

A photograph of a rural landscape with a grassy field, several large trees, and a body of water in the background under a cloudy sky.

TRAFFIC IMPACT ASSESSMENT

**RESIDENTIAL SUBDIVISION
WATERFORD COUNTY (REMAINING STAGES)**

**LOT 4 IN DP 1220220, LOT 2831 IN DP 1238911
AND PT LOT 1 IN DP 1020710
2 SETTLERS BOULEVARD, 118 DRAGONFLY DRIVE
AND 239 McFARLANES ROAD, CHISHOLM**

PREPARED FOR: AVID PROPERTY GROUP

APRIL 2018

18/016

**TRAFFIC IMPACT ASSESSMENT
AVID PROPERTY GROUP****WATERFORD COUNTY RESIDENTIALSUBDIVISION REMAINING STAGES
LOT 2831 IN DP 1238911, LOT 4 IN DP 1220220 AND PT LOT 1 IN DP 1020710
2 SETTLERS BOULEVARD, 118 DRAGONFLY DRIVE AND 239 McFARLANES ROAD, CHISHOLM**

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This document has been prepared, checked and released in accordance with the Quality Control Standards established by Intersect Traffic Pty Ltd.

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A	18/04/18	Draft	PA
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Date 30th April 2018**Disclaimer**

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd (Intersect Traffic) was engaged by ADW Johnson on behalf of Avid Property Group to undertake a traffic impact assessment for a proposed 250 lot residential subdivision and 20 lot display village (Stage 51) on Lot 4 in DP 1220220, Lot 2831 in DP 1238911 and Pt Lot 1 in DP 1020710, 2 Settlers Boulevard, 118 Dragonfly Drive and 239 McFarlanes Road, Chisholm.

The subdivision and display village are within the Waterford County residential estate, Stages 29, 38, 39, 51 – 55 (, with accesses to the road network to be provided at Settlers Boulevard south of Kittyhawk Drive and via an extension of Settlers Boulevard north of Dragonfly Drive connecting to the existing intersections with Raymond Terrace Road at Settlers Boulevard and Harvest Boulevard. Access to McFarlanes Road through the extension of Settlers Boulevard within Stages 30 – 33, 37, 61 & 62 (previously known as Stages B – G) will also be available for lots within the subdivision. All new subdivision roads will be constructed to Maitland City Council requirements. The proposed subdivision plans are shown in **Attachment A**. The land area covered in the subdivision is within the Thornton North Urban Release Area.

This report is required to support a development application to Maitland City Council as the consent authority. The report presents the findings of the traffic assessment and includes the following;

1. An outline of the existing situation near the site.
2. An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
3. Reviews parking, public transport, pedestrian and cycle way requirements for the proposed development, including assessment against Council and Australian Standards.
4. Presentation of conclusions and recommendation.

2.0 SITE DESCRIPTION & LOCATION

The subject site is currently vacant rural land. The site is bounded by low lying rural land to the north and northwest, residential rural land to the east, major sections of the newly constructed low density residential subdivision (Waterford County) to the west and Raymond Terrace Road to the south. St Aloysius Catholic School adjoins the western side of the development approximately centrally. The northern section of the development is approximately: 1.7 kilometres from Raymond Terrace Road south of the site - via Dragon Fly Drive, Heritage Drive and Settlers Boulevard; 2 kilometres from Raymond Terrace Road south of the site - via Dragon Fly Drive, Heritage Drive and Harvest Boulevard; 2 kilometres from Raymond Terrace Road - via McFarlanes Road and 2.7 kilometres to Morpeth - via McFarlanes Road. The development site's location within the context of surrounding buildings, land and roads is shown in the location plan provided as **Figure 1**, below.

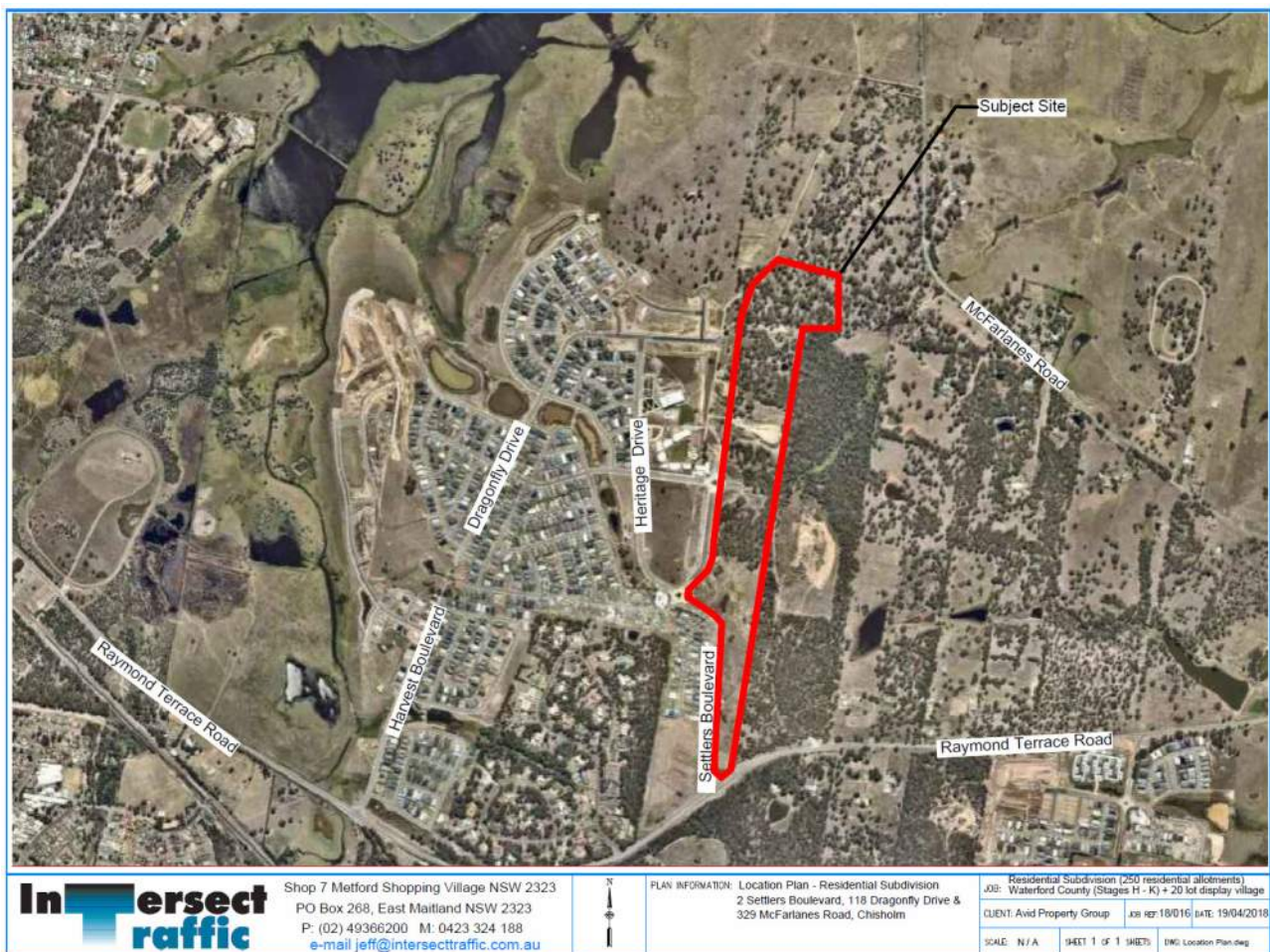


Figure 1 – Site Location

The site has the following property descriptors:

- ◆ Formal land titles of:
 - Lot 4 in DP 1220220;
 - Lot 2831 in DP 1238911, and
 - Pt Lot 1 in DP 1020710.
- ◆ Postal address of 2 Settlers Boulevard, 118 Dragonfly Drive and 239 McFarlanes Road, Chisholm;
- ◆ Site development area of approximately 25 ha; and
- ◆ Land zoning of R1 – General Residential in accordance with Maitland LEP (2011).

The site currently has road frontages to Raymond Terrace Road, Settlers Boulevard, Grasshawk Drive and Nighthawk Way with access provided by these and other Waterford County road

intersections already constructed. **Photographs 1 & 2** shows the existing site conditions and a typical existing access road to the development site.



Photograph 1 – Development site.



Photograph 2 – Existing road access to development

3.0 EXISTING ROAD NETWORK

In terms of the local road network, the roads most likely to be impacted by the additional traffic generated by the proposed development will be Raymond Terrace Road, Dragonfly Drive, Harvest Boulevard, Heritage Drive, Settlers Boulevard and McFarlanes Road.

Raymond Terrace Road near the site is a classified main road (MR104) under the care and control of the NSW Roads and Maritime Services (RMS) providing a single travel lane in both directions constructed to a typical rural standard. Lane widths are between 3.2 and 3.5 metres. Raymond Terrace Road performs the function of a sub-arterial road connecting Maitland to Raymond Terrace. On inspection the road was observed to be in good condition with an 80 km/h speed zoning along the site frontage. **Photograph 3** shows Raymond Terrace Road near the site.



Photograph 3 – Raymond Terrace Road at Settler's Boulevard intersection

Settler's Boulevard, Harvest Boulevard, Heritage Drive and Dragonfly Drive are all local roads under the care and control of Maitland City Council which under a functional road hierarchy perform the function of a collector road as they collect and distribute traffic from the Waterford County and Harvest residential estates to the sub-arterial road network at Raymond Terrace Road. On inspection these roads were found to be two-lane two-way urban roads with kerb and gutter and longitudinal drainage and parking lanes on both sides of the road. Travel lane widths are in the order of 3.5 metres while parking lanes are generally 2 to 3.4 metres wide. A 50 km/h speed zoning exists within the residential estates except where the variable school zones exist near the catholic primary and high schools in Heritage Drive. The roads being relatively new construction are all in good condition. Dragonfly Drive and Harvest Boulevard have on-road cycle lanes along both sides of the road while off-road cycleways exist within Heritage Drive and Settler's Boulevard. An extensive concrete pedestrian footpath exists within each road reserve on both sides of the collector roads and one side of the road for most local roads except for Settler's Boulevard between Heritage Drive and Raymond Terrace Road. Settlers Boulevard in this location also has additional turning lanes provided at intersections. **Photograph 4** below shows Dragonfly Drive near the site, **Photograph 5** below shows Heritage Boulevard near the site and **Photograph 6** below shows Settlers Boulevard near Raymond Terrace Road.



Photograph 4 – Dragonfly Drive near the site.



Photograph 5 – Harvest Boulevard.



Photograph 6 – Settlers Boulevard near Raymond Terrace Road.

McFarlanes Road near the site connects Chisholm to Morpeth and is a local collector road under a functional road hierarchy classification. As such it is under the care and control of the Maitland City Council providing a single travel lane in both directions constructed to a typical sealed rural standard. Lane widths are between 3.2 and 3.5 metres with 1.5 to 2.0 metre shoulders. On inspection the road was observed to be in good condition with an 80 km/h speed zoning along the site frontage. **Photograph 7** shows McFarlanes Road near the site.



Photograph 7 – McFarlanes Road near the site.

4.0 ROAD NETWORK IMPROVEMENTS

As part of the original planning for the Thornton North Urban Release Area a traffic study was undertaken by Parsons Brinckerhoff (2003) to inform the Thornton North Masterplan and it is understood this report has been recently reviewed by Maitland City Council. This study assessed the regional transport and traffic impacts of the urban release area and identified the required road and intersection upgrades required to mitigate the traffic impacts. These road and intersection upgrades were then included within the Thornton North S94 Contributions Plan so that all developers could pay their fair and reasonable contribution to the works.

Administration of the S94 developer contributions plan is the responsibility of Maitland City Council who must also organise and plan the construction works once development has reached the stage that triggers the required works. It is concluded that for this development payment of the required S94 developer contributions ensures that the external road network is upgraded to a suitable standard to cater satisfactorily for additional traffic generated by the subdivision. The latest schedule of works for the S94 contribution plan sourced from Maitland City Council's website is reproduced below. It is also noted the S94 developer contributions plan includes for additional cycleways in the area as shown below.

