

Technical Note

Title	Rail Level Crossing Modelling Traffic Management Plan West Dapto Road – Kembla Grange		
Client	Wollongong Recycling & Building Supplies Pty Ltd	Project No	82015053
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1 Introduction

Cardno has been engaged by Wollongong Recycling and Building Supplies Pty Ltd to prepare a Modelling Traffic Management Plan in relation to traffic impact on the railway level crossing located on West Dapto Road, Kembla Grange NSW. This technical note is in response to Sydney Trains comments regarding the proposed expansion of the Re-cycling Facility located at 50 Wylie Road, Kembla Grange.

The railway level crossing is located at West Dapto Road on the northern side of Princes Highway, between Wylie Road and Princes Highway. This railway level crossing is located to the west of the Kembla Grange train station.

Figure 1 shows the location of the railway level crossing.

Figure 1: Site Location



2 Scope of Work

The following works have been undertaken as part of this study:

- > Collate data and review background documents for the study site (railway level crossing and signalised intersection of West Dapto Road/Princes Highway);
- > Assess traffic volumes based on existing (including committed developments which includes: Prixcar site, PAC Stage 2, and PAC Stage 3) plus proposed development flows (Wollongong Recycling and Building Supplies). The scenarios to be tested are 'Existing conditions,' and 'Future Baseline with Developments.'
- > Undertake assessment of railway level crossing and the West Dapto Road / Princes Highway intersection using SIDRA modelling software;
- > Extract anticipated performance indicators from the model such as queue lengths at the boom gate approach when it is closed; and
- > To check if the proposed development with the baseline flows (including committed developments) is within the ALCAM rating of the rail crossing for the forecast design year.

Assumptions

- > Traffic survey data and forecasted traffic from the Rail Level Modelling Traffic Management Plan report (for the Prixcar site, PAC Stage 2, and PAC Stage 3 developments) undertaken by Cardno (November 2014) used as a basis for baseline and committed development traffic generation.
- > The weekday AM and PM peak hour periods shall be the focus of the assessment.
- > We shall assume an annualised growth rate based on previous studies data.
- > A freight train service assumed to operate during the peak periods.

3 Existing Conditions

ALCAM Rating

On the 13 October 2014 a traffic tube count (**Appendix A**) was undertaken for a seven day period (24 hours per day) adjacent to the railway level crossing on West Dapto Road. The survey results showed the total volume of traffic along West Dapto Road that would travel along the rail level crossing. The peak hour traffic volumes were also obtained for the AM and PM peak periods. The total daily volumes for the 7 days extracted from the traffic tube count survey data are shown below in **Table 1**.

Table 1: Total Daily Traffic Volumes (vehicles per day)

Daily Total Traffic Volume	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Eastbound	1660	1661	1734	1654	1748	1382	955
Westbound	1640	1688	1742	1702	1752	1403	989
Combined	3300	3349	3476	3356	3500	2785	1944

Based on discussions with Railcorp, the ALCAM rating was obtained for this rail level crossing adjacent to Kembla Grange train station, which is 3700 vehicle movements per day. As shown above the survey data reveals that the existing daily traffic volume is close to the ALCAM rating capacity of the rail level crossing.

Peak Hour Traffic Flows

Results from the traffic tube count undertaken from 13 October 2014 showed that the maximum peak hour combined traffic volume for AM was 391 vehicles per hour (Saturday) and 338 vehicles per hour for PM peak hour (Friday). These peak hour volumes are summarised in **Table 2** and **Table 3**.

Table 2: AM Peak Hour Traffic Volumes (vehicles per day)

AM Peak Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Eastbound	154	156	173	149	168	191	121
Westbound	160	156	161	163	161	200	116
Combined	314	312	334	312	329	391	237

Table 3: PM Peak Hour Traffic Volumes (vehicles per day)

PM Peak Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Eastbound	160	173	160	154	177	161	112
Westbound	137	148	147	146	161	128	107
Combined	297	321	307	300	338	289	219

The baseline traffic flows for the years 2015 and 2025 have been calculated with a 2.5% annual growth factor applied to the traffic volumes obtained for the year 2012 (consistent with other proposed developments traffic reports in the vicinity of the Wollongong Recycling and Building Supplies). These traffic volumes were larger than the volumes obtained from the traffic tube count undertaken in year 2014. Therefore, as a conservative approach was retained for this assessment.

