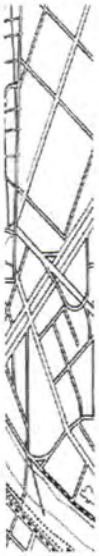
# Appendix 4
# Traffic Report



*Traffic Report*

# Proposed Mar Narsai High School / College, Horsley Park

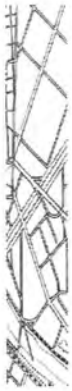
**6 August 2007**

Prepared for

**Assyrian School Limited**

Suite 20/809 Pacific Highway
Chatswood NSW 2067
**(t)** 02 9410 4100 **(f)** 02 9410 4199
**(e)** info@mwttraffic.com.au
**(w)** www.mwttraffic.com.au

MASSON | WILSON | TWINEY
TRAFFIC AND TRANSPORT CONSULTANTS



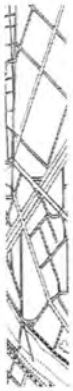
**Document:**
Title: Proposed Mar Narsai High School / College, Horsley Park
File Name: 063265r01_revised_2.doc

**Client:**
Assyrian School Limited

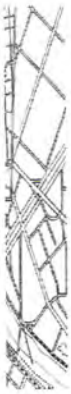
**Issue Date:**
6 August 2007

**Print Date:**
6 August 2007 12:22 PM

**Authorised by:**
Penny Dalton



# Contents



# 1. Introduction

This report has been prepared on behalf of Assyrian School Limited to present the findings of a revised traffic and transport assessment of a proposed high school and college in Horsley Road, Horsley Park.

This study has reviewed the background traffic conditions near the site, parking provision, bus access and estimated future traffic generation of the development.

The remainder of the report is set out as follows:

- Chapter 2 discusses the background traffic conditions;
- Chapter 3 reviews the traffic and parking surveys undertaken;
- Chapter 4 describes the proposed development;
- Chapter 5 examines the traffic generation and effect of the proposed development;
- Chapter 6 reviews the proposed car park and bus facilities; and
- Chapter 7 provides a summary of the investigation and presents the conclusions.

# 2. Site Location and Existing Development

## 2.1 Site Location and Land Use

The site is currently a rural residential dwelling with driveway access from Horsley Road. The location of the proposed development is shown in **Figure 1**.

Properties along Horsley Road mainly consist of rural residential dwellings. A large long day care centre has recently been constructed just east of the development site.

## 2.2 Site Inspection

A site inspection was undertaken in and around the site. This site inspection included photographing and recording the road system surrounding the proposed development site. These photographs are shown in **Appendix A** of this report.

## 2.3 Road Network

Horsley Road - is the rural collector road providing access to the M7 in the east for adjacent residential developments. Across the frontage of the site has a single travel lane in each direction and unformed shoulders. The topography of the road changes across the site to some extent. Horsley Road also forms part of the route linking Mamre Road in the west with the M7 / Wallgrove Road in the east.

Lincoln Road is a local street providing access to adjacent rural residential properties. It has a single travel lane in each direction and unformed shoulders.

## 2.4 Existing Traffic Flows

Counts of traffic movements were undertaken at the intersection of Horsley Road / Lincoln Road on a typical weekday between the hours of 7:30am – 9:00am and 2:30pm – 4:00pm. These times were chosen as they represented the peak traffic periods for the proposed development. A copy of these counts is provided in **Appendix B** of this report.

The AM and PM peak hour volumes are presented in **Figures 2**. **Table 2.1** contains a summary of existing two-way traffic flows during the peak periods for these roads.

**Table 2.1 – Existing Peak Hour Traffic Volumes (veh/hr)**

| Location | | Existing Two-Way Traffic Flows | |
|---|---|---|---|
| | | AM Peak | School PM peak* |
| Horsley Road | West of Lincoln Road | 176 | 135 |
| | East of Lincoln Road | 254 | 214 |
| Lincoln Road | South of Horsley Road | 84 | 83 |

*The PM peak for the school does not coincide with the PM peak of the surrounding road network.

From **Table 2.1** it can be seen that the roads surrounding the development are carrying traffic volumes in line with their classification.

## 2.5 Existing Intersection Operation

Intersections are the critical points which control the capacity of the road network. This is due to the need for conflicting traffic movements to share the same road space at these locations.

