Transport Impact Assessment

Residential Subdivision 830 Leakes Road, Tarneit North

CG130911

Prepared for
Peet Limited

19 December 2013

Cardno
Shaping the Future

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Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
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1 Introduction

1.1 Background

A planning permit is currently being sought for a proposed residential subdivision to be located at 830 Leakes Road in Tarneit North under a Section 96a Application. The proposed development incorporates 303 lots accessed via Leakes Road.

The Metropolitan Planning Authority (MPA), formally known as the Growth Areas Authority (GAA), is currently in the pre-planning stage of preparing the Tarneit North Precinct Structure Plan (PSP) for the area, which will be incorporated as an Amendment to the Wyndham Planning Scheme. The proposed development is located within the draft Tarneit North PSP area.

Cardno was engaged by Peet Limited in December 2013 to undertake a traffic and transport assessment of the proposed development.

1.2 References

In preparing this report, reference has been made to the following:

> Wyndham Planning Scheme;

> Wyndham North Precinct Structure Plans Background report, prepared by GAA, dated June 2013;

> Wyndham North Development Contributions Plan, prepared by GAA, dated June 2013;

> Draft Tarneit North Precinct Structure Plan, prepared by GAA, dated August 2013

> Development plans, prepared by Bosco Jonson Pty Ltd, dated 19 December 2013; and

> Other documents as specified.

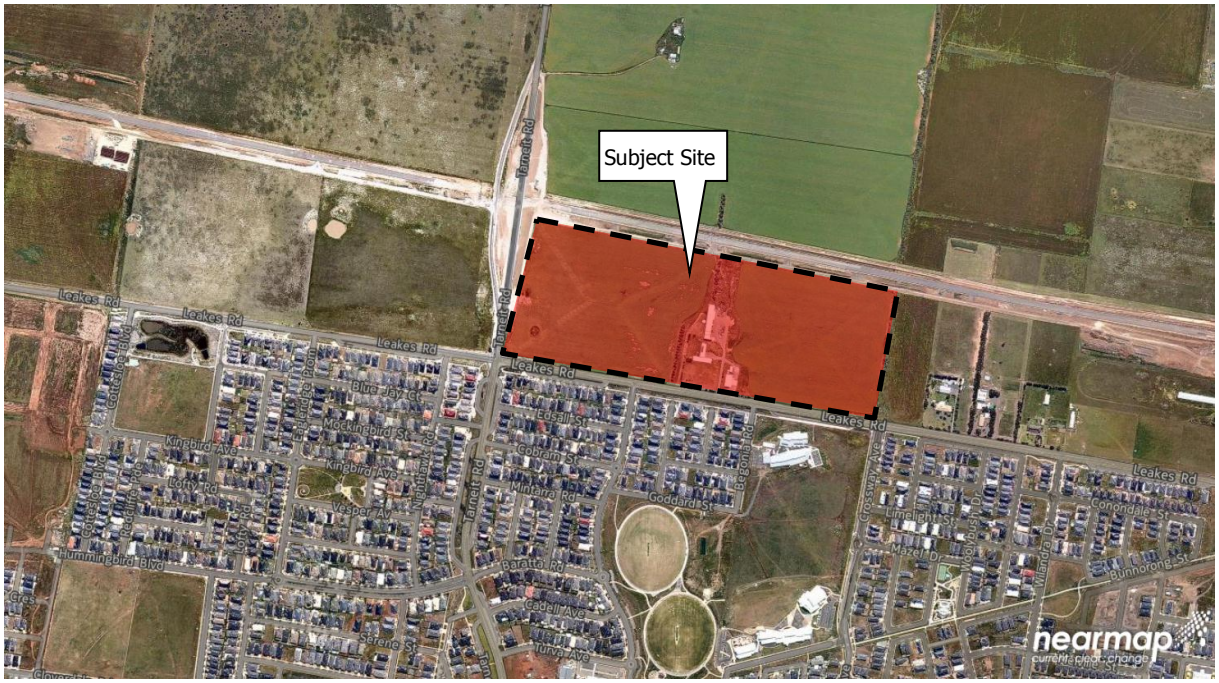
2 Background and Existing Conditions

2.1 Subject Site

The subject site is located at 830 Leakes Road in Tarneit North. The site of approximately 217,000sqm has a southern frontage of 800m to Leakes Road and a western frontage of 300m to Tarneit Road.

The subject site is located within an Urban Growth Zone (UGZ) and is shown in Figure 2-1.

Figure 2-1 Subject Site and it's Surrounds



(Reproduced with Permission from Nearmap)

2.2 Road Network

2.2.1 Leakes Road

Leakes Road currently functions as a major road and is aligned in an east-west direction between Shanahans Road and Old Geelong Road. Adjacent to the site, Leakes Road has a single lane in each direction. Leakes Road is currently under Wyndham City Council control.

Ultimately, Leakes Road is to be duplicated to incorporate a six lane median divided carriageway. It is anticipated that Leakes Road will be duplicated to a four lane arterial road in the near future with responsibility being transferred to VicRoads.

Leakes Road currently carries approximately 1,270 vehicles per day[1], to the west of Derrimut Road and has a posted speed limit of 80km/hr.

2.2.2 Tarneit Road

Tarneit Road functions as a major road. It is a two-way road aligned in a north-south direction between Boundary Road and Railway Avenue and is configured with a single lane in each direction, north of Leakes Road. Tarneit Road is ultimately to be duplicated to incorporate a four lane median divided carriageway.

Tarneit Road carries approximately 10,460 vehicles per day[1], north of Sayers Road.

