BETTER TRANSPORT FUTURES
MARK WAUGH

Wickham Woolstore Project
Concept Plan and Stage One Development

Investec

Traffic Impact Statement
May 2017

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Contents

1 Introduction

1.1 The Project

Investec is proposing to complete a redevelopment of the former wool stores buildings located in Wickham NSW. The subject site is located on the corner of Annie and Milford Streets in Wickham, a short distance from the Central Business District of Newcastle.

1.2 Scope of Traffic Impact Assessment

These investigations have assessed the range of traffic and transport features of the subject site and its surrounds with specific reference to the requirements of the Guide to Traffic Generating Developments (Version 2.2, RTA October 2002) (Herein after referred to as the Guide) The work is required to accompany the Statement of Environmental Effects supporting the Development Application for the subject site and development. Specific work tasks have included:

1. SITE INVESTIGATIONS – Consideration of the existing form and features of the surrounding road system.
2. TRAFFIC COUNTS - Traffic counts for one weekday at the intersections of Milford Road with Annie Street, Robert Street, and The Avenue with Milford Road & McMichael Street (Staggered T-intersections)
    a. Confirming AM and PM peak periods, (NOTE: RMS here in Newcastle have been asking for 3 consecutive days of data including a Saturday ….)
    b. Monitoring any local queuing, and the presence of industrial (truck) traffic.
3. DESIGN REVIEW – One review of the proposed site access design and layout, from a technical capacity, movement and also road safety perspective.
4. TURNING MOVEMENT (CAD) ANALYSIS REVIEW – Review of Turning movement analysis by others to assess access and loading arrangements.
5. ASSESSMENT - Complete a Traffic Impact Assessment in accordance with the Guide to Traffic Generating Development (RTA 2002)
6. TIS REPORT - Prepare a Traffic Impact Statement (TIS) incorporating the findings form the above assessments, suitable for lodging with the road authorities for approval.

The TIS report is set out as follows:

- Chapter 2 describes the existing situation
- Chapter 3 details the traffic and transport aspects of the subject site and development proposal
- Chapter 4 presents the traffic impact assessment of the proposal
- Chapter 5 summaries the conclusions and recommendations form the investigations.

2 Project Background

2.1 Site Description and Local Context

The subject site is located on the corner of Annie and Milford Streets Wickham. It is close to the border of Wickham and the neighbouring localities of Islington and Maryville. The Wickham area is distinguished by its mix of light and heavy industrial development, and well as a mix of existing residential development within the vicinity of the subject site. Wickham is undergoing transition from its industrial past into predominantly residential but also including some retail and commercial uses.

The local context currently consists of light industrial and commercial to the east, a fuel storage facility to the north-east, commercial and low rise residential to the north and low rise residential to the south. To the west a large existing woolstore has already been adapted for residential use, 'Soque Apartments'. The existing road and lane network provide easy access to parks, playgrounds, retail outlets, the harbour and public transport routes.

The site currently contains three almost identical four storey wool stores. The first two of these existing buildings are to be developed primarily as residential with associated car parking. The third will be retail and commercial with upper level apartments. Two additional buildings are proposed within the ultimate site development. A new building is to be built east of the third woolstore. This building will be predominantly retail and commercial with associated parking. A building will also be built to the north of Woolstore 1 and this will be a residential flat building of similar size to the existing wool stores. A park is proposed to the east of this new building which will be open to public use.
The proposed Stage 1 of the master planned development incorporates the adaptive reuse of the first woolstore on the west of the site. The stated aim is to primarily preserve the original built form. The proposal does not modify the footprint, or height, and the envelope remains largely untouched. New openings and fenestrations will be clearly identified as new interventions.

Proposed car parking is to be hidden within the building allowing the ground floor to be activated by townhouses opening up to the surrounding streets and lanes.

The site location and local road network are shown in **Figures 1 and 2**.

Figure 1 – Site Location
Source: adapted from GHD 2016

2.2 Road Network

External Roads

The site is accessed from Annie Street, Milford Road, and with access also available from The Avenue. Each of these roads are local streets with a mixture of adjacent land use development.

Also of significance is the nearby arterial road Hannell Street, which forms part of the 'A43' arterial road network providing an important north / south traffic corridor serving the inner areas of Newcastle.

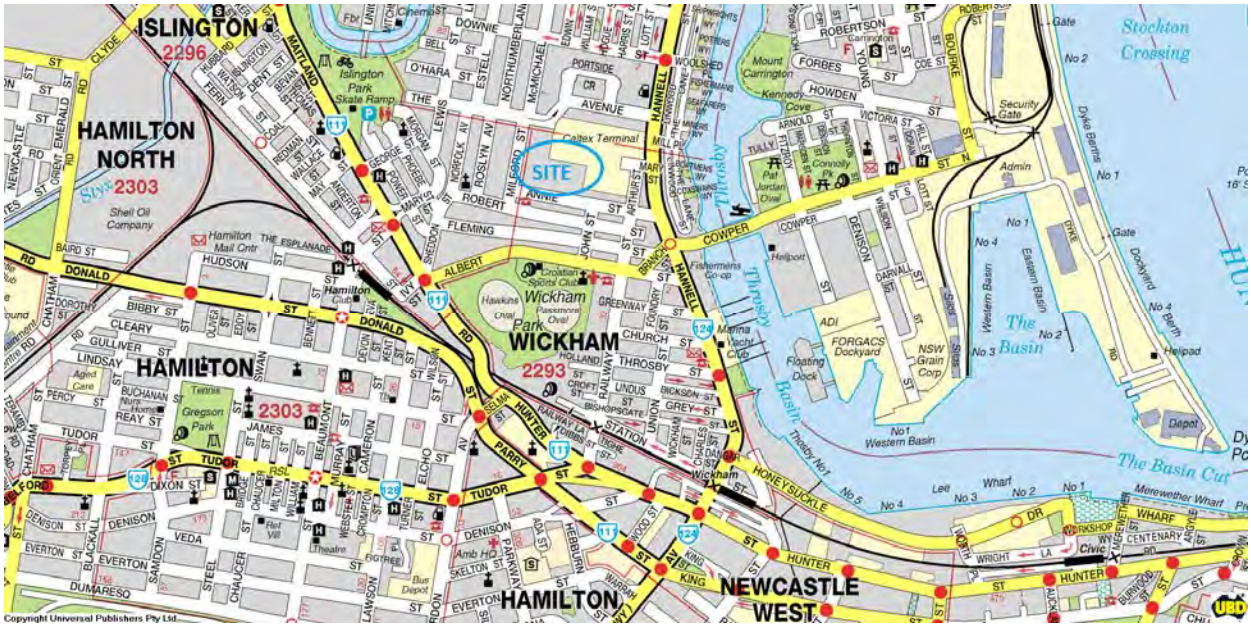


Figure 2 – Local Road Network
Source: UBD City Streets 2008

Hannell Street (A43)

Hannell Street (A43) is the main road connection from Newcastle north to the New England and Pacific Highways via Industrial Drive, connecting ultimately to the Maitland and the upper Hunter Valley, and Port Stephens and the NSW north coast.

In the vicinity of the subject site it is built to a dual carriageway standard with 2 traffic lanes and one parking lane in e ach direction. Significant junctions in the vicinity of the subject site include the Hannell Street / Branch Street / Cowper Street roundabout and adjacent bridge over Throsby Creek connecting to the suburb of Carrington, and the traffic signal controlled intersection of Downie Street / Woolshed Place providing access to Maryville and the Throsby Creek (former woolsheds) residential precinct.

Photo Plate 1 – Hannell Street looking north from Annie Street

Photo Plate 2 – Hannell Street looking north from The Avenue

Albert Street

Albert Street is a local collector road which along with Branch Street provides an important local connection from the A43 Hannell Street corridor through to the Maitland Road corridor at Islington. Since the recent closure of Railway Street Wickham in conjunction with the development of the proposed Wickham Transport Interchange, Albert Street has taken on a more important access and distributor role in the local road network.

Albert Street is a single carriageway two way two lane road with parking lanes in both directions. It is more remote from the subject site and will not figure significantly in its immediate access needs.

Annie Street

Annie Street is a local street in Wickham that provides access to a mix of light and heavy industrial and residential development. It is a single carriageway two way two lane road with prarelle parking in both direcitons. The carriagewau=y is approximiately 13 metres wide kerb to kerb.

Photo Plate 3 – Annie Street looking east from Milford Street (subject site on the left of photo)

Milford Street

Milford Street is a local street in Wickham that provides access to predominatly residential development, some of which is former warehouse / woo shed conversions. It is a single carriageway two way two lane road with prarelle parking in both direcitons. The carriageway is approximiately 12 metres wide kerb to kerb.

Photo Plate 4 – Milford Street looking south from The Avenue

The Avenue

The Avenue is a local street on the border of Wickham and Maryville that provides access to predominatly industrial development at its eastern end, and then resdiential development west of Mildford Street. It is a single carriageway two way two lane road with paralle' parking in both direcitons. The carriageway is approximiately 12 metres wide kerb to kerb. The transition from adjacent industrial to residential uses occurs at a significant double curve in the road alignment. (See **Photo Plate 6** oveleaf.)

Photo Plate 5 – The Avenue looking east Milford Street is to the right (subject site on right of photo)

Photo Plate 6 – The Avenue looking south from Portside Close toward Milford Street.

Photo Plate 7 – The Avenue looking west from Hannell Street

2.3 Traffic Surveys and Site Observations

Traffic Surveys

Monitoring of traffic movements was conducted over an AM and PM peak for a typical weekday. The traffic surveys were conducted on Thursday 24 November 2016. Traffic survey data was collected at three intersections along Milford Street:

- Robert Street
- Annie Street
- McMichael Street / The Avenue

The survey data is included in **Appendix A – Traffic Survey Data**.

General Site Observations

The most significant observations from a traffic movement efficiency and road safety perspective that were observed from the data monitoring and subsequent site observations were:

1. Traffic flows along the local road network are well within the technical capacity limits the road system.
2. Parking on the roads is higher in Annie Street during business hours, due to the adjacent business uses along part of this street.
3. Bus movements along the local street network were observed, on The Avenue and McMichael Street in close proximity to the subject site.
4. Existing site turn movements (in and out) from the local road network all operate well
5. All local intersections currently operate at volume levels below which intersection analysis is considered unnecessary and essentially at free flow conditions. (AustRoads 2009) (See also Section 4 of this report.)

The above observations have been taken into account when considering the development proposals.

2.4 Cycling Facilities

The road network in the vicinity of the subject site does not include specific cycling facilities. However the Newcastle City to University of Newcastle Callaghan cycle route is within a short distance along the local road network. This regional route provides safe cycle access to a range of significant activity centres in Newcastle.

The City of Newcastle Council has actively promoted cycling as a mode of transport as well as a recreational activity for many years. This is not without its challenges, including some topography challenges, but with much of the local Wickham and inner city area quite flat, it lends itself to the promotion of cycling in the local area.

Appendix B - Newcastle Cycling Map illustrates the existing and planned network of cycleways being development by Council.

2.5 Public Transport Services

The locality is well service by bus public transport, as illustrated in **Figure 3**, with scheduled bus services are operated By Newcastle Buses, a State Government owned corporation. Regular services on Hannell Street (Routes 106,107), Cowper and Albert Street (Route 104) Maitland Road ((Routes 100, 118, 201) and a local service through Maryville and Islington (Route 111) via McMichael Street, The Avenue and Norfolk Street. The closest bus stops to the subject site are in McMichael Street near its intersection with The Avenue. Other bus services on Hannell Street, Albert Street and Maitland Road are within a comfortable walking distance of the sites.

Figure 3 – Bus Routes in vicinity of site
Source: www.transportnsw.info

Photo Plate 8 – The Avenue / Milford St / McMichael St (bus stop is visible in McMichael Street)

A full map of the Newcastle region guide showing services in inner Newcastle as well as the Route 101 local service are illustrated in **Appendix C Public Transport Maps.**

2.6 Local Authority Liaison

Liaison has been undertaken with planning officers of the City of Newcastle during the pre DA phase of this project. Council has noted that the proposed development meets the definition of traffic generating development and any development application will require the concurrence of the Roads and Maritime Services. Specific advice received from council on traffic and parking issues in outlined overleaf.

15.3 Traffic and Parking

Traffic

- *A Traffic Impact Study prepared by an appropriately qualified and practicing engineer is to be submitted in support of the development application. The study is to address the relevant requirements of section 7.03.01 of the NDCP, 2012*
- *A Green Travel Plan to be prepared for in accordance with the relevant requirements of section 7.03.03 of the NDCP, 2012.*
- *A Local traffic management plan (TMP) will need to be prepared to indicate the flow and management of vehicular and pedestrian traffic within the site. The TMP will need to determine if the main internal access road will be done as an intersection to Milford St (traffic numbers will need to be confirmed). Also, consider safety at bends and intersections (including passing bays) and sightlines. Line marking, signage and treatment of pavement.*
- *The internal pavement design is to create a slow speed environment and allow for internal pedestrian movement or separated pedestrian path to be provided.*
- *Turning circles for all types of vehicles associated with the development are to be provided.*
- *The internal roads are to be designed for multi-use including pedestrians, vehicles and cyclist. The provision of parking spaces for people with a disability and 'Universal Design 'concept will also need to be addressed.*
- *It is recommended driveways be provided for the dwellings and the commercial/retail building via the internal road network. This will allow for retention of additional on-street parking. Driveway design to consider impact on the driveway of adjoining properties.*
- *For your information, a traffic study is currently been undertaken by Council for Wickham to the likely impact on the introduction of the light rail system. It is anticipated the study will be completed in March, 2017.*

Garbage Collection and Loading Areas

- *The SEE is to indicate whether is garbage collection will be undertaken by private contractor or Council. As well as details of garbage collection location, loading locations and size of trucks.*
- *The vehicular manoeuvring templates for all vehicles associated with the development are to be indicated on the development plans.*
- *Loading areas for retail/commercial and the dwellings will need to be considered. Off-street loading is recommended.*

Parking

- *Car, motorbike and bicycle parking and storage facilities will be required to be provided in accordance with relevant requirements of the NDCP. Note: On-street parking is not to form part of the calculations.*
- *Visitor parking spaces are to be provided and clearly indicated by appropriate signage and pavement markings.*
- *The car parking within the commercial/retail and the existing buildings will need to clearly marked out and sign posted for management of the parking. Internal road parking will also need to be managed.*
- *Additional visitor bicycle spaces can be provided with the internal road network and on Council footway as well. End user facility and change rooms are to be provided for staff to promote alternative transport.*
- *Compliance with the relevant Australian Standards for the parking needs to be achieved including manoeuvring, gradients for driveway, ramps and dimensions for spaces.*
- *Safety aspects and pedestrian movements will need to be considered within the site. Links to be provided to open areas and to venues.*
- *Lighting to be provided along the internal roadway, parks and public open areas and venues.*

Source: The City of Newcastle, 21 December 2016

The above matters raised by Council officers have been considered in preparing this Traffic Impact Statement.

3 The Development Proposal

The significant uses being proposed for the site are residential apartments, in a mixture of adaptive re-use of the existing woolstore buildings, and then with two new buildings proposed, additional residential as well as retail and commercial components to the development.

As such the concept plan presents a true mixed use development proposition. The mix becomes important in the way the surrounding street system is used, with commonly residential trips being produced and radiating out from a site in the AM peak period, and then returning during the evening. Conversely commercial activity generates attractions to a site in the AM, and then departures in the PM. Retail activity generates its most significant trips in the PM peaks of Thursday and Friday, and then on Saturdays. These flow characteristics of the various components of the concept plan have been considered in developing the traffic generation profile for the site.

3.1 Existing and Permissible Site Uses

The subject site is currently used as a warehouse storage facility. With around 17740 m^2 of existing gross floor area available on the site it would also be permissible under current land use zoning for the site to allow light industrial uses.

For a warehouse operation the projected traffic generation would be around 90 trips in a morning peak hour vehicle trips rate = 0.5 per 100m^2 gross floor area (RTA 2002). Trips would be predominantly attractions to the site.

For light industrial uses the projected traffic generation would be around 180 trips applying the industrial evening peak hour vehicle trips = 1 per 100 m2 gross floor area (RTA 2002). Similar to warehouse activity these trips would be predominantly attractions to the site.

The land uses (existing and permissible) are considered here as a comparison to the changes being proposed in the adaptive re-use of the Wool stores buildings on the site.

3.2 Stage 1 Development Application

The 'Stage 1' Development Application relates primarily to the local heritage item known as 'Woolstore 1' and a substantial new community park that will be open to the public.

The Stage 1 DA seeks consent for:

- adaptive re-use of 'Woolstore 1' building as a residential flat building comprising 100 apartments
- associated parking for cars, motorbikes and bicycles (Refer to details in **Table 3.2** overleaf) ;
- alterations to the Woolstore 1 building, including a new pedestrian entry, fenestration and private open space;
- demolition and earthworks;
- a public park; and
- public domain works.

Plans Illustrating Stage 1 are part of the **Appendix E Woolstore Project Drawing List** supplied by others in support of the Stage 1 Development Application.