The intersection of Horsley Road and Lincoln Road was analysed using the Sidra Intersection Analysis intersection analysis program. Sidra Intersection Analysis determines the average delay that vehicles encounter, the degree of saturation of the intersection, and the level of service. The degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Sidra Intersection Analysis provides analysis of the operating conditions which can be compared to the performance criteria set out in Table 2.2.

**Table 2.2 – Level of Service Criteria**

| Level of Service | Average Delay per Vehicle (secs/veh) | Signals & Roundabouts | Give Way & Stop Signs |
|---|---|---|---|
| A | less than 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 |
| F | > 70 | Extra capacity required | Extreme delay, traffic signals or other major treatment required |

Adapted from RTA Guide to Traffic Generating Developments, 2002.

For roundabouts and sign posted intersections, the delay examined is the delay for the worst movement at the intersection. The results of the analysis are presented in Table 2.3. Average delay is expressed in seconds per vehicle.

**Table 2.3 – Intersection Operating Conditions**

| | | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| **Intersection** | **Control** | **Avg Delay (secs)** | **LOS** | **Avg Delay (secs)** | **LOS** |
| Horsley Road / Lincoln Road | Give Way | 8.5 | A | 8.9 | A |

Avg Delay is over all movements at signals, and for the worst movement at priority and roundabouts

From Table 2.3 it can be seen that the intersection of Horsley Road / Lincoln Road currently operates at a good level of service.

# 3. The Proposed Development

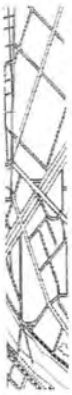
The key features of the proposed development with regards to traffic are:

- Construction of a new school with a design capacity for 600 students from years 5 – 12 plus 70 staff.
- Construction of a small on-site college premises with a maximum teaching capacity of 60 students at any one time and a maximum enrolment of 120 students.
- An off street car park with a total capacity of 96 spaces consisting of:
    - 90 general vehicle spaces
    - 2 accessible spaces
    - 3 mini bus spaces
    - 1 delivery / emergency vehicle space
- An indented bus bay which can accommodate 3 full sized buses
- Separate entry and exit driveways in Horsley Road.

The mini bus operation would provide door to door transport to / from the school for fee paying students. A similar operation currently operates at the existing feeder school. It is noted that the private bus door to door service would not be limited to the mini buses and full sized buses can also be used.

A plan showing the subject site is shown in **Appendix C**.

The exiting school at Greenfield Park would act as a feeder school to this high school.



# 4. Data Collection at St Harmizd Primary School / College

A number of parking, traffic and interview surveys were undertaken as part of the development of this report. A summary of these surveys is provided below:

## 4.1 Existing School – Greenfield Park

The St Harmizd Primary School in Greenfield Road, Greenfield Park would act as a feeder school for this new college.

The existing primary school currently caters for Kindergarten to Year 7. Following the construction of the new high school the primary school will revert to Kindergarten to Year 6.

A breakdown of the existing student numbers is provided below:

St Harmizd Primary School

- Kindergarten 81 students
- Year 1 63 students
- Year 2 60 students
- Year 3 58 students
- Year 4 59 students
- Year 5 34 students
- Year 6 24 students
- Year 7 41 students

Grand Total 420 students

The existing school / church car park have one 'entry only' and one 'exit only' driveway to Greenfield Road.

## 4.2 Existing Traffic Operations

The existing school has a traffic management plan in place for morning and afternoon peak periods. The road around the church building operates as a one-way loop. During the morning peak, a number of 90 degree spaces are converted into parallel Kiss and Drop spaces and vehicles then travel around the church building to exit the site.

In the afternoon peak, the Kiss and Ride operation is moved to Devenish Street at the rear of the school. Children are walked to waiting cars in groups. Once the buses have been loaded and left the site, parents are then able to pick up their children from the main off street car park.

## 4.3 Driveway Counts

Counts were undertaken of all vehicles that entered and exited each driveway between the hours of 7:30am – 9:00am and 2:30pm – 4:00pm. This count included recording the number of people in each vehicle to obtain vehicle occupancy statistics.

A summary of these driveway counts are presented in Table 4.1 below:

**Table 4.1- Existing School Peak Hour Traffic Generation**

| Peak Period | Inbound Vehicle Trips | Outbound Vehicle Trips |
|---|---|---|
| 8:00am – 9:00am | 223 | 173 |
| 2:50pm – 3:50pm | 120 | 142 |

From Table 4.1 it is noted there is some 22 vehicles difference between inbound and outbound vehicle trips in the afternoon, which is likely to be due to teachers. The difference in the morning peak between inbound and outbound trips is greater due to observed church activity during this time.