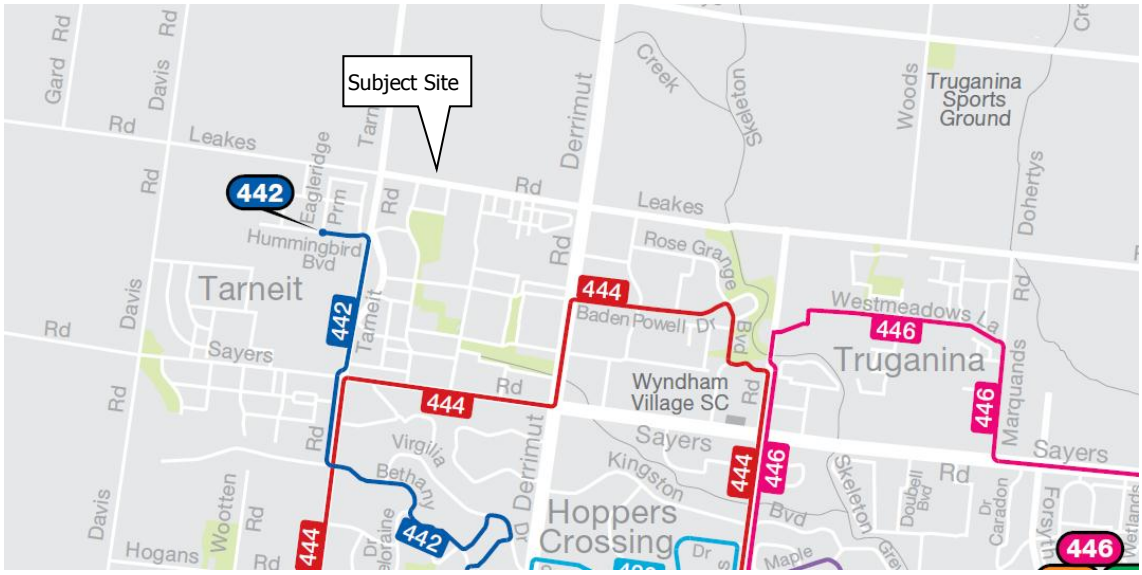
[1] *'Review of 2012 Traffic Volumes in Wyndham'*

2.3 Sustainable Transport Infrastructure

2.3.1 Public Transport

The public transport services operating in the vicinity of the site are illustrated in Figure 2-2.

Figure 2-2 Existing Public Transport Infrastructure



As illustrated in Figure 2-2, limited public transport services currently operate in the vicinity of the site. However bus services currently operating on Tarneit Road, to the south of the site, and Derrimut Road, to the east.

2.3.2 Pedestrian and Cyclist Infrastructure

Pedestrian paths are located on the south side of Leakes Road, both sides of Tarneit Road (south of Leakes Road) and both sides of Crossway Avenue in the vicinity of the site. In addition, signalised pedestrian crossings are located on all approaches of the Leakes Road/Tarneit Road intersection.

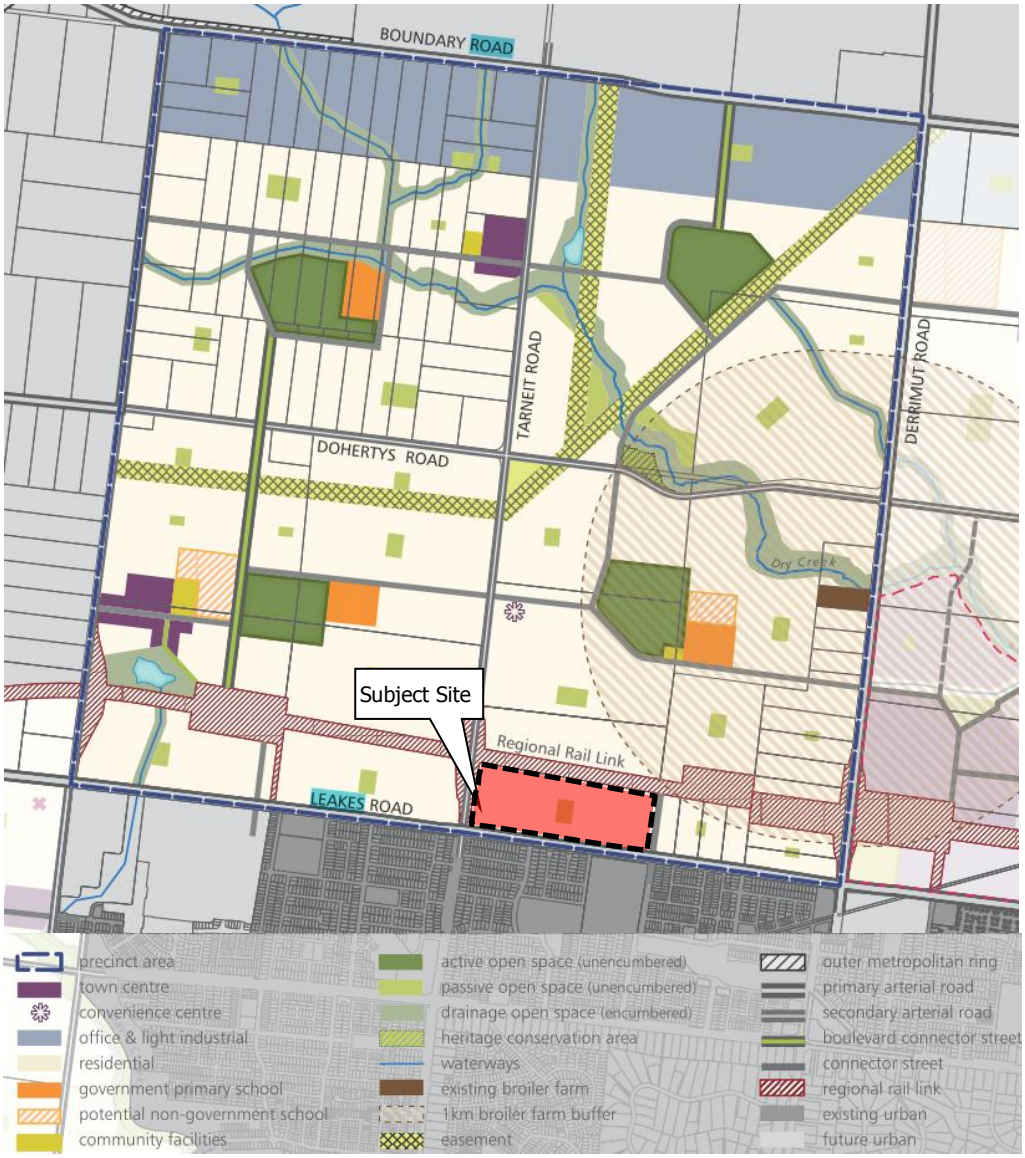
On-road bicycle lanes are also located on both sides of the Crossway Avenue carriageway.

