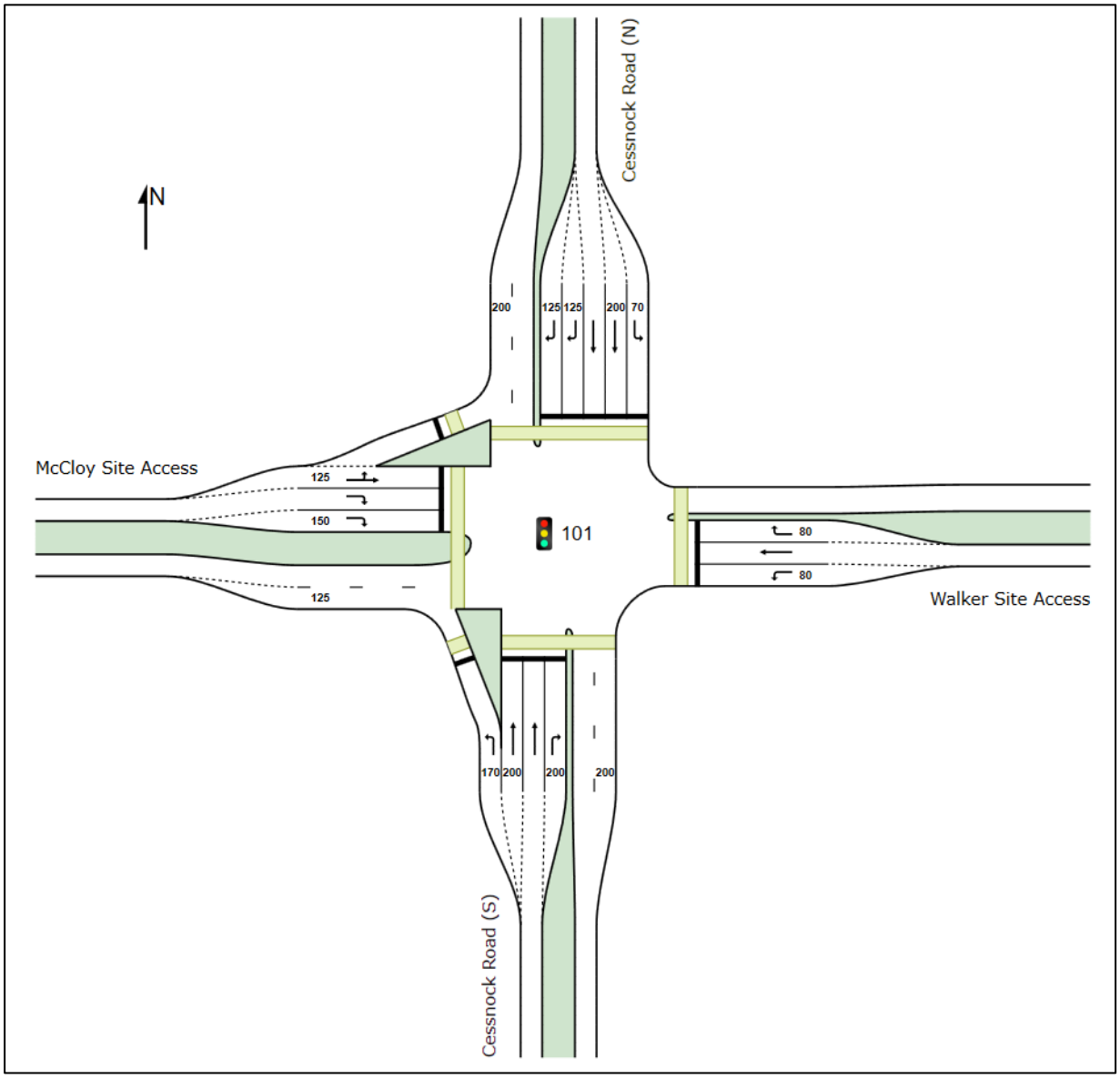


Figure 4-1 Recommended layout for new 4-way signalised intersection

APPENDIX A SIDRA RESULTS

Future year 2036

MOVEMENT SUMMARY

Site: 101 [2036 AM_Gillieston Heights - New 4-way signalised intersection_v3 - DD (Site Folder: Optimised layout 1950 DD)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Cessnock Road (S)															
1	L2	All MCs	128	5.0	128	5.0	0.139	22.8	LOS B	3.8	27.5	0.54	0.73	0.54	51.9
2	T1	All MCs	864	5.0	864	5.0	*0.827	49.2	LOS D	25.6	186.8	1.00	0.94	1.11	43.9
3	R2	All MCs	27	5.0	27	5.0	0.308	70.7	LOS F	1.6	11.9	1.00	0.72	1.00	35.5
Approach			1019	5.0	1019	5.0	0.827	46.4	LOS D	25.6	186.8	0.94	0.91	1.03	44.4
East: Walker Site Access															
4	L2	All MCs	109	5.0	109	5.0	*0.208	39.7	LOS C	4.8	35.0	0.79	0.75	0.79	43.5
5	T1	All MCs	20	5.0	20	5.0	0.042	36.3	LOS C	0.9	6.4	0.79	0.57	0.79	29.7
6	R2	All MCs	73	5.0	73	5.0	0.222	50.1	LOS D	3.7	26.8	0.89	0.75	0.89	27.9
Approach			202	5.0	202	5.0	0.222	43.1	LOS D	4.8	35.0	0.83	0.73	0.83	37.3