Therefore for the purpose of modelling, the existing school teachers generate 22 inbound and outbound trips in the morning and afternoon peak periods respectively.

## 4.4 Existing Mode Share

The number of people in each vehicle which entered and exited the main car park was recorded to determine the average vehicle occupancy for the school.

Between the hours of 7:30am – 9:00am, 589 people (including drivers) were recorded entering the school in 223 cars and 230 people were recorded to leave in 173 cars, a difference of 359 people.

Between the hours of 2:30pm – 4:00pm, 168 people (including drivers) were recorded entering the school in 120 cars and 368 people were recorded to leave in 142 cars, a difference of 200 people.

For inbound trips in the AM peak, the average vehicle occupancy was 2.10 persons per vehicle. For the outbound trips in the PM peak, the average vehicle occupancy was 1.32 persons per vehicle.

100 students were recorded catching the bus out of a total of 420 students. Also 15 students were recorded walking to / from the school.

Therefore the existing mode share of the school is summarised in Table 4.2

**Table 4.2 - Existing School Survey Results**

| Students | Car Drop Off / Pick Up | Car Driver | Bus | Bicycle | Walk |
|---|---|---|---|---|---|
| 420* | 73.8% | 0.0% | 23.8% | 0.0% | 3.6% |

*Assumed conservatively that all students attended school on the day of the survey whereas there would be a proportion of students on sick leave etc.

It should be noted that the buses are operated privately with parents paying an annual fee.

# 5. Traffic Impacts of the Proposed Development

## 5.1 Previous Traffic Impact Assessment Report

The traffic report[1] submitted previously assumed the following:

- The estimated the vehicle occupancy for the new school would be 1.15 students per vehicle.
- 200 out of the 600 students would travel by bus (33%).
- The school would generate 228 inbound and outbound passenger vehicle trips associated with parent set down / pick up activities during both the morning and afternoon peak periods.
- The school would generate 30 inbound trips in the morning and 30 outbound trips in the afternoon associated with staff travel.
- The school would generate 4 inbound and outbound bus trips in both peak periods.

## 5.2 Review of Similar Schools

As part of previous work undertaken by this firm, surveys of other schools in greenfield areas have been used to provide a comparison for traffic generation calculations. The schools surveyed, whilst in Port Macquarie, were regional schools located some distance from the nearest built up residential area and therefore provide a good comparison.

The information was gathered from interview surveys of all students which attended these schools. The schools surveyed were:

- St Josephs High School (Years 7-10)
- Mary Mackillop College (Years 11-12)

A summary of the information collected from the personal mode of travel surveys is presented below:

[1] TIS Report Proposed Assyrian Secondary School & Chapel – Thompson Stanbury Associates December 2005

**Table 5.1 – Other Schools Survey Results**

| School | Years | Students Surveyed | Car Drop Off / Pick Up | Car Driver | Bus | Bicycle / Walk |
|---|---|---|---|---|---|---|
| St. Joseph Regional | 7-10 | 513 | 44.8% | 0.0% | 47.2% | 8.0% |
| Mary MacKillop | 11-12 | 250 | 30.4% | 34.8% | 30.0% | 4.8% |

From Table 5.1 it is observed the high school students are much more likely to catch a bus to school. Also, some older students would drive to school which in turn would add to the traffic generation of the school.

Assuming no students would walk to the new school but arrive as a passenger of a vehicle and an even proportion of students per year, applying the mode share of similar schools surveyed would result in the following traffic generation as summarised in Table 5.2:

**Table 5.2 – Traffic Generation based on surveys of similar schools**

| School | No of Students | Car Drop Off / Pick Up | Car Driver | Bus | Bicycle / Walk |
|---|---|---|---|---|---|
| Year 7 | 100 | 53 (52.8%) | 0.0% | 47 (47.2%) | 0.0% |
| Year 8 | 100 | 53 (52.8%) | 0.0% | 47 (47.2%) | 0.0% |
| Year 9 | 100 | 53 (52.8%) | 0.0% | 47 (47.2%) | 0.0% |
| Year 10 | 100 | 53 (52.8%) | 0.0% | 47 (47.2%) | 0.0% |
| Year 11* | 100 | 53 (52.8%) | 0.0% | 47 (47.2%) | 0.0% |
| Year 12 | 100 | 35 (35.2%) | 35 (34.8%) | 30 (30.0%) | 0.0% |
| **Traffic Generated** | | **300** | **35** | **---** | |

*Only a very small number of Year 11 students would have access to a car and be old enough to obtain a licence. It has been assumed that their travel mode would mirror Years 7-10 students.