3 Tarneit North Precinct Structure Plan (Draft)

3.1 Overview

As noted previously, the subject site is located within the Tarneit North PSP area which is currently in the pre-planning stage. The draft Future Urban Structure Plan for the Tarneit North PSP area is shown in Figure 3-1.

Figure 3-1 Draft Future Urban Structure Plan



As shown in Figure 3-1, the structure plan proposes predominately residential uses with two town centres, 5 school sites, a convenience centre and open space.

3.2 Traffic and Transport Provisions

3.2.1 Road Network

The proposed road network of the Tarneit North PSP is illustrated in Figure 3-2.

Figure 3-2 Proposed Road Network

As illustrated in Figure 3-2, a number of road infrastructure items are outlined as part of the PSP including:

> Duplication of Leakes Road to form a 6 lane arterial road;

> Duplication of Derrimut Road to form a 6 lane arterial road;

> Duplication of Davis Road to form a 6 lane arterial road;

> Duplication of Tarneit Road to form a 4 lane arterial road;

> Duplication of Dohertys Road to form a 4 lane arterial road;

> Upgrade of Kennings Road to form a connector street; and

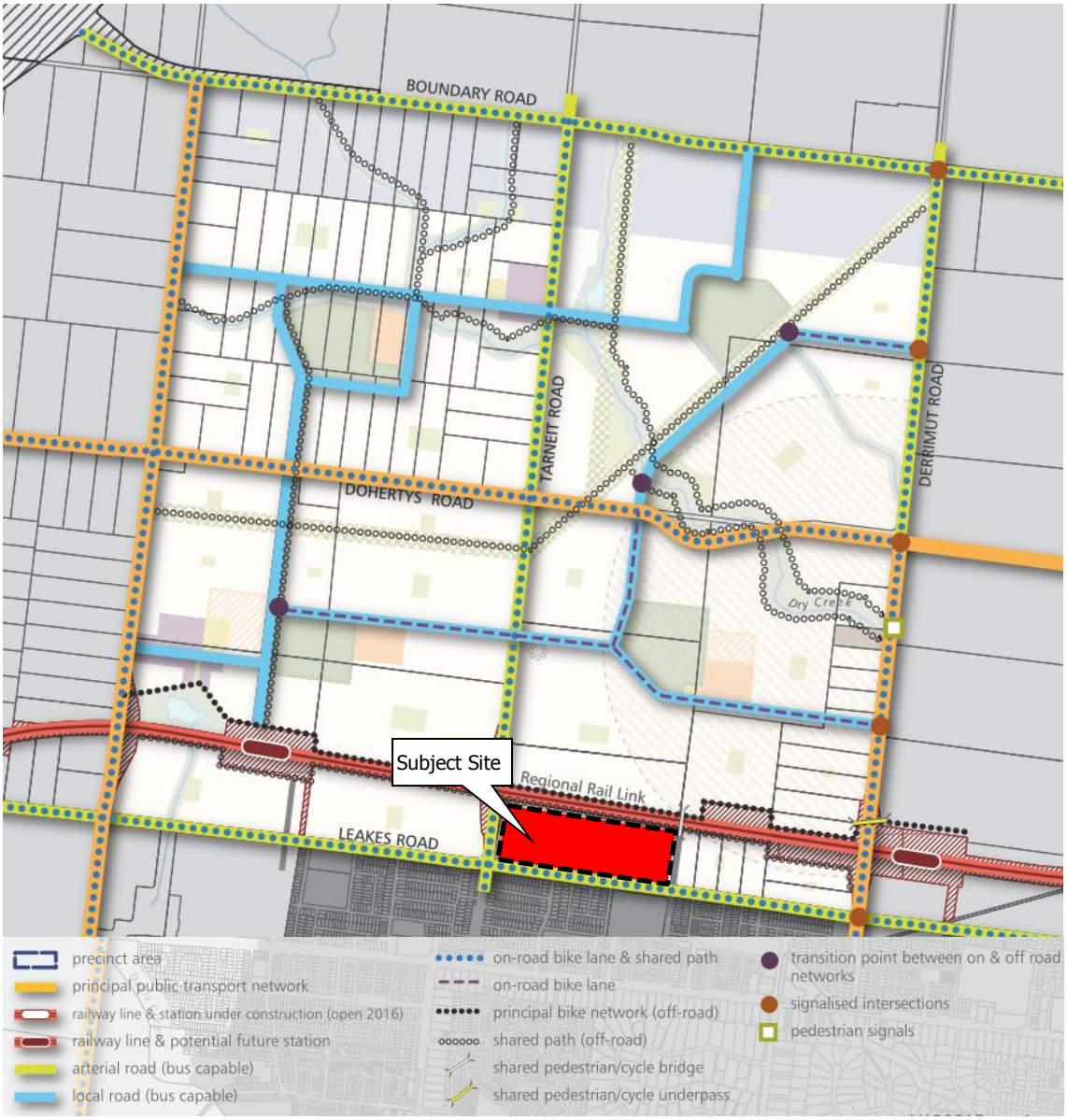
> Provision of an internal connector street network.