THORNTON NORTH CYCLEWAYS

	Location	Est. Capital Cost	Est. Land Cost	Total Cost	Estimated Timing
Thornton R2	TN36 Somerset Dye to Raymond Terrace Road	\$180,300	\$0	\$180,300	1500 lots
Thornton R2 - Supp	TN36S Thornton Station to Raymond Terrace Road	\$412,300	\$0	\$412,300	3000 lots
Scenic S5	TN37 Melford Station to Raymond Terrace Road	\$250,000	\$20,000	\$270,000	4500 lots
TOTAL		\$842,600	\$20,000	\$862,600	

THORNTON NORTH ROADS AND TRAFFIC FACILITIES

Services / Facilities	Location	Description	Est. Capital Cost	Est. Land Cost	Total Cost	Estimated Timing
Road Upgrades	TN38	Intersection 4 to Haussman Drive	\$5,992,357	\$767,604	\$6,759,961	Stage 1
	TN39	Haussman to The Boulevard	\$10,896,727	\$303,002	\$11,199,729	Stage 1
	TN40	The Boulevard to Government Road	\$6,969,829	\$1,212,007	\$8,181,836	Stage 2
	TN41	Government Road to McFarlanes Road	\$6,984,612	\$686,804	\$7,671,416	Stage 2
	TN42	Haussman Drive	\$14,503,670	\$3,313,871	\$17,817,541	Stage 1
	TN44	Railway Avenue and Glenwood Drive	\$7,151,104	\$59,826	\$7,210,932	Stage 1
	TN45	McFarlanes Road	\$6,349,640	\$579,568	\$6,929,208	Stage 2
	TN46	Government Road	\$1,674,814	\$246,651	\$1,921,465	Stage 1
Intersections	TN47	Raymond Terrace Road / New Intersection West	\$1,216,758	\$0	\$1,216,758	Stage 1
	TN48	Haussman Drive / Raymond Terrace Road	\$2,020,919	\$0	\$2,020,919	Stage 1
	TN49	The Boulevard / Raymond Terrace Road	\$1,246,019	\$0	\$1,246,019	Stage 1
	TN50	Raymond Terrace Road / Government Road	\$2,140,733	\$0	\$2,140,733	Stage 2
	TN51	Raymond Terrace Road / McFarlanes Road	\$1,432,678	\$0	\$1,432,678	Stage 2
	TN52	McFarlanes Road / The Boulevard	\$1,179,791	\$0	\$1,179,791	Stage 2
	TN53	Haussman Drive / Taylor Avenue	\$1,981,514	\$4,944	\$1,986,458	Stage 1
	TN54	Railway Avenue / Glenroy Street	\$3,794,138	\$2,197,475	\$5,991,613	Stage 1
	TN55	Huntingdale Drive / Thornton Drive	\$1,137,841	\$0	\$1,137,841	Stage 1
	TN56	Thornton Road / Glenwood Drive	\$3,676,586	\$498,199	\$4,176,785	Stage 1
	TN57	Government Road / New Intersection	\$641,324	\$0	\$641,324	Stage 1
	TN58	Government Road / New Intersection	\$641,324	\$0	\$641,324	Stage 1
New Roads	TN58	The Boulevard (additional 4.0m wide median)	\$1,354,847	\$754,000	\$2,108,847	Stages 1,2
	TN59	Fringe Road (additional 6.0m reserve, 1.5m for shared way and 2.5m parking lane)	\$2,583,849	\$120,000	\$2,703,849	Stages 1,2
TOTAL			\$85,573,074	\$10,743,953	\$96,317,027	

It is noted that the S94 contributions plan for the Thornton North area provides for contributions to the following road upgrades relevant to the road network around the site;

1. Raymond Terrace Road – upgrading to four lanes.
2. McFarlanes Road – upgrading.
3. Raymond Terrace Road / Haussman Drive intersection
4. Raymond Terrace Road / McFarlanes Road intersection
5. McFarlanes Road / The Boulevard intersection.

Note: - works at the Settlers Boulevard and Harvest Boulevard intersections with Raymond Terrace Road have already been completed as part of previous development works and it is understood the development of the Sophia Waters Residential Estate will include upgrading of the Raymond Terrace Road / McFarlanes Road intersection and McFarlanes Road.

5.0 TRAFFIC VOLUMES

Existing traffic volumes on Raymond Terrace Road, Harvest Boulevard and Settlers Boulevard have been determined from manual traffic counts carried out by Northern Transport Planning and Engineering (NTPE) on behalf of Intersect Traffic at the Raymond Terrace Road / Settler's Boulevard signalised intersection and at the Raymond Terrace Road / Harvest Boulevard signalised intersection on Tuesday 10th October 2017 during peak AM and PM traffic periods between 8 am and 9 am and between 4.45 pm and 5.45 pm, respectively. Also, previously Intersect Traffic undertook manual peak hour traffic counts at the Raymond Terrace / McFarlanes Road intersection on Thursday 11th December 2014 during peak AM and PM traffic periods between 8 am and 9 am and between 4.30 pm and 5.30 pm, respectively. To represent the traffic in 2018 the 2014 and 2017 peak hour count volumes have been increased by a 4.0% estimated traffic growth per annum for 4 years and 1 year respectively. Predicted 2028 traffic volumes have also been calculated using a 3 % per annum background traffic growth rate. The traffic count data collected during these counts are shown in **Attachment B**. The two-way mid-block existing traffic volumes calculated from this data are shown below in **Table 1**.

Table 1 – Existing and future AM & PM peak hour traffic volumes.

Road Section	Year Period	2018AM (vtph)	2018PM (vtph)	2028AM (vtph)	2028PM (vtph)
Raymond Terrace Road (west of Harvest Boulevard)		1,674	1,730	2,479	2,560
Raymond Terrace Road (east of Harvest Boulevard)		1,716	1,743	2,540	2,580
Harvest Boulevard (north of Raymond Terrace Road)		104	113	154	168
Raymond Terrace Road (west of Settlers Boulevard)		1,281	1,251	1,897	1,852
Raymond Terrace Road (east of Settlers Boulevard)		1,064	1,040	1,575	1,539
Settlers Boulevard (north of Raymond Terrace Road)		729	523	1,079	774
Raymond Terrace Road (west of McFarlanes Road)		828	924	1,225	1,367
Raymond Terrace Road (east of McFarlanes Road)		787	863	1,165	1,278
McFarlanes Road north of Raymond Terrace Road)		139	137	206	203



6.0 ROAD CAPACITY

The capacity of urban roads is generally determined by the capacity of intersections. However, Tables 4.3 and 4.4 of the RMS' *Guide to Traffic Generating Developments* provides some guidance on mid-block capacities for urban roads and likely levels of service. These tables are reproduced below.

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Source: - RTA's *Guide to Traffic Generating Developments* (2002).

Based on these tables it is considered that:

- ◆ Raymond Terrace Road as a major sub-arterial road would have a two-way mid-block capacity of up to 2,800 vph if a level of service (LoS) D was considered acceptable;
- ◆ Settlers Boulevard / Harvest Boulevard / McFarlanes Road as collector roads would have a two-way mid-block capacity of up to 1,800 vph on the assumption that a LoS C was desirable on local roads;

The road capacities adopted in this assessment for the local road network impacted by this development are therefore as shown below in **Table 2**.

Table 2 - Adopted Road Capacities

Street	Two Way Road Capacity (vph)
Raymond Terrace Road LoS D	2,800
Settlers Boulevard LoS C	1,800
Harvest Boulevard LoS C	1,800
McFarlanes Road LoS C	1,800

The highest peak two-way traffic counts in 2018 for Raymond Terrace Road was 1,726 vph, for Settlers Boulevard was 722 vph, for Harvest Boulevard was 112 vph and McFarlane's Road was 138 vph (refer to **Section 5**). These 2018 traffic volumes are well below all the relevant road network capacity thresholds shown in **Table 2**. Therefore, based on the available traffic data it can be concluded that there is spare mid-block two-way road capacity within the local and state road network to cater for additional development.

7.0 ALTERNATE TRANSPORT MODES

Hunter Valley Buses operates service route 189 Stockland's Greenhills to Thornton and route 184 Stocklands Greenhills to Morpeth (**Figure 2** below) within the vicinity of the development site. Route 189 runs along Raymond Terrace Road north along Settlers Boulevard to Heritage Drive then does a loop along Heritage Drive to Tigerhawk Drive and back to Settlers Boulevard and Raymond Terrace Road. The nearest bus stops to the site would be in Tigerhawk Drive near the St Aloysius Primary College. However, with further development of Waterford County this route is likely to change, and bus stops have been provided within Dragonfly Drive in the newer parts of the subdivision. Similarly, the Morpeth services which loop around Swan Street, Edward Street and James Street could be extended to the proposed development in the future.

This existing service provides access for residents to the major retail, commercial and medical facilities in the area as well as providing connection to local train stations on the Hunter Line.

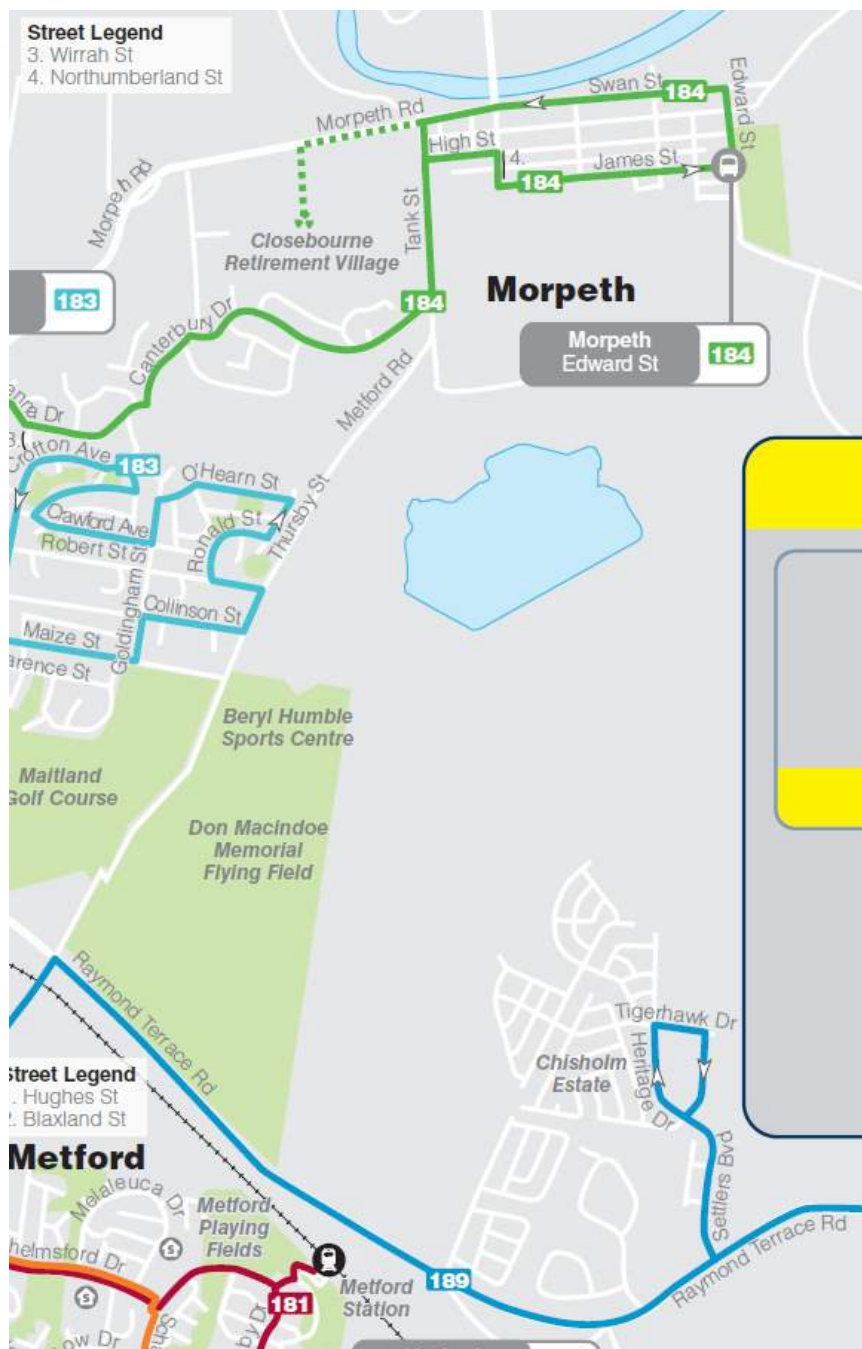


Figure 2 – Hunter Valley Buses Service Routes 184 & 189

An existing off road shared pedestrian / bicycle path runs along the western side of Dragonfly Drive and Harvest Boulevard and both sides of Heritage Drive and along the western side of Settlers Boulevard. This path connects to existing bus stops, schools and a future commercial precinct in Waterford County. This infrastructure is being extended as development in Chisholm occurs and it is noted that a bus stop on both sides of the recently constructed extended section of Dragon Fly Drive to Settlers Boulevard just north of Heritage Drive has been provided as depicted in **Photograph 8** below. On-road cycle lanes are also provided on both sides of Dragonfly Drive and Harvest Boulevard near the site as well as on Raymond Terrace Road through the Settlers Boulevard and Harvest Boulevard signalised intersections. Pedestrian footpaths in the area are generally provided on both sides of the road along the collector roads and on one side only on the local streets. Typical existing cycleways are shown in **Photograph 9** below.

Overall it is considered that both the Waterford County and Harvest residential estates have an extensive network of constructed concrete footpaths and on and off-road cycleways that would encourage this alternative transport mode trip making within these residential estates.



Photograph 8 – Bus stops Dragonfly Drive



Photograph 9 – Typical cycleway / pedestrian facilities – Settlers Boulevard

8.0 DEVELOPMENT PROPOSAL

The proposed development is a 250-lot residential subdivision of Lot 4 in DP 1220220, Lot 2831 in DP 1238911 and Pt Lot 1 in DP 1020710, 2 Settlers Boulevard, 118 Dragonfly Drive and 239 McFarlanes Road, Chisholm. The subdivision plan showing the proposed internal road network including connection to the existing external road network are shown in **Attachment A**.

All new internal subdivision roads, improvements to existing roadways, footways and cycleways will be constructed to Maitland City Council requirements (Manual of Engineering Standards). The internal roads have all internal intersections as priority give-way controlled T-intersections which not only provides suitable intersection control but represents best practice regarding road safety for subdivision design. Cross intersection connections on the collector roads are generally constructed as roundabouts.

Access to the subdivision will be made available via the new subdivision roads which will connect the subject site from the existing Settlers Boulevard and its extension from Dragon Fly Drive to the north. At present Settlers Boulevard has been constructed up to Tiger Hawk Drive however, approval exists for its construction up to Stages 33 & 62 under DA15-1963 (with its slight realignment proposed as part of Stage 31) (see **Attachment A**). A further connection is available from the west and provision has been made for another connection to the north (also see **Attachment A**). The proposed layout and surrounding proposed and future development will allow residents to access McFarlane's Road to the north and Raymond Terrace Road to the south via either Dragonfly Drive and Harvest Boulevard or via Settler's Boulevard.

9.0 TRAFFIC GENERATION

The RMS' *RTA's Guide to Traffic Generating Development's* provides specific advice on the traffic generation potential of various land uses. However, the RMS has released a Technical Direction (TDT 2013/4) releasing the results of updated traffic surveys and as a result amended land use traffic generation rates. Regarding low density residential dwellings, the following amended advice is provided within the Technical Direction.

Rates.

Daily vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas

Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90).

Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85).

*(The above rates do **not** include trips made internal to the subdivision, which may add up to an additional 25 %).*

Notwithstanding Maitland City Council have previously advised for developments in the Thornton North Urban Release Area that they require the following rates to be used;

- ◆ 9.0 trips per dwelling;
- ◆ 0.85 vtpd – AM weekday peak.
- ◆ 0.9 vtpd – PM weekday peak.