North: Cessnock Road (N)															
7	L2	All MCs	18	5.0	18	5.0	0.022	32.0	LOS C	0.6	4.1	0.57	0.69	0.57	37.5
8	T1	All MCs	765	5.0	765	5.0	0.731	46.6	LOS D	20.6	150.5	0.97	0.85	0.98	46.5
9	R2	All MCs	85	5.0	85	5.0	0.561	72.1	LOS F	3.1	22.4	1.00	0.75	1.03	18.3
Approach			868	5.0	868	5.0	0.731	48.8	LOS D	20.6	150.5	0.96	0.83	0.98	43.6
West: McCloy Site Access															
10	L2	All MCs	372	5.0	372	5.0	0.586	38.2	LOS C	17.9	130.6	0.87	0.82	0.87	26.1
11	T1	All MCs	5	5.0	5	5.0	0.586	45.7	LOS D	17.9	130.6	0.87	0.82	0.87	29.1
12	R2	All MCs	558	5.0	558	5.0	*0.849	64.8	LOS E	17.7	129.0	1.00	0.99	1.22	34.3
Approach			935	5.0	935	5.0	0.849	54.1	LOS D	17.9	130.6	0.95	0.92	1.08	32.0
All Vehicles			3024	5.0	3024	5.0	0.849	49.3	LOS D	25.6	186.8	0.94	0.88	1.02	39.8

MOVEMENT SUMMARY

Site: 101 [2036 PM_Gillieston Heights - New 4-way signalised intersection_v3 - DD (Site Folder: Optimised layout 1950 DD)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