It is noted that a connector street is proposed to be located immediately east of the site which will form a signalised intersection with Leakes Road.

3.3 Sustainable Transport Modes

The public transport, pedestrian and cycle routes proposed as part of the PSP are illustrated in Figure 3-3.

Figure 3-3 Sustainable Transport Modes



3.3.2 Public Transport

As illustrated in Figure 3-3, Derrimut Road, to the east of the site, Dohertys Road to the north, and Davis Road to the west, form part of the Principle Public Transport Network.

In addition, railway stations are proposed to be located 850m to the east (approx.) and 900m to the west (approx.) of the site as part of the Regional Rail Link (RRL) project.

3.3.3 Pedestrian and Cyclist Infrastructure

Shared paths are proposed to be provided on the arterial road network through the PSP including Leakes Road and Tarneit Road.

In addition, the PSP indicates that a shared path is also proposed on the southern side of the RRL, which will run along the northern boundary of the site. We are advised that discussions with MPA have indicated that the provision of the shared path at this location will be unachievable as there will be no underpass provided beneath Tarneit Road at the RRL overpass. As such, it is envisaged that the shared path will be removed from the PSP.

Other shared path links are also proposed to the north of the site including an east-west route and a route adjacent to Dry Creek.

3.4 Referral Comments

As part of the pre-planning process, the draft PSP was reviewed by referral authorities including VicRoads and Wyndham City Council. Following their review, VicRoads letter response (letter dated 24 October 2013) stated the following with regards to the subject site:

> *Land does not appear to have been set aside for a deceleration lane for the future duplication of Leakes Road*

> *The access street onto Leakes Road will ultimately be a left-in/left-out arrangement.*

> *An appropriate interim access treatment will need to be identified that will provide access on the site until such time that as Leakes Road is duplicated.*

In addition, Wyndham City Council issued a referral response (letter dated 15 October 2013) citing the following item relating to the proposed connector street immediately east of the subject site:

> *There needs to be a shared path link along the Connector Road/shared path rail bridge/Key Access Street from Leakes Road as this is the main access to the P10-12 school off Leakes Road.*

Further discussion regarding these items is provided in the following sections of this report.

4 Proposed Development

4.1 Land Uses

The proposed development is to incorporate a total of 303 lots as illustrated in Figure 4-1.

Figure 4-1 Development Plan

Prepared by Bosco Jonson Pty Ltd, dated 19 December 2013

4.2 Access Arrangements

4.2.1 Interim Access

In the interim (i.e. prior to the duplication of Leakes Road), access to the proposed development will be provided via a full turning movement unsignalised intersection to Leakes Road.

The interim access intersection design is to incorporate a standard 'urban' channelized right turn lane (CHR) and an auxiliary left turn lane (AUL).

A copy of the concept plan for the interim access arrangement is provided at Appendix A of this report.

4.2.2 Ultimate Access

Ultimately, and following the duplication of Leakes Road to incorporate a 6 lane median divided carriageway, access to the development will be provided via a left-in/left-out arrangement to Leakes road.

A concept plan for the Leakes Road/Site Access intersection under ultimate conditions is provided at Appendix A of this report.

In addition, access will also be provided via a connector street to be located adjacent to the site's eastern property boundary. The connector street will ultimately form a signalised intersection with Leakes Road. It is unknown when this connection will be available as the connector road reserve is outside of the subject site and will be constructed by others as land to the east is developed.

4.3 Road Network

As illustrated in Figure 4-1, the internal road network is to consist predominately of Access Street Level 1 (16m) cross-sections. It is noted that the road reserve has been reduced (i.e. 13.5m to 14m) adjacent to reserve frontages.

The design characteristics of the proposed internal road hierarchy are summarised in Table 4-1.

Table 4-1 Proposed Cross Sections

Type	Road Reserve	Carriageway	Indicative Traffic Volumes	Bicycles	Parking	Pedestrians
Rear Lane	7.0m	6.0m	300vpd	On-Road	None	On-Road
Access Lane	12.0m	6.0m	300vpd	On-Road	None	2 x 1.5m wide footpaths
Access Street Level 1 (Single fronted Only)	13.5m	5.5m	2,000-3,000vpd	On-Road	On-Road (One Side Only)	1 x 1.5m wide footpath
Access Street Level 1	16.0m	7.3m	2,000-3,000vpd	On-Road	On-Road	2 x 1.5m wide footpaths

In addition to the above, development plans have been designed to ensure a 50m wide road reserve for the future duplication of Leakes Road in accordance with the PSP requirements.

Further discussion regarding the suitability of the proposed road network is provided at Section 5 of this report.

5 Traffic Implications

5.1 Access Arrangements

As noted previously in this report, access to the proposed development will occur via an 'interim' full turning movement arrangement, prior to the duplication of Leakes Road and the construction of future development within the adjacent land parcels.

Ultimately, the Leakes Road site access point will be downgraded to a left-in/left-out treatment, consistent with access arrangements proposed as part of the PSP with additional access provided via the connector street to the east.

On the basis of the above, the operation of the ultimate access intersection (i.e. left-in/left-out) has not been assessed in the following sections of this report.

5.2 Traffic Generation

Reference is made to traffic surveys undertaken by Cardno at the Westleigh Gardens Estate on the Princes Highway, to the west of the Werribee Town Centre in April 2010. The results of these surveys indicate that residential dwellings in the vicinity of Werribee Town Centre typically generate up to 8.7 vehicle trips per day.

