TRAFFIC · PARKING · ACOUSTICS

Penrith Lakes Urban Lands Development Application

Traffic Impact Statement

Penrith Lakes Development Corporation

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1. Introduction

1.1. Background

TTM Consulting has been engaged by Penrith Lakes Development Corporation to prepare a traffic impact statement investigating a proposed staged subdivision of land into rural residential lots. It is understood that a Development Application DA5.2 will be lodged with Penrith City Council.

1.2. Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Identification of likely traffic volumes and traffic distribution from the future development;
- Identification of likely traffic impact of development on the public road network.

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- Penrith Development Control Plan 2010, specifically:
  - Part C10 Transport, Access and Parking;
- Austroads Guide to Road Design series.
- RTA Guide to Traffic Generating Developments (2002)

1.3. Site Location

The site is located on Castlereagh Road, as shown in Figure 1. The site adjoins the Sydney International Regatta Centre. The site has road frontages to Castlereagh Road and McCarthys Lane. The site is currently unoccupied.

Figure 1: Site location

2. The Proposed Development

2.1. Development Profile

The development proposal includes 138 residential lots. It is noted that the size of each lot is consistent with existing land uses accessing Castlereagh Road between McCarthys Lane and Inalls Lane and the Interim Development Order 93 applicable to the site.

2.2. Access

The development plan includes the following access arrangements as shown in Figure 2:

- 1. McCarthys Lane:
  - Extension of existing stub
- 2. Castlereagh Road:
  - Approximately 470m north of Cranebrook Road (northern intersection)
  - New intersection, which will replace existing driveway access
- 3. Castlereagh Road:
  - Approximately 2.03km north of Cranebrook Road (northern intersection)
  - New intersection

Figure 2: Proposed Access Locations

3. Existing Transport Infrastructure

3.1. The Road Network

All roads in the vicinity of the subject site are administered by Penrith City Council.

Castlereagh Road spans from the Great Western Highway (Mulgoa Road/Jane Street) in the south to Kurrajong Road in the north. It is a state road, except for the length between Cranebrook Road (northern intersection) and Springwood Road, which is a regional road. Castlereagh Road is four-lane dual carriageway south of the Waterside Boulevard / McCarthys Lane intersection. North of this intersection, Castlereagh Road is a two lane rural road. The speed limit along the site frontage is 80kph north of Cranebrook Road (southern intersection) and 60kph south of this intersection.

McCarthys Lane is a 7.5m wide local access road and primarily provides access to Penrith Whitewater Stadium. The speed limit is 40kph, but is expected to be 50kph after the upgrading and extending of McCarthys Lane into the development.

4. Existing Traffic Volumes

4.1. Base / Future Traffic

Table 1, below shows existing and future predicted traffic flows to 2025 on Castlereagh Road as it passes the subject site. The traffic volume north of Nepean Street was taken from the *'Section 75W application environmental assessment - for the Importation of VENM Modification'*, produced by Arup and dated 30 August 2012. The traffic count was undertaken in May 2012. The traffic volume north of Devlin Road is taken from a 2007 Arup report, *Penrith Lakes Concept Plan Traffic and Transport Assessment*.

TTM has assumed a 3% growth per annum in traffic along Castlereagh Road as a typical growth factor where some development takes place.

This table also includes estimated daily traffic volumes and peak hour volumes at the affected / proposed intersections along Castlereagh Road. Peak hour volumes are anticipated to comprise 10% of daily traffic volumes.

Table 1: Base / Future Traffic Volumes on Castlereagh Road (vpd / vph)

Volume Type / Year	North of Nepean Street	At McCarthys Lane Intersection*	North of Cranebrook Road (Int 2 and 3)*	North of Devlin Road
2007 AADT				5,282
Arup report – S75W VENM modification 2012 AWT	18,343**			
2012 AWT		21,343***	7,337#	6,123
Opening year 2015 AWT	20,043	23,322	8,018	6,691
2015 Peak Hour	2,004	2,332	802	669
10 years after opening 2025 AWT	26,937	31,343	10,775	8,992
2025 Peak Hour	2,694	3,134	1,078	899

* Estimations.

** Does not include the projected increase in HGV's due to PLDC's Virgin Excavated Natural Material (VENM) programme as part of the Penrith Lakes remediation program, as this will be complete by the time any new buildings on Lot 4 are ready for occupation.

*** 3,000 vpd added to account for traffic entering and leaving Castlereagh Road at Nepean Street.

Assumes 60% of traffic uses Cranebrook Road and 40% of traffic uses Castlereagh Road north of Cranebrook Road

AWT = Average Weekday Traffic

5. Estimated Future Transport Demands

5.1. Estimated Development Traffic Generation

The proposed development comprises 138 residential lots. The accepted peak hour traffic generation rate from the *RTA Guide to Traffic Generating Developments* is 0.85vph per dwelling house. For a conservative assessment due to the lack of public transport in rural areas, a traffic generation rate of 1vph per residential lot has been used, which equates to 138vph. The accepted daily traffic generation rate is 9vpd per dwelling house. For a conservative assessment, a traffic generation rate of 10vpd per residential lot has been used, which equates to 1,380vpd.