Therefore, based on this advice and noting the subdivision provides 250 residential allotments the likely traffic generation figures (rounded up) for the proposal are as follows;

Daily vehicle trips	= 250 x 9 = 2,250 vtpd;
PM peak hour	= 250 x 0.9 = 225 vtpd.
AM peak hour	= 250 x 0.85 = 213 vtpd.

These additional traffic volumes are adopted in this assessment

There is no relevant traffic generation data available for display villages and previously for the Homezone village at Thornton Intersect Traffic proposed a rate comparable to the car parking rate within Maitland City Council's DCP (Section C.3 – Exhibition Homes & Villages) of 2 vtpd per home. This is based on the car parking rate of 2 spaces per home display and assuming an average 2 hour stay at the village i.e. 50 % turnover of car parking in the peak hour. This was accepted by Council in issuing approval for the display village therefore is proposed for this development as well. Therefore, traffic generation for the display village can be calculated as = 20 x 2 = 40 vtpd and around 320 vtpd based on an 8 hour day.

It is noted that the display village peak is likely to be on weekends rather than weekdays however by adopting this peak as a weekday peak this traffic assessment is considered robust. It is also noted that on closure of the display village in 5 years' time the homes become normal residential dwellings with a traffic generation of less than 1 vtpd per home. Therefore using the display village rate proposed above also ensures the assessment remains robust when the display village ceases to operate.

Therefore, the traffic generation from this development adopted for this development in this report is;

Daily vehicle trips	= 2250 + 320 = 2,570 vtpd;
PM peak hour	= 225 + 40 = 265 vtpd; and
AM peak hour	= 213 + 40 = 253 vtpd.

10.0 TRIP DISTRIBUTION

Before carrying out any traffic assessment the additional external peak hour traffic generated by the development needs to be distributed through the adjoining road network. In distributing traffic onto the existing road network an assessment of likely origins and destinations as well as a review of manual traffic count data collected at the Raymond Terrace Road / Settlers Boulevard, Raymond Terrace Road / Harvest Boulevard intersections and the Raymond Terrace Road / McFarlanes Road has been made and the following trip distribution is considered appropriate;

- ◆ 70% of traffic will utilise Settlers Boulevard south for access at Raymond Terrace Road.
- ◆ 20% will utilise Settlers Boulevard / Dragon Fly Drive / Harvest Drive for access at the Raymond Terrace Road.
- ◆ 10% of traffic will utilise Settlers Boulevard north for access at McFarlanes Road.
- ◆ Traffic at Settlers Road south will be split 50:50 east and west on Raymond Terrace Road, and
- ◆ All traffic at Harvest Boulevard will have origin / destinations via Raymond Terrace Road west.

The resulting development traffic trip distribution is shown in **Figure 3** below

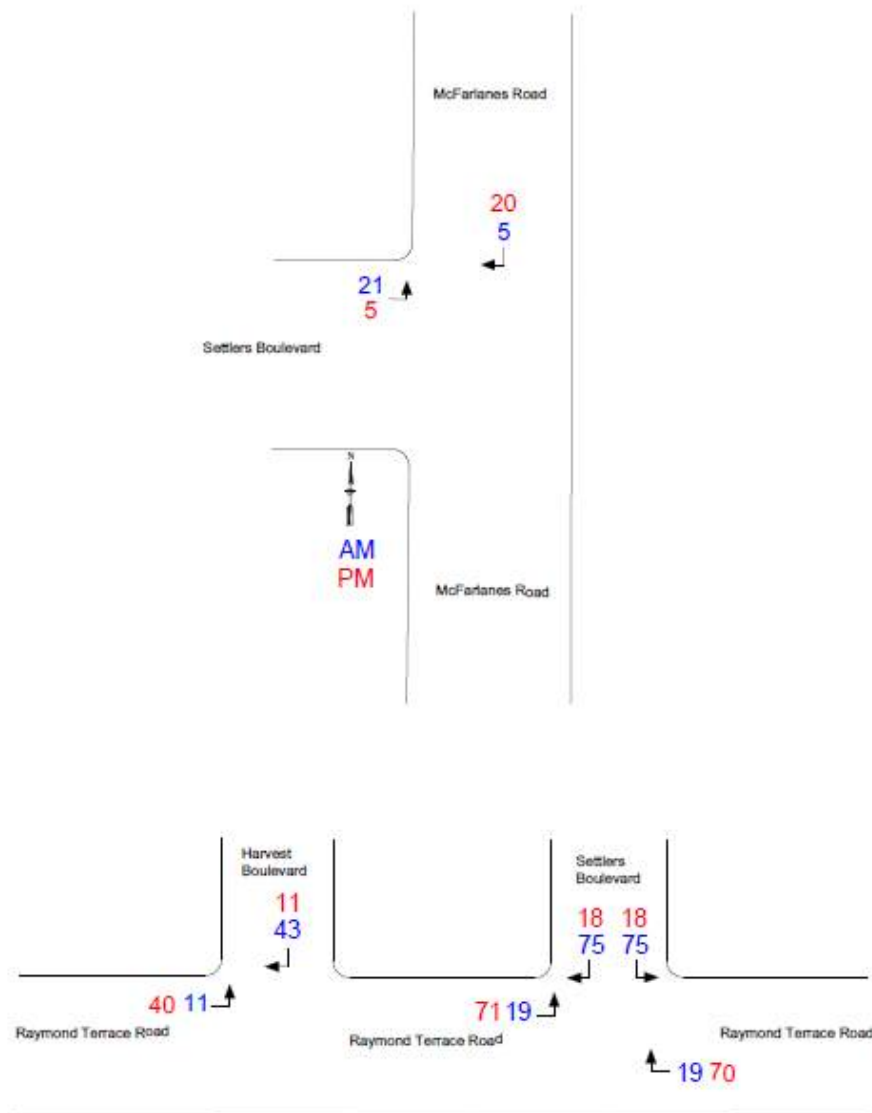


Figure 3 – Development Traffic Trip Distribution

11.0 TRAFFIC IMPACTS OF DEVELOPMENT

11.1 Road Network Capacity

It has previously been shown in **Section 6** of this report that the local road network is currently operating within its technical mid-block capacity. The existing and forecast traffic volumes collected and determined for the local network referred to in **Section 5** are impacted by the additional development generated for this development as per **Figure 3** and the traffic generated and redirected by adjoining Waterford County Stages A, 30 – 33, 37, 61 & 62 (previously B – G) which will be constructed prior to this subdivision. This has been covered in previous Traffic Impact Assessments undertaken by Intersect Traffic (November 2017) for development applications for these subdivisions. The resultant likely cumulative adjustments to traffic on the local road network are shown below in **Table 3** with the Stages A, 30 – 37, 40 – 42, 61 & 62 (previously Stages B – G & O'Brien's Land) volumes extracted from the relevant Traffic Assessments undertaken by Intersect Traffic in November 2017.

Table 3 – Traffic Volume Adjustments

Road	Section	Waterford Stages	A - G + O'Briens	Waterford	Stages H - K	Waterford	Combined
		AM peak (vtph)	PM peak (vtph)	AM peak (vtph)	PM peak (vtph)	AM peak (vtph)	PM peak (vtph)
Raymond Terrace Road	west of Harvest Boulevard	173	172	148	140	321	312
Raymond Terrace Road	east of Harvest Boulevard	66	50	94	89	160	139
Harvest Boulevard	north of Raymond Terrace Road	435	366	54	51	489	417
Raymond Terrace Road	west of Settlers Boulevard	-22	-14	94	89	72	75
Raymond Terrace Road	east of Settlers Boulevard	150	149	94	89	244	238
Settlers Boulevard	north of Raymond Terrace Road	-86	-19	188	176	102	157
Raymond Terrace Road	west of McFarlane's Road	86	79	94	89	180	168
Raymond Terrace Road	east of McFarlane's Road	121	113	94	89	215	202
McFarlanes Road	south of Settlers Boulevard	101	95	0	0	101	95
McFarlanes Road	north of Settlers Boulevard	154	145	26	25	180	170

The addition of the traffic generated from the development onto the existing traffic volumes determined in **Section 5** will not result in the capacity thresholds determined in **Section 6** to be reached. With 4 % per annum traffic growth on the road network added to the development traffic over a ten-year period these road capacity thresholds are still not reached. The 4% p.a. background traffic growth has been used to account for normal background traffic growth (1.5% p.a.) plus future development of other areas of the Thornton North urban release area. This is demonstrated in **Table 4** below for the critical PM peak.

Table 4 - Road Capacity Assessment

Road Section	Year Period	Capacity (vtph)	2018PM (vtph)	2028PM (vtph)	Development PM (vtph)
Raymond Terrace Road (west of Harvest Boulevard)		2800	2,042	2,872	312
Raymond Terrace Road (east of Harvest Boulevard)		2800	1,882	2,719	139
Harvest Boulevard (north of Raymond Terrace Road)		1800	530	585	417
Raymond Terrace Road (west of Settlers Boulevard)		1800	1,326	1,927	75
Raymond Terrace Road (east of Settlers Boulevard)		1800	1,278	1,777	238
Settlers Boulevard (north of Raymond Terrace Road)		1800	680	931	157
Raymond Terrace Road (west of McFarlanes Road)		1800	1,092	1,535	168
Raymond Terrace Road (east of McFarlanes Road)		1800	1,065	1,480	202
McFarlanes Road (south of Settler's Boulevard)		1800	232	298	95

Therefore, it can be concluded that the local and state road network subject to suitable intersection controls being in place has sufficient spare capacity to cater for the proposed development.

However, Raymond Terrace Road reaches its capacity in 2028 and will need to be widened as proposed in the S94 contributions plan prior to 2028.

11.2 Intersection Capacity

The major intersections impacted by this development are:

- ◆ Raymond Terrace Road / Harvest Boulevard signalised intersection;
- ◆ Raymond Terrace Road / Settlers Boulevard signalised intersection; and
- ◆ McFarlanes Road / Settlers Boulevard T-intersection (new).

There will also be some impact on the Raymond Terrace Road / Haussman Drive and Raymond Terrace Road / Government Road intersections because of this development however the impact is deemed to be minor particularly with the redistribution of traffic resulting from the connection of Waterford County to Harvest residential estates. The net effect would not result in an adverse impact on the levels of service for any movements at these intersections. Further these intersections are identified within the Thornton North S94 Plan works schedule for upgrading therefore the payment of S94 contributions by this development would represent its fair and reasonable contribution to any upgrading works. As such, no further analysis of these intersections would be required particularly if the assessment of the Raymond Terrace Road / Harvest Boulevard and Raymond Terrace Road / Settlers Boulevard intersections show the development has no adverse impact on the operation of these intersections.

Assessment of the capacity of the three identified key intersections has been undertaken using the Sidra 7 intersection modelling software. This software package predicts likely delays, queue lengths and the levels of service that will occur at intersections. Assessment is then based on the level of service (LoS) requirements of the RMS shown below:

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	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

Source: - RTA's Guide to Traffic Generating Developments (2002).

Assumptions made in this modelling were;

- ◆ Traffic distribution from the development is as per **Figure 3**.
- ◆ Modelling carried out for 10-year horizon period expected to cater for full development of the proposed subdivision.
- ◆ Background traffic growth assumed to be 4% per annum on Raymond Terrace Road and McFarlanes Road being representative of normal background traffic growth plus likely additional traffic generated by other developments within the Thornton North urban release area.
- ◆ Background traffic growth assumed to be 5 % per annum on Harvest Boulevard and Settlers Boulevard resulting in a doubling of traffic from the two estates in the 10-year period. This is based on the estates on completion of this development being approximately 75 % complete.
- ◆ It is likely that the Settlers Boulevard connection to McFarlanes Road will generate additional traffic from the existing traffic within the estate seeking to access Morpeth.

Therefore a 10 % per annum background traffic growth on Settlers Boulevard has been assumed in the modelling of the McFarlanes Road / Settlers Boulevard intersection to account for this.

- ◆ Given the likely future turning traffic volumes on McFarlanes Road at the new Settler's Boulevard connection a nexus would exist for the construction of a CHR/AUL rural intersection at this location and as it is expected this will be required by Council this standard intersection has been modelled.
- ◆ The Raymond Terrace Road / Settlers Boulevard, McFarlanes Road / Settler's Boulevard and the Raymond Terrace Road / Harvest Boulevard modelling includes traffic from the Waterford County Stages A, 30 – 33, 37, 61 & 62 (previously B – G) and Stages 34 – 36 & 40 – 42 (previously O'Brien's Land) developments with the models being used the models established by Intersect Traffic for the Waterford County Stages 34 – 36 & 40 – 42 subdivision (previously O'Brien's Land).
- ◆ The Raymond Terrace Road / McFarlanes Road intersection modelling includes Sophia Waters Residential Estate traffic with the model used being the model established by Intersect Traffic for the Sophia Waters Residential Estate Traffic Impact Assessment.

The results of the modelling for the intersections are summarised in **Tables 5 to 7** below. The Sidra movement summary tables are provided in **Attachment C**.

Table 5 – Sidra Results (all vehicles) – Raymond Terrace Road / Harvest Boulevard

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Level of Service	95% back of queue length (cars)
2018 AM + development	0.710	24.6	B	15.3
2018 PM + development	0.777	20.1	B	17.3
2028 AM	1.1	61.4	E	61.3
2028 PM	1	45.3	D	74.4

Table 6 – Sidra Results (all vehicles) – Raymond Terrace Road / Settlers Boulevard

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Level of Service	95% back of queue length (cars)
2018 AM + development	0.520	21.0	B	7.4
2018 PM + development	0.573	20.8	B	8.0
2028 AM	0.689	32.3	C	17.9
2028 PM	0.685	26.3	B	16.2

Table 7 – Sidra Results (all vehicles) – McFarlanes Road / Settlers Boulevard

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Level of Service	95% back of queue length (cars)
2018 AM + development	0.115	3.7	A	0.4
2018 PM + development	0.113	4.6	A	0.5
2028 AM	0.235	4.4	A	1.0
2028 PM	0.269	5.8	A	1.2

This modelling shows that all the intersections would operate satisfactorily during both the AM and PM peak periods post development and would continue to do so post development and with 10 years traffic growth to 2028. Average delays, LoS and 95% back of queue lengths all remain at acceptable levels based on the RMS assessment criteria listed above.