Specific land use details are included in **Table 3.1** overleaf as part of the full concept plan profile.

3.3 Full Development Concept Plan

The Full Development Concept Plan seeks consent for:

- Adaptive re-use of existing 'Woolstore 1' and 'Woolstore 2' buildings for residential purposes;
- Adaptive re-use of the existing 'Woolstore 3' building for a mixed-use development comprising commercial, retail, residential and art studios;

- One (1) building envelope for 'Building 4' comprising a mixed-use development including commercial, retail, residential and function space;
- One (1) building envelope for 'Building 5' comprising a mixed-use development including residential and retail uses;
- One (1) public park;
- Public domain works;

The mix and distribution of land uses is summarised in **Table 3.1 Concept Plan – Land Use Profile.**

Table 3.1 Concept Plan – Land Use Profile

BUILDING	LAND USE	NUMBER	UNITS
WOOL 1	RESIDENTIAL	100	Apartments
WOOL 2	RESIDENTIAL	99	Apartments
WOOL 3	RESIDENTIAL	42	Apartments
	RETAIL	820	GFA (m^2)
	COMMERCIAL	5746	GFA (m^2)
WOOL 4	RETAIL / PRODUCE	1765	GFA (m^2)
	COMMERCIAL	2858	GFA (m^2)
WOOL 5	RESIDENTIAL	69	Apartments
	RETAIL	170	GFA (m^2)
TOTAL	RESIDENTIAL	310	Apartments
	RETAIL / PRODUCE	2755	GFA (m^2)
	COMMERCIAL	8604	GFA (m^2)

Plans illustrating the concept plans for full site development are part of the **Appendix E Woolstore Project Drawing List** supplied by others in support of this application.

The above land use characteristics were used to develop traffic generation profiles for the concept plan.

3.4 Proposed Parking

Parking provision for the concept plan has been assessed against the requirements of The City of Newcastle Development Control Plan (DCP) 7.03 Traffic, Access and Parking (CoN, 2012). The DCP requirements and provisions nominated for the site are presented in **Table 3.2 Concept Plan – Parking Provisions**

Table 3.2 Concept Plan – Parking Provisions

BUILDING	LAND USE	No.	DCP CAR Req'd	Plan	Diff	DCP M'bike Req'd	Plan	Diff	DCP Cycle Req'd	Plan	Diff
WOOL 1	RESIDENTIAL APTS	100	120	121	+1	5	25		110	100	-10
WOOL 2	RESIDENTIAL APTS	99	119	125	+6	5	34		109	100	-9
WOOL 3	TOTAL		187	66	-121	9	10	+1	84	89	+5
	RESIDENTIAL APTS	42									
	RETAIL GFA (m^2)	820									
	COMMERCIAL GFA (m^2)	5746									
WOOL 4	TOTAL		93	76	-17	5	6		24	54	+30
	RETAIL/PROD GFA (m^2)	1765									
	COMMERCIAL GFA (m^2)	2858									
WOOL 5	TOTAL		86	110	+24	4	7		78	93	+15
	RESIDENTIAL APTS	69									
	RETAIL GFA (m^2)	170									
ON SITE	Laneway Parking			102	+102						
TOTAL	TOTAL ON-SITE PARKING		605	600	-5	28	82	+54	405	436	+31

The provisions show a slight (<1%) shortfall for cars, but a significant surplus proposed for both motorbikes and bicycles. Overall this is considered a positive outcome for the subject site.

Service vehicle provisions are proposed across the site, with Buildings 3 and 4 particularly for the commercial and retail components of the concept plan, with an overall supply of 18 spaces proposed against a DCP requirement for 16 spaces.

3.5 Traffic Generation

Table 3.3 – Applied Traffic Generation Rates presents the traffic generation characteristics of the subject site.

Table 3.3 – Future Traffic Generation Assumptions

BUILDING	LAND USE	NUMBER	UNITS	AM Trip Rate[1]	AM Peak Trips	PM Trip Rate[1]	PM Peak Trips
WOOL 1							
	RESIDENTIAL	100	Apartments	0.53	53	0.32	32
WOOL 2							
	RESIDENTIAL	99	Apartments	0.53	53	0.32	32
WOOL 3							
	RESIDENTIAL	42	Apartments	0.53	23	0.32	10
	RETAIL	820	GFA (m^2)	n/a	30[3]	12.3	101
	COMMERCIAL	5746	GFA (m^2)	1.6	92	1.2	69
WOOL 4							
	RETAIL / PRODUCE	1765	GFA (m^2)	n/a	64[3]	12.3	217
	COMMERCIAL	2858	GFA (m^2)	1.6	46	1.2	35
WOOL 5							
	RESIDENTIAL	69	Apartments	0.53	37	0.32	22
	RETAIL	170	GFA (m^2)	n/a	6[3]	12.3	21
TOTALS	RESIDENTIAL	310	Apartments	0.53	166	0.32	96
	RETAIL / PRODUCE	2755	GFA (m^2)	n/a	100[3]	12.3	339
	COMMERCIAL	8604	GFA (m^2)	1.6	138	1.2	104
	TOTALS				404		539

Notes:

1. Traffic Generation Rates Source (The Guide – updated traffic surveys, RMS August 2013
2. GFA Trip Rate is per 100 m^2 GFA
3. AM Retail trip rate assumed as 100 employees (~ 1 per ~ 30m^2) arrives in the AM peak.

Care should be taken in considering the total trip generation of the concept plan, because of the mixture of land use types and subsequent trip productions and attractions of the development.

The Guide does not stipulate an AM peak trip rate for retail (shopping centres) uses, focussing on the much more prominent evening (Thursday and Friday) and Saturday periods. These are the highest traffic generating periods around retail activity, with Friday's typically 94% of the Thursday peak. Saturdays are generally higher in absolute peak but in this Wickham locality it is considered that there would be a much lower base traffic volume level. Hence for the purposes of this analysis the Thursday PM trip rate has been applied, coupled with the weekday peak volumes observed. And for the AM peak period, a nominal trip rate of 100 trips has been assumed to reflect arrival of workers at this time.

All other trips rates have been applied as per rates nominated in the Guide. Further details of the breakdown of the expected traffic flows on local roads in the vicinity of the site are provided in Section 5 of this report.

3.6 Traffic Assignment and Distribution

It is proposed to access Building 1 via two of the existing driveways on Milford Street, with subsequent development of Buildings 2, 3 and 4 accessed via a series of one way laneways from Annie Street. Building 5 is also proposed to be accessed from Milford Street. Additional access is provided from The Avenue, with all traffic existing the one way laneway system onto Milford Street.

Access to the surrounding local road system from Annie Street and Milford Street is expected to be dispersed across a number of routes. For example, Annie Street and The Avenue connect directly to Hannell Street for left in (from the south) left out (to the north) movements. Access to the north, south and west is also available via Milford Street, Robert Street and Sheddon Street to the Albert Street lights at Maitland Road. Access to the south and from the north is available via Maitland Road, and Hannell Street via either of the Cowper Street roundabout or Downie Street traffic lights.

Reviewing the traffic survey data collected on Milford Street from The Avenue to Annie and Robert Streets, the following observations were made:

- Around 75% of trips in Milford Street are southbound in both the AM and PM peaks
- Around 74% to 80% of trips on Robert Street east are eastbound in the AM and PM peaks
- Traffic flows on Annie Street and The Avenue show an eastbound bias in the AM (67% to 75%) and a westbound bias in the PM (68% to 87%) Robert Street shows a similar trends
- Robert Street west shows a similar trends with an eastbound bias in the AM (74%) and a westbound bias in the PM (67% to 87%)

What the above distribution of flows suggests is that The Avenue, Robert Street and Annie Street are used as approach routes to the nearby employment areas, from the west in the AM, and a departure route to the west in the PM.

It should be noted that a significant portion of trips from the proposed development of the subject site will be generated by residential activity, and so the assignment and distribution of trips is likely to differ from that observed in the recent traffic surveys. Taking this into account and considering the mixed use elements of the site the fundamental assignment and distribution of trips has been assumed as follows:

Assignment of Trips

a. AM – 25% IN, 75% OUT
b. PM – 75% IN, 25% OUT

Directional Distribution

a. 20% northbound, 50% via Annie Street, 50% via The Avenue
b. 50% southbound, 50% via Hannell Street, 50% via Maitland Road
c. 30% westbound,

3.7 Site Access, Circulation and Parking Review

Site Access and Circulation

The proposed access system for the Woolstore site is illustrated in **Figure 4 Site layout and proposed access system** overleaf and described below:

a. Building 1 (Stage 1) includes use of 2 of the existing driveways on Milford Street for entry and exit.
b. Building 5 (of the Masterplan proposes a single two-way driveway also on Milford Street.
c. Access to Buildings 2, 3 and 4, on ground parking and open space elements of the masterplan will be via a series of one way lane ways, from Annie Street and The Avenue.
d. A central east west lane way to be known as Wool Row provides the site exit onto Milford Street.

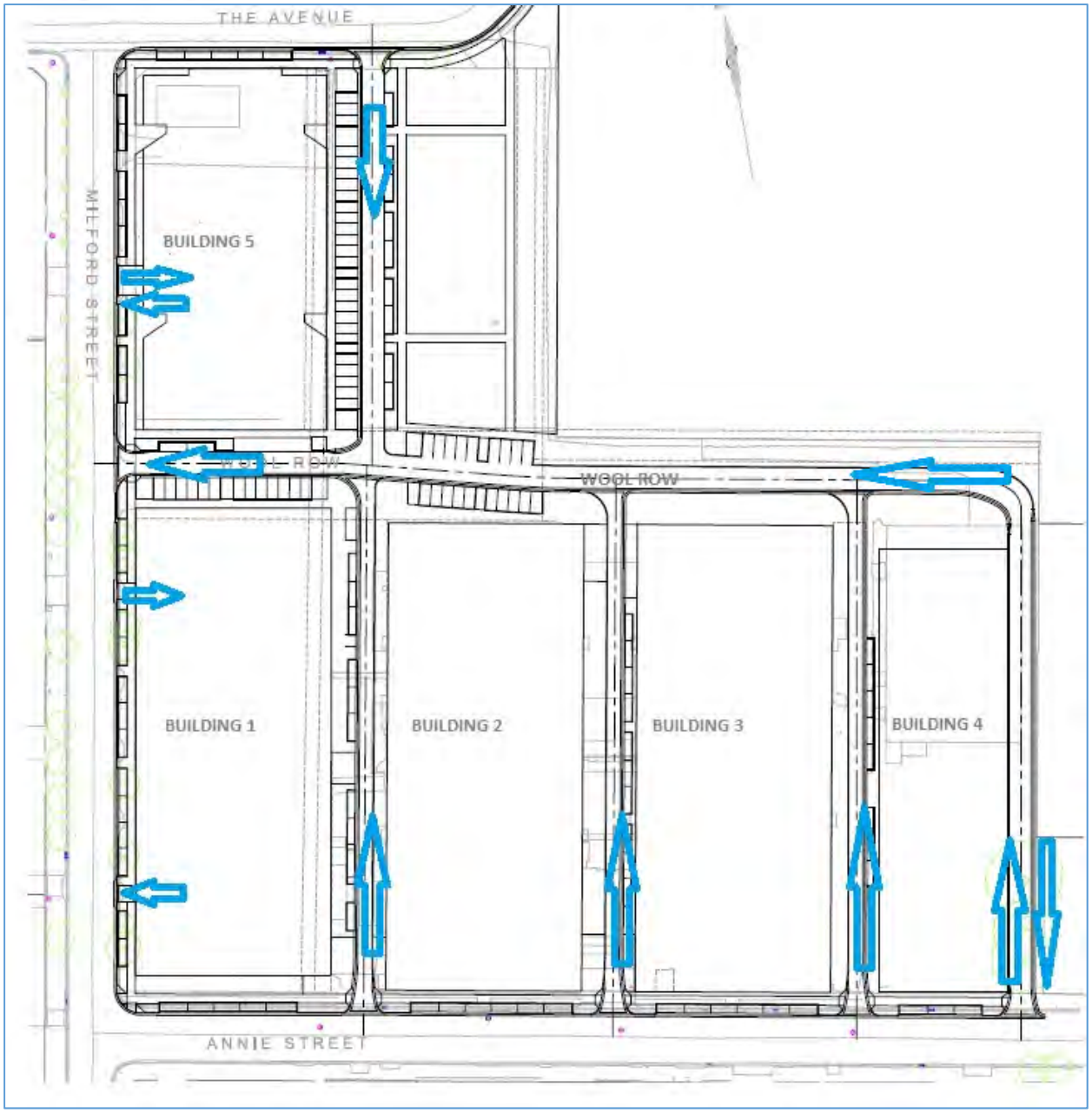


Figure 4 Site layout and proposed access system.

Key features of the proposed access arrangements are as follows:

- The 4 entry / exit points proposed on Milford Street is less than the existing 6 site access points (5 driveways into Building 1, one external access way) and so will add on street parking
- The existing driveways on Annie Street serving Buildings 1, 2 and 3 are to be retained
- A new driveway at the eastern boundary of the site will be constructed to serve the new building 4, and will provide the principle service vehicle corridor for the site in combination with the east west lane way (Wool Row). (Net effect with Milford access is no change in available on-street pakring.
- Overall, by dispersing the site access across seven (7) access points, and 4 exits, the pattern of flows is expected to be comparable to that of the existing site.
- Buildings 3 and 4 are proposed to contain the majority of retail and commercial activity and so a concentration of the trips generated by these components is expected at the Building 4 access and the Milford Street exit.

Parking Review

Parking is proposed for the subject site internally for all buildings, plus an allocation of on ground parking along the internal access laneways. The combination of parking allocations (refer to **Table 3.2 Concept Plan – Parking Provisions** above) is capable of meeting and in most cases exceeding the requirements of the City of Newcastle (CoN) Development Control Plan (DCP) (Re: CoN DCP 2012 – 7.03 Traffic, Parking and Access)

Council's DCP calls up the following technical manuals and additional information for consideration in traffic parking and access matters:

DCP Associated technical Manuals

- Australian Standard (AS/NZS) 2890.1, Parking Facilities – Off-Street car parking
- Australian Standard 2890.2 2002 – *Parking facilities - Off-street commercial vehicle facilities*
- Australian Standard 2890.3 – *Parking facilities - Bicycle parking facilities*
- Australian Standard 2890.5 – *Parking facilities - On-street parking*
- Austroads, 2009, *Guide to Traffic Management*
- Newcastle City Council, (2007), *Guidelines for Motorbike Parking in Newcastle*
- Roads and Traffic Authority NSW, 2003, *NSW Bicycle Guidelines*

Additional information

- Department of Infrastructure, Planning and Natural Resources, December 2004, *Planning guidelines for walking and cycling*
- Newcastle City Council, (2006), *Section 94A Development Contributions Plan 2006*
- Roads and Traffic Authority NSW, 2002, *Guide to Traffic Generating Developments*
- Building Code of Australia
- Roads and Traffic Authority, 2010, *Traffic Control at Work Sites*

The following features of the on-site traffic, access parking arrangements were reviewed and noted as part of the design development for the Stage 1 and overall Masterplan for the subject site:

a. Turning paths for the appropriate design vehicles have been reviewed in terms of access to the Building 1 car park, and on ground access laneways for the site.
    a. Standard service vehicle has been assumed as the AS2890 Medium Rigid Vehicle (MRV)
    b. Additional paths checked for the required electrical service vehicle assumed as equivalent to a Heavy Rigid Vehicle (HRV)
    c. Car movements in building 1 have been reviewed for both the B85 and B99 templates.
b. An site access laneway widths have been assumed at:
    a. 3.6 metres on one way lane ways (exceeds minimum width on straights of 2.5 metres required as per AS2890.2 - Off Street Commercial Facilities), and
    b. 5.4 metres adjacent to 90 degree on ground parking (minimum manoeuvring width required for on street parking as per AS2890.5 - On Street Parking)
c. On ground parking spaces are provided to the requirements of the Australian standards.
d. Where the design vehicle requires additional width to negotiate turns on site, as well as negotiating access driveways, the design development has taken this into consideration and allows provision for the necessary additional width to accommodate these turns.
e. Building 1 internal parking utilises a combination of angled and wide bay parking to allow the most efficient use of the aisle and parking space available within the existing building footprint and layout. Ramps have been adjust to accommodate AS2890 turning requirements.
f. 45 degree angled parking was found to provide the most efficient use of the existing space with the closest conformance to the turning paths and geometry.

g. Column locations may require multi point turns in some cases, and where possible some existing columns have been removed/.relocated to improve parking operations, but without compromising the structural integrity of the existing building.

Samples of vehicle turning path analysis are included in **Appendix D Design Vehicle Turning Path Analysis**.

Comments on Parking Provision

Parking provisions are in most cases in excess of requirements. Motorbike and Bicycle parking is proposed to exceed the CoN DCP 2012 levels.

Service vehicle access and parking provision is also proposed to meet CoN DCP 2012 levels.

With regard to car parking for the subject development, there is an overall provision of 600 spaces proposed against a DCP requirement of 605 spaces.