The subject site is anticipated to have similar traffic generation characteristics (i.e. proximity to public transport, retail, education and commercial centres). As such, a rate of 8.7 vehicle trips per day is considered to be appropriate in terms of estimating the traffic generation characteristics of the development.

In addition, and in order to ensure a conservative assessment, it is anticipated that each dwelling within the proposed development could be expected to generate up to one vehicle movement during the weekday AM and PM peak hours.

On the basis of the above, Table 5-1 has been prepared to summarise the traffic volumes likely to be generated by the proposed development.

Table 5-1 Traffic Generation Summary

Dwellings	Traffic Generation Rate		Traffic Generation Estimate	
	Peak Hour	Daily	Peak Hour	Daily
303 Dwellings	1 trip per hour	8.7 trips per day	303 trips per hour	2,636 trips per day

5.3 Traffic Distribution and Directional Split

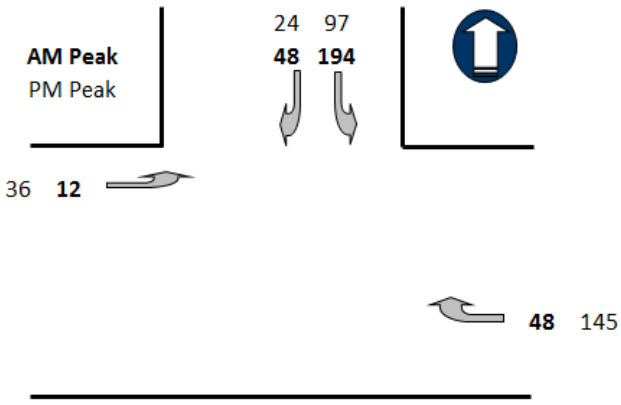
In the interim, it is anticipated that the distribution of traffic on Leakes Road will be similar to that of existing conditions whereby in the order of 80% of trips travel to/from the east with the remaining 20% of trips travelling to and from the west.

With regards to the directional split (i.e. ratio and inbound and outbound trips) the following has been adopted

- AM peak: 80% outbound movements and 20% inbound movements; and
- PM peak: 40% outbound movements and 60% inbound movements.

On the basis of the above, Figure 5-1, has been prepared to illustrate the peak hour traffic volumes likely to be generated by the site under interim development conditions.

Figure 5-1 Peak Hour Site Generated Volumes (Interim)



5.4 Peak Hour Traffic Impact

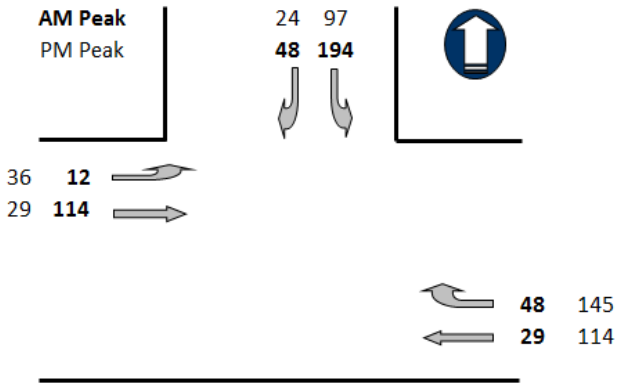
5.4.1 Interim

By adding the development generated traffic volumes and existing traffic volumes on Leakes Road, the post development volumes can be determined.

In order to estimate existing peak hour traffic volumes on Leakes Road, a 10% peak to daily ratio has been applied to the existing two-way daily volume outlined earlier within this report. In addition, it is assumed that 80% of the peak hour volumes will travel to/from the east. It is noted that a 2.5% annual growth factor has been applied to the existing through volumes on Leakes Road for a five year period, at which point the site is anticipated to reach full development.

Based on the above, Figure 5-2 has been prepared to illustrate the AM and PM post development volumes.

Figure 5-2 Peak Hour – Post Development Volumes (Interim)



The operation of the site access intersection under interim conditions has been assessed using SIDRA Intersection, a computer package originally developed by the Australian Road Research Board, based on the concept intersection layout provided at Appendix A.

SIDRA Intersection determines intersection performance based on the degree of saturation (DOS), average delay and the 95th percentile queue distance as discussed below.

Degree of Saturation (DOS) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Table 5-2, below summarises level of service ratings associated with a range of DOS results.

Table 5-2 Rating of Degrees of Saturation

Degree of Saturation (Unsignalised Intersection)	Level of Service Rating
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

The ***95th Percentile Queue*** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

The results of the SIDRA Intersection analysis are summarised below with full results provided at Appendix B.

Table 5-3 Intersection Operation – Leakes Road/Site Access Intersection

Period	Approach	Turn	Degree of Saturation	Average Delay	95th Percentile Queue
AM Peak	Leakes Road (east)	Through	0.16	Nil	Nil
		Right	0.03	11 sec	1 m
	Site Access (north)	Left	0.21	9 sec	7 m
		Right	0.21	9 sec	7 m
	Leakes Road (west)	Left	0.01	12 sec	Nil
		Through	0.06	Nil	Nil
	Intersection	**All**	**0.21**	**7 sec**	**7 m**
PM Peak	Leakes Road (east)	Through	0.06	Nil	Nil
		Right	0.09	11 sec	3 m
	Site Access (north)	Left	0.10	9 sec	3 m
		Right	0.10	9 sec	3 m
	Leakes Road (west)	Left	0.02	12 sec	Nil
		Through	0.02	Nil	Nil
	Intersection	**All**	**0.10**	**7 sec**	**3 m**

As summarised in Table 5-3, the interim intersection configuration is anticipated to operate an 'excellent' level of service following full development and occupation of the site.