It is noted however that by 2028 the Raymond Terrace Road / Harvest Boulevard signalised intersection may reach its capacity for the current layout and this intersection layout may need to be reviewed at some time in the future. In reality however it is unlikely to fail before 2028 as there is spare capacity within both the Settlers Boulevard and Raymond Terrace Road accesses to

Waterford County. Therefore as the Harvest Boulevard access gets more congested, traffic will be diverted to the other two accesses and the modelled 2028 traffic volumes at the Harvest Boulevard will not eventuate.

Overall it is concluded that the subject subdivision will not have an adverse impact on the local and state road network through unacceptable intersection performance.

11.3 Vehicular Access

Vehicular access to the site will be through the existing Harvest and Waterford County residential estates via two existing signalised intersections off Raymond Terrace Road (Harvest Boulevard and Settlers Boulevard) as well as a new priority controlled CHR/AUL intersection off McFarlanes Road being an extension of Settlers Boulevard. This new intersection will be constructed as part of the Waterford County Stage 37 subdivision which will precede this development and will be subject to detail design approval by Maitland City Council.

The lots being between 480 m² and 1,345 m² with road frontages exceeding 15 metres will have sufficient room to construct an urban residential access crossing from the local road network to each individual lot. These would need to be constructed to Maitland City Council requirements. The suitability of these accesses would be assessed at development application stage for each of the individual allotments.

All lots fronting McFarlanes Road will be prohibited from having any vehicular access to McFarlanes Road with all vehicular access being via an internal subdivision road. This is consistent with Council's DCP and supported on improved road safety grounds.

11.4 Off-Street Car Parking

As a residential subdivision the development apart from the display home village does not generate any on-site parking demand. However future development of each of the allotments will generate a parking demand and on-site car parking will need to be further assessed at the development application stage for the development of each individual allotment.

Regarding the display home village Maitland City Council's DCP Section C.3 – Exhibition Homes & Villages details Council's on-site car parking requirements for the proposed home exhibition village. Specific requirements are as follows;

- ◆ *Off street car parking is to be provided to meet the parking demand generated by the exhibition home or village.*
- ◆ *All car parking areas shall be constructed with a sealed compacted granular pavement, and conform to Council's Manual of Engineering Standards.*
- ◆ *An exhibition village proposal shall provide a centralised car parking area within the village. There should be a minimum of two car parking spaces per home, provided in the centralised area. "Accessibility" parking in accordance with the Building Code of Australia and Council's car parking standards should be provided.*

A 19 space car park has recently been approved as part of the Waterford Sales Office DA18-575 which has been designed in accordance with Australian Standard AS2890.1-2004 *Parking facilities – Part 1 – off-street car parking* and can be co-used for the display village. Each individual display home will also provide parking for at least two (2) cars thereby providing a total of 59 spaces excluding on-street car parking for use by the display village staff and visitors.

Overall it is considered that the development complies with the off-street car parking requirements of both Maitland City Council and Australian Standard AS2890.1-2004 *Parking facilities – Part 1 – off-street car parking*.

11.5 Internal Road layout

The proposed internal road layout is to be constructed in accordance with Maitland City Council's Manual of Engineering Standards road types and dimensions table and general best practice for intersection control. The following has been determined;

- ♦ Traffic volumes at all internal local intersections will be below the thresholds for uninterrupted flow conditions shown in the following table (see below) sourced from *Austrroads Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2010)* for which the Guide states a detailed analysis to demonstrate adequate capacity is available is unlikely to be necessary. As such give way sign controls as proposed on the minor local road will be satisfactory and uninterrupted flow conditions will prevail.

Major road type ¹	Major road flow (vph) ²	Minor road flow (vph) ³
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Source: - *Austrroads Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings (2010)*

- ♦ Road reserve widths provided will be consistent with the requirements of the road types and dimension table within Maitland City Council's Manual of Engineering Standards (MOES) with the future Link Road to be constructed as per the requirements for a Distributor Road.
- ♦ All connections between local collector roads will be provided with suitable intersection control such as roundabouts or give way priority controlled T-intersections. In this respect at the display village access at Nighthawk Way the existing T-intersection will be modified to a cross-intersection with an urban seagull treatment for right turn movements into and out of the display village. A concept layout for this intersection treatment is provided in **Attachment A**. This will not change the current controls for the constructed section of Nighthawk Way which is left in and left out only. The seagull treatment is similar to the Settler's Boulevard / Bluestreak Way intersection approximately 160 metres north of Nighthawk Way. This treatment will allow all directional safe movements to and from the display village without impacting on the existing road network and is considered appropriate given the level of traffic generation likely from the display home village (40vtph).

Overall it is considered the proposed internal road layout will be satisfactory and compliant with Maitland City Council requirements.

12.0 PEDESTRIAN & CYCLE FACILITIES

As a residential subdivision the proposal is likely to generate additional pedestrian and bicycle traffic. Provision of pedestrian pathways / cycleways within the subdivision would provide benefit to pedestrians / cyclists and will need to be provided in accordance with Maitland City Council's subdivision standards and in accordance with Council's DCP requirements.

Further additional pedestrian pathways will be provided within the subdivision to ensure that not only is there external connectivity with external paths but internal connectivity with all lots within the subdivision is also achieved even with footpaths on one side of the road only. Overall it is concluded a suitable pedestrian and cycleway network will be provided within the subdivision allowing connection to the existing infrastructure provided within the residential estate.

13.0 PUBLIC TRANSPORT FACILITIES

The proposed development will generate some additional public transport usage particularly regarding school bus services. From a review of the plans all lots may not be within 400 metres from existing bus routes adjoining the development. However, it is anticipated that the supply of bus services will be provided to suit the demand in the new development area as residences are built and occupied as has occurred in other stages of the adjoining development. Once demand for school services is established it is envisaged that some existing bus routes may need to be changed and the internal collector road through the site (Settlers Boulevard) will become part of a future bus route loop. This would then allow all new allotments to be within 400 metres of a bus route. This would also allow Hunter Valley Buses to consider linking their Chisholm and Morpeth services to increase servicing of both areas.

The provision of shelters and seats for new and existing bus stops does not appear to be part of the Thornton North S94 developer contributions plan so it would not be expected that such facilities would be required within this subdivision until a demand for the public transport route is established. However, if required based on any advice from Transport NSW and Hunter Valley Buses appropriate conditions of consent would be agreeable.

Overall it can be concluded the proposed subdivision provides suitable infrastructure to allow a suitable public transport service to support the site.



14.0 CONCLUSIONS

This traffic impact assessment for a proposed 250 lot residential subdivision and 20 lot display village on Lot 4 in DP 1220220, Lot 2831 in DP 1238911 and Pt Lot 1 in DP 1020710, 2 Settlers Boulevard, 118 Dragonfly Drive and 239 McFarlane's Road, Chisholm has concluded:

- ◆ Existing traffic volumes on the local and state road network are within the technical mid-block capacity standards for urban roads determined by Austroads and the NSW *Roads and Maritime Services (RMS)*.
- ◆ The local and state road network is currently operating with satisfactory levels of service and acceptable delay for motorists and has capacity to cater for additional traffic associated with new development in the area.
- ◆ The proposed subdivision is likely to generate an additional 253 vtpd during the AM peak traffic period and 265 vtpd during the PM peak traffic period or 2,250 vtpd.
- ◆ The local and state road network has sufficient spare capacity to cater for the development traffic generated by this development and other developments in the area without adversely impacting on the levels of service experienced by motorists on the road network through to at least 2028.
- ◆ SIDRA modelling of the Raymond Terrace Road / Harvest Boulevard signalised intersection, the Raymond Terrace Road / Settlers Boulevard signalised intersection and the proposed McFarlanes Road / Settlers Boulevard priority controlled T-intersection has shown that with the additional traffic from the proposed subdivision and other future developments in the area included, these intersections will operate with satisfactory levels of service at least until 2028.
- ◆ By 2028 the Raymond Terrace Road / Harvest Boulevard signalised intersection may reach its capacity for the current layout and this intersection layout may need to be reviewed at some time in the future. In reality however it is unlikely to fail before 2028 as there is spare capacity within both the Settlers Boulevard and Raymond Terrace Road accesses to Waterford County and as the Harvest Boulevard access gets more congested, traffic will be diverted to the other two accesses.
- ◆ The proposed lots are of suitable size to ensure an urban residential access crossing from the local road network to each individual lot. These would need to be constructed to Maitland City Council requirements. The suitability of these accesses would be assessed at development application stage for each of the individual allotments.
- ◆ That future development of the new allotments would be able to accommodate the required on-site car parking and the development will not generate an unacceptable on-street car parking demand that would adversely impact on the local road network.
- ◆ The development complies with the off-street car parking requirements of both Maitland City Council and Australian Standard *AS2890.1-2004 Parking facilities – Part 1 – off-street car parking*.
- ◆ The proposed internal road layout is satisfactory and compliant with Maitland City Council Manual of Engineering Standards noting that the display village access will be constructed as an urban seagull treatment opposite Nighthawk Way in a similar layout to the existing Settlers Boulevard / Bluestreak Way intersection.
- ◆ A suitable pedestrian and cycleway network will be provided within the subdivision allowing connection to the existing infrastructure provided within both residential estates.
- ◆ The proposed development will generate additional public transport usage particularly regarding school bus services. Therefore, in the future, once demand for school services is established, it is envisaged that the existing bus routes in the area may need to be changed and it is likely the internal collector road (Settlers Boulevard) will become part of a future bus route loop. Suitable reserve width has been provided to accommodate a bus route along this route which would allow all new allotments to be within 400 metres of a bus route. Therefore, the proposed subdivision provides suitable infrastructure to allow a suitable public transport service to support the site.

15.0 RECOMMENDATION

Having carried out this traffic impact assessment for the proposed 250 lot residential subdivision and 20 lot display village on Lot 4 in DP 1220220, Lot 2831 in DP 1238911 and Pt Lot 1 in DP 1020710, 2 Settlers Boulevard, 118 Dragonfly Drive and 239 McFarlane's Road, Chisholm it is recommended that the proposal can be supported from a traffic perspective as it will not adversely impact on the local and state road network and complies with all relevant Maitland City Council, Australian Standard and NSW Roads and Maritime Services requirements.