This shortfall of 5 spaces represents less than 1% of the overall DCP requirement and is not considered a significant diversion from the DCP.

In fact, with the allocation of some 28 motorbike and 31 bicycle parking spaces over and above the DCP requirement, the combination of parking is considered to be a positive incentive toward promoting alternate travel to private motor vehicle trips only.

The City of Newcastle Transport Strategy (CoN December 2014) actively seeks to promote alternate transport such as walking, cycling and public transport as alternatives to private car travel. And so the combination of parking for motorbikes, bicycles while meeting the vast majority of Council's car parking requirement is seen as a positive element to the site's overall design.

Notwithstanding the above commentary on encouraging alternate transport, it is noted that the existing carriageway widths of both Milford Street and Annie Street are such that it would be possible to reconfigure the travel lanes and on street parking lanes to accommodate angled parking, and thereby increase overall parking supply in the immediate neighbourhood of the subject site.

Whilst this form of pakring supply was considered by the project team because of the material public benefit it could offer, Council officers in discussions about the project have rejected the use of this form of parking as a contribution toward the development proposal.

Comment on Pedestrian Access and Movement

All on-site laneways are proposed to operate as shared Zones, with pedestrians afforded right of way, and vehicle speeds limited to 10 kph.

This will help encourage an environment on site that encourages walking in particular for local trips, and is considered entirely consistent with the principles of the City of Newcastle Transport Strategy.

Conclusion on Site Access, Circulation and Parking

The overall conclusion of the review of traffic, parking and access elements of the design development for the subject site is that the proposed adaptive reuse of existing buildings, coupled with the proposed new on ground facilities will be able to accommodate the expected needs of the combined site activity.

The predominantly one way treatment of access presents a consistent approach to movement on site.

4 Traffic Impact Assessment

4.1 Existing Traffic Flows

Traffic volume data for the project has been collected during a 1 day survey of intersection traffic volumes as outlined in Section 3.2 of this report. These surveys were completed on a typical weekday. The surveys were completed using video monitoring and data capture techniques, and allow post survey viewing of video footage for review of characteristics such as queuing, driver behaviour and so on. Data reduction has been completed that focusses on the typical peak periods for commuters (and school based activity) at the start and end of the business day, i.e. 7.00 AM to 10.00 AM, and 3.00PM to 6.00PM. (Refer to **Appendix A Traffic Survey Data** for summaries of the results of this monitoring).

A summary of the 24th November 2016 traffic data is presented in **Table 4.3 – Existing Traffic Volumes** overleaf.

The results presented are drawn from the urban flow conditions and Levels of Service definitions as presented in the Guide to Traffic Generating Developments ((NSW RTA October 2002) Theses are reproduced below as **Table 4.1 - Urban Road peak hour flows per direction and Table 4.2 – Environmental Capacity performance standards on residential Streets** . It can be seen that the ultimate capacity for a local street such as Milford Street for example is 900 vph at the acceptable technical limit of flow conditions under urban conditions of Level of Service 'D'. For the current observed traffic flows along local roads it can be seen that the level of service for road users is very good at LoS 'A'.

Table 4.1 - Urban Road peak hour flows per direction

Level of service	One Lane (vph)	Two Lanes (vph)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Source: RTA Guide to Traffic Generating Developments, version 2.2 dated October 2002.

Table 4.2 – Environmental Capacity performance standards on residential streets sets out the recommended Environmental Capacity performance standard that are also relevant to streets with direct access to residential properties. Existing flow levels observed are at least within the environmental goal of local street performance, and in many cases at the lower ideal performance standard.

Table 4.2 – Environmental Capacity performance standards on residential streets

Road Class	Road Type	Maximum Speed (km/hr)	Maximum peak hour volume (veh/hr)
Local	Access way	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	200 environmental goal
			300 maximum

Source: RTA Guide to Traffic Generating Developments, version 2.2 dated October 2002.

Table 4.3 – Existing Traffic Volumes

Road	Location	Peak Period	Peak flow[1]	Mid-Block Road Capacity	Level of Service
Milford Street	South of The Avenue	AM peak	25 N/B 82 S/B	200 (one-way) [2]	A A
		PM peak	35 N/B 95 S/B	200 (one-way) [2]	A A
Milford Street	South of Annie Street	AM peak	29 N/B 75 S/B	200 (one-way) [2]	A A
		PM peak	19 N/B 107S/B	200 (one-way) [2]	A A
The Avenue	East of Milford Street	AM peak	112 eastbound 38 westbound	200 (one-way) [2]	A A
		PM peak	18 eastbound 125 westbound	200 (one-way) [2]	A A
The Avenue	West of Milford Street	AM peak	102 eastbound 49 westbound	200 (one-way) [2]	A A
		PM peak	44 eastbound 124 westbound	200 (one-way) [2]	A A
Annie Street	East of Milford Street	AM peak	55 eastbound 27 westbound	200 (one-way) [2]	A A
		PM peak	23 eastbound 49 westbound	200 (one-way) [2]	A A
Robert Street	East of Milford Street	AM peak	46 eastbound 23 westbound	200 (one-way) [2]	A
		PM peak	23 eastbound 27 westbound	200 (one-way) [2]	A
Robert Street	West of Milford Street	AM peak	44 eastbound 33 westbound	200 (one-way) [2]	A
		PM peak	28 eastbound 67 westbound	200 (one-way) [2]	A

Notes: 1. Peak flow from 24th November 2016 traffic survey results by Mark Waugh Pty Ltd
2. RTA 2002, Urban Road Conditions, One Lane, Level of Service (Refer Table 4.1 above)

Table 4.3 demonstrates that the roads serving as the main access routes for the subject site will continue to operate well within their technical, functional and environmental capacity levels as described by Austroads and NSW RMS guidelines.

The conclusion drawn from this data is that the technical and environmental lane capacity of the road system adjacent to the subject sites is high and the performance is very good.

4.2 Existing Intersection Performance

4.2.1 Local Intersections

There are a number of intersections and local access streets serving the subject site. Intersections of and with the local streets are priority controlled, all operating under priority control. All local street intersections to the west of Hannell Street operate under priority control. This reflects the local function of these roads.

For the assessment of intersection performance it is useful to firstly consider the Austroads threshold levels for intersection capacity under uninterrupted flow conditions. Table 4.4 Intersection Capacity – Uninterrupted Flow Conditions below presents these thresholds. Where traffic flows fall within these limits intersection performance is essentially operating with little or no delay for approaching drivers other than to obey the requisite road rules.

Table 4.4 Intersection Capacity – Uninterrupted Flow Conditions

Road Type	Light Crossing or turning volumes Maximum Design Hour Volumes, Two-way (vph)		
Two Lane through Roadway	400	500	650
Cross Road	250	200	100
Four Lane through roadway	1000	1500	2000
Cross road	100	50	25

Source: Austroads Guide to Traffic Engineering Practice - Part 5, 1988

For both the morning and afternoon peak periods, the survey results illustrated in Figure 5 Existing Traffic Volumes overleaf. These volumes indicate that these limits are not met on all the local street priority junctions involving local streets only. Essentially, traffic is required to slow down to negotiate turns with little if any delay for the through traffic movements. This is consistent with the site observations.

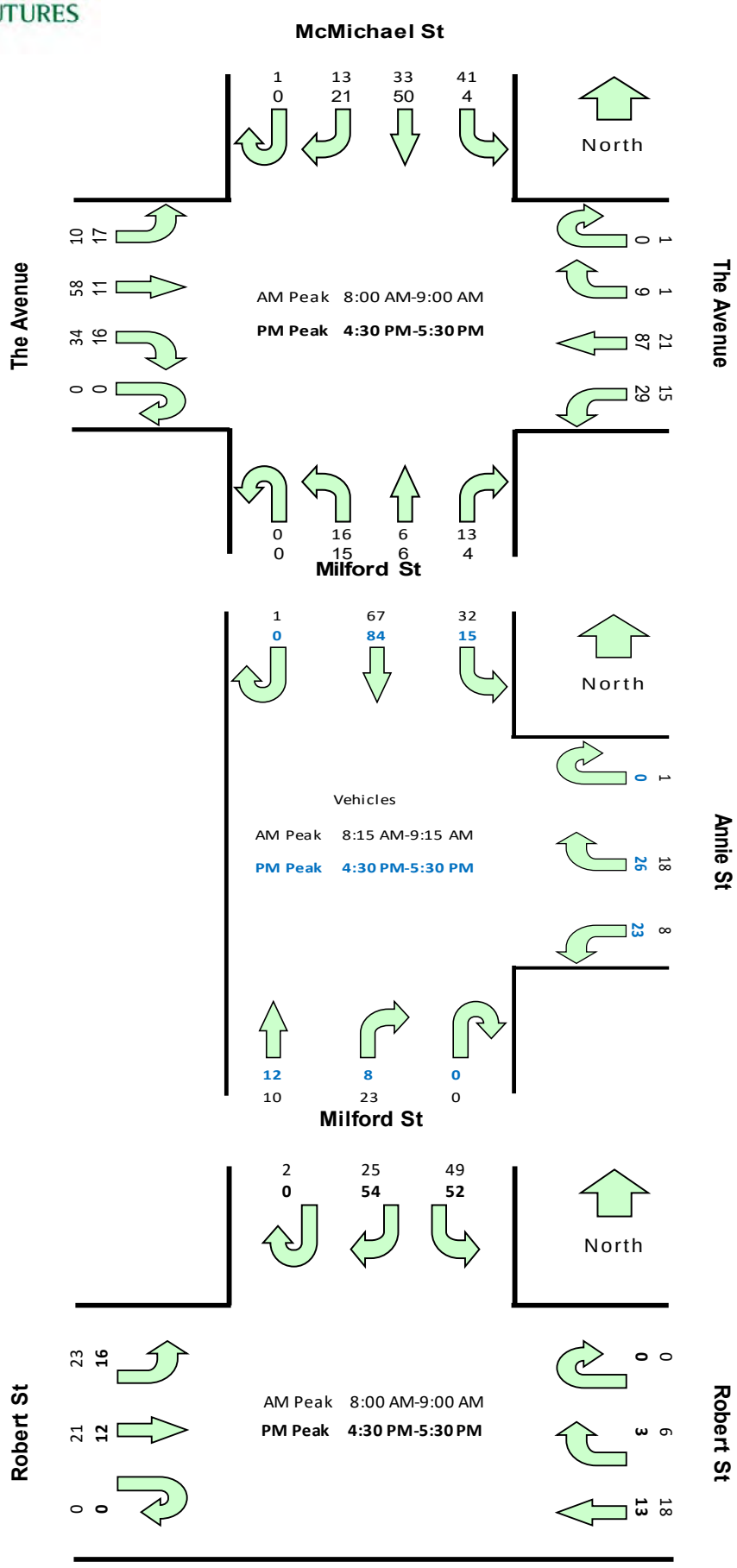


Figure 5 Existing Traffic Volumes
Source BTF 2016

4.2.2 Access to Main Road Network

The Hannell Street (A43) road corridor is an important arterial route in the Newcastle Road network, and as such access to and from it has been carefully considered and limited in terms of local road access. AS a result of this consideration local access to Hannell Street for the Maryville and Wickham local area has been concentrated at Downie Street (traffic signals) and Cowper Street (Roundabout) with several other left in left out connections such as at Annie Street and The Avenue. The reason for this access strategy is to limit the level of disruption to the main road corridor, while at the same time providing some access for local businesses and residences in the area. Access to the Maitland Road corridor (the former main road route through the area) has been subject to the same philosophy in terms of controlling access to the higher order road corridor.

As a consequence of this conscious strategy access to the main road network for the local area is focussed at a limited number of road intersections. Hannell Street is accessed via four (4) different intersections:

- Cowper Street / Branch Street (Roundabout control)
- Annie Street (Left in Left out only)
- The Avenue (Left in Left out only)
- Downie Street / Woolshed Place (Traffic Signals)

In addition to these junctions access is also available via Maitland Road at:

- Albert Street / Sheddon Street (Traffic Signals)
- George Street (Minor access only)

The aim of this access strategy is to maintain the efficiency of the main road network, whilst affording some level of access to main roads from the local road system. Existing traffic flows recorded for the Wickham Masterplan Traffic and Transport Assessment (Bitzios Consulting 2017 for The City of Newcastle) are reproduced below and overleaf as **Figure 6 Existing Traffic Flows (AM) Hannell & Albert Streets** and **Figure 7 Existing Traffic Flows (PM) Hannell & Albert Streets**

Northbound traffic flows on the Hannell Street corridor south of Annie Street are in the order of 1142 vehicles per hour (AM) and 1581 vehicles per hour (PM) in the peak direction. The forecast flows along Albert Street west of Railway Street are in the order of 230 vph (W/B AM) 295 vph (E/B AM) and 350 vph (W/B PM) 243 vph (E/B PM). Given the typical urban road peak hour flows per direction are 900 vph for a single lane, and 2200 vph for two lanes, there is significant spare mid bock capacity on these roads in the vicinity of the subject site.

Figure 6 Existing Traffic Flows (AM) Hannell & Albert Streets
Source: Bitzios Consulting 2017 for the City of Newcastle

Figure 7 Existing Traffic Flows (PM) Hannell & Albert Streets
Source: Bitzios Consulting 2017 for the City of Newcastle

4.3 Strategic Planning and Traffic Management affecting Wickham

The NSW RMS has for some time considered it necessary to make allowance for 'background growth' along its road corridors. This is slated as being required to take account of additional traffic flows from unknown sources that add to the base traffic flows.

In this instance and focussing on the Wickham locality, there are a number of significant land use and transport decisions that have been made by the NSW and Newcastle government authorities that will have impact on the operation and performance of the main road network serving the Wickham area. These include:

- Wickham Transport Interchange (GHD 2014)

This NSW Government study noted the following in relation to flows on network roads such as Hannell Street:

"*The daily flows on these major arterial roads into Newcastle are generally between 20,000 and 30,000 vehicles per day. Because of the volume of existing traffic and the relative scale of the interchange proposal, these flows are unlikely to change markedly as a result of the proposal.*"

- Wickham Masterplan Project

This City of Newcastle Project seeks to identify the challenges and opportunities for Wickham within its changing role within the Newcastle City Centre. This is a current project and includes the completion of Wickham Masterplan Traffic and Transport Assessment (Bitzios Consulting January 2017 for The City of Newcastle) Whilst outside the study area of the Wickham Masterplan the subject site is expected to be influenced by and interact with the fundamental principles of this urban strategy. The subject site has the great potential to expand on and enhance its planning principles. As such it is anticipated and expected that the subject site will be informed by and conform to the access principles adopted in these strategic planning strategies.

It must be emphasised that the form of any changes to access to the higher order road network will be dictated by these strategic planning exercises. As such within the local context of the Wickham Woolstore site it is not planned to change the fundamental access arrangements to the higher order arterial road network.

- Wickham Parking Study

The Wickham Parking Study was developed and finalised by Council in October 2014. Implementation of resident parking zones and other recommendations were carried out in early 2015.

- Wickham LATM (Current)

Council is currently seeking comments on the Wickham LATM study discussion report. The report recommends various traffic management devices for the area bounded by Mary Street in the north, Hannell Street in the easy, the railway line (Station Street) in the sought, and part of Albert Street and Wickham Park in the west.

The significance to the subject site is its proximity to and alignment with the principles of the Wickham Urban Village.

- Wickham Master Plan Traffic and Transport Assessment (Bitzios Consulting, January 2017)

This study informs the Wickham Masterplan Project. The study area is shown in **Figure 8** below.
The significant issue for the subject site is its proximity to and inclusion in the Wickham locality, but exclusion from this strategic planning study.

Annie Street at its eastern most extent is included in the study area and model boundary. The most significant issue from a traffic and transport perspective is the change in land use that occurs north of Annie Street. Whereby the cluster of significant industry activity surrounding the Caltex oil refinery. This area of Wickham from Albert Street to Annie Street is a predominantly residential precinct that does not relate to the more industrial uses to the immediate north.
It is more consistent relationship is to the Wickham urban Village to the south and hence there is a need to be consistent with the manner of access and movement that is afforded to that area for the development of the subject site.