From Table 5.2 it is observed the students of the new school at ultimate occupation would generate some 300 inbound and outbound trips associated with parent drop off / pick up activities. Also, 35 trips inbound in the morning and outbound in the afternoon associated with Year 12 students. The forecast traffic generation from Table 5.2 is similar to previous estimates.

For the college component, 60 students would arrive and depart during the morning and afternoon school peak periods. The remaining 60 students would attend classes in the evening similar to a community college type of operation.

The college students would be considered first year tertiary education students and for the purpose of traffic generation calculations, their travel behaviour has been assumed to mirror Year 12 students. The model split for Year 12 students listed in Table 5.2 has been applied to the 60 college students which would attend during the day.

The college is therefore expected to generate the following as shown in Table 5.3.

**Table 5.3 – Daytime Traffic Generation of College Component**

| School | No of Students | Car Drop Off / Pick Up | Car Driver | Bus | Bicycle / Walk |
|---|---|---|---|---|---|
| College | 60 | 18 (30.4%) | 21 (34.8%) | 21 (30.0%) | 0.0% |

Therefore for modelling purposes the following traffic generation has been adopted as summarised in Table 5.4.

**Table 5.4 - Total Expected School / College Peak Hour Traffic Generation.**

| Component | Inbound AM Trips | Outbound AM Trips | Inbound PM Trips | Outbound PM Trips |
|---|---|---|---|---|
| Years 7-11 | 265 | 265 | 265 | 265 |
| Year 12 passengers | 35 | 35 | 35 | 35 |
| Year 12 drivers | 35 | 0 | 0 | 35 |
| College passengers | 18 | 18 | 18 | 18 |
| College Drivers | 21 | 0 | 0 | 21 |
| Teachers* | 35 | 0 | 0 | 35 |
| Buses | 5 | 5 | 5 | 5 |
| **Total** | **409 cars + 5 buses** | **323 cars + 5 buses** | **323 cars + 5 buses** | **409 cars + 5 buses** |

*Assumes 50% of teachers would arrive and depart during school peak periods.

The traffic generation for each peak period shown in Table 5.4 is considered a conservative estimate for the school. The traffic generation has been estimated based on mode share surveys of other schools. However, it has not accounted for students starting early or finishing late, students away due to illness and that all students would not arrive and depart within a single hour.

## 5.3 Trip Distribution

It is envisaged a large majority of students travelling to / from the new school would be from the east (Fairfield LGA). For modelling purposes, the following trip distribution has been adopted:

- 85% of inbound trips would travel to / from Horsley Road east
- 15% of generated trips would travel to / from Horsley Road west

## 5.4 Future Traffic Volumes

The traffic volumes from the proposed school were added to the traffic volumes recorded on the existing road system using the distribution presented in Section 5.3.

Table 5.5 contains a summary of future traffic flows during peak periods on the surrounding road network so estimated. Figure 3 shows the flows diagrammatically.

**Table 5.5 - Existing and Future Traffic Volumes**

| Location | | AM Peak | | School PM Peak | |
|---|---|---|---|---|---|
| | | Existing | Future | Existing | Future |
| Horsley Road | West of Lincoln Road | 176 | 799 | 135 | 758 |
| | East of Lincoln Road | 254 | 877 | 214 | 837 |
| | West of School Entrance | 176 | 282 | 135 | 242 |
| Lincoln Road | South of Horsley Road | 84 | 84 | 83 | 83 |

From Table 5.5 it can be seen that traffic volumes in Horsley Road would increase markedly in the future following the development of the school.

### 5.4.1 *Horsley Road Lane Capacity*

Austroads Guide to Engineering Practice – Roadway Capacity provides the following formula to calculate the lane capacity of a single lane rural road:

$$C = 1{,}800 f_w f_{HV}$$

Where:

C = capacity in vehicles per hour under prevailing roadway and traffic conditions

$f_w$ = adjustment factor for narrow lanes and lateral clearances

$f_{HV}$ = adjustment factor for heavy vehicles

Calculations for this lane capacity analysis can be found in **Appendix D** of this report.