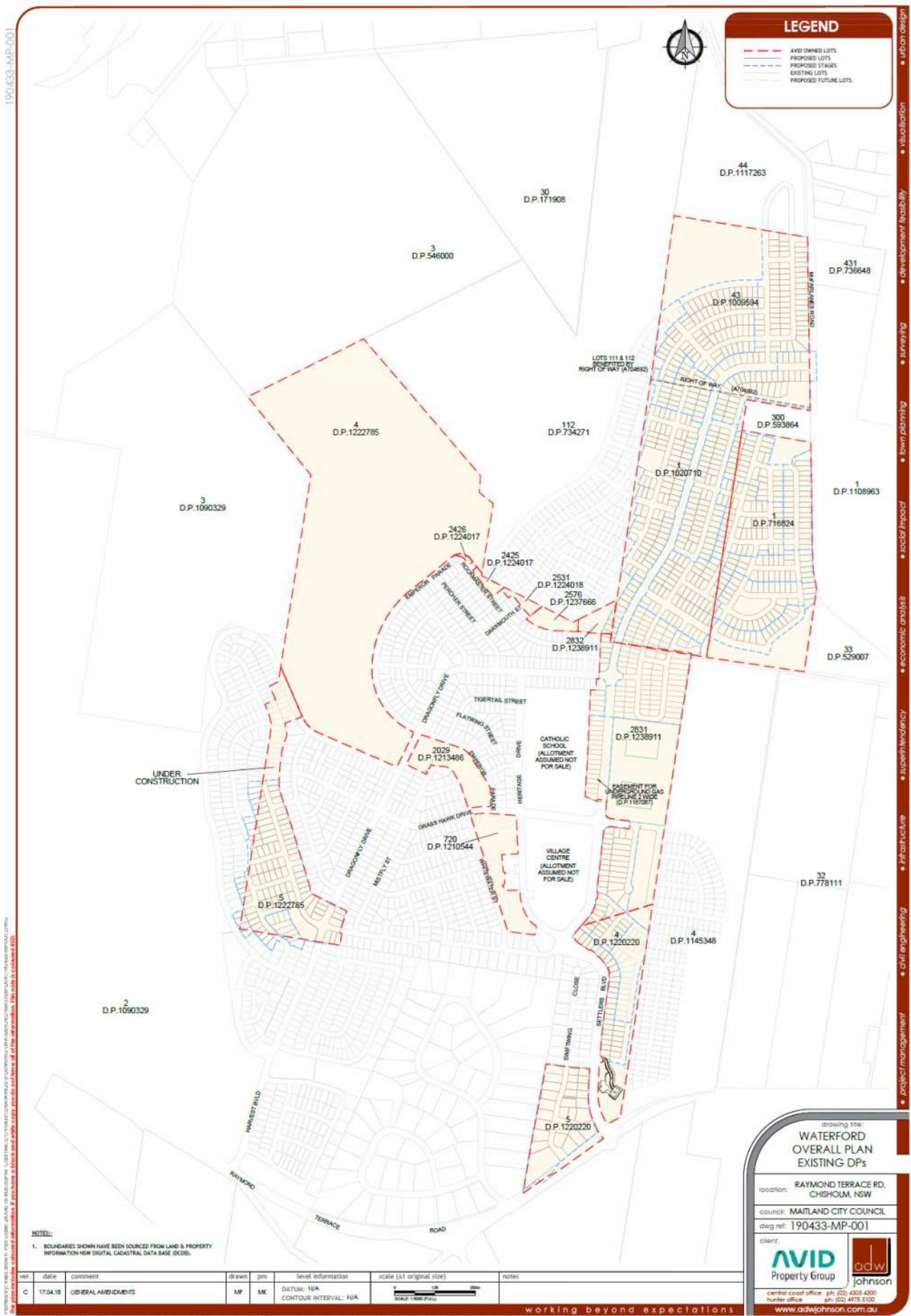


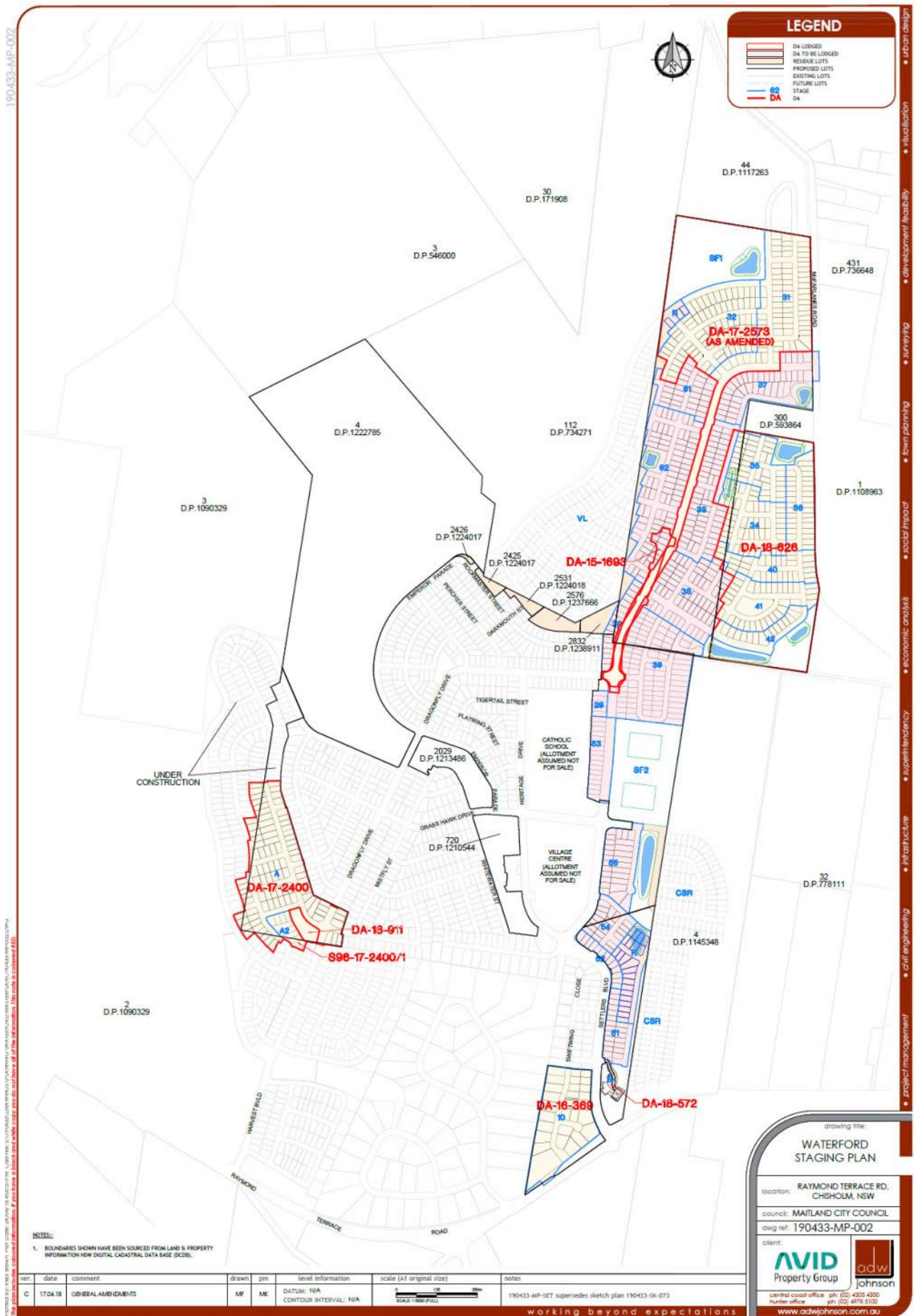
JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