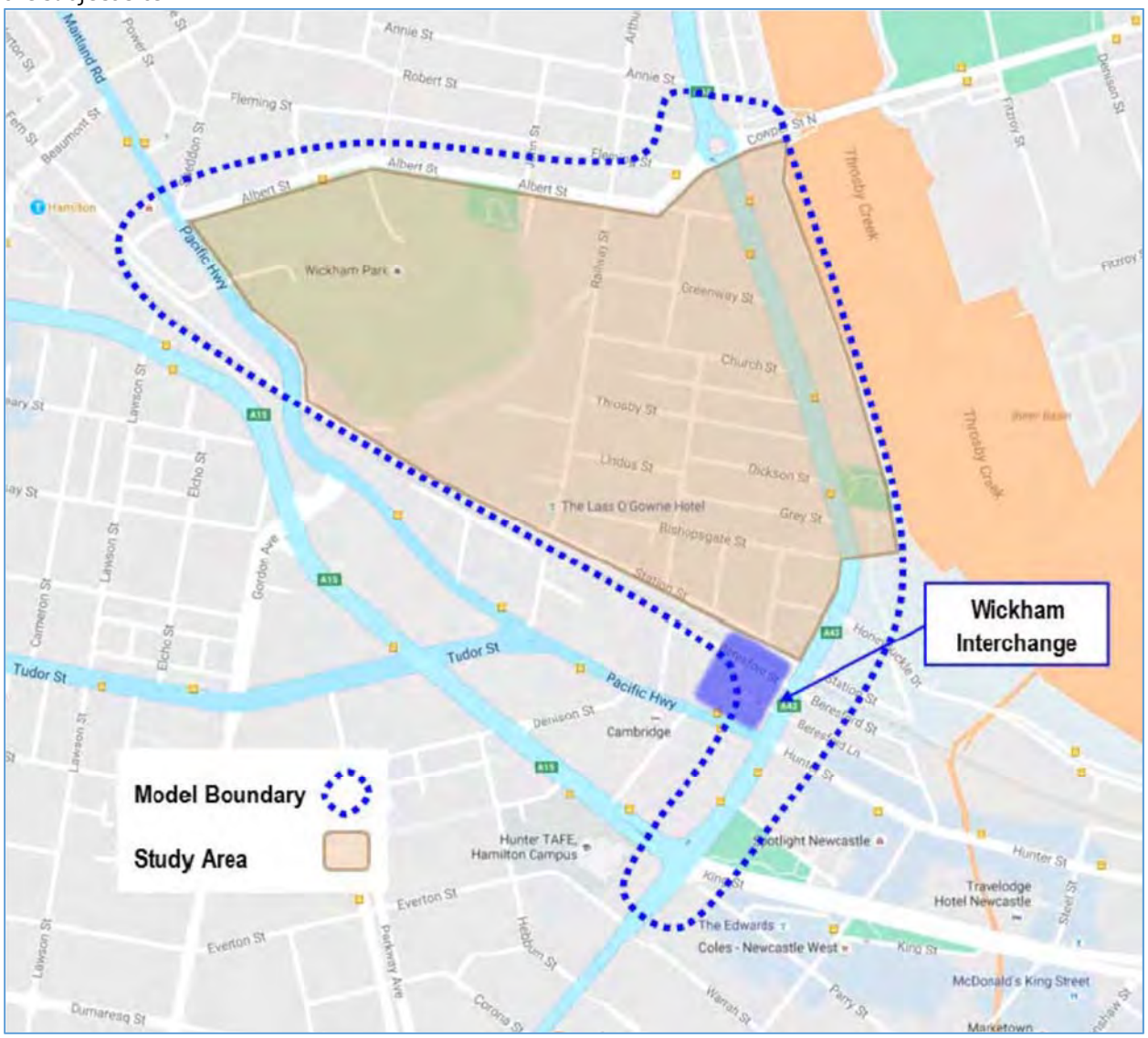


Figure 8 Wickham Masterplan Traffic and Transport Assessment Study Area
Source: Bitzios Consulting 2017 for the City of Newcastle

Of relevance to this strategic planning issue is the current Newcastle LEP definition of the Wickham area.

Also of relevance from the Bitzios Consulting work to support the Wickham Masterplan is the recommended street network as reproduced in **Figure 9** below

Figure 9 Wickham Masterplan Traffic and Transport Assessment Recommended Street Network
Source: Bitzios Consulting 2017 for the City of Newcastle

The key issue affecting the subject site is the recommendation to upgrade both the Albert Street / Railway Street intersection to traffic signals, and to consider the potential upgrade of the Cowper Street / Hannell Street / Branch Street roundabout to traffic signals.

A portion of traffic from the subject site is likely to utilise both of these intersections. But it has to be emphasised the major consideration in the upgrade of these junctions is the requirements of the Wickham Masterplan area to the south of the subject site.

4.4 Forecast Development Traffic Flows

Calculations of traffic flows from the subject site onto the surrounding local road network are illustrated overleaf in **Figure 10 Trip Generation and Assignment Calculations**.

Figure 10 Trip Generation and Assignment Calculations.
Source: BTF 2017

4.5 Forecast Local Road Performance

The calculated traffic generation levels from the subject site presented in **Figure 10** have been added to the existing flows to arrive at a 'with development' scenario. A summary of the changes in peak traffic flows, assuming the flow distribution nominated in section 3.6 is presented below.

Table 4.5 – Forecast Mid-Block Traffic Volumes

Road	Location	Peak Period	Peak flow(1)	Mid-Block Road Capacity	Level of Service
Milford Street	South of The Avenue	AM peak	57 N/B 88 S/B	200 (one-way) (2)	A A
		PM peak	54 N/B 117 S/B	200 (one-way) (2)	A A
Milford Street	South of Annie Street	AM peak	107 N/B 246 S/B	200 (one-way) (2 380 (one-way) (2))	A B
		PM peak	152 N/B 234 S/B	200 (one-way) (2 380 (one-way) (2))	A B
The Avenue	East of Milford Street	AM peak	144 eastbound 44 westbound	200 (one-way) (2 380 (one-way) (2))	A A
		PM peak	37 eastbound 147 westbound	200 (one-way) (2)	A A
The Avenue	West of Milford Street	AM peak	108 eastbound 81 westbound	200 (one-way) (2)	A A
		PM peak	66 eastbound 143 westbound	200 (one-way) (2)	A A
Annie Street	East of Milford Street (&Site)	AM peak	71 eastbound 200 westbound	200 (one-way) (2)	A A
		PM peak	35 eastbound 310 westbound	200 (one-way) (2 380 (one-way) (2))	A B
Robert Street	East of Milford Street	AM peak	97 eastbound 40 westbound	200 (one-way) (2)	A
		PM peak	77 eastbound 48 westbound	200 (one-way) (2)	A
Robert Street	West of Milford Street	AM peak	95 eastbound 50 westbound	200 (one-way) (2)	A
		PM peak	82 eastbound 88 westbound	200 (one-way) (2)	A

Notes: 1. Peak flow from 24th November 2016 traffic survey results by Mark Waugh Pty Ltd
2. RTA 2002, Urban Road Conditions, One Lane, Level of Service (Refer Table 4.1 above)

Table 4.5 demonstrates that the roads surrounding the subject site will continue to operate well within their technical and functional lane capacity levels as described by Austroads and NSW RMS guidelines. The forecasts based on the distribution and assignment assumptions suggest all local street will remain acceptable and very high levels of service, with some approaches such as Milford Street (AM & PM south of Annie Street) and Annie Street in the PM peak operating at Level of Service 'B'. This is still a very satisfactory performance.

4.6 Changes to Intersection Layouts

As a result of the analysis of forecast traffic flows no changes are planned or recommended for the intersections on the local road network supporting the subject site.

4.7 Main Road Intersection Performance

The recently completed Wickham Masterplan Traffic and Transport Assessment (Bitzios Consulting 2017 for the City of Newcastle) considered in detail the street network required to accommodate the traffic generated by the masterplan development.

Traffic modelling from that study demonstrated that the local street network has the capacity to accommodate the traffic generated by the Wickham Masterplan. Similar this traffic investigations has demonstrated that the local Street network north of Albert Street has the capacity to accommodate the traffic generated by the Wickham Woolstore Development (The subject site of this investigation.)

The Wickham Masterplan Traffic and Transport Assessment has made the following recommendations for improved access to the Albert Street (east-west) and Hannell Street (North-south):

- *Minimise north-south and east-west traffic passing entirely through the masterplan area, such that Albert Street (east-west) and Hannell Street (North-south) are continued to be relied upon to service these functions;*
- *Facilitate local traffic circulation without the need to enter Hannell Street or Albert Street to re-enter the local network;*
- *Signalisation of Albert Street / Railway Street better manages the movement of traffic to and from the masterplan area given the likelihood of queues extending back from the Hannell Street roundabout along Albert Street in the future. It also introduces benefits for pedestrian and cyclist movement north-south across this intersection.*

Additionally the Wickham Masterplan Traffic and Transport Assessment also acknowledges the following with respect to the operation of the Hannell Street / Cowper Street / Brach / Street roundabout:

Whilst not specifically a consequence of master plan development, the intersection of Brach Street / Hannell Street / Cowper Street North is a significant constraint in the area, generating long queues and preventing the ease of egress from the study area in the PM peak, from both Albert Street and Throsby Street. Signalising this intersection would be expected to alleviate this key constraint.

The recommended street network from Council's Wickham Masterplan Traffic and Transport Assessment is reproduced overleaf as **Figure 11 Wickham Masterplan Recommended Street Network**

It includes the recommendations for upgrading of the two key intersections to support the growth and development of the wider Wickham area:

a. *New traffic signals at Albert Street / Railway Street*
b. *Consider traffic signal conversion of the existing roundabout at Hannell Street / Cowper Street / Branch Street*

It is considered that the additional flows form the subject site, the Wickham Woolstore site when dispersed across the local road network will be able to be accommodated without alteration to the recommended upgrades for the Wickham nominated in Council's Wickham Masterplan Traffic and Transport Assessment.

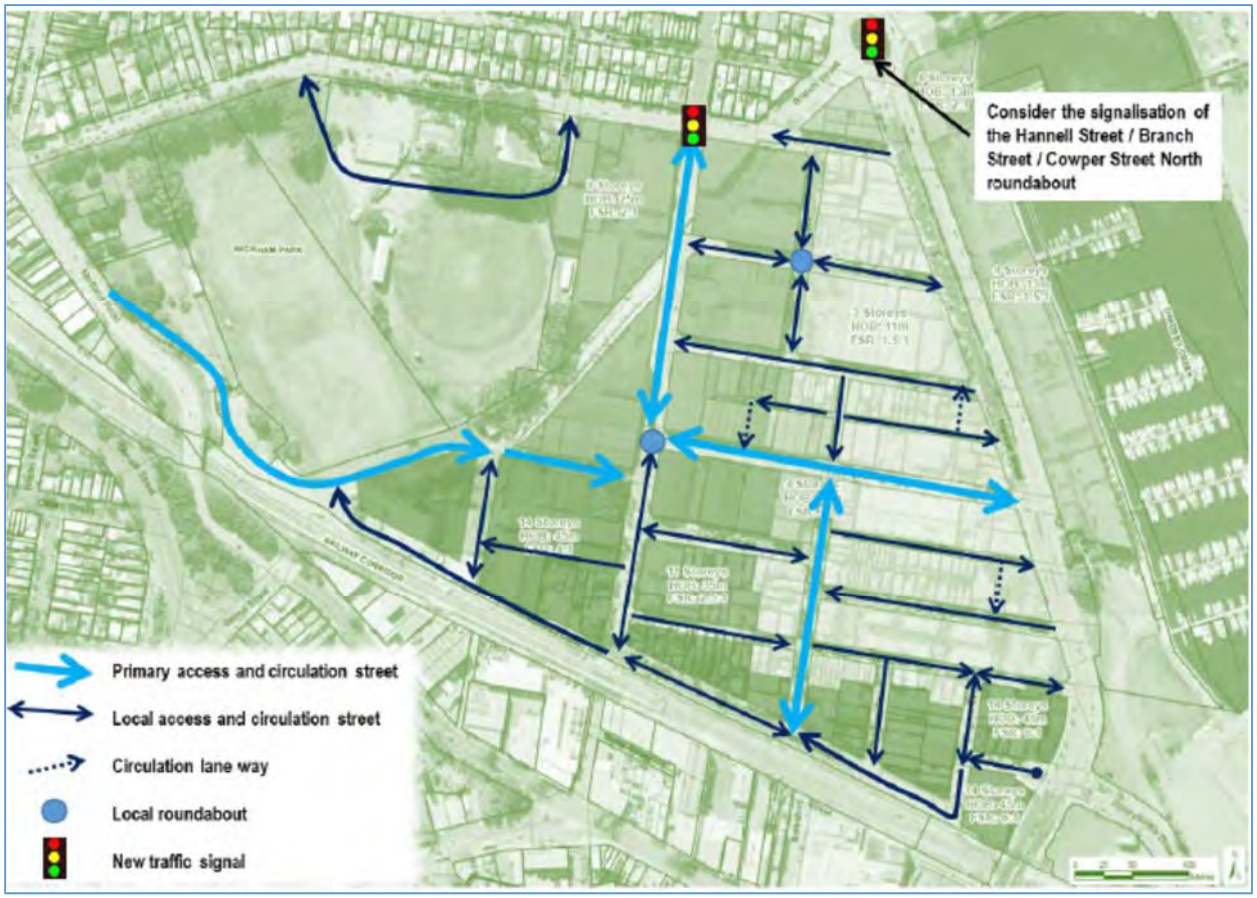


Figure 11 Wickham Masterplan Recommended Street Network
Source: Bitzios Consulting 2017 for the City of Newcastle

4.8 Recommended Access Strategy

(Traffic Management Principles from Austroads Guide to Traffic Management Part 4: Network Management)

The local access requirements of the subject site connecting to Hannell Street and Maitland Road (north-south) via Albert Street (east-west) and the local road network will be satisfied by priority junction control on the local road system, and the recommended upgrades from the current Wickham Masterplan Study.

It is recommended that the subject site be approved on traffic and transport considerations, and incorporated into the access principles of the wider Wickham Masterplan.

5 Summary and Conclusions

5.1 Summary

Investec proposes to complete an adaptive re-use development of the existing Wickham Woolstore site. The concept plan for the development comprises redevelopment of the three (3) existing woolstore building and the addition of two new buildings. The overall land use profiles proposed for the site is one of mixed use – residential retail/produce and commercial uses.

This traffic study has investigated the existing conditions and potential development of the subject site, arriving at the following outcomes:

Existing Conditions

a. Existing flow conditions on the local road system supporting the site are well within the technical and environmental capacity limits of local urban streets.
b. Surveys of intersection flows indicate that junctions operate essentially under free flow conditions.
c. Cycling facilities are provided along the Throsby Creek foreshore to the east of the site, and are readily accessible via the local road network.
d. Existing bus services through and adjacent to the Wickham locality provide a good level of public transport service

Proposed Development

e. The proposed redevelopment of the Woolstore site includes 5 buildings ultimately, with a mixture of residential, commercial and retail / produce activity, as a mixed use precinct,

f. Parking provision is able to comply with DCP requirements, with only a minor deviation (<1%) from DCP car parking provision requirements. Motorbike and bicycle parking is proposed in excess of the DCP requirements which is considered a benefit to the proposal.

g. Car parking and access proposals have been developed to generally comply generally with the Australian Standards. Access and circulation within the existing buildings has been assessed using CAD turning movement analysis to arrive at the most expedient layout of angled parking. This has allowed consideration of retention of the structural grid of the existing wool store buildings.

h. Additional traffic generation associated with the redevelopment is up to 542 trips in the peak period.

i. Permissible use of the site would generate about half this number of trips, at around 200 peak hour trips.

j. Existing use of the site as warehousing would generate around 100 peak hour trips.

k. Distribution of trips across up to five (5) key access points will aid in dispersing traffic flows across junctions and reducing the anticipated individual impacts on the local road network.

Future Performance

l. The proposed Wickham Transport Interchange project will increase the level of public transport available within a short walking distance of the subject site.

a. Stage 1 development can be accommodated on the local road network. No upgrades are proposed.
m. Full Concept Plan development can also be accommodated on the local road network.
n. Council's Wickham Masterplan Traffic and Transport Assessment includes recommendations to upgrade key intersections that are part of local access for Wickham and which includes to the subject site.
    a. *New traffic signals at Albert Street / Railway Street*
    b. *Consider traffic signal conversion of existing roundabout at Hannell Street / Cowper Street / Branch Street*
o. Both of these recommended upgrades whilst improving access to the subject site, are required irrespective of the re-development of the Woolstore site.
p. The dispersed nature of the traffic flows from the subject site will not impact on the recommended upgrades to these intersections.

5.2 Conclusion and Recommendations

The proposed adaptive re-use of the Wickham Woolstore site is able to provide suitable access, circulation and parking facilities on site while maintaining the integrity of the existing woolstore buildings. Additional facilities proposed compliment the proposed overall site activity and allow parking to levels consistent with the requirements of The City of Newcastle DCP 2012.

Access to and from the subject site is dispersed across a number of external access points and will not impact beyond acceptable capacity limits for the local road network.

In view of the conditions of the local roads and predicted performance of key intersections from Council's Wickham Masterplan Traffic and Transport assessment, the following recommendations are made for road and intersections improvements to support the development proposal:

b. The Stage 1 redevelopment focussing on Building 1 of the subject site is able to be accommodated with no local road or intersection upgrades are proposed / required

c. No local road or intersection upgrades are proposed / required as a result of the predicted full redevelopment of the subject site.

d. The City of Newcastle's Wickham Masterplan Traffic and Transport Assessment has identified the need for:

    a. traffic signal conversion of existing roundabout at Hannell Street / Cowper Street / Branch Street
    b. upgrading the existing intersection of Albert Street / Railway Street to traffic signal control

Both of these recommended upgrades whilst improving access to the subject site, are required irrespective of the re-development of the Woolstore site.