Applying the formula results in an estimated lane capacity of 1,409 vehicles per hour. As the future traffic flows would be some 60% of the estimated lane capacity of Horsley Road, Horsley Road would satisfactorily accommodate the future traffic flows generated by the school, with spare capacity.

## 5.5 Future Intersection Performance

The operation of the intersection of Horsley Road / Lincoln Road along with the proposed access to the school have been reanalysed for the increased traffic loads. Table 5.6 presents the results of this analysis.

**Table 5.6 - Existing and Future Intersection Performance**

| Intersection | Existing AM Peak | | Future AM Peak | | Existing School PM Peak | | Future School PM Peak | |
|---|---|---|---|---|---|---|---|---|
| | Avg Delay | LOS | Avg Delay | LOS | Avg Delay | LOS | Avg Delay | LOS |
| Horsley Road / Lincoln Road | 8.5 | A | 26 | B | 8.9 | A | 26 | B |
| School Access / Horsley Road | N/A | N/A | 19 | B | N/A | N/A | 17 | B |

Avg Delay is over all movements at signals, and for the worst movement at priority and roundabouts

From Table 5.6 it can be seen that whilst traffic flows in Horsley Road would increase markedly, the adjacent intersection of Horsley Road / Lincoln Road along with the proposed school access would operate with a satisfactory level of service in the future. Therefore from an intersection operation prospective, the traffic impacts of the proposed development are considered acceptable.

It is noted from the intersection modelling the delay for the worst movement was the right turn into Lincoln Road for traffic travelling eastbound along Horsley Road. The traffic counts at this intersection recorded two vehicles in the AM peak and zero vehicles in the PM peak undertaking this movement. It is also noted that the remaining movements at the intersection operate at a Level of Service A during both peak periods in the future.

Whilst the school access operates with a good level of service, a right turn bay should be provided for vehicles turning right into the site travelling westbound In Horsley Road. The need to provide a right turn bay is based on the expected large volume of vehicles turning right into the site.

As adjacent intersections continue to operate with a satisfactory level of service and lane capacity in Horsley Road is not exceeded, the traffic impacts of the proposed school are considered acceptable.

# 6. Parking, Access and Internal Layout

## 6.1 Fairfield Council Parking DCP

Council's DCP for Parking recommends the following parking rates which are applicable to this development:

School

- 1 space per employee, plus
- 1 space per 10 students in Year 12

Tertiary Institute or Technical College

- 1 space per employee plus
- 1 space per 5 students

Assuming 70 employees, 100 students in Year 12 and 60 students attending college classes during the day at ultimate development, the development as a whole would require 92 spaces. As the development proposes 92 general parking spaces, the parking provision is considered satisfactory.

## 6.2 Access

The proposed access driveways will serve both the off street car park and the bus bays. Turning path analysis of the driveways and bus bays was undertaken using AutoTURN. These turning paths are shown in Figure 4 of this report. The proposed driveway and access driveways are considered satisfactory.

## 6.3 Bus Parking Area

The bus parking area was reviewed for its compliance with the State Transit Bus Stop Style Guide. This review found the bus parking area can accommodate two full sized buses acting independently or three full sized buses acting in tandem. On site parking for three 22 seater buses has also been provided within the main car park.

From Table 5.2 it is estimated some 248 students would travel by bus. The proposed three full sized bus bays which can carry some 150 students for each three bus loads and 66 students per each three mini bus loads are considered adequate to service the school.

## 6.4 Internal Layout

The staff parking area would be considered Class 1 parking in accordance with the Australian Standard for off street parking facilities (AS2890.1) and therefore 2.4m wide spaces with 6.2m wide aisles adjacent should be provided.

The spaces set aside for parents would be classified as Class 3A parking in accordance with AS2890.1. Therefore 2.6m wide spaces with 6.6m wide aisles should be provided.

As with the existing school at Greenfield Park, the row of 90 degree spaces along the northern boundary of the car park would operate as parallel "Kiss and Ride' spaces. This allows vehicles to pull up to the kerb and drop off and pick up children in a one-way loop arrangement without the parent leaving their vehicle. This minimises time taken to park vehicles and allows the bump in / out of students to occur more quickly.

All parking spaces and aisles have been reviewed for their compliance with the Australian Standard and were found to be satisfactory.