5.4.2 Ultimate

Given that the proposed land uses and access arrangements are consistent with that of the draft PSP, the ultimate access arrangements are considered to be satisfactory.

5.5 Daily Traffic Impacts

As discussed previously, the proposed development is anticipated to generate up to 2,636 vehicle movements per day. Given that internal traffic volumes will ultimately be dispersed between four access points, including a left-in/left-out access to Leakes Road and three connections to the adjacent connector

street, the internal road network is not anticipated to exceed the theoretical volume capacity for an Access Street Level 1 cross-section (i.e. 2,000-3,000vpd[2]).

On the basis of the above, the internal road network is considered to be satisfactory.

5.6 Other Design Issues

Given that the southern boundary of the site will abut Leakes Road, it is recommended that landscaping or a screen be provided on the southern boundary of the site in accordance with Austroads Design Guidelines.

[2] *Based on target traffic volumes outlined in Clause 56.06 of the Wyndham Planning Scheme.*

6 Sustainable Transport

6.1 Public Transport

The draft PSP does not show any bus or other public transport routes operating through the proposed development site. As such, the proposed development layout is considered to be satisfactory and accords with the public transport requirements of the draft PSP.

6.2 Bicycles & Pedestrians

As outlined earlier within this report, the draft PSP indicates that a shared path is to be located on the northern property boundary running parallel to the RRL. However subsequent discussions with the MPA have indicated that this shared path can't be provided due to connectivity issues with Tarneit Road.

Furthermore, pedestrian paths are to be provided on both sides of Access Streets within the site.

It is noted that in their referral response to the draft PSP, Wyndham City Council indicated that a shared path route should be provided on the connector street, on the site's eastern property boundary to provide a connection to the educational uses to the north. While not located within the subject site, this shared path would further improve pedestrian and cyclists connectivity in the vicinity of the site. The inclusion of the shared path at this location will be resolved as part of the PSP.

In this regard, future pedestrian and cyclist routes in the vicinity of the site are illustrated in Figure 6-1.

Figure 6-1 Key Pedestrian and Cyclist Routes

On the basis of the above, the proposed development plan is consistent with the requirements of the draft PSP and is considered to be appropriate to accommodate pedestrian and cyclists requirements within the development.

7 Conclusions

On the basis of the discussions and analysis contained within this report, the following conclusions are made:

> The proposed development will contain approximately 303 residential lots and open space.

> The subject site is located on the north-east corner of the Leakes Road/Tarneit Road intersection and within the Tarneit North PSP area.

> Access will initially be provided via a single full turning movement access from Leakes Road.

> Ultimately, access will be restricted to left-in/left-out with additional access provided via the north-south connector street, adjacent to the eastern boundary of the subject site.

> The proposed development is anticipated to generate in the order of 2,636 vehicle movements per day and 303 vehicle movements during peak hours.

> Sufficient capacity exists within the existing external road network to accommodate the additional traffic likely to be generated by the development under interim conditions.

> The ultimate access arrangements are consistent with that of the PSP.

> The proposed internal road network is consistent with the requirements of the draft PSP

> The pedestrian and cyclist provisions within the development are consistent with the infrastructure requirements specified in the PSP.