It is recommended that the nature of the Wickham Masterplan intersection upgrades be confirmed with Council in terms of the extent of contributions and timing that are applicable under Council's contributions planning obligations.

The overall conclusion is that given the potential level of future development proposed for the Woolstore site the access strategy put forward here to for approval as part of the DA planning submission is supported.

Appendix A. Traffic Survey Data

BVY TRAFFIC SURVEY ABN 18 434 565 435
3 Hepburn Way * Carpline Springs * Victoria * 3023 * Australia
Quality data services proven since 2000 Phone 1300 883 936 * Fax 1300 882 932

TURNING MOVEMENT SURVEY

Milford St and Annie St, Wickham
Thursday, November 24, 2016

Weather:	Overcast
Suburban:	Wickham
Customer:	BTF

Survey Start	
AM:	7:00
PM:	15:00

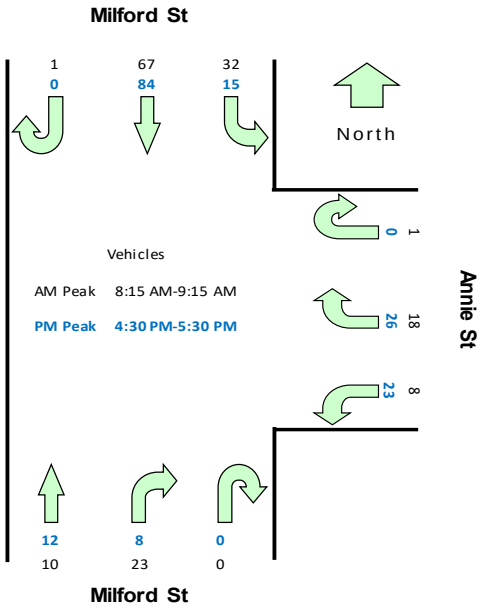
Peakhour	
AM:	8:15 AM-9:15 AM
PM:	4:30 PM-5:30 PM

All Vehicles

Time		North Approach Milford St			East Approach Annie St			South Approach Milford St			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
7:00	7:15	0	12	5	0	1	0	0	2	3	91	
7:15	7:30	0	6	5	0	3	0	0	5	1	104	
7:30	7:45	0	8	8	0	1	2	0	3	2	131	
7:45	8:00	0	12	2	0	0	4	0	5	1	143	
8:00	8:15	0	16	8	1	3	1	0	3	4	158	
8:15	8:30	0	17	9	0	5	2	0	10	4	160	Peak
8:30	8:45	1	16	10	0	4	2	0	3	0	150	
8:45	9:00	0	18	6	0	4	4	0	4	3	139	
9:00	9:15	0	16	7	1	5	0	0	6	3	126	
9:15	9:30	0	17	3	0	6	4	0	3	4		
9:30	9:45	0	7	3	0	5	6	0	3	1		
9:45	10:00	0	11	5	0	4	3	0	2	1		
15:00	15:15	0	17	8	0	3	4	0	2	6	124	
15:15	15:30	0	5	5	0	6	8	0	0	2	119	
15:30	15:45	0	9	2	0	3	3	0	2	5	134	
15:45	16:00	0	17	5	0	5	4	0	1	2	153	
16:00	16:15	0	13	3	0	10	3	0	5	1	151	
16:15	16:30	0	12	9	0	12	1	0	3	4	162	
16:30	16:45	0	23	4	0	2	7	0	4	3	168	Peak
16:45	17:00	0	12	2	0	9	5	0	0	4	154	
17:00	17:15	0	27	5	0	7	5	0	0	2	146	
17:15	17:30	0	22	4	0	8	6	0	4	3		
17:30	17:45	0	10	1	0	3	11	0	0	4		
17:45	18:00	0	8	2	0	5	3	0	0	6		

Peak Time		North Approach Milford St			East Approach Annie St			South Approach Milford St			Peak
Period Start	Period End	U	T	L	U	R	L	U	R	T	total
8:15	9:15	1	67	32	1	18	8	0	23	10	160
16:30	17:30	0	84	15	0	26	23	0	8	12	168

Graphic



Light Vehicles

Time		North Approach Milford St			East Approach Annie St			South Approach Milford St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	12	4	0	1	0	0	2	3
7:15	7:30	0	6	3	0	3	0	0	4	1
7:30	7:45	0	6	8	0	1	2	0	3	1
7:45	8:00	0	10	2	0	0	4	0	5	1
8:00	8:15	0	16	7	1	3	1	0	3	3
8:15	8:30	0	17	9	0	5	2	0	10	4
8:30	8:45	1	16	10	0	4	2	0	3	0
8:45	9:00	0	18	6	0	4	4	0	4	3
9:00	9:15	0	16	7	1	5	0	0	6	3
9:15	9:30	0	15	3	0	6	4	0	3	4
9:30	9:45	0	7	3	0	4	5	0	3	1
9:45	10:00	0	11	5	0	4	3	0	1	1
15:00	15:15	0	17	8	0	2	4	0	2	6
15:15	15:30	0	5	2	0	5	8	0	0	2
15:30	15:45	0	9	2	0	3	3	0	2	5
15:45	16:00	0	16	5	0	5	3	0	1	2
16:00	16:15	0	13	3	0	9	3	0	4	1
16:15	16:30	0	12	8	0	12	1	0	3	4
16:30	16:45	0	23	3	0	2	7	0	4	3
16:45	17:00	0	12	2	0	9	5	0	0	4
17:00	17:15	0	27	5	0	7	5	0	0	2
17:15	17:30	0	22	4	0	8	6	0	4	3
17:30	17:45	0	10	1	0	3	11	0	0	3
17:45	18:00	0	8	2	0	5	2	0	0	6

Heavy Vehicles

Time		North Approach Milford St			East Approach Annie St			South Approach Milford St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	0	1	0	0	0	0	0	0
7:15	7:30	0	0	2	0	0	0	0	1	0
7:30	7:45	0	2	0	0	0	0	0	0	1
7:45	8:00	0	2	0	0	0	0	0	0	0
8:00	8:15	0	0	1	0	0	0	0	0	1
8:15	8:30	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	2	0	0	0	0	0	0	0
9:30	9:45	0	0	0	0	1	1	0	0	0
9:45	10:00	0	0	0	0	0	0	0	1	0
15:00	15:15	0	0	0	0	1	0	0	0	0
15:15	15:30	0	0	3	0	1	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	1	0	0	0	1	0	0	0
16:00	16:15	0	0	0	0	1	0	0	1	0
16:15	16:30	0	0	1	0	0	0	0	0	0
16:30	16:45	0	0	1	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	1
17:45	18:00	0	0	0	0	0	1	0	0	0

Bus

Time		North Approach Milford St			East Approach Annie St			South Approach Milford St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0	0	0	0
9:30	9:45	0	0	0	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0

Cyclists

Time		North Approach Milford St			East Approach Annie St			South Approach Milford St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	0	1	0	0	0	0	0	0
7:15	7:30	0	1	0	0	0	0	0	0	0
7:30	7:45	0	0	2	0	0	0	0	0	0
7:45	8:00	0	2	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0
8:15	8:30	0	3	0	0	0	0	0	1	0
8:30	8:45	0	2	1	0	2	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	1	0	0	0	0	0	0	0
9:30	9:45	0	3	0	0	0	0	0	0	0
9:45	10:00	0	2	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	1	0	0	0	0
15:45	16:00	0	0	0	0	1	0	0	0	0
16:00	16:15	0	1	0	0	1	0	0	0	0
16:15	16:30	0	0	0	0	1	0	0	0	1
16:30	16:45	0	1	0	0	1	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	1	0	0	0	0	0	0	2
17:15	17:30	0	0	0	0	1	1	0	0	0
17:30	17:45	0	2	0	0	4	0	0	0	0
17:45	18:00	0	0	5	0	1	0	0	0	0

BVY TRAFFIC SURVEY ABN 18 434 565 435
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TURNING MOVEMENT SURVEY

Milford St and Robert St, Wickham
Thursday, November 24, 2016

Weather:	Overcast
Suburban:	Wickham
Customer:	BTF

Survey Start	
AM:	7:00
PM:	15:00

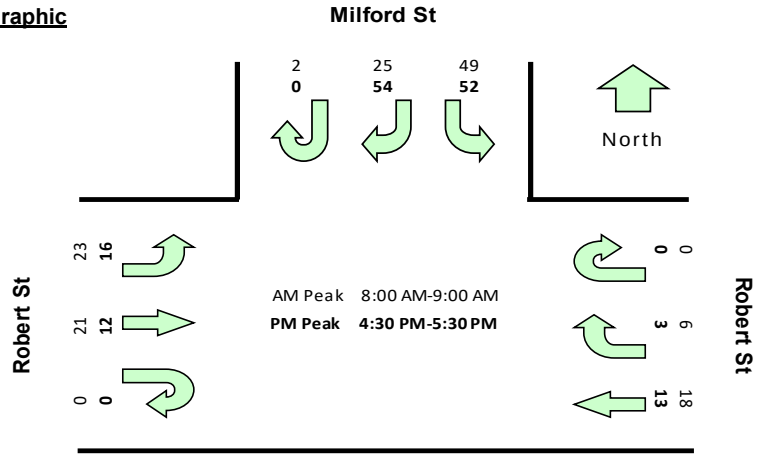
Peakhour	
AM:	8:00 AM-9:00 AM
PM:	4:30 PM-5:30 PM

All Vehicles

Time		North Approach Milford St			East Approach Robert St			West Approach Robert St			Hourly Total	
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	Hour	Peak
7:00	7:15	0	2	10	0	1	0	0	1	5	81	
7:15	7:30	0	4	3	0	0	1	0	3	5	99	
7:30	7:45	0	5	6	0	0	4	0	0	4	122	
7:45	8:00	0	10	3	0	1	3	0	5	5	134	
8:00	8:15	0	6	12	0	1	5	0	8	5	144	Peak
8:15	8:30	1	1	17	0	4	3	0	4	9	140	
8:30	8:45	0	9	7	0	0	6	0	5	4	129	
8:45	9:00	1	9	13	0	1	4	0	4	5	120	
9:00	9:15	0	3	13	0	2	1	0	6	8	107	
9:15	9:30	0	10	10	0	2	0	0	2	4		
9:30	9:45	0	6	6	0	1	2	0	4	3		
9:45	10:00	0	2	12	0	0	2	0	5	3		
15:00	15:15	0	9	12	0	1	6	0	1	7	113	
15:15	15:30	0	10	3	0	2	2	0	5	0	101	
15:30	15:45	0	5	8	0	2	1	0	5	5	105	
15:45	16:00	0	9	12	0	0	1	0	4	3	122	
16:00	16:15	0	5	10	0	0	1	0	2	6	119	
16:15	16:30	0	7	7	0	1	2	0	3	6	138	
16:30	16:45	0	13	17	0	0	4	0	2	7	150	Peak
16:45	17:00	0	13	4	0	2	2	0	3	2	137	
17:00	17:15	0	14	17	0	0	5	0	5	2	133	
17:15	17:30	0	14	14	0	1	2	0	2	5		
17:30	17:45	0	16	4	0	1	3	0	3	3		
17:45	18:00	0	7	3	0	3	2	0	4	3		

Peak Time		North Approach Milford St			East Approach Robert St			West Approach Robert St			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
8:00	9:00	2	25	49	0	6	18	0	21	23	144
16:30	17:30	0	54	52	0	3	13	0	12	16	150

Graphic



Light Vehicles

Time		North Approach Milford St			East Approach Robert St			West Approach Robert St		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
7:00	7:15	0	2	10	0	1	0	0	1	4
7:15	7:30	0	3	3	0	0	1	0	3	5
7:30	7:45	0	5	3	0	0	4	0	0	4
7:45	8:00	0	10	3	0	1	3	0	5	5
8:00	8:15	0	6	12	0	1	5	0	7	5
8:15	8:30	1	1	17	0	4	3	0	4	9
8:30	8:45	0	9	7	0	0	5	0	5	3
8:45	9:00	1	9	13	0	1	4	0	4	5
9:00	9:15	0	3	13	0	2	1	0	6	8
9:15	9:30	0	9	9	0	2	0	0	2	4
9:30	9:45	0	5	6	0	1	2	0	4	3
9:45	10:00	0	2	12	0	0	2	0	5	2
15:00	15:15	0	9	12	0	1	6	0	1	7
15:15	15:30	0	10	3	0	2	2	0	5	0
15:30	15:45	0	5	8	0	2	1	0	5	5
15:45	16:00	0	8	11	0	0	1	0	4	3
16:00	16:15	0	5	10	0	0	1	0	2	5
16:15	16:30	0	7	7	0	1	2	0	3	6
16:30	16:45	0	13	17	0	0	4	0	2	7
16:45	17:00	0	13	4	0	2	2	0	3	2
17:00	17:15	0	14	17	0	0	5	0	5	2
17:15	17:30	0	14	14	0	1	2	0	2	5
17:30	17:45	0	16	4	0	1	3	0	3	2
17:45	18:00	0	6	3	0	3	2	0	4	3

Heavy Vehicles

Time		North Approach Milford St			East Approach Robert St			West Approach Robert St		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
7:00	7:15	0	0	0	0	0	0	0	0	1
7:15	7:30	0	1	0	0	0	0	0	0	0
7:30	7:45	0	0	3	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	1	0
8:15	8:30	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	1	0	0	1
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	1	1	0	0	0	0	0	0
9:30	9:45	0	1	0	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0	0	0	1
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	1	1	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	1
16:15	16:30	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	1
17:45	18:00	0	1	0	0	0	0	0	0	0

Bus

Time		North Approach Milford St			East Approach Robert St			West Approach Robert St		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
7:00	7:15	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0	0	0	0
9:30	9:45	0	0	0	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0

Cyclists

Time		North Approach Milford St			East Approach Robert St			West Approach Robert St		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
7:00	7:15	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	1	0	0	0	0	2	0
7:45	8:00	0	0	0	0	0	0	0	2	0
8:00	8:15	0	0	2	0	0	1	0	3	0
8:15	8:30	0	0	3	0	0	0	0	0	1
8:30	8:45	0	0	2	0	0	0	0	1	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	2	0	0	0
9:30	9:45	0	2	2	0	0	0	0	0	0
9:45	10:00	0	0	2	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	1	0	0	0	0	0	0
16:15	16:30	0	0	0	0	1	0	0	1	0
16:30	16:45	0	1	0	0	0	2	0	0	0
16:45	17:00	0	0	0	0	0	1	0	0	0
17:00	17:15	0	0	1	0	2	0	0	0	0
17:15	17:30	0	1	0	0	0	1	0	1	0
17:30	17:45	0	0	2	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0

TURNING MOVEMENT SURVEY

McMichael St and The Avenue, Wickham
Thursday, November 24, 2016

Weather:	Overcast
Suburban:	Wickham
Customer:	BTF

Survey Start	
AM:	7:00
PM:	15:00

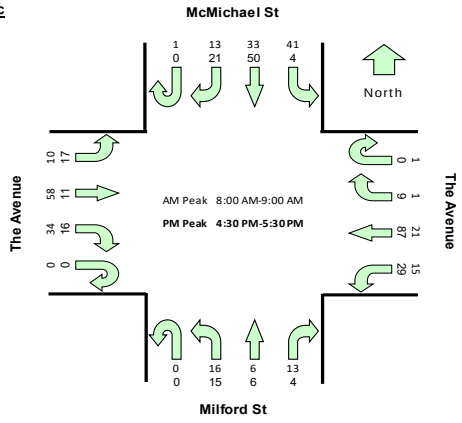
Peakhour	
AM:	8:00 AM-9:00 AM
PM:	4:30 PM-5:30 PM

All Vehicles

Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:00	7:15	0	1	4	8	0	1	5	9	0	1	0	3	0	4	11	0	184	
7:15	7:30	0	2	5	3	0	0	4	3	0	4	0	1	0	1	10	3	201	
7:30	7:45	0	1	6	8	0	0	1	1	0	2	0	4	0	3	19	4	226	
7:45	8:00	0	4	6	9	0	2	4	1	0	2	0	2	0	3	17	2	244	
8:00	8:15	0	3	5	12	1	0	2	5	0	7	1	2	0	9	16	1	263	Peak
8:15	8:30	0	2	8	5	0	0	6	2	0	2	3	6	0	10	13	4	263	Peak
8:30	8:45	1	1	12	12	0	0	6	4	0	2	0	5	0	8	15	1	247	
8:45	9:00	0	7	8	12	0	1	7	4	0	2	2	3	0	7	14	4	221	
9:00	9:15	0	1	14	13	0	0	10	2	0	4	1	1	0	4	10	4	201	
9:15	9:30	0	1	10	8	2	0	5	2	0	4	0	5	0	2	4	2		
9:30	9:45	0	2	6	13	0	2	7	2	0	1	1	2	0	1	2	2		
9:45	10:00	0	4	12	6	0	2	9	3	0	1	2	2	0	1	6	3		
15:00	15:15	0	4	11	6	0	1	13	5	0	1	1	4	0	4	10	1	186	
15:15	15:30	0	5	3	2	0	1	9	2	0	3	1	1	0	1	1	1	181	
15:30	15:45	0	3	3	2	0	2	8	2	0	3	2	2	0	6	4	7	220	
15:45	16:00	0	1	13	4	0	1	9	3	0	3	1	3	0	4	4	5	231	
16:00	16:15	0	3	9	8	0	0	15	3	0	3	1	3	0	3	6	2	239	
16:15	16:30	0	7	10	3	0	1	10	8	0	4	0	9	0	3	11	3	274	
16:30	16:45	0	4	6	3	0	0	18	12	0	0	2	2	0	4	1	3	278	Peak
16:45	17:00	0	3	8	6	0	2	19	3	0	0	0	5	0	4	2	7	268	
17:00	17:15	0	7	17	1	0	4	30	10	0	1	0	7	0	5	3	6	244	
17:15	17:30	0	7	19	3	0	3	20	4	0	3	4	1	0	3	5	1		
17:30	17:45	0	6	9	3	0	1	12	4	0	3	0	1	0	0	3	3		
17:45	18:00	0	3	7	0	0	2	10	0	0	0	2	3	0	3	3	2		