Queue Lengths

The West Dapto Road / Rail level crossing intersection was analysed using SIDRA 6.0 intersection software. The SIDRA results are attached in **Appendix B**. This analysis was based on existing AM and PM peak hour road network volumes. **Figure 2** shows the layout of the intersection. This model was analysed based on the following assumptions

- > The railway crossing level boom gate closure duration is 55 seconds for all trains (based on freight train information from Railcorp). This is a conservative approach as the freight trains have longer closure periods when compared to regular train services.
- > The South Coast train line operates through Kembla Grange station with four train services operating during the AM and PM peak hour periods (based on Transport Sydney Trains timetable). For a conservative approach, one extra service will be added as part of the assessment, which will be for a freight train during these peak periods.

Figure 2: West Dapto Road / Rail Level Crossing Intersection Layout

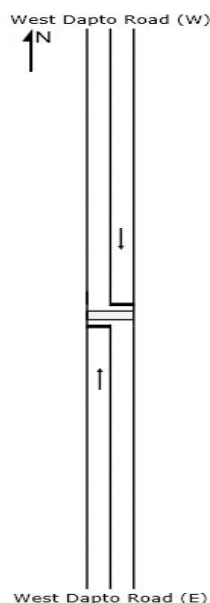


Table 4 shows the modelling queue lengths for the eastern and western approaches to the rail level crossing for the existing scenarios.

Table 4: West Dapto Road / Rail Level Crossing Intersection - Queue Lengths (Existing)

	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road (East)	48.0m	37.7m
West Dapto Road (West)	45.6m	41.9m

The Wylie Road / West Dapto Road intersection is located 370m to the west of the West Dapto Road / Rail Level Crossing intersection. The western leg of the West Dapto Road / Rail Level Crossing intersection has a maximum queue length of 45.6m, which is well below the distance to the Wylie Road intersection. The West Dapto Road / Princes Highway intersection is located 130m to the east of the West Dapto Road / Rail Level Crossing intersection. The eastern leg of the West Dapto Road / Rail Level Crossing intersection has a maximum queue length of 48.0m, which is below the distance to the Princes Highway intersection.

The West Dapto Road / Princes Highway intersection was analysed using SIDRA 6.0 intersection software. This analysis was based on AM and PM existing peak road network volumes. **Figure 3** shows the layout of the intersection.