# 7. Conclusions

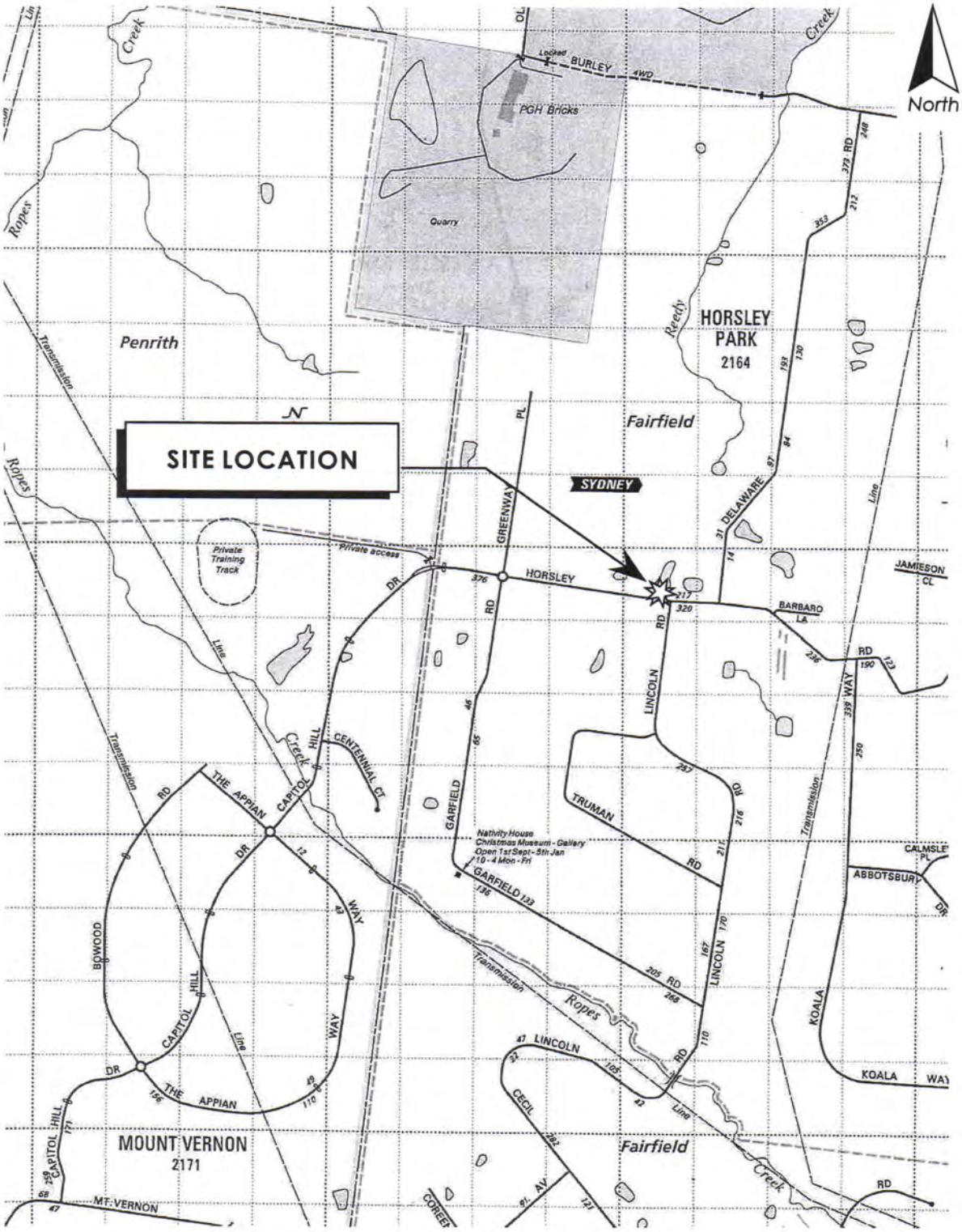
This report has examined the traffic implications of a proposed High School in Horsley Road, Horsley Park. The findings of the investigation are summarised below:

- The proposed school would generate some additional 723 peak hour vehicle trips (two way) in Horsley Road.
- The traffic generation estimate is considered conservative as it has not accounted for students starting early / leaving late, students away because of illness or that all students would not arrive / depart in a single hour.
- Analysis of expected future traffic volumes in Horsley Road has found the road can accommodate this additional traffic demand.
- The intersection of Horsley Road / Lincoln Road would continue to operate with a satisfactory level of service in the future.
- A right turn bay into the site should be provided for traffic travelling westbound in Horsley Road.
- The proposed car park provides parking in accordance with Council's DCP and is considered adequate to accommodate all parking needs off street.
- The proposed access arrangements for the new school are considered appropriate and can accommodate the turning manoeuvres of large buses.