5.2. Estimated Development Traffic Distribution

The following assumptions are anticipated for development traffic distribution:

- 85% of traffic will be to / from the south (119vph);
- 15% of traffic will be to / from the north (21vph);
- 80% of traffic is expected to be outbound in the AM peak with the remaining 20% being inbound;
- 20% of traffic is expected to be outbound in the PM peak with the remaining 80% being inbound;
- Given the Castlereagh Road access locations the following is presumed:
  - Intersection 1 (McCarthys Lane) will cater for 40% of development traffic movements;
  - Intersection 2 (new middle intersection) will cater for 35% of development traffic movements; and
  - Intersection 3 (new northern intersection) will cater for the remaining 25% of development traffic movements

The anticipated peak hour development turn movements based on these assumptions are shown in Table 2.

Table 2: Estimated Development Turn Movements

Turn Movement	Intersection 1 (vph)	Intersection 2 (vph)	Intersection 3 (vph)
AM left in	10	8	6
AM right in	2	1	1
AM left out	7	6	4
AM right out	37	32	24
PM left in	37	32	24
PM right in	7	6	4
PM left out	2	1	1
PM right out	10	8	6

As shown in Table 2, the highest traffic movement to and from the subject site is predicted to be 37vph turn right out of the McCarthys Lane intersection in the AM peak and 37vph turn left into McCarthys Lane in the PM peak.

6. Road Network Performance

6.1. Castlereagh Road Impact

The development is expected to add no more than 47vph to any intersection. This is expected to occur south of the McCarthys Lane intersection. Given that the peak hour volumes along Castlereagh Road at this location are expected to be 2,332vph on the opening day (year 2015), the development is expected to have a negligible impact (less than 5%) on through volumes south of this intersection.

Castlereagh Road is generally a rural road north of McCarthys Lane. It is generally accepted that Level of Service C is the acceptable limit for rural roads. *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* indicates that a rural road can have a flow rate up to 1,190vph in each direction and still retain this level of service. Within the 10 year design horizon, the two-way two lane section of Castlereagh Road passing intersections 2 and 3 is not expected to exceed 1,078vph. Development traffic will add no more than 79vph (1,157vph total) and as such Level of Service C is not expected to be exceeded for Castlereagh Road in the vicinity of intersections 2 and 3.

LOS D describes unstable traffic flow, which is acceptable for short distances so that overall journey time is not significantly affected. *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* indicates that a rural road can have a flow rate up to 1,830vph in each direction and still retain this level of service. Between McCarthys Lane and Cranebrook Road, the two-way two lane section of Castlereagh Road is not expected to exceed 3,134vph (1,567vph each way) within the 10 year design horizon. Development traffic will add no more than 58vph in one direction (1,625vph total) and as such Level of Service D is not expected to be exceeded for Castlereagh Road between McCarthys Lane and Cranebrook Road.

South of McCarthys Lane, additional through lanes are provided on Castlereagh Road. Development traffic is further diluted through additional traffic from Andrews Road. It is anticipated that the additional lanes are suitable to compensate for any additional traffic flows from the development.

An assessment of sight distance was undertaken at each intersection into the development. In all cases the sight distance exceeded the requirements in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*; i.e., Safe intersection sight distance of 226m for a design speed of 90kph and 151m for a design speed of 70kph.

6.2. Analysis of Castlereagh Road / McCarthys Lane Intersection

This intersection is a four way intersection with Waterside Boulevard. Into McCarthys Lane the right and left turn lanes are approximately 90m long. Given the level of through traffic in the peak hours it is anticipated that full auxiliary left turn (AUL) and channelised right turn (CHR) treatments are required at this intersection. This requires a 75m long deceleration distance (including taper) for a 70kph design speed (60kph posted speed limit). The design vehicle is a 12.5m long truck / bus.

In relation to Figure 7.7 in *Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections*, the total lane length should therefore be 87.5m long including taper. In relations to Figure 8.4 in the same document the left turn lane should be 75m long including taper.

As the existing turn treatments are consistent with guidance in Austroads, no upgrade to these turn facilities are warranted. However, it is noted that minor realignment is proposed in order to provide a shared pedestrian and bike path.

Given this intersection is a four arm intersection with a reasonable residential catchment from Waterside Boulevard, a detailed capacity review of this intersection may be required prior to detail design.

6.3. Analysis of Intersections 2 and 3

These intersections will be formed as three arm intersections. Given the low turn volumes from the subject site and low expected Castlereagh Road passing volumes, there is unlikely to be significant capacity issues at these intersections. The posted speed limit on Castlereagh Road at the location of these intersections is 80kph. For the design speed of 90kph, the deceleration distance is 125m.

From the same methodology as in Section 6.2, the right turn lanes into the subject site should therefore be 137.5m long including taper. Similarly the left turn lane should be 125m long including taper.

6.4. Analysis Conclusions

The turn provisions from Castlereagh Road to McCarthys Lane are suitable considering the posted speed limit and development turn / anticipated future through volumes. A capacity assessment of this intersection may be required prior to detail design.

The new intersections with Castlereagh Road do not warrant a detailed capacity assessment. The right turn lanes at these intersections should be 137.5m long and the left turn lanes should be 125m long, including tapers.

7. Recommendations

7.1. Impact on Surrounding Road Network

The Castlereagh Road / McCarthys Lane intersection does not require an upgrade, however a capacity assessment may be required prior to detail design.

The new intersections will require turn / deceleration lanes from Castlereagh Road with a length of 137.5m for right turns and 125m for left turns.

No further assessments are warranted for the type and scale of development proposed.

Appendix A Development Layout