Residential Subdivision 830 Leakes Road, Tarneit North

APPENDIX A

SITE ACCESS CONCEPT PLANS

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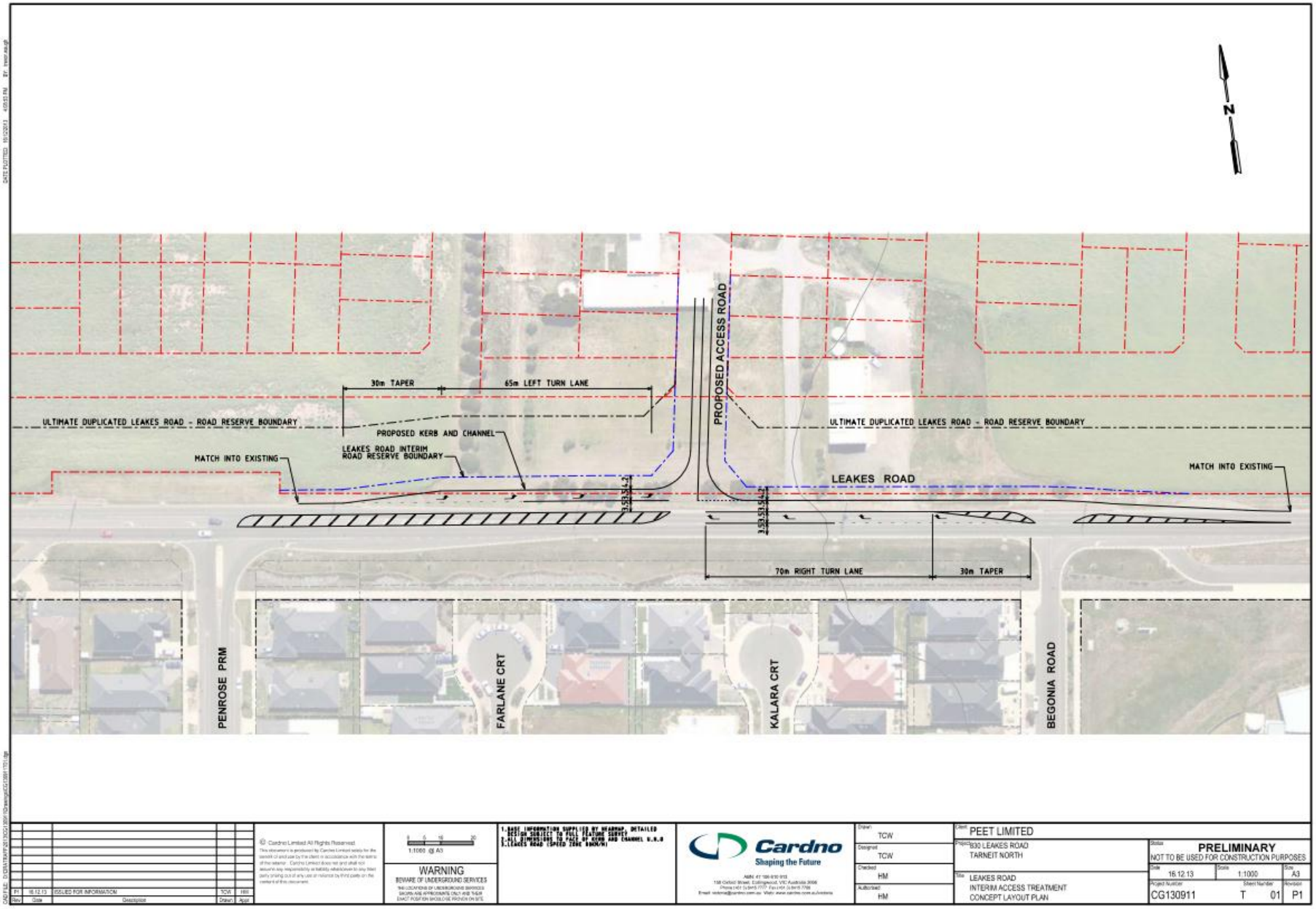
N
30m TAPER
65m LEFT TURN LANE
PROPOSED ACCESS ROAD
ULTIMATE DUPLICATED LEAKES ROAD - ROAD RESERVE BOUNDARY
PROPOSED KERB AND CHANNEL
LEAKES ROAD INTERIM
ROAD RESERVE BOUNDARY
MATCH INTO EXISTING
ULTIMATE DUPLICATED LEAKES ROAD - ROAD RESERVE BOUNDARY
MATCH INTO EXISTING
LEAKES ROAD
70m RIGHT TURN LANE
30m TAPER
PENROSE PRM
FARLANE CRT
KALARA CRT
BEGONIA ROAD
WARNING
BEWARE OF UNDERGROUND SERVICES
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PEET LIMITED
830 LEAKES ROAD
TARNEIT NORTH
LEAKES ROAD
INTERIM ACCESS TREATMENT
CONCEPT LAYOUT PLAN
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES
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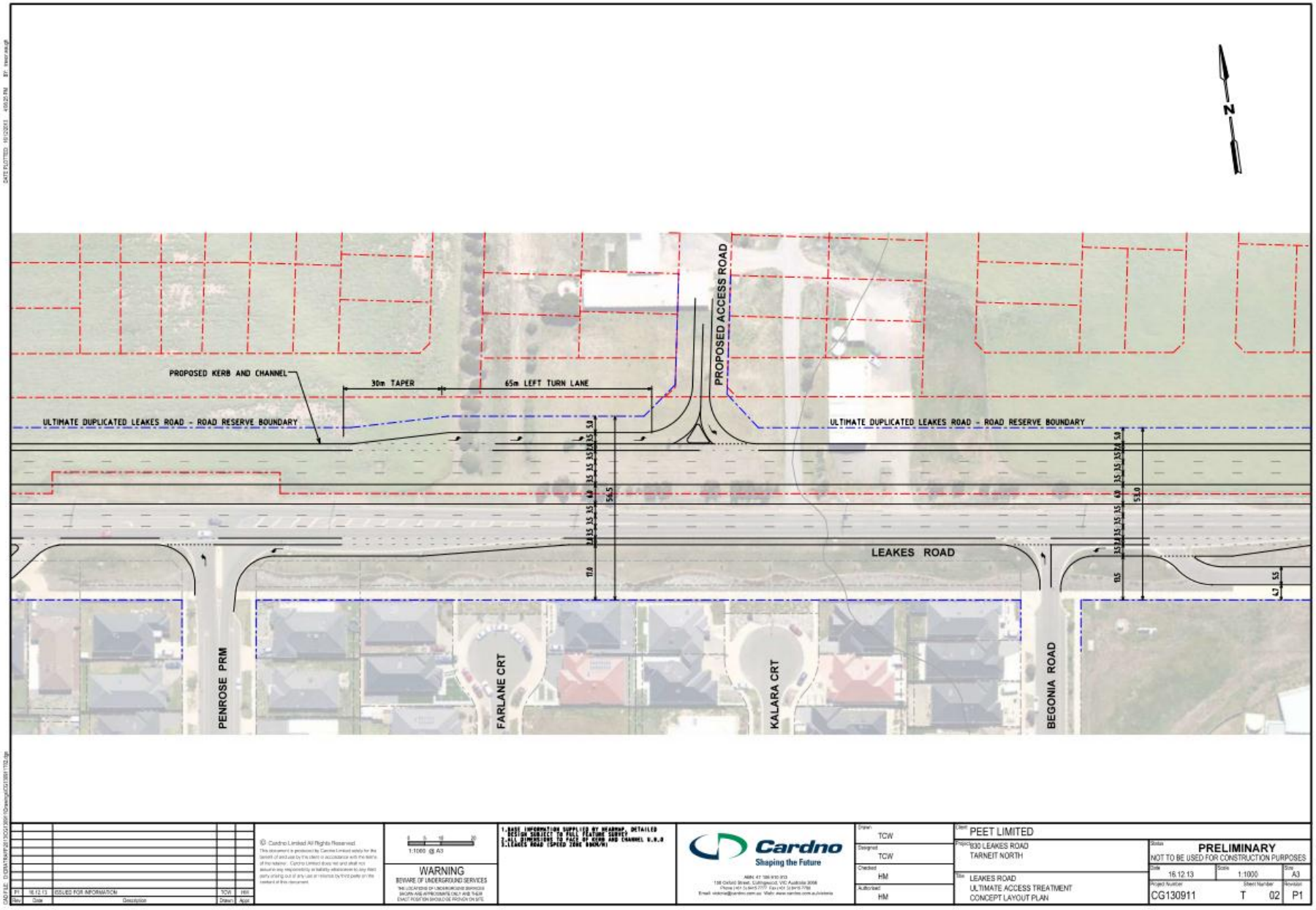
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PROPOSED ACCESS ROAD
PROPOSED KERB AND CHANNEL
30m TAPER
65m LEFT TURN LANE
ULTIMATE DUPLICATED LEAKES ROAD - ROAD RESERVE BOUNDARY
ULTIMATE DUPLICATED LEAKES ROAD - ROAD RESERVE BOUNDARY
LEAKES ROAD
PENROSE PRM
FARLANE CRT
KALARA CRT
BEGONIA ROAD
WARNING
BEWARE OF UNDERGROUND SERVICES
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Residential Subdivision 830 Leakes Road, Tarneit North