Overall the potential traffic of the proposed development is considered to be satisfactory.

# SITE LOCATION

## PROPOSED MAR NARSAI HIGH SCHOOL




MASSON | WILSON | TWINEY
TRAFFIC AND TRANSPORT CONSULTANTS

**Figure 1**

**Filename:** 063265di01.ai

**Date:** 12 January 2007

# NG TRAFFIC FLOWS

## ARSAI HIGH SCHOOL


**Key**

5: AM Peak (8:00 - 9:00am)

(5): PM Peak (2:40 - 3:40pm)

MASSON | WILS(

TRAFFIC AND TRANSPO

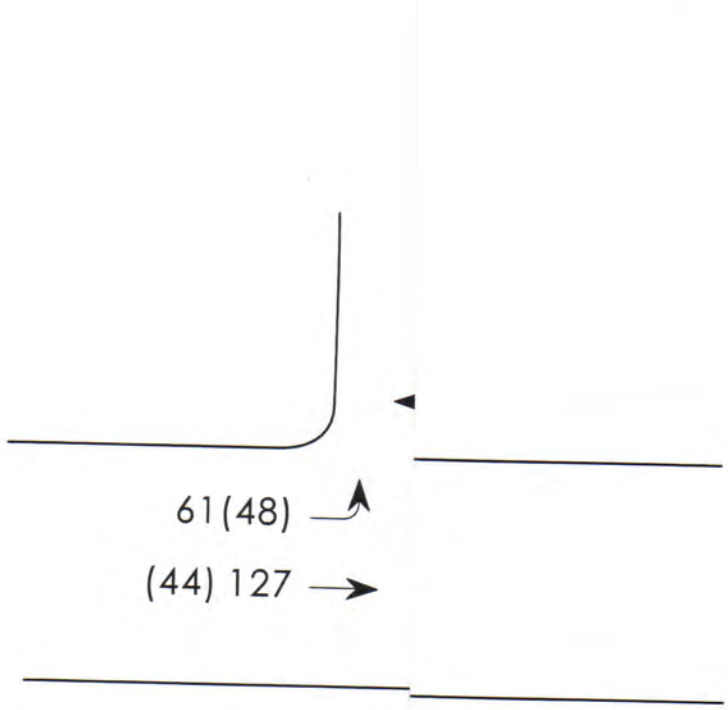
**Figure 2**

**Filename:** 063265di02ai

**Date:** 12 January 2007

# RE TRAFFIC FLOWS

## ARSAI HIGH SCHOOL




**Key**

5: AM Peak (8:00 - 9:00am)

(5): PM Peak (2:40 - 3:40pm)

MASSON | WILSO

TRAFFIC AND TRANSPO

**Figure 3**

**Filename:** 063265di03ai

**Date:** 12 January 2007

# SITE INSPECTION

## MAR NARSAI HIGH SCHOOL, HORSLEY PARK

**Horsley Road** 01

Looking west towards Lincoln Road

**Horsley Road** 02

Looking east

# SITE INSPECTION

## MAR NARSAI HIGH SCHOOL, HORSLEY PARK

**Lincoln Road** 03

Looking north towards Horsley Road

**Horsley Road** 04

Looking east across site frontage

# SITE INSPECTION

## MAR NARSAI HIGH SCHOOL, HORSLEY PARK

**Horsley Road**

05

Looking west from proposed entry driveway location

# Appendix B - Intersection Counts


Count

To

Dean Brodie

at Masson Wilson Twiney

your results for

Prairiewood Parking & Counts

supplied by

R.O.A.R. DATA Pty. Ltd.

www.roardata.com.au

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847, Fax 88196849, Mob.0418-239019