Peak Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:00	9:00	1	13	33	41	1	1	21	15	0	13	6	16	0	34	58	10	263
16:30	17:30	0	21	50	13	0	9	87	29	0	4	6	15	0	16	11	17	278

Graphic



Light Vehicles

Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
7:00	7:15	0	1	4	8	0	1	5	8	0	1	0	3	0	4	11	0
7:15	7:30	0	2	5	3	0	0	4	1	0	4	0	1	0	1	10	2
7:30	7:45	0	0	6	8	0	0	1	1	0	2	0	4	0	3	19	3
7:45	8:00	0	4	5	9	0	2	4	1	0	2	0	2	0	3	17	2
8:00	8:15	0	3	5	12	1	0	2	5	0	4	1	2	0	9	16	0
8:15	8:30	0	1	8	5	0	0	6	2	0	2	3	6	0	10	12	4
8:30	8:45	1	1	11	12	0	0	6	4	0	1	0	5	0	8	15	1
8:45	9:00	0	6	8	12	0	1	6	4	0	2	2	3	0	7	14	3
9:00	9:15	0	1	14	13	0	0	10	2	0	4	1	1	0	4	10	4
9:15	9:30	0	1	10	7	2	0	5	1	0	4	0	5	0	2	4	1
9:30	9:45	0	2	6	12	0	2	6	2	0	1	1	2	0	1	2	2
9:45	10:00	0	2	12	5	0	2	8	3	0	1	2	1	0	1	6	3
15:00	15:15	0	3	11	6	0	1	13	5	0	1	1	3	0	4	10	1
15:15	15:30	0	5	3	2	0	1	9	1	0	1	1	1	0	1	1	1
15:30	15:45	0	3	3	2	0	2	8	2	0	3	2	2	0	6	4	6
15:45	16:00	0	1	13	4	0	1	9	2	0	3	1	3	0	4	4	5
16:00	16:15	0	2	9	8	0	0	15	3	0	2	1	3	0	3	6	1
16:15	16:30	0	6	10	3	0	1	10	7	0	4	0	9	0	3	11	2
16:30	16:45	0	4	6	3	0	0	17	11	0	0	2	2	0	4	1	3
16:45	17:00	0	2	8	6	0	2	19	3	0	0	0	5	0	4	2	7
17:00	17:15	0	7	17	1	0	4	30	10	0	1	0	7	0	5	3	6
17:15	17:30	0	6	19	3	0	3	20	4	0	3	4	1	0	3	5	1
17:30	17:45	0	6	9	3	0	1	12	4	0	3	0	1	0	0	3	2
17:45	18:00	0	3	7	0	0	2	10	0	0	0	2	3	0	3	3	2

Heavy Vehicles

Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
7:00	7:15	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45	8:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8:30	8:45	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
9:30	9:45	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
9:45	10:00	0	1	0	1	0	0	1	0	0	0	0	1	0	0	0	0
15:00	15:15	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
16:15	16:30	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
16:45	17:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bus

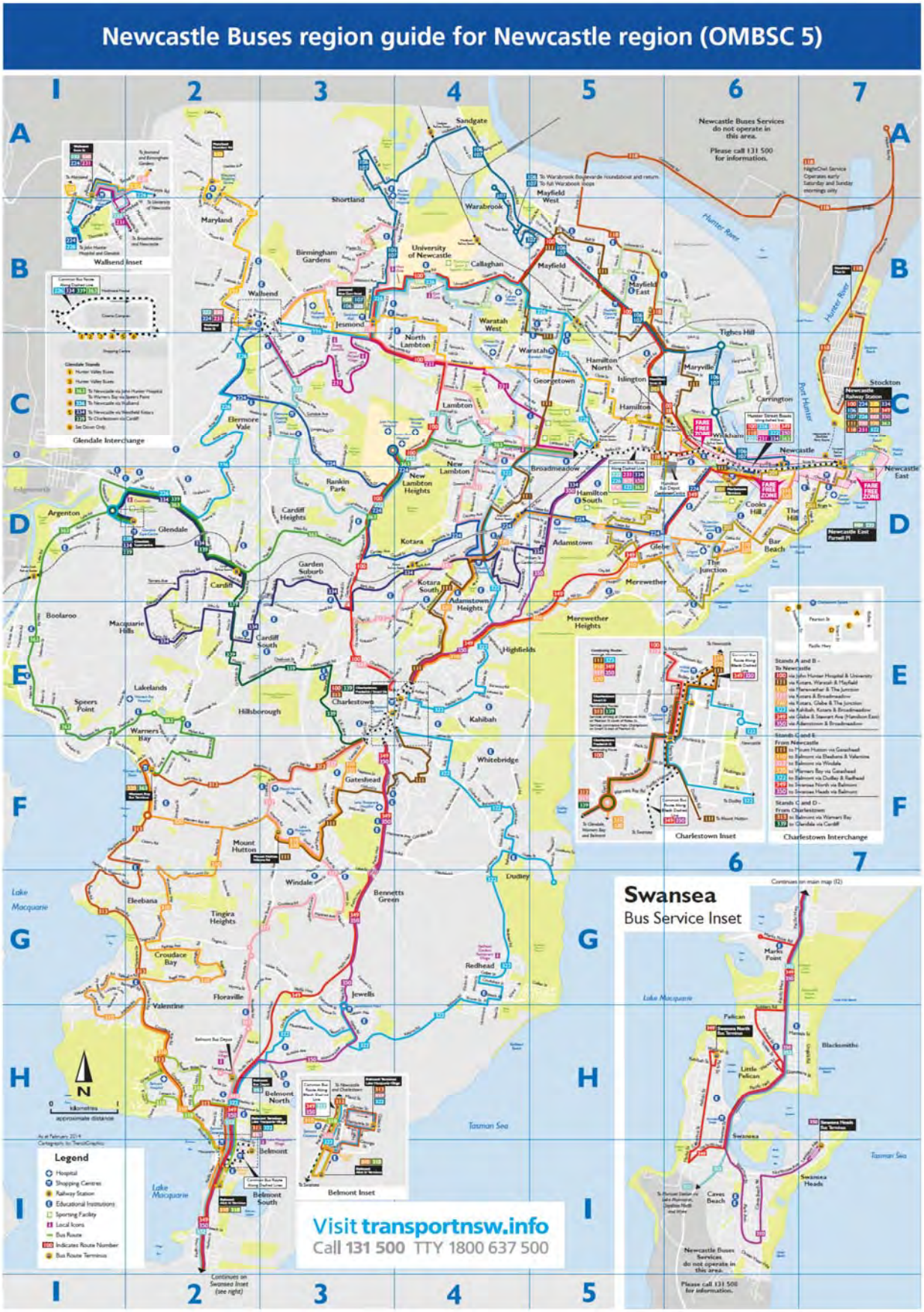
Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30	7:45	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15	8:30	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	9:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:00	9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:30	9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45	10:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15:45	16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	16:15	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16:30	16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	17:30	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

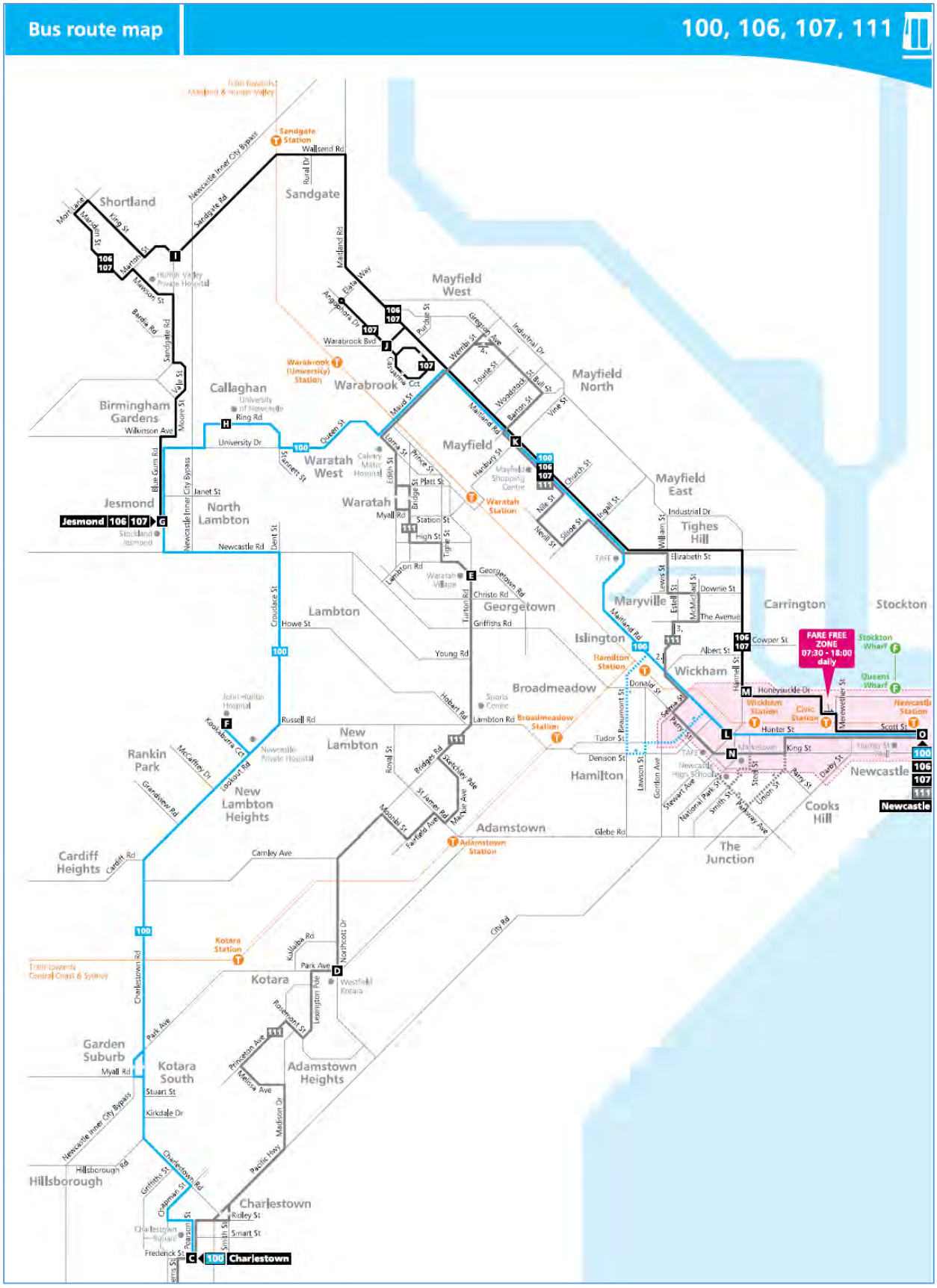
Cyclists

Time		North Approach McMichael St				East Approach The Avenue				South Approach Milford St				West Approach The Avenue			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0
8:15	8:30	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30	9:45	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0
9:45	10:00	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	0
15:00	15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
15:15	15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
16:15	16:30	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
16:30	16:45	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1
16:45	17:00	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	0
17:45	18:00	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix B. Newcastle Cycling Map

Appendix C. Public Transport Maps

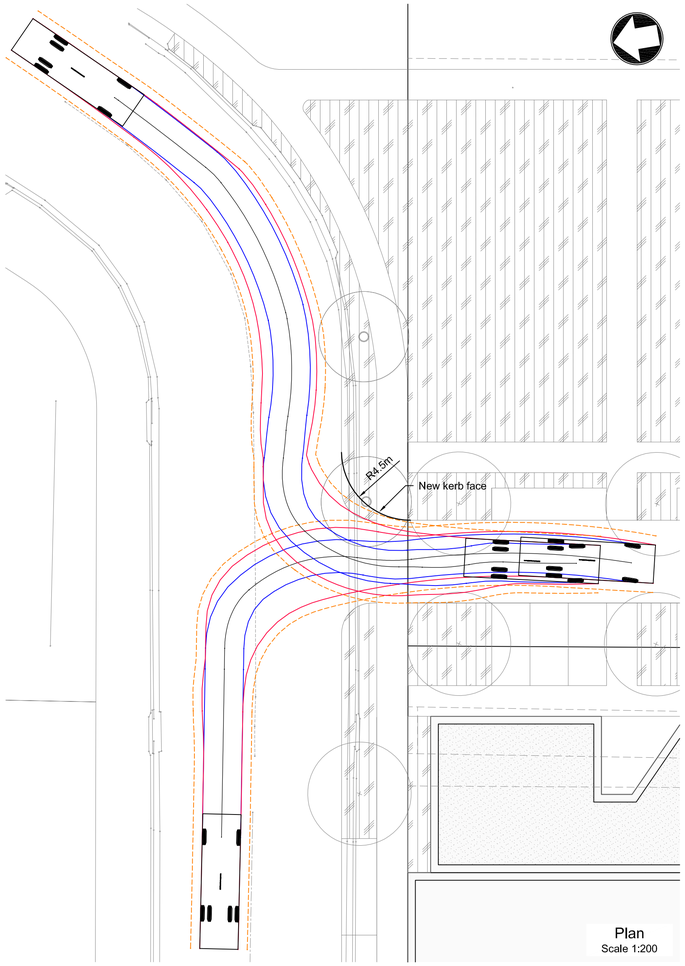




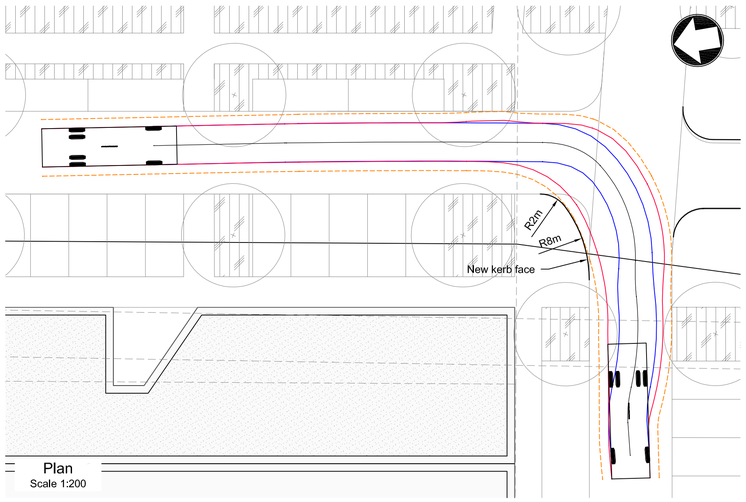
Bus Route Map – Routes 100, 106, 107, 111

Source: http://www.newcastlebuses.info/routes

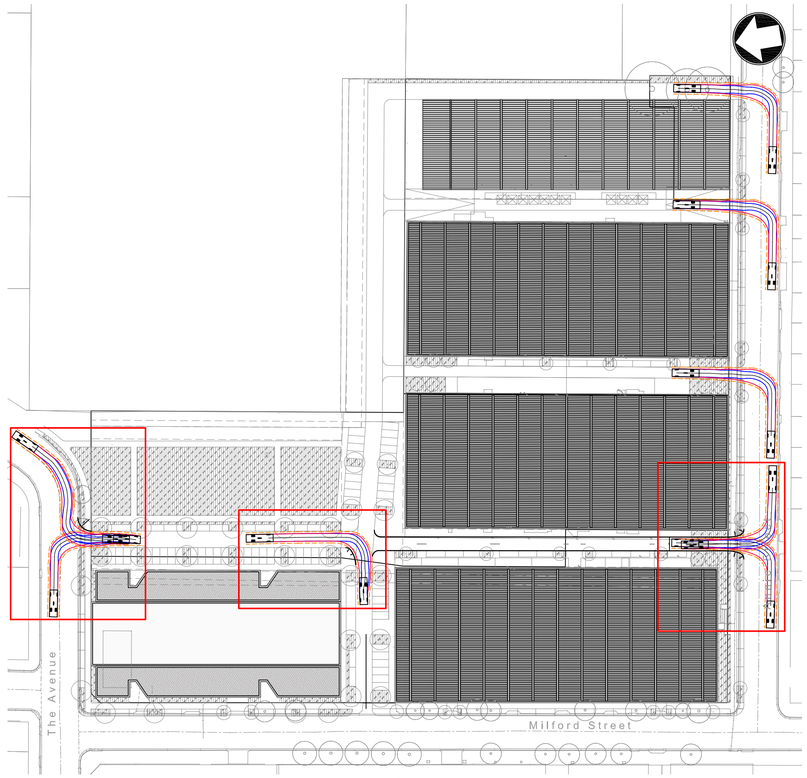
Appendix D. Design Vehicle Turning Path Analysis