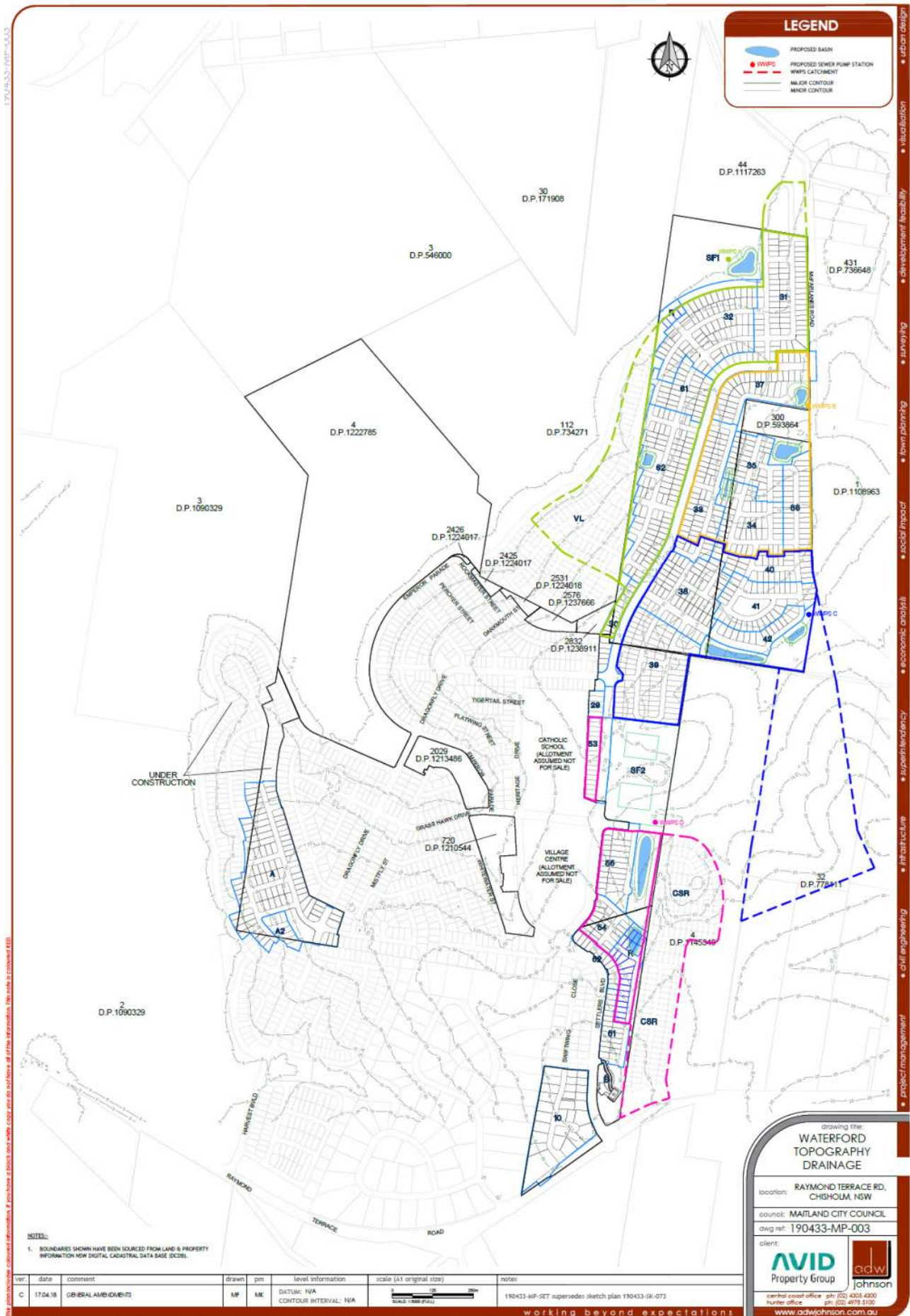


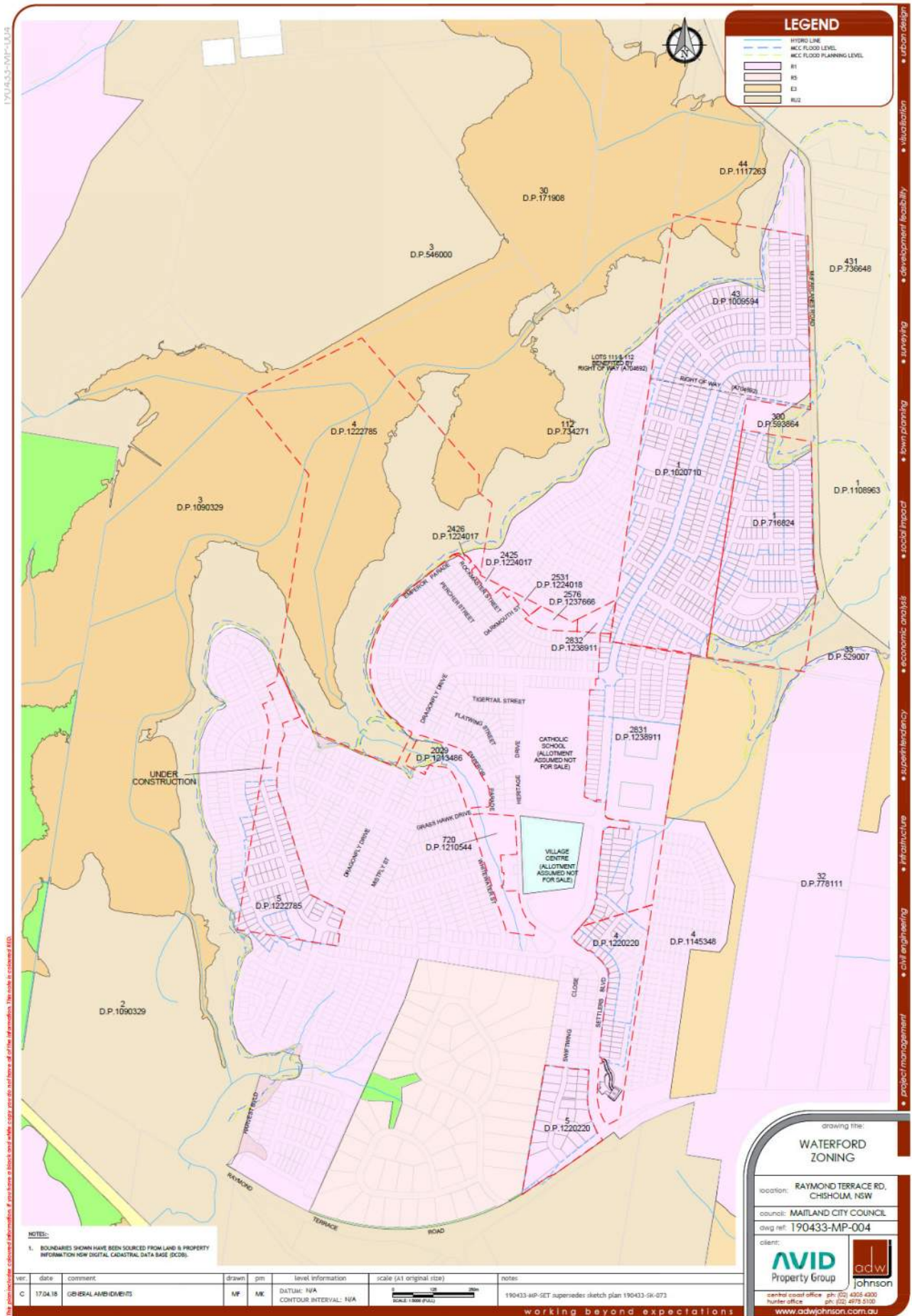
ATTACHMENT A

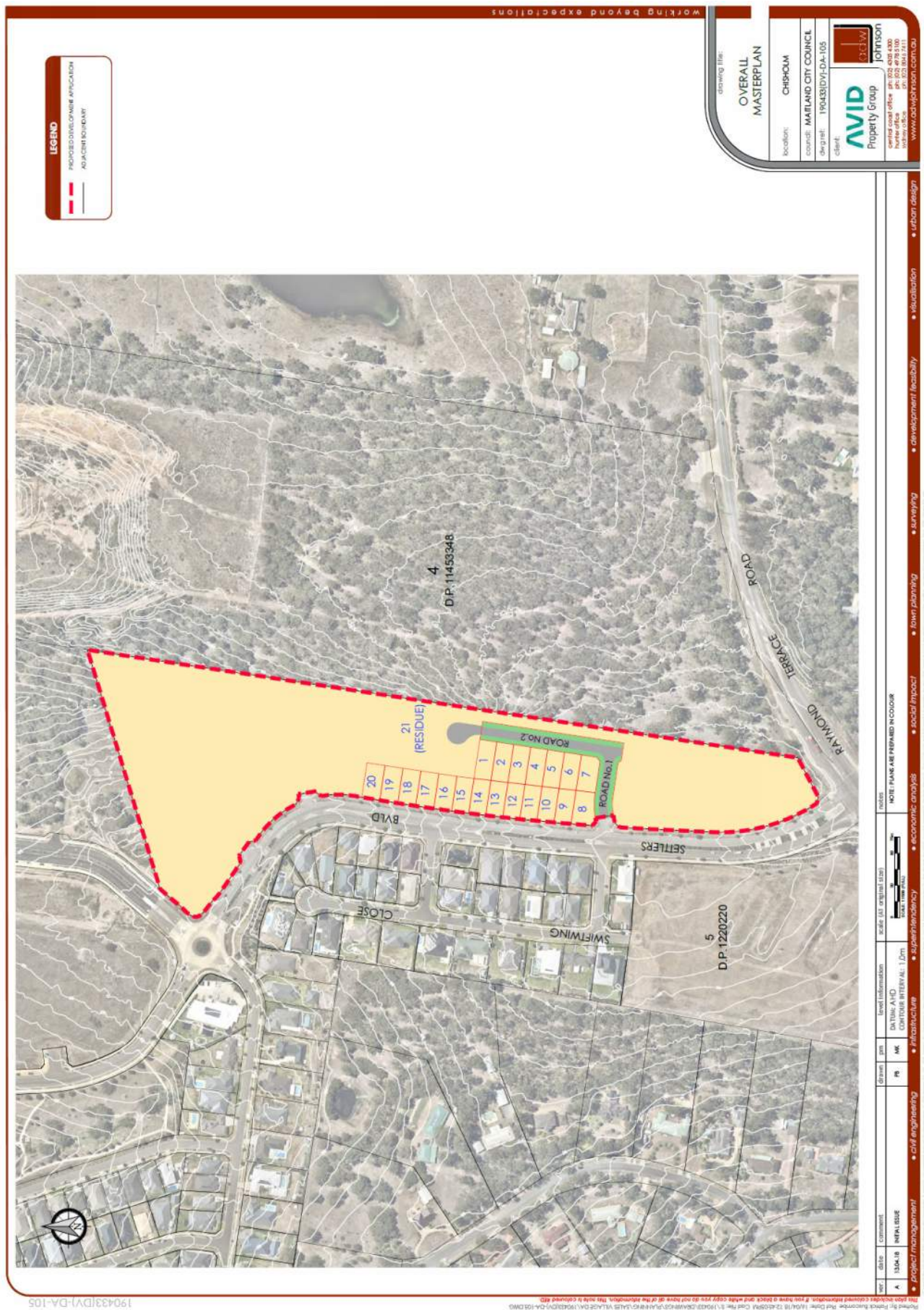
Subdivision Plan

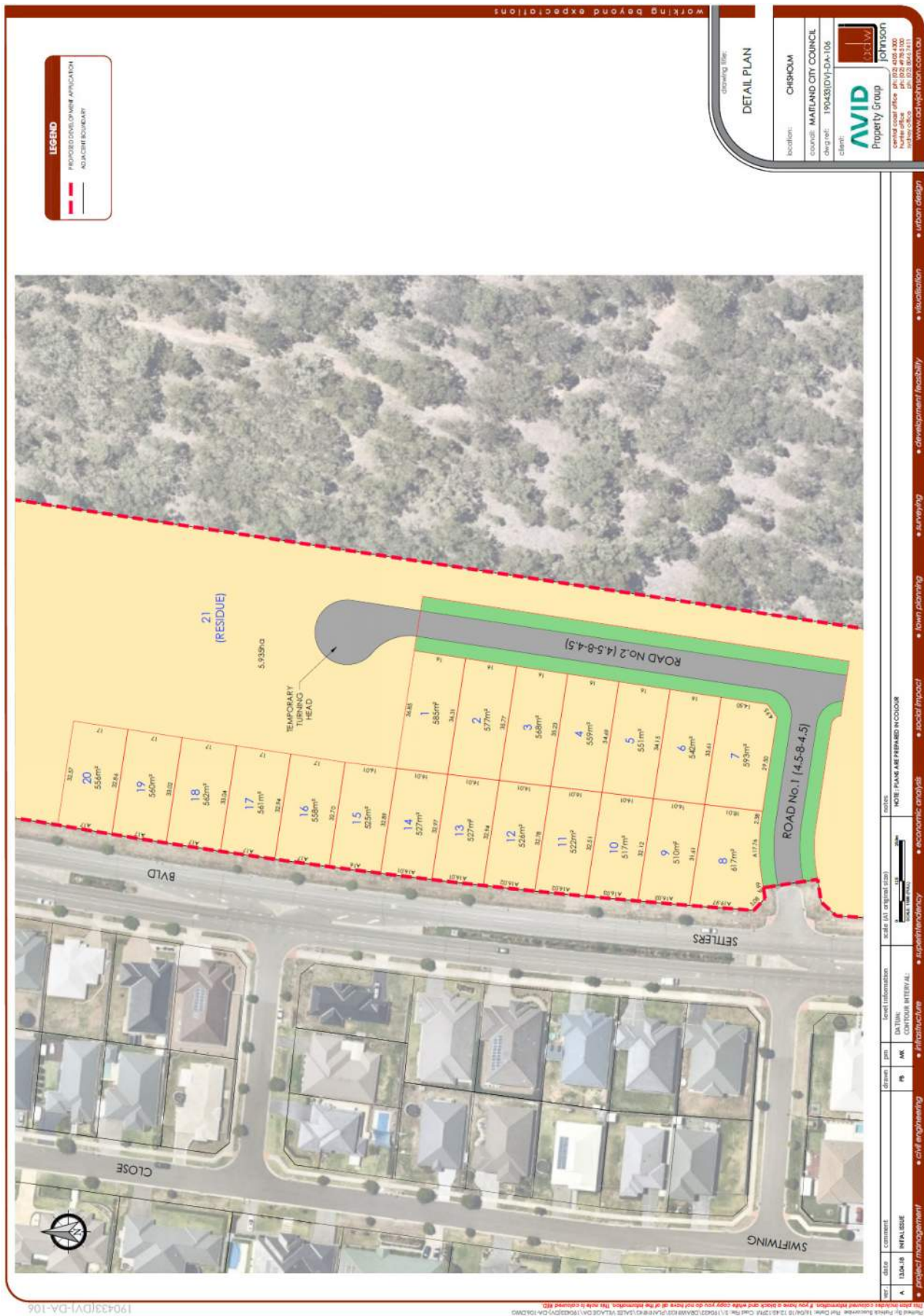














CONCEPT PLAN
SCALE 1:250

drawing title:
SALES VILLAGE
CONCEPT
INTERSECTION
ARRANGEMENT

SETTLERS BOULEVARD
CHESHOLM

ATLANTA CITY COURT

5

at office. ph: (02) 4305 4121
ph: (02) 49 78 5111
ph: (02) 8046 7444

odwjohnson.com

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ATTACHMENT B

Traffic Count Data

11/10/2017 - RAYMOND TCE RD / HARVEST BLVD, CHISHOLM

9:00 <<< HOUR ENDING

Wednesday

Summary:

RAYMOND TCE RD / HARVEST BLVD

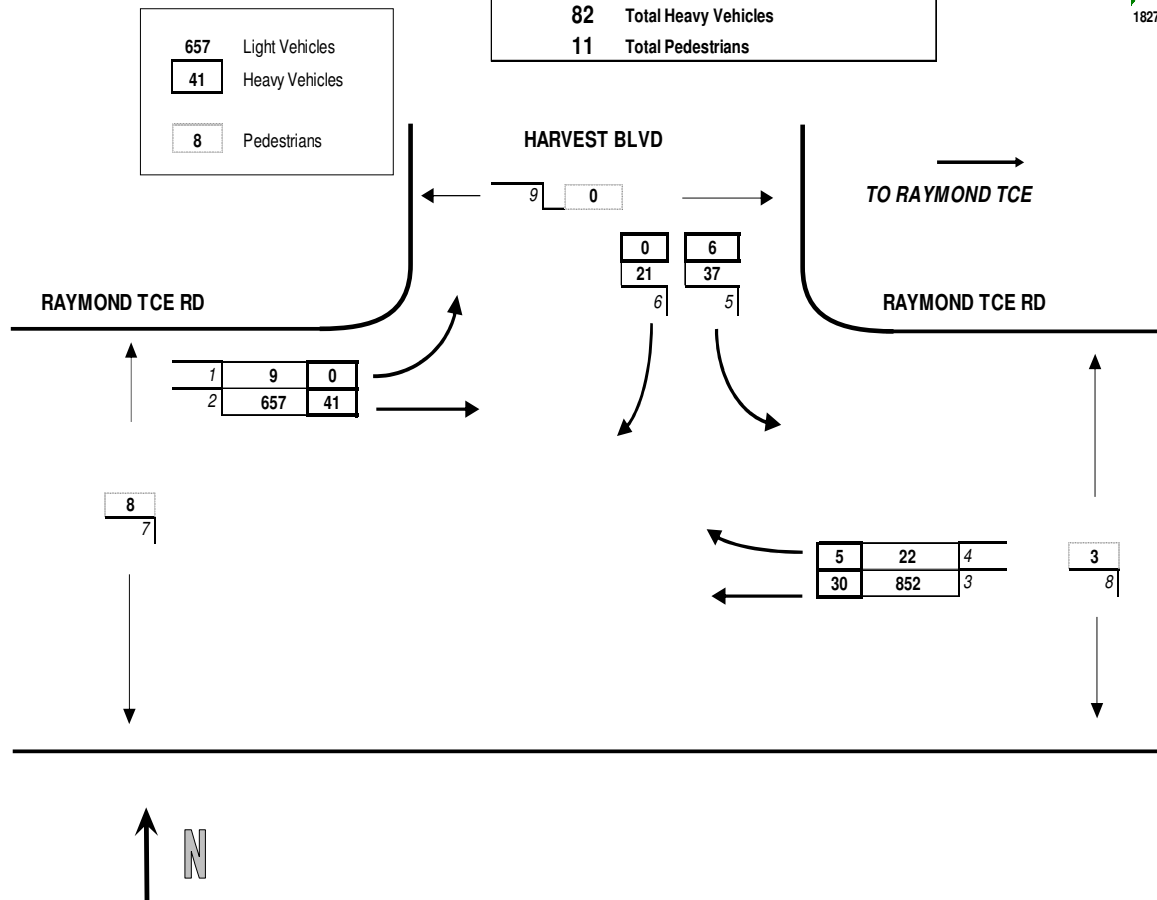
1598 Total Light Vehicles

82 Total Heavy Vehicles

11 Total Pedestrians



Quality Surveys
182726



10/10/2017 - RAYMOND TCE RD / HARVEST BLVD, CHISHOLM

17:45 <<< HOUR ENDING

Tuesday

Summary:

RAYMOND TCE RD / HARVEST BLVD

1695 Total Light Vehicles

29 Total Heavy Vehicles

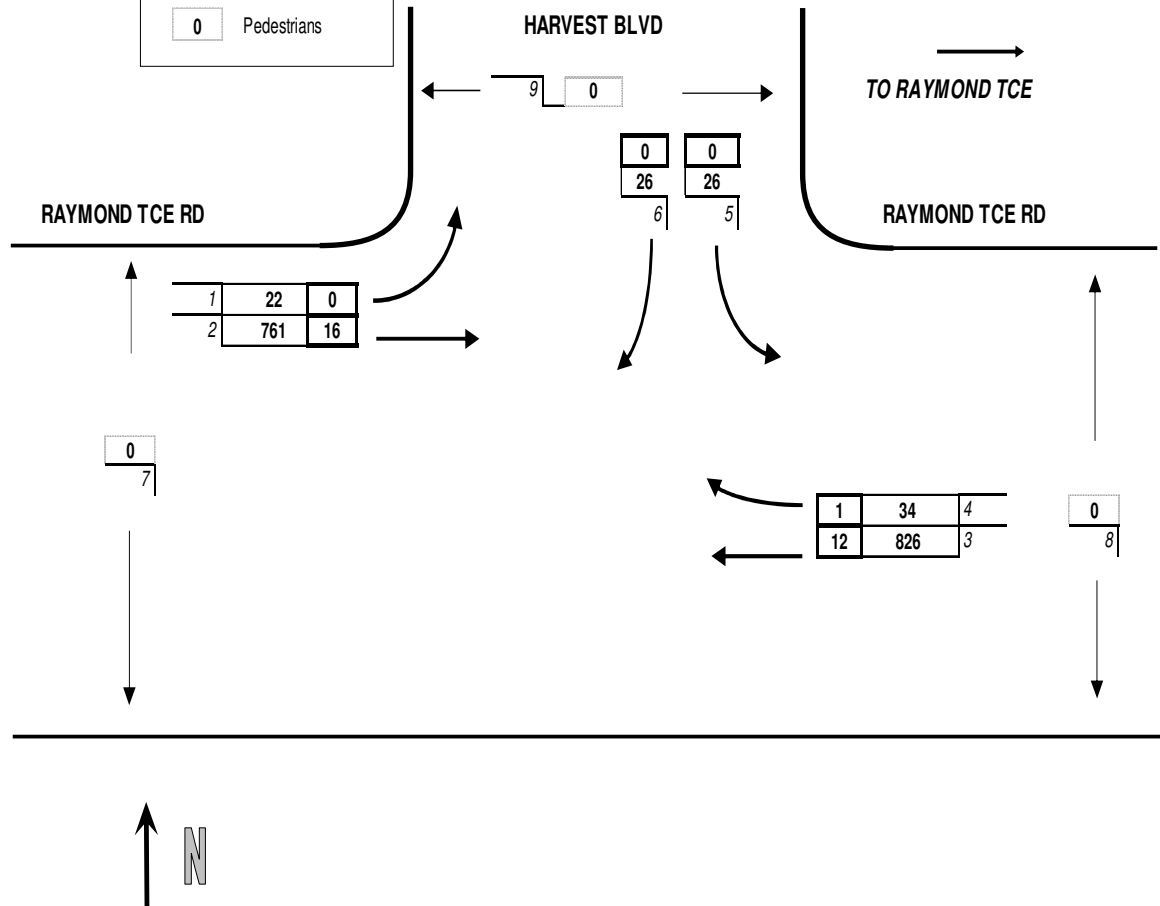
0 Total Pedestrians



Quality Surveys

182726

761	Light Vehicles
16	Heavy Vehicles
0	Pedestrians



11/10/2017 - RAYMOND TCE RD / SETTLERS BLVD, CHISHOLM

9:00 <<< HOUR ENDING

Wednesday

Summary:

RAYMOND TCE RD / SETTLERS BLVD

1405 Total Light Vehicles

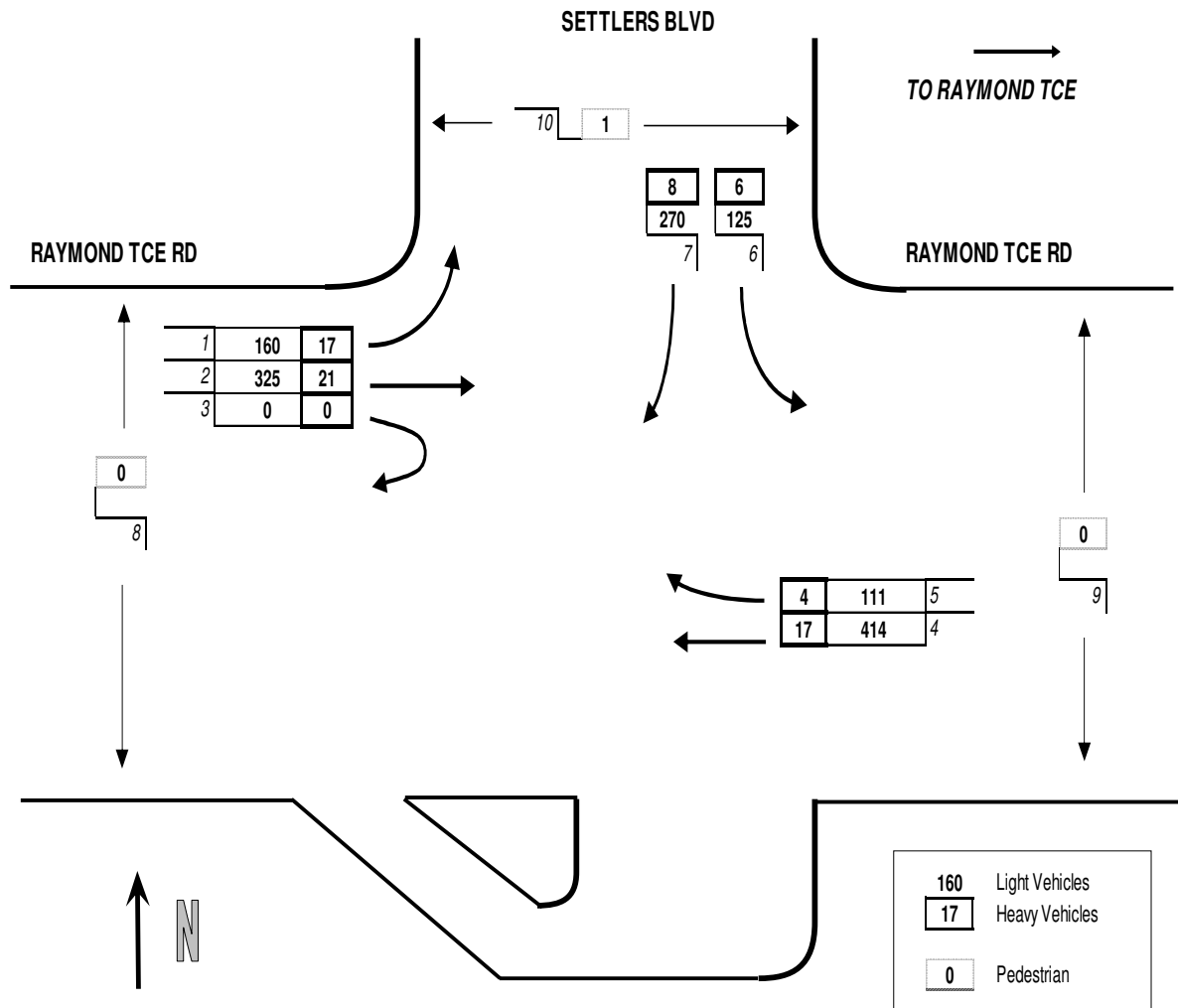
73 Total Heavy Vehicles

1 Total Pedestrians



Quality Surveys

182726



10/10/2017 - RAYMOND TCE RD / SETTLERS BLVD, CHISHOLM

17:45 <<< HOUR ENDING

Tuesday

Summary:

RAYMOND TCE RD / SETTLERS BLVD

1332 Total Light Vehicles

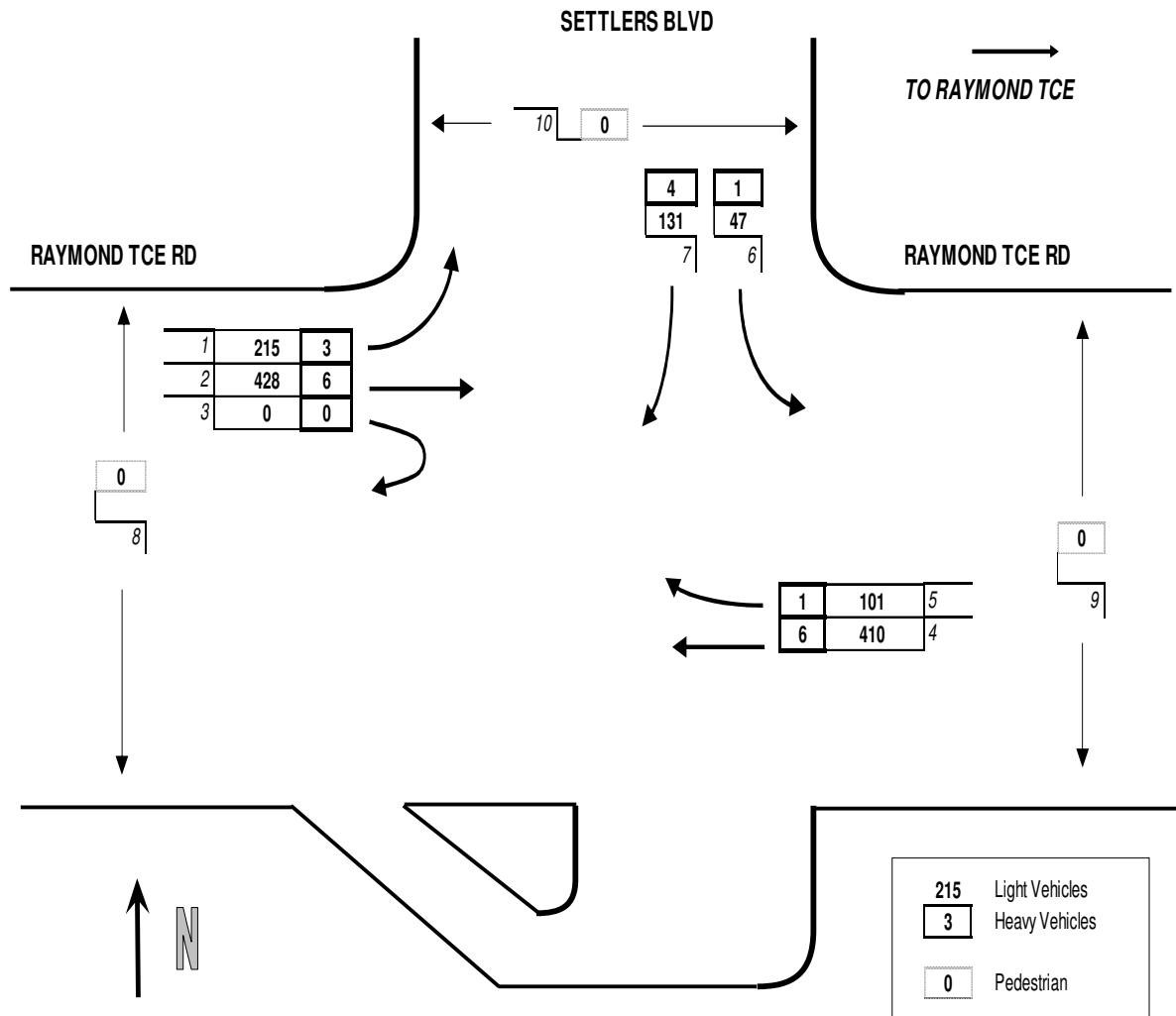
21 Total Heavy Vehicles

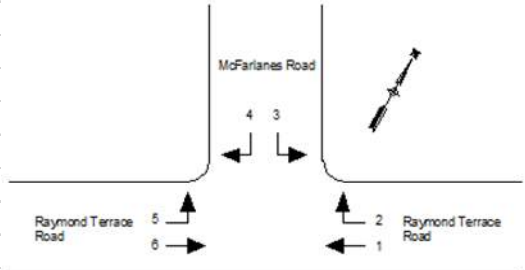
0 Total Pedestrians



Quality Surveys

182726



Date	11th December 2014		Intersect traffic			
Day	Thursday					
Time	8:00am - 9:00am					
Weather	Wet					
Conducted by:	Jeff					
MOVEMENT	1	2	3	4	5	6
8:00 - 8:15	85	2	10	13	4	65
8:15 - 8:30	79	4	8	22	7	75
8:30 - 8:45	92	5	6	11	5	78
8:45 - 9:00	115	3	6	10	7	60
SUM	371	14	30	56	23	278
PEAK	371	14	30	56	23	278
Leg	PHT (vph)					
Raymond Terrace Road East	693					
Raymond Terrace Road West	728					
McFarlanes Road	123					

Date	11th December 2014					
Day	Thursday					
Time	4:30pm - 5:30pm					
Weather	Overcast					
Conducted by:	Jeff					
MOVEMENT	1	2	3	4	5	6
4:30 - 4:45	88	3	4	7	9	101
4:45 - 5:00	74	7	8	6	19	79
5:00 - 5:15	97	1	3	8	17	102
5:15 - 5:30	94	4	4	8	13	91
SUM	353	15	19	29	58	373
PEAK	353	15	19	29	58	373
Leg	PHT (vph)					
Raymond Terrace Road East	760					
Raymond Terrace Road West	813					
McFarlanes Road	121					
</						

ATTACHMENT C

SIDRA Movement Summary Tables

MOVEMENT SUMMARY

 **Site: 101 [2018AM + development]**

Raymond Terrace Road / Harvest Boulevard signals

Signals - Actuated Isolated Cycle Time = 74 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	857	3.5	0.616	21.9	LOS B	12.8	92.6	0.85	0.74	54.1
6	R2	92	5.4	0.381	41.2	LOS C	3.2	23.4	0.93	0.77	36.1
Approach		949	3.7	0.616	23.7	LOS B	12.8	92.6	0.86	0.74	51.6
North: Harvest Boulevard											
7	L2	144	4.2	0.311	29.9	LOS C	4.3	31.1	0.83	0.76	38.9
9	R2	259	0.0	0.543	31.8	LOS C	8.3	58.0	0.89	0.81	38.5
Approach		403	1.5	0.543	31.2	LOS C	8.3	58.0	0.87	0.79	38.6
West: Raymond Terrace Road											
10	L2	97	0.0	0.418	26.1	LOS B	8.0	57.6	0.77	0.70	44.8
11	T1	685	6.0	0.710	21.9	LOS B	15.3	112.6	0.86	0.76	53.5
Approach		782	5.2	0.710	22.4	LOS B	15.3	112.6	0.85	0.75	52.3
All Vehicles		2134	3.8	0.710	24.6	LOS B	15.3	112.6	0.86	0.76	48.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P2	East Full Crossing	3	31.2	LOS D	0.0	0.0	0.92	0.92	
P3	North Full Crossing	1	21.2	LOS C	0.0	0.0	0.76	0.76	
P4	West Full Crossing	8	17.6	LOS B	0.0	0.0	0.69	0.69	
All Pedestrians		12	21.3	LOS C			0.75	0.75	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: INTERSECT TRAFFIC PTY LTD | Processed: 19 April 2018 16:05:54

Project: C:\Work Documents\Project Files\2018\18.016 - Waterford Stages H - K\Sidra\Harvest Boulevard\Harvest.sip7

MOVEMENT SUMMARY

Site: 101 [2018PM + development]

Raymond Terrace Road / Harvest Boulevard signals

Signals - Actuated Isolated Cycle Time = 66 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	842	1.4	0.533	16.7	LOS B	10.4	73.5	0.79	0.68	58.5
6	R2	118	0.8	0.384	35.5	LOS C	3.5	25.0	0.91	0.78	38.3
Approach		960	1.4	0.533	19.0	LOS B	10.4	73.5	0.80	0.69	55.0
North: Harvest Boulevard											
7	L2	67	0.0	0.238	33.2	LOS C	2.0	13.9	0.89	0.74	38.1
9	R2	107	0.0	0.380	34.0	LOS C	3.3	22.8	0.92	0.76	37.6
Approach		174	0.0	0.380	33.7	LOS C	3.3	22.8	0.91	0.75	37.8
West: Raymond Terrace Road											
10	L2	238	0.0	0.457	21.0	LOS B	8.7	61.6	0.72	0.73	46.7
11	T1	764	2.1	0.777	18.2	LOS B	17.3	123.5	0.87	0.79	56.4
Approach		1002	1.6	0.777	18.9	LOS B	17.3	123.5	0.84	0.78	53.8
All Vehicles		2136	1.4	0.777	20.1	LOS B	17.3	123.5	0.83	0.74	52.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P2	East Full Crossing	1	27.3	LOS C	0.0	0.0	0.91	0.91	
P3	North Full Crossing	1	17.5	LOS B	0.0	0.0	0.73	0.73	
P4	West Full Crossing	1	19.7	LOS B	0.0	0.0	0.77	0.77	
All Pedestrians		3	21.5	LOS C			0.80	0.80	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028AM]

Raymond Terrace Road / Harvest Boulevard signals

Signals - Actuated Isolated Cycle Time = 102 seconds (Practical Cycle Time)