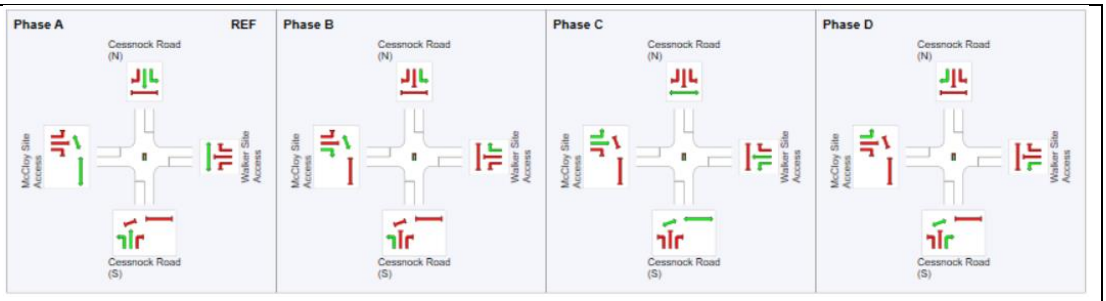
Vehicle Movement Performance

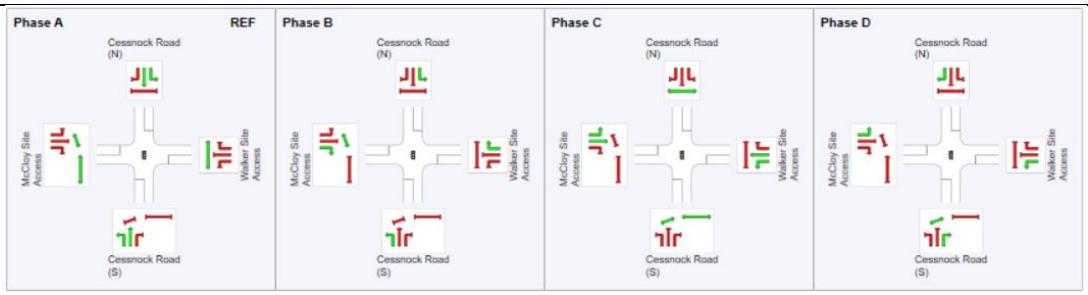
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Cessnock Road (S)															
1	L2	All MCs	508	5.0	508	5.0	0.622	33.0	LOS C	22.2	161.8	0.81	0.84	0.81	46.4
2	T1	All MCs	893	5.0	893	5.0	0.676	35.2	LOS C	22.1	161.2	0.91	0.80	0.91	50.3
3	R2	All MCs	99	5.0	99	5.0	0.377	57.8	LOS E	5.3	39.0	0.95	0.78	0.95	38.7
Approach			1500	5.0	1500	5.0	0.676	35.9	LOS C	22.2	161.8	0.88	0.81	0.88	47.9
East: Walker Site Access															
4	L2	All MCs	25	5.0	25	5.0	0.040	32.0	LOS C	0.9	6.9	0.69	0.67	0.69	46.2
5	T1	All MCs	5	5.0	5	5.0	0.013	40.0	LOS C	0.2	1.7	0.82	0.54	0.82	28.5
6	R2	All MCs	17	5.0	17	5.0	0.190	67.3	LOS E	1.0	7.4	0.99	0.69	0.99	24.0
Approach			47	5.0	47	5.0	0.190	45.6	LOS D	1.0	7.4	0.81	0.67	0.81	36.3
North: Cessnock Road (N)															
7	L2	All MCs	66	5.0	66	5.0	0.094	40.1	LOS C	2.4	17.3	0.65	0.73	0.65	35.2
8	T1	All MCs	952	5.0	952	5.0	*0.731	40.8	LOS C	24.7	180.4	0.93	0.82	0.93	49.8
9	R2	All MCs	339	5.0	339	5.0	*0.746	62.7	LOS E	11.7	85.6	0.99	0.84	1.05	20.3
Approach			1357	5.0	1357	5.0	0.746	46.2	LOS D	24.7	180.4	0.93	0.82	0.95	41.9
West: McCloy Site Access															
10	L2	All MCs	78	5.0	78	5.0	0.142	26.8	LOS B	3.6	26.4	0.69	0.68	0.69	29.6
11	T1	All MCs	18	5.0	18	5.0	*0.142	40.8	LOS C	3.6	26.4	0.69	0.68	0.69	32.2
12	R2	All MCs	117	5.0	117	5.0	*0.652	70.7	LOS F	3.7	26.8	1.00	0.82	1.13	32.6
Approach			213	5.0	213	5.0	0.652	52.1	LOS D	3.7	26.8	0.86	0.76	0.93	31.9
All Vehicles			3117	5.0	3117	5.0	0.746	41.7	LOS C	24.7	180.4	0.90	0.81	0.91	44.0

Arcadis Model name: GHS New 4-way signalised intersection – FINAL DD

Location: 30101043 - Gillieston Heights South project - Variation 3 - 4 way intersection - All Documents (sharepoint.com)

APPENDIX B SIGNAL PHASING

Signal Phasing (AM peak)				
Cycle Time (sec)	120			
Phase Time (sec)	41	29	37	13
Phase Split	34%	24%	31%	11%
Late Start	5 seconds for left turn (pedestrian safety)	-	5 seconds for left turn (pedestrian safety)	-

Signal Phasing (PM peak)				
Cycle Time (sec)	120			
Phase Time (sec)	50	13	32	25
Phase Split	42%	11%	27%	21%
Late Start	5 seconds for left turn (pedestrian safety)	-	5 seconds for left turn (pedestrian safety)	-

Arcadis Model name: GHS New 4-way signalised intersection – FINAL DD

Location: 30101043 - Gillieston Heights South project - Variation 3 - 4 way intersection - All Documents (sharepoint.com)