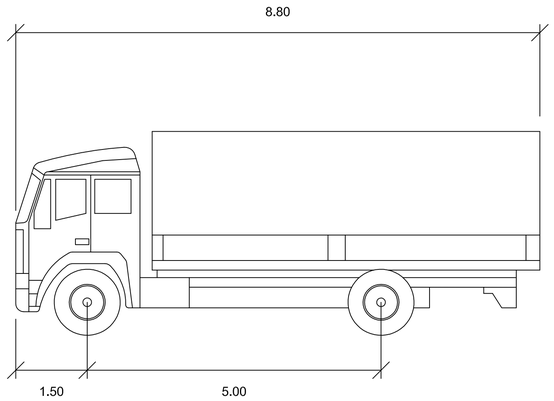
Plan
Scale 1:200



Plan
Scale 1:200



Key Plan
Scale 1:1000

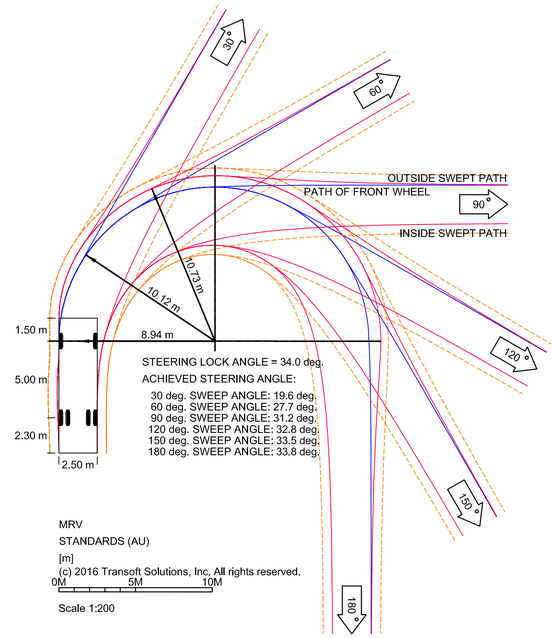


MRV

meters

Width	:	2.50
Track	:	2.50
Lock to Lock Time	:	6.0
Steering Angle	:	34.0

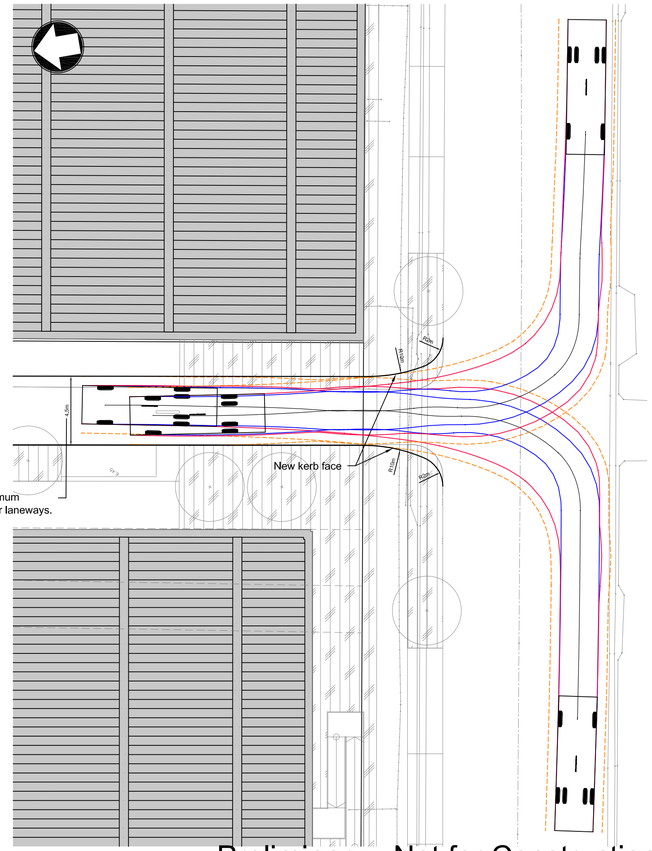
Scale 1:50



MRV
STANDARDS (AU)
[m]

0M 5M 10M

Scale 1:200



Recommended minimum carriageway width for laneways.

Preliminary - Not for Construction

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	08.05.2017	PDC	Issued for information	JG	X

1:1000 0 50m 100m
1:200 0 10m 20m
1:50 0 2.5m 5m

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W www.mottmac.com.au

Client: Investec

Title: Wickham Woolstores
Milford Street

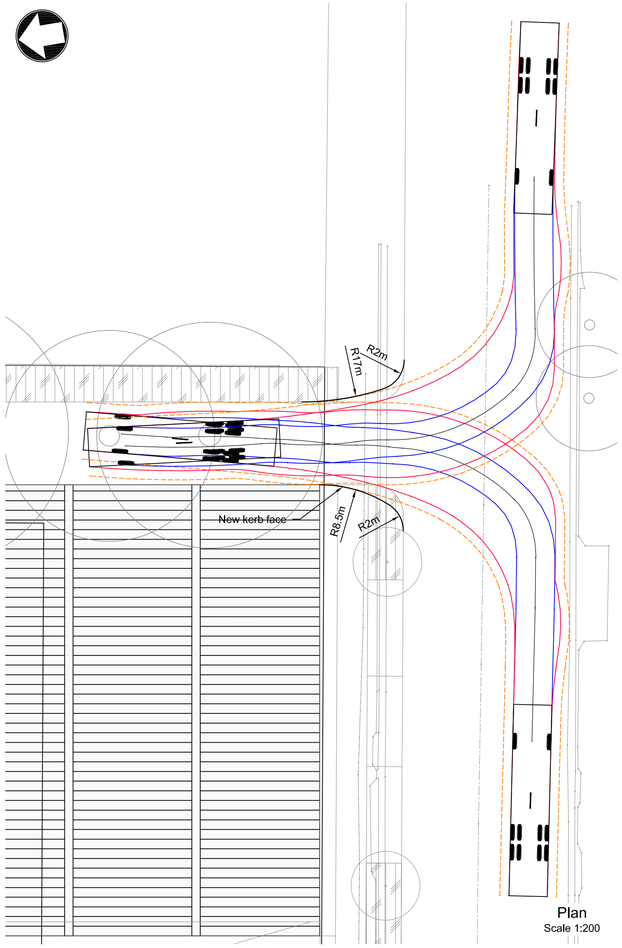
Stage 1
MRV Swept Path Plan and Details

Designed	P Cavanagh		Eng check	J Gilligan	
Drawn	P Cavanagh		Coordination	A Zou	
Dwg check	A Singh		Approved	C Avis	

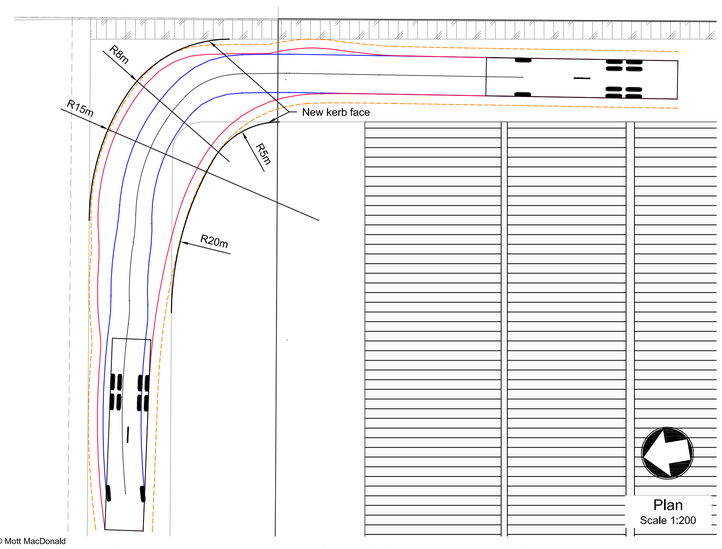
Scale at A1	Status	Rev	Security
As Shown	INF	P1	STD

Drawing Number: MMD-366163-C-SK-00-XX-0011

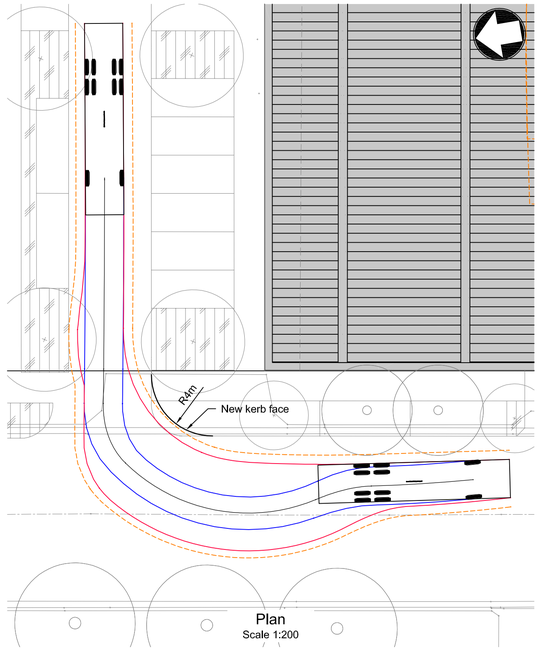
\\mottmac\Project\Sydney\Projects\36xxxx\366163\04 Working\01 CAD\Civil\Sketches\MMD-366163-C-SK-00-XX-0011.dwg May 8, 2017 - 11:34AM cav55648



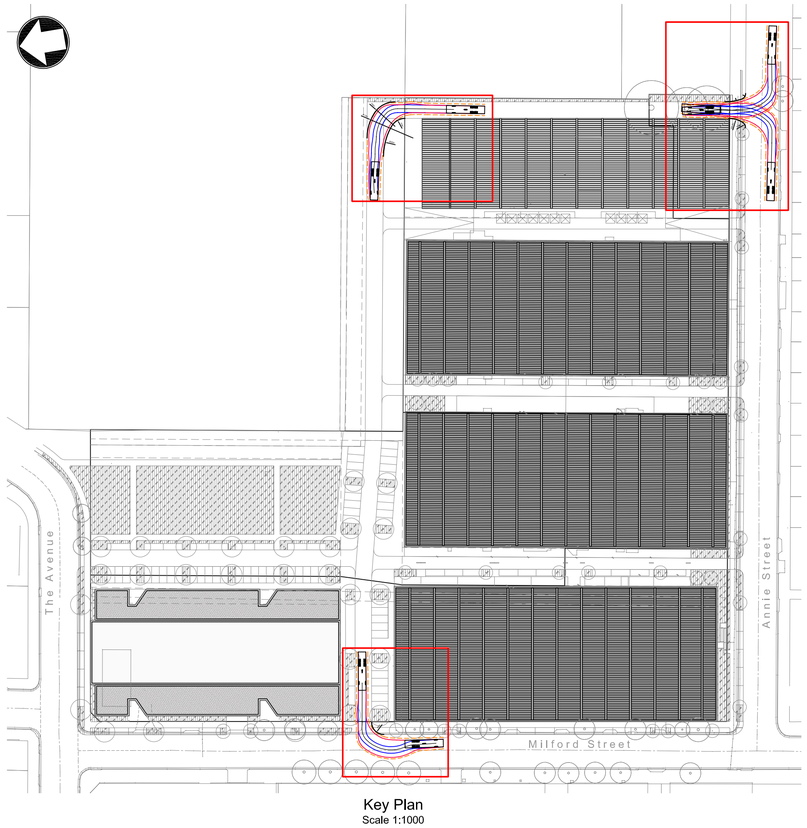
Plan
Scale 1:200



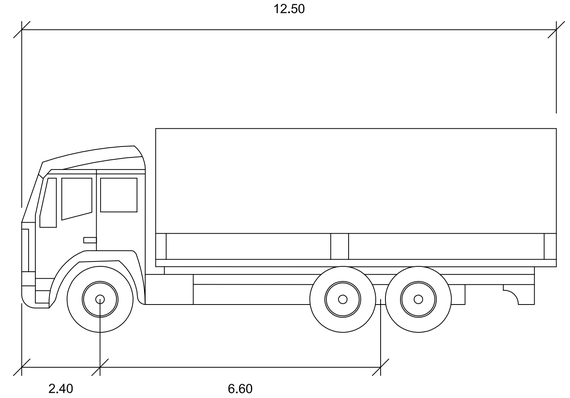
Plan
Scale 1:200



Plan
Scale 1:200



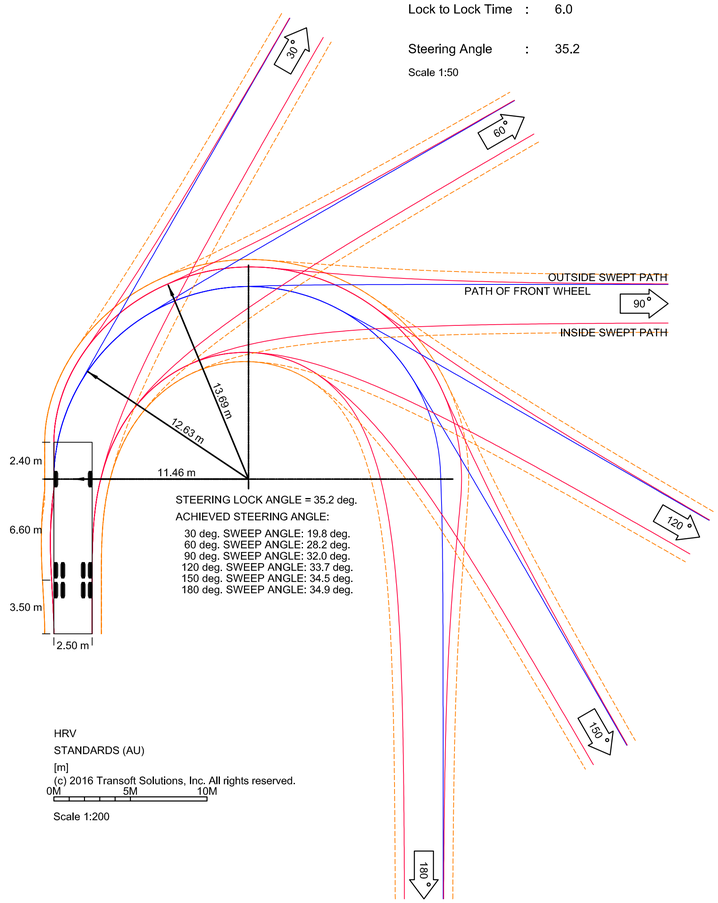
Key Plan
Scale 1:1000



HRV meters

Width	:	2.50
Track	:	2.50
Lock to Lock Time	:	6.0
Steering Angle	:	35.2

Scale 1:50



STEERING LOCK ANGLE = 35.2 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 19.8 deg.
60 deg. SWEEP ANGLE: 28.2 deg.
90 deg. SWEEP ANGLE: 32.0 deg.
120 deg. SWEEP ANGLE: 33.7 deg.
150 deg. SWEEP ANGLE: 34.5 deg.
180 deg. SWEEP ANGLE: 34.9 deg.