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	1200	3.5	0.746	27.9	LOS B	25.2	181.4	0.89	0.79	49.7
6	R2	138	5.4	0.437	49.9	LOS D ¹¹	6.3	46.0	0.91	0.79	33.3
Approach		1338	3.7	0.746	30.1	LOS C	25.2	181.4	0.89	0.79	47.2
North: Harvest Boulevard											
7	L2	216	4.2	0.531	44.1	LOS D ¹¹	9.6	69.8	0.91	0.80	33.8
9	R2	461	0.0	1.100	236.8	LOS F ¹¹	61.3	429.3	1.00	1.68	12.0
Approach		677	1.3	1.100	175.3	LOS F ¹¹	61.3	429.3	0.97	1.40	15.1
West: Raymond Terrace Road											
10	L2	146	0.0	0.513	29.9	LOS C	14.8	107.4	0.76	0.72	42.8
11	T1	959	6.0	0.872	29.4	LOS C	32.6	239.7	0.91	0.84	48.2
Approach		1105	5.2	0.872	29.5	LOS C	32.6	239.7	0.89	0.83	47.4
All Vehicles		3119	3.7	1.100	61.4	LOS E ¹¹	61.3	429.3	0.91	0.94	32.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	4	43.3	LOS E ¹²	0.0	0.0	0.92	0.92
P3	North Full Crossing	1	22.7	LOS C	0.0	0.0	0.67	0.67
P4	West Full Crossing	10	22.0	LOS C	0.0	0.0	0.66	0.66
All Pedestrians		14	27.4	LOS C			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

¹² Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

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MOVEMENT SUMMARY

Site: 101 [2028PM]

Raymond Terrace Road / Harvest Boulevard signals

Signals - Actuated Isolated Cycle Time = 109 seconds (Practical Cycle Time)

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	1179	1.4	0.665	25.6	LOS B	24.2	171.7	0.82	0.73	51.3
6	R2	177	0.8	0.523	52.8	LOS D ¹¹	8.7	61.2	0.93	0.81	32.4
Approach		1356	1.3	0.665	29.1	LOS C	24.2	171.7	0.83	0.74	47.6
North: Harvest Boulevard											
7	L2	101	0.0	0.281	47.0	LOS D ¹¹	4.6	32.4	0.87	0.76	33.3
9	R2	161	0.0	0.449	48.7	LOS D ¹¹	7.7	53.7	0.91	0.79	32.7
Approach		261	0.0	0.449	48.1	LOS D ¹¹	7.7	53.7	0.89	0.78	32.9
West: Raymond Terrace Road											
10	L2	357	0.0	0.589	28.7	LOS C	20.4	144.0	0.75	0.78	42.4
11	T1	1070	2.1	1.000	70.8	LOS F ¹¹	74.4	530.0	0.96	1.20	31.1
Approach		1427	1.6	1.000	60.3	LOS E ¹¹	74.4	530.0	0.90	1.09	33.3
All Vehicles		3043	1.3	1.000	45.3	LOS D ¹¹	74.4	530.0	0.87	0.91	38.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	48.7	LOS E ¹²	0.0	0.0	0.95	0.95
P3	North Full Crossing	1	21.2	LOS C	0.0	0.0	0.62	0.62
P4	West Full Crossing	1	25.1	LOS C	0.0	0.0	0.68	0.68
All Pedestrians		4	31.7	LOS D			0.75	0.75

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

¹² Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

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MOVEMENT SUMMARY

Site: 101 [2018AM + development]

Raymond Terrace Road / Settlers Boulevard signals

Signals - Actuated Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	492	3.5	0.460	19.4	LOS B	6.4	46.4	0.83	0.69	56.2
6	R2	111	3.6	0.409	34.2	LOS C	3.1	22.5	0.92	0.77	38.8
Approach		603	3.5	0.460	22.1	LOS B	6.4	46.4	0.85	0.71	51.9
North: Settlers Boulevard											
7	L2	213	2.8	0.440	21.0	LOS B	6.3	45.5	0.78	0.77	43.2
9	R2	291	2.7	0.491	25.5	LOS B	6.3	45.5	0.86	0.78	41.2
Approach		504	2.8	0.491	23.6	LOS B	6.3	45.5	0.83	0.78	42.0
West: Raymond Terrace Road											
10	L2	147	11.6	0.132	11.6	LOS A	1.6	12.6	0.39	0.71	51.0
11	T1	423	5.0	0.520	19.4	LOS B	7.4	53.7	0.83	0.69	56.2
12u	U	1	0.0	0.005	32.3	LOS C	0.0	0.2	0.85	0.61	44.8
Approach		571	6.7	0.520	17.4	LOS B	7.4	53.7	0.72	0.69	54.7
All Vehicles		1678	4.4	0.520	21.0	LOS B	7.4	53.7	0.80	0.72	49.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back Pedestrian ped	of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	24.3	LOS C	0.0	0.0	0.90	0.90
P3	North Full Crossing	1	24.3	LOS C	0.0	0.0	0.90	0.90
P4	West Full Crossing	1	24.3	LOS C	0.0	0.0	0.90	0.90
All Pedestrians		3	24.3	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2018PM + development]

Raymond Terrace Road / Settlers Boulevard signals

Signals - Actuated Isolated Cycle Time = 57 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	485	1.2	0.450	18.5	LOS B	6.0	42.6	0.83	0.69	57.0
6	R2	245	0.4	0.503	27.6	LOS B	6.0	42.2	0.88	0.81	41.7
Approach		730	1.0	0.503	21.5	LOS B	6.0	42.6	0.84	0.73	50.8
North: Settlers Boulevard											
7	L2	79	1.3	0.332	27.7	LOS B	3.0	21.0	0.88	0.76	40.2
9	R2	121	3.3	0.371	30.5	LOS C	3.0	21.0	0.92	0.75	39.0
Approach		200	2.5	0.371	29.4	LOS C	3.0	21.0	0.90	0.75	39.4
West: Raymond Terrace Road											
10	L2	243	1.2	0.251	15.3	LOS B	3.7	26.3	0.56	0.75	48.6
11	T1	475	1.3	0.573	18.9	LOS B	8.0	56.9	0.85	0.71	56.6
12u	U	1	0.0	0.003	25.0	LOS B	0.0	0.1	0.74	0.63	49.2
Approach		719	1.3	0.573	17.7	LOS B	8.0	56.9	0.75	0.72	53.6
All Vehicles		1649	1.3	0.573	20.8	LOS B	8.0	56.9	0.81	0.73	50.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	22.8	LOS C	0.0	0.0	0.89	0.89
P3	North Full Crossing	1	22.8	LOS C	0.0	0.0	0.89	0.89
P4	West Full Crossing	1	22.8	LOS C	0.0	0.0	0.89	0.89
All Pedestrians		3	22.8	LOS C			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028AM]

Raymond Terrace Road / Settlers Boulevard signals

Signals - Actuated Isolated Cycle Time = 101 seconds (Practical Cycle Time)

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	689	3.5	0.610	32.4	LOS C	15.5	111.5	0.87	0.75	46.8
6	R2	191	3.1	0.530	48.4	LOS D ¹¹	8.6	61.8	0.92	0.81	33.7
Approach		879	3.4	0.610	35.9	LOS C	15.5	111.5	0.88	0.76	43.2
North: Settlers Boulevard											
7	L2	416	2.2	0.602	29.0	LOS C	17.9	127.9	0.80	0.81	39.6
9	R2	437	2.7	0.671	37.7	LOS C	17.9	127.9	0.89	0.83	36.3
Approach		852	2.5	0.671	33.4	LOS C	17.9	127.9	0.85	0.82	37.8
West: Raymond Terrace Road											
10	L2	221	11.6	0.188	13.5	LOS A	3.9	29.8	0.38	0.71	49.7
11	T1	592	5.0	0.689	32.5	LOS C	17.9	130.5	0.87	0.75	46.8
12u	U	1	0.0	0.004	43.5	LOS D ¹¹	0.0	0.3	0.80	0.63	39.4
Approach		814	6.7	0.689	27.4	LOS B	17.9	130.5	0.74	0.74	47.5
All Vehicles		2545	4.2	0.689	32.3	LOS C	17.9	130.5	0.82	0.77	42.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	35.8	LOS D	0.0	0.0	0.84	0.84
P3	North Full Crossing	1	32.5	LOS D	0.0	0.0	0.80	0.80
P4	West Full Crossing	1	37.5	LOS D	0.0	0.0	0.86	0.86
All Pedestrians		4	35.2	LOS D			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

 **Site: 101 [2028PM]**

Raymond Terrace Road / Settlers Boulevard signals

Signals - Actuated Isolated Cycle Time = 83 seconds (Practical Cycle Time)

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Raymond Terrace Road											
5	T1	679	1.2	0.537	24.1	LOS B	11.9	84.1	0.82	0.70	52.4
6	R2	299	0.5	0.669	39.7	LOS C	11.2	78.9	0.94	0.83	36.7
Approach		978	1.0	0.669	28.8	LOS C	11.9	84.1	0.86	0.74	46.4
North: Settlers Boulevard											
7	L2	192	0.8	0.377	29.1	LOS C	7.2	50.7	0.80	0.77	39.7
9	R2	182	3.3	0.420	36.6	LOS C	7.2	50.7	0.88	0.78	36.6
Approach		374	2.0	0.420	32.7	LOS C	7.2	50.7	0.84	0.78	38.1
West: Raymond Terrace Road											
10	L2	365	1.2	0.322	15.5	LOS B	7.0	49.7	0.50	0.75	48.5
11	T1	665	1.3	0.685	24.9	LOS B	16.2	114.7	0.85	0.73	51.8
12u	U	1	0.0	0.004	34.1	LOS C	0.0	0.3	0.76	0.64	43.9
Approach		1031	1.3	0.685	21.6	LOS B	16.2	114.7	0.73	0.74	50.6
All Vehicles		2382	1.3	0.685	26.3	LOS B	16.2	114.7	0.80	0.75	46.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	1	35.7	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	1	26.2	LOS C	0.0	0.0	0.80	0.80
P4	West Full Crossing	1	35.7	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		4	32.6	LOS D			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

▽ Site: 101 [AM 2018 + dev]

McFarlanes Road / Settlers Boulevard T intersection
CHR/AUL
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: McFarlanes Road south											
1	L2	19	5.0	0.011	7.0	LOS A	0.0	0.0	0.00	0.63	63.7
2	T1	44	5.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		63	5.0	0.023	2.1	NA	0.0	0.0	0.00	0.19	74.3
North: McFarlanes Road north											
8	T1	101	5.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R2	36	5.0	0.027	7.1	LOS A	0.1	0.8	0.16	0.59	53.9
Approach		137	5.0	0.053	1.9	NA	0.1	0.8	0.04	0.16	71.0
West: Settlers Boulevard											
10	L2	144	5.0	0.115	4.8	LOS A	0.4	3.2	0.13	0.50	52.6
12	R2	82	5.0	0.098	6.0	LOS A	0.4	2.9	0.35	0.58	51.8
Approach		226	5.0	0.115	5.2	LOS A	0.4	3.2	0.21	0.53	52.3
All Vehicles		426	5.0	0.115	3.7	NA	0.4	3.2	0.12	0.36	60.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [PM 2018 + dev]

McFarlanes Road / Settlers Boulevard T
CHR/AUL
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		veh	m		per veh	km/h
South: McFarlanes Road south											
1	L2	77	5.0	0.043	7.0	LOS A	0.0	0.0	0.00	0.63	63.7
2	T1	85	5.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		162	5.0	0.045	3.3	NA	0.0	0.0	0.00	0.30	71.3
North: McFarlanes Road north											
8	T1	56	5.0	0.030	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R2	135	5.0	0.113	7.6	LOS A	0.5	3.4	0.29	0.61	53.5
Approach		191	5.0	0.113	5.4	NA	0.5	3.4	0.20	0.43	59.2
West: Settlers Boulevard											
10	L2	35	5.0	0.029	4.9	LOS A	0.1	0.8	0.18	0.50	52.5
12	R2	18	5.0	0.026	6.9	LOS A	0.1	0.7	0.43	0.60	51.2
Approach		53	5.0	0.029	5.6	LOS A	0.1	0.8	0.26	0.54	52.0
All Vehicles		406	5.0	0.113	4.6	NA	0.5	3.4	0.13	0.39	62.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [AM 2028 + dev]

McFarlanes Road / Settlers Boulevard T intersection
CHR/AUL
Giveaway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: McFarlanes Road south											
1	L2	38	5.0	0.021	7.0	LOS A	0.0	0.0	0.00	0.63	63.7
2	T1	62	5.0	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		100	5.0	0.033	2.7	NA	0.0	0.0	0.00	0.24	72.9
North: McFarlanes Road north											
8	T1	141	5.0	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R2	72	5.0	0.056	7.3	LOS A	0.2	1.7	0.21	0.59	53.7
Approach		213	5.0	0.075	2.5	NA	0.2	1.7	0.07	0.20	68.7
West: Settlers Boulevard											
10	L2	288	5.0	0.235	4.9	LOS A	1.0	7.4	0.18	0.51	52.5
12	R2	164	5.0	0.226	7.3	LOS A	1.0	7.1	0.48	0.68	50.9
Approach		452	5.0	0.235	5.8	LOS A	1.0	7.4	0.29	0.57	51.9
All Vehicles		765	5.0	0.235	4.4	NA	1.0	7.4	0.19	0.42	58.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [PM 2028 + dev]

McFarlanes Road / Settlers Boulevard T intersection
 CHR?AUL
 Giveway / Yield (Two-Way)
 Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: McFarlanes Road south											
1	L2	204	5.0	0.114	7.0	LOS A	0.0	0.0	0.00	0.63	63.7
2	T1	119	5.0	0.063	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		323	5.0	0.114	4.5	NA	0.0	0.0	0.00	0.40	68.9
North: McFarlanes Road north											
8	T1	78	5.0	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
9	R2	270	5.0	0.269	8.7	LOS A	1.2	8.9	0.47	0.71	52.9
Approach		348	5.0	0.269	6.8	NA	1.2	8.9	0.36	0.55	57.3
West: Settlers Boulevard											
10	L2	70	5.0	0.060	5.1	LOS A	0.2	1.6	0.22	0.52	52.4
12	R2	36	5.0	0.075	10.2	LOS A	0.3	2.0	0.58	0.77	49.0
Approach		106	5.0	0.075	6.8	LOS A	0.3	2.0	0.34	0.60	51.2
All Vehicles		777	5.0	0.269	5.8	NA	1.2	8.9	0.21	0.50	60.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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