Figure 3: West Dapto Road / Princes Highway Intersection Layout

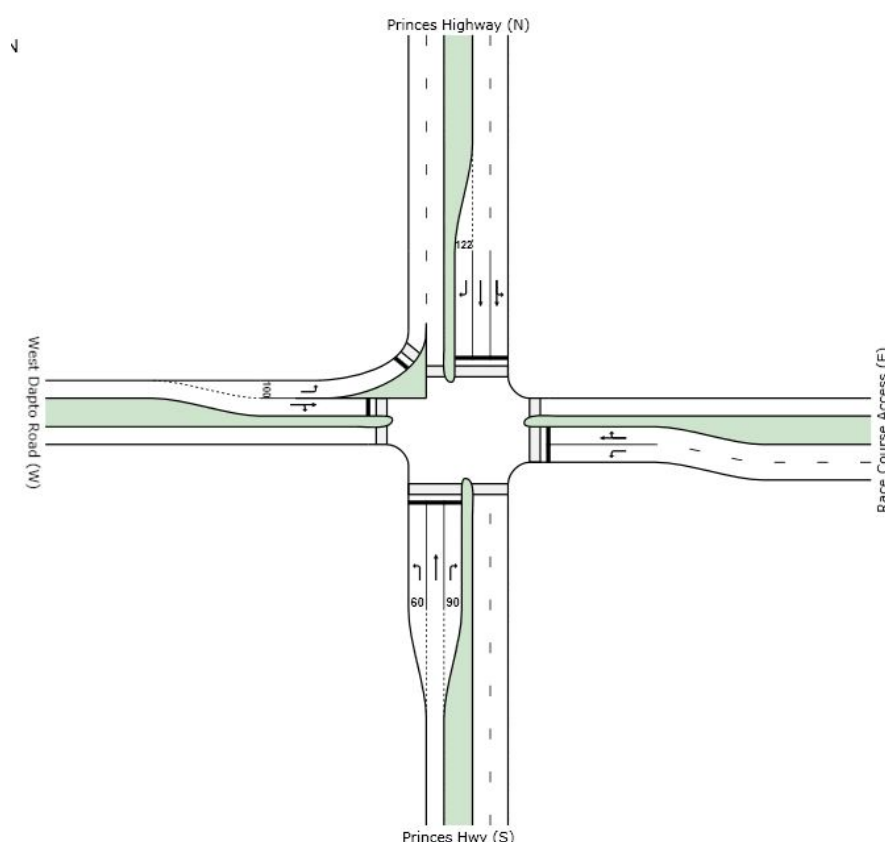


Table 5 shows the existing queue length of the West Dapto Road leg of the West Dapto / Princes Highway Intersection.

Table 5: West Dapto Road / Princes Highway Intersection – Queue Lengths (Existing)

	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road (East)	24.6	17.0

The distance of the West Dapto Road / Rail Level Crossing intersection is 130m west of the West Dapto Road / Princes Highway intersection. The West Dapto Road leg of the West Dapto Road / Princes Highway intersection has a maximum queue length of 24.6m for the 2014 AM peak. This queue length is well below the distance to the rail level crossing.

4 Proposed Development

The total daily traffic generation of the proposed expansion of Wollongong Recycling and Building Supplies development at its maximum production of 230,000 tonnes per year, which would result in an equivalent of 950 vehicles per day by the year 2015. The development is currently operating with a current production of 30,000 tonnes per year with a total of 260 vehicles per day. This existing operation would have been accounted for in the traffic tube count and surveys. Therefore, the additional traffic generated with the proposed expansion is 690 vehicles per day.

ALCAM Rating

The additional traffic generated from the Wollongong Recycling and Building Supplies development is as follows:

> 690 vehicles per day

This additional traffic generated from the proposed expansion were added to the traffic tube survey data and the committed developments (traffic generated from Prixcar site, PAC Stage 2, and PAC Stage 3). This was applied for the 7 days of the extracted data from the traffic tube count survey. The results are shown below in **Table 6**.

Table 6: Total Daily Traffic Volumes (with development)

Daily Total Traffic Volume	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Existing	5,130	5,179	5,306	5,186	5,330	4,615	3,774
Developments	690	690	690	690	690	690	690
Total	5,820	5,869	5,996	5,876	6,020	5,305	4,464

As shown above the survey data reveals that the daily traffic volumes with development are over the ALCAM rating capacity of this railway level crossing, which is 3700. However, as discussed above, the existing survey data revealed that the daily traffic volume is already near capacity of railway level crossing ALCAM rating. With the anticipated developments for future years throughout this area this rail level crossing would only have minimal capacity to accommodate these future planned developments.

Queue Lengths

The proposed traffic generation for the expansion of the Wollongong Recycling and Building Supplies development for the AM and PM peak hour is 69 vehicles (31 light vehicles and 38 heavy vehicles).

The traffic generation from proposed expansion were added to the year 2015 base plus committed development traffic flows and also to the future base scenario in the year 2025. The traffic volumes for the future 2025 scenario were calculated based on an annual growth rate of 2.5%.

An intersection analysis was undertaken for the West Dapto Road / Rail Level Crossing and West Dapto Road / Princes Highway intersections. The assessment was undertaken for the years 2015 and 2025 (10 year horizon) for the AM and PM peak hour periods. **Table 7** show the queue lengths obtained from this analysis.