HRV
STANDARDS (AU)
[m]

0M 5M 10M

Scale 1:200

Preliminary - Not for Construction

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	08.05.2017	PDC	Issued for information	JG	X

1:1000	0 50m	100m
1:200	0 10m	20m
1:50	0 2.5m	5m

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W www.mottmac.com.au

Client: Investec

Title: Wickham Woolstores
Milford Street

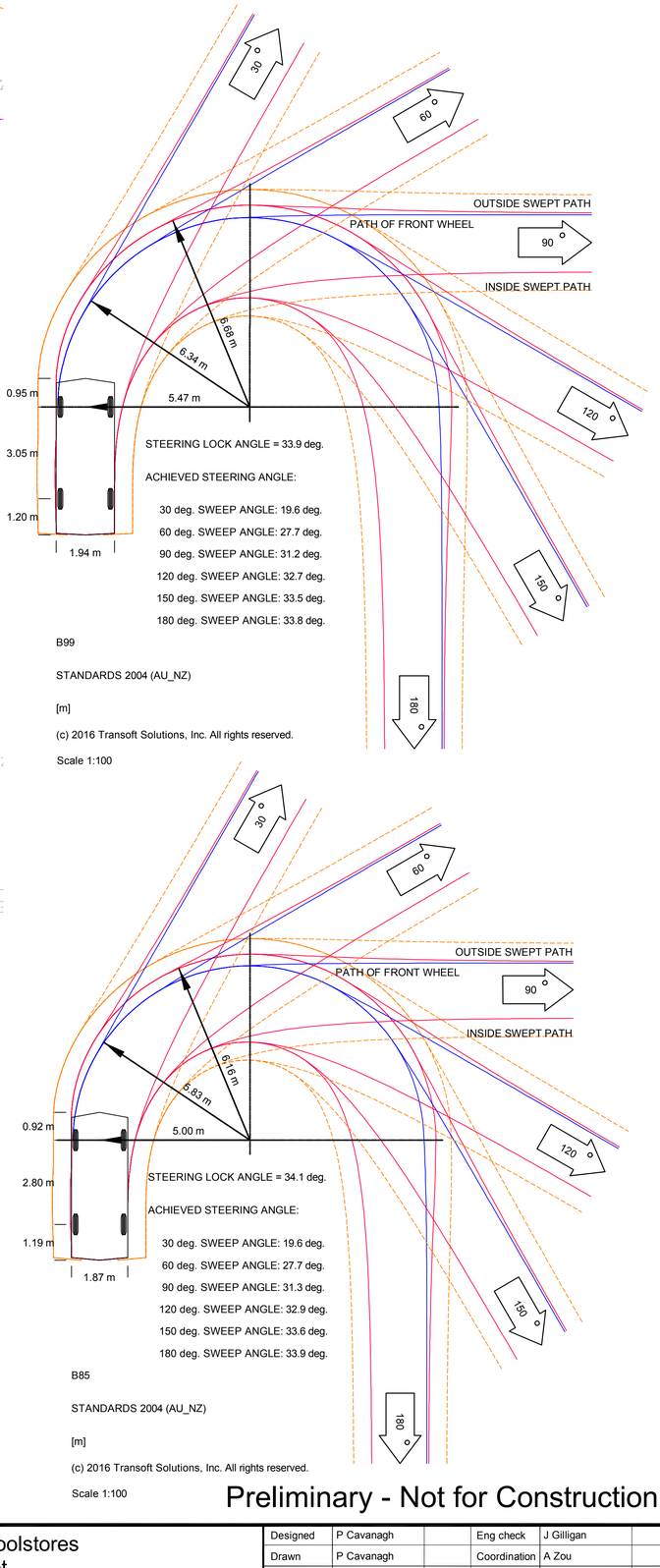
Masterplan
HRV Swept Path Plan and Details

Designed	P Cavanagh		Eng check	J Gilligan	
Drawn	P Cavanagh		Coordination	A Zou	
Dwg check	A Singh		Approved	C Avis	

Scale at A1	Status	Rev	Security
As Shown	INF	P1	STD

Drawing Number: MMD-366163-C-SK-00-XX-0012

Plan
Scale 1:200



STEERING LOCK ANGLE = 33.9 deg.

ACHIEVED STEERING ANGLE:

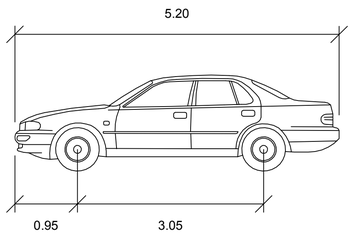
30 deg. SWEEP ANGLE: 19.6 deg.
60 deg. SWEEP ANGLE: 27.7 deg.
90 deg. SWEEP ANGLE: 31.2 deg.
120 deg. SWEEP ANGLE: 32.7 deg.
150 deg. SWEEP ANGLE: 33.5 deg.
180 deg. SWEEP ANGLE: 33.8 deg.

B99

STANDARDS 2004 (AU_NZ)

[m]

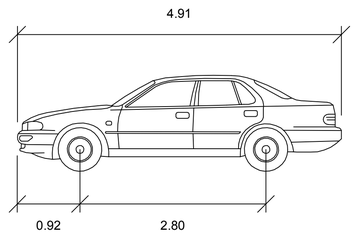
Scale 1:100



B99 meters

Width	:	1.94
Track	:	1.84
Lock to Lock Time	:	6.0
Steering Angle	:	33.9

Scale 1:50

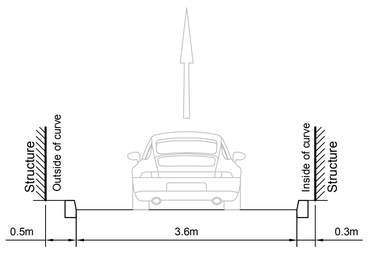


B85 meters

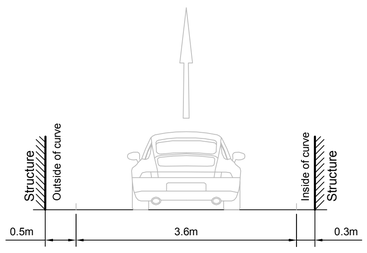
Width	:	1.87
Track	:	1.77
Lock to Lock Time	:	6.0
Steering Angle	:	34.1

Scale 1:50

Plan
Scale 1:200



Typical Section - Minimum widths for Circulation Ramp
Domestic Property - Option 1
Scale 1:50



Typical Section - Minimum widths for Circulation Ramp
Domestic Property - Option 2
Scale 1:50

STEERING LOCK ANGLE = 34.1 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 19.6 deg.
60 deg. SWEEP ANGLE: 27.7 deg.
90 deg. SWEEP ANGLE: 31.3 deg.
120 deg. SWEEP ANGLE: 32.9 deg.
150 deg. SWEEP ANGLE: 33.6 deg.
180 deg. SWEEP ANGLE: 33.9 deg.

B85

STANDARDS 2004 (AU_NZ)

[m]

Scale 1:100

Preliminary - Not for Construction

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	10.05.2017	PDC	Issued for information	JG	X

1:200 0 10m 20m
1:100 0 5m 10m
1:50 0 2.5m 5m

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com.au

Client: Investec

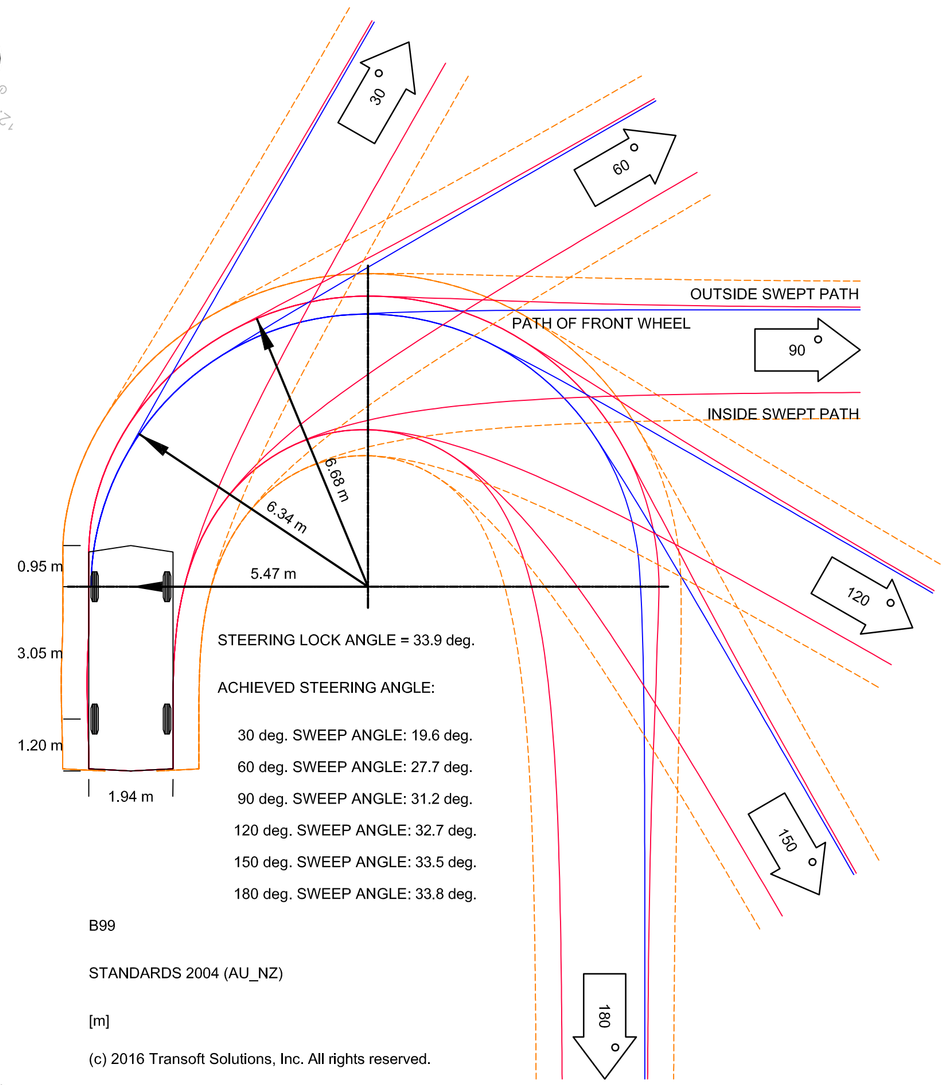
Title: Wickham Woolstores
Milford Street

Building 1 - 45° Parking
Swept Path Plan and Details

Designed	P Cavanagh		Eng check	J Gilligan	
Drawn	P Cavanagh		Coordination	A Zou	
Dwg check	A Singh		Approved	C Avis	
Scale at A1	Status		Rev		Security
As Shown	INF		P1		STD

Drawing Number
MMD-366163-C-SK-00-XX-0014

Plan
Scale 1:200



STEERING LOCK ANGLE = 33.9 deg.

ACHIEVED STEERING ANGLE:

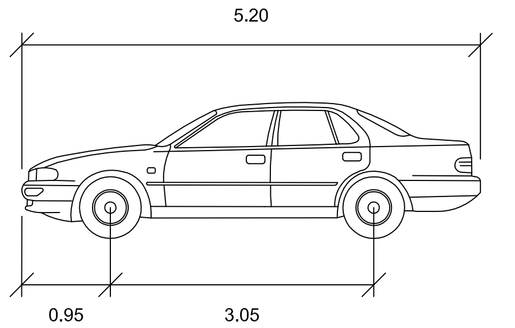
30 deg. SWEEP ANGLE: 19.6 deg.
60 deg. SWEEP ANGLE: 27.7 deg.
90 deg. SWEEP ANGLE: 31.2 deg.
120 deg. SWEEP ANGLE: 32.7 deg.
150 deg. SWEEP ANGLE: 33.5 deg.
180 deg. SWEEP ANGLE: 33.8 deg.

B99

STANDARDS 2004 (AU_NZ)

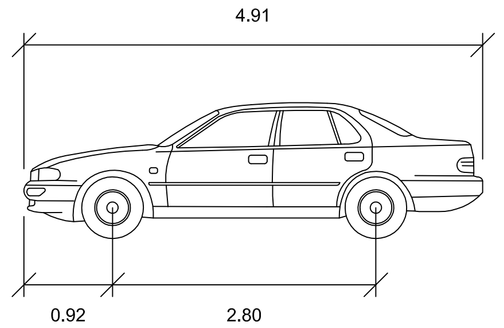
[m]

Scale 1:100



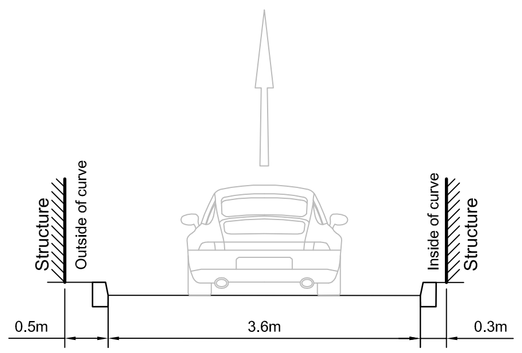
B99	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

Scale 1:50

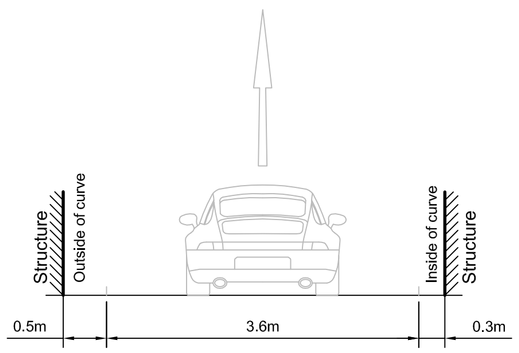


B85	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

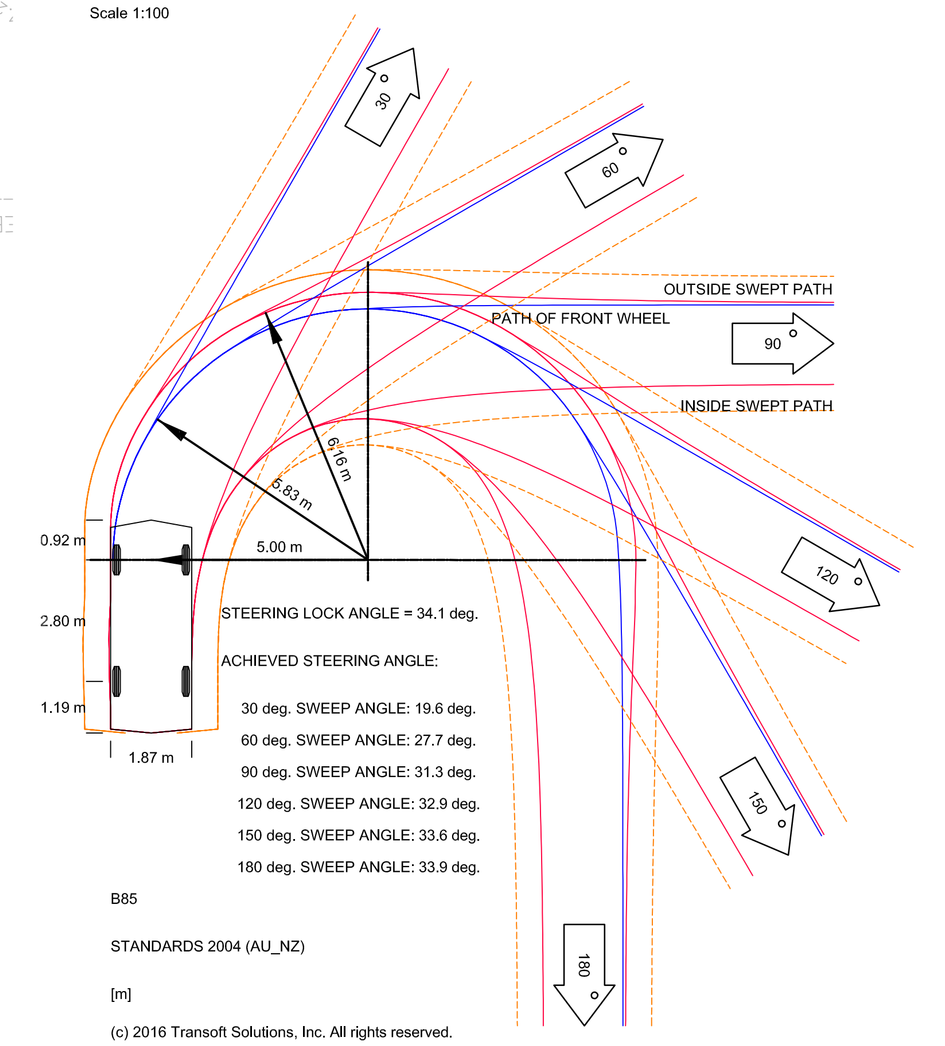
Scale 1:50



Typical Section - Minimum widths for Circulation Ramp
Domestic Property - Option 1
Scale 1:50



Typical Section - Minimum widths for Circulation Ramp
Domestic Property - Option 2
Scale 1:50



STEERING LOCK ANGLE = 34.1 deg.

ACHIEVED STEERING ANGLE:

30 deg. SWEEP ANGLE: 19.6 deg.
60 deg. SWEEP ANGLE: 27.7 deg.
90 deg. SWEEP ANGLE: 31.3 deg.
120 deg. SWEEP ANGLE: 32.9 deg.
150 deg. SWEEP ANGLE: 33.6 deg.
180 deg. SWEEP ANGLE: 33.9 deg.

B85

STANDARDS 2004 (AU_NZ)

[m]

Scale 1:100

Preliminary - Not for Construction

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	10.05.2017	PDC	Issued for information	JG	X

1:200 0 10m 20m
1:100 0 5m 10m
1:50 0 2.5m 5m

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W www.mottmac.com.au

Client: Investec

Title: Wickham Woolstores
Milford Street

Building 1 - 90° Parking
Swept Path Plan and Details

Designed	P Cavanagh		Eng check	J Gilligan	
Drawn	P Cavanagh		Coordination	A Zou	
Dwg check	A Singh		Approved	C Avis	
Scale at A1	Status		Rev	Security	
As Shown	INF		P1	STD	

Drawing Number
MMD-366163-C-SK-00-XX-0015

\\mottmac\Projects\Sydney\Projects\366xxxx\366163\04 Working\01 CAD\Civil\Sketches\MMD-366163-C-SK-00-XX-0015.dwg May 10, 2017 - 1:34PM cav55649

Appendix E. Woolstore Project Drawing List