APPENDIX B

SIDRA INTERSECTION RESULTS

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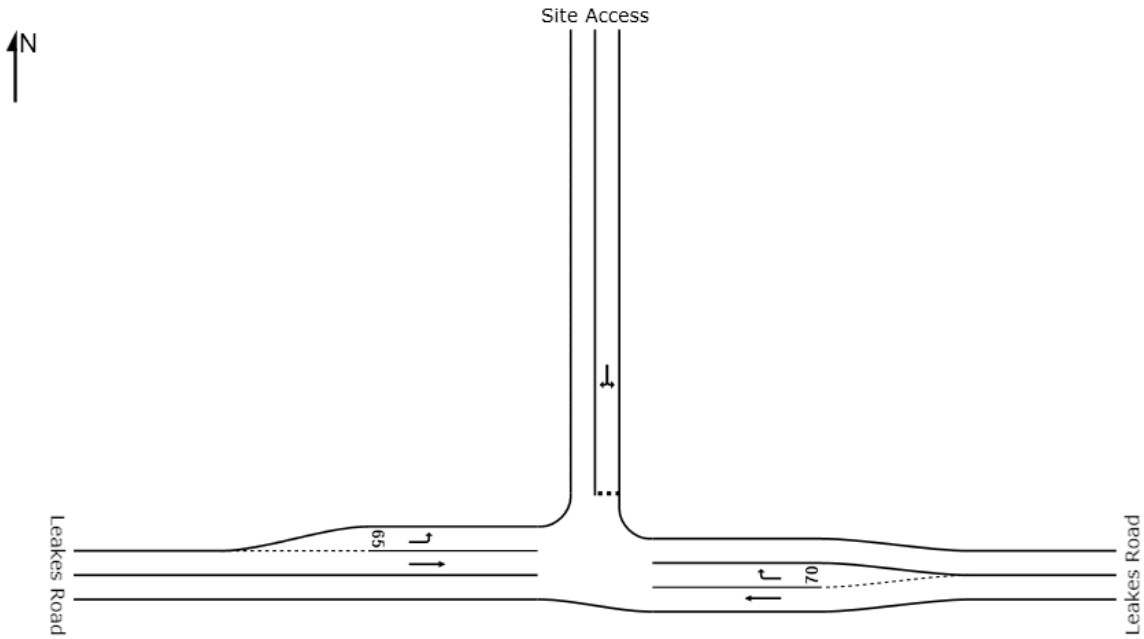
Leakes Road/Site Access Intersection (Interim)



AM Peak Results

MOVEMENT SUMMARY

Site: AM Peak Post Dev

New Site
Giveway / Yield (Two-Way)

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: Leakes Road											
5	T1	31	0.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R2	51	0.0	0.031	10.6	LOS B	0.2	1.1	0.23	0.66	55.6
Approach		81	0.0	0.031	6.6	NA	0.2	1.1	0.15	0.41	64.2
North: Site Access											
7	L2	204	0.0	0.207	9.2	LOS A	0.9	6.5	0.25	0.64	45.6
9	R2	51	0.0	0.207	9.3	LOS A	0.9	6.5	0.25	0.64	45.6
Approach		255	0.0	0.207	9.2	LOS A	0.9	6.5	0.25	0.64	45.6
West: Leakes Road											
10	L2	13	0.0	0.007	12.3	LOS B	0.0	0.0	0.00	0.75	58.3
11	T1	120	0.0	0.062	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		133	0.0	0.062	1.2	NA	0.0	0.0	0.00	0.07	77.3
All Vehicles		468	0.0	0.207	6.5	NA	0.9	6.5	0.16	0.44	54.7

PM Peak Results

MOVEMENT SUMMARY

Site: Pm Peak Post Dev

New Site
Giveway / Yield (Two-Way)

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: Leakes Road											
5	T1	120	0.0	0.062	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
6	R2	153	0.0	0.089	10.5	LOS B	0.5	3.2	0.16	0.67	56.0
Approach		273	0.0	0.089	5.9	NA	0.5	3.2	0.09	0.38	66.0
North: Site Access											
7	L2	102	0.0	0.099	9.0	LOS A	0.4	2.8	0.08	0.66	46.2
9	R2	25	0.0	0.099	9.0	LOS A	0.4	2.8	0.08	0.66	46.2
Approach		127	0.0	0.099	9.0	LOS A	0.4	2.8	0.08	0.66	46.2
West: Leakes Road											
10	L2	38	0.0	0.020	12.3	LOS B	0.0	0.0	0.00	0.75	58.3
11	T1	31	0.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		68	0.0	0.020	6.8	NA	0.0	0.0	0.00	0.42	66.5
All Vehicles		468	0.0	0.099	6.8	NA	0.5	3.2	0.07	0.46	58.8

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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