Table 7: West Dapto Road / Rail Level Crossing Intersection - Queue Lengths (with Development)

2015	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road (East)	110.3	51.0
West Dapto Road (West)	59.4	102.3
2025	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road (East)	128.7	63.7
West Dapto Road (West)	74.0	119.6

The Wylie Road / West Dapto Road intersection is located 370m to the west of the West Dapto Road / Rail Level Crossing intersection. The western leg of the West Dapto Road / Rail Level Crossing intersection has a maximum queue length of 119.6m (year 2025 PM peak hour), which is well below the distance of the Wylie Road intersection. The West Dapto Road / Princes Highway intersection is located 130m from the east of the West Dapto Road / Rail Level Crossing intersection. The eastern leg of the West Dapto Road / Rail Level Crossing intersection has a queue length of 128.7m (year 2025 AM peak hour), which is below the distance of the Princes Highway intersection.

The West Dapto Road / Princes Highway intersection was analysed using SIDRA intersection software. This analysis was based on AM and PM peak periods during the years 2015 and 2025 with development. **Table 8** shows the queue lengths of the West Dapto Road leg of the West Dapto Road / Princes Highway intersection.

Table 8: West Dapto Road / Princes Highway Intersection – Queue Lengths (with Development)

2015	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road	38.7	70.2
2025	AM Peak Hour 95 th ile Queue (m)	PM Peak Hour 95 th ile Queue (m)
West Dapto Road	40.4	81.0

The distance of the West Dapto Road / Rail Level Crossing intersection is 130m west of the West Dapto Road / Princes Highway intersection. The West Dapto Road leg of the West Dapto Road / Princes Highway intersection has a maximum queue length of 81m, which is below the distance to the rail level crossing. Therefore, this would not result in queuing across the rail level crossing.

5 Conclusion

Cardno has assessed the rail level crossing and the impacts of queuing on the approaches to the rail level crossing and the queue from the West Dapto Road / Princes Highway intersection to the rail level crossing. The outcomes of this assessment are as follows:

- > The 13 October 2014 traffic tube count that was undertaken showed that the maximum daily traffic volume that crossed the rail level crossing was 3500 vehicles. This is close to the ALCAM rating capacity of this rail level crossing which has a capacity of 3700 vehicles per day. Therefore, to consider any future proposed developments in the area, further investigations and mitigations should be considered. It is recommended that continuous traffic and rail line infrastructure studies be undertaken to prevent any queuing and safety issues from arising at this location in future years.
- > The queue lengths on the approaches to the railway level crossing were sufficiently within the distances to the adjacent intersections to the east and west for the AM and PM peak periods of the years 2015 and 2025 with development.

- > The worst case AM and PM peak hour queue length from the West Dapto Road / Princes Highway intersection is 81m (year 2024 PM peak hour), which is below the distance to the rail level crossing, which is 130m away.

6 Addendum

This Traffic Impact Assessment for Wollongong Recycling and Building Supplies has shown that the 95th percentile queue lengths on the West Dapto Road leg of the West Dapto Road / Princes Highway intersection are not expected to extend as far as the rail level crossing during the AM and PM peak periods in the years 2015 and 2025. It should be noted, however, that this traffic study does not consider the traffic generated from special events at the Kembla Grange racecourse. It is expected that during the weekend special events the traffic volume generated by the Wollongong Recycling and Building Supplies development would be 25% of the weekday traffic. In the worst case of full development, the traffic volume expected to be generated during the weekend peak hour is 24 vehicles per hour. This is less than 1 vehicle per minute. A sensitivity traffic analysis showed that a 15% increase in traffic volumes in the weekday peak periods did not result in queuing across the rail level crossing. Therefore, it is anticipated that the proposed development traffic would not create a significant impact if a proper traffic management plan is implemented by the operators of the special events. This should consider deterring or minimising right turning and through movements from the West Dapto Road approach to the Princes Highway intersection during these special events.