Client :Masson Wil[illegible]Twiney

Job No/Name :1627 Prairiewood Parking & Counts

Day/Date :Monday 11th December 06

**All Vehicles**

| | WEST | | SOUTH | | EAST | | |
|---|---|---|---|---|---|---|---|
| | *Horsley Rd* | | *Lincoln Rd* | | *Horsley Rd* | | |
| **Time Per** | **T** | **R** | **L** | **R** | **L** | **T** | **TOTAL** |
| 0730 - 0745 | 42 | 0 | 0 | 11 | 2 | 3 | **58** |
| 0745 - 0800 | 33 | 0 | 1 | 10 | 1 | 5 | **50** |
| 0800 - 1815 | 33 | 0 | 1 | 11 | 3 | 11 | **59** |
| 0815 - 0830 | 29 | 2 | 0 | 7 | 7 | 7 | **52** |
| 0830 - 0845 | 36 | 0 | 0 | 15 | 5 | 10 | **66** |
| 0845 - 0900 | 29 | 0 | 0 | 20 | 13 | 18 | **80** |
| **Period End** | **202** | **2** | **2** | **74** | **31** | **54** | **365** |

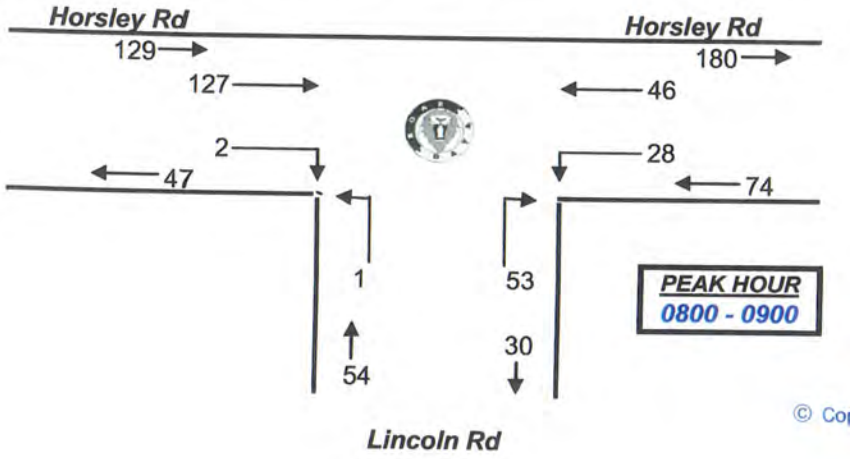
**All Vehicles**

| | WEST | | SOUTH | | EAST | | |
|---|---|---|---|---|---|---|---|
| | *Horsley Rd* | | *Lincoln Rd* | | *Horsley Rd* | | |
| **Time Per** | **T** | **R** | **L** | **R** | **L** | **T** | **TOTAL** |
| 1430 - 1445 | 6 | 0 | 0 | 3 | 7 | 13 | **29** |
| 1445 - 1500 | 19 | 0 | 0 | 9 | 7 | 19 | **54** |
| 1500 - 1515 | 11 | 0 | 0 | 9 | 9 | 19 | **48** |
| 1515 - 1530 | 8 | 0 | 2 | 4 | 13 | 29 | **56** |
| 1530 - 1545 | 14 | 0 | 0 | 7 | 13 | 22 | **56** |
| 1545 - 1600 | 11 | 0 | 0 | 11 | 15 | 19 | **56** |
| **Period End** | **69** | **0** | **2** | **43** | **64** | **121** | **299** |

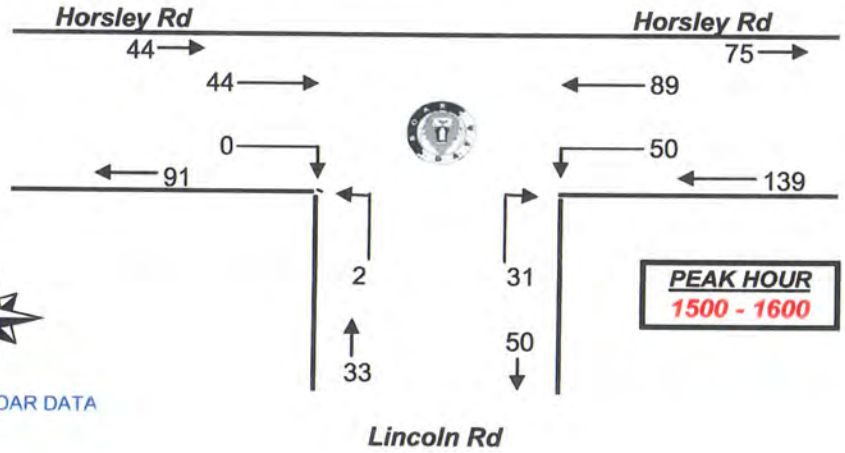
| | WEST | | SOUTH | | EAST | | |
|---|---|---|---|---|---|---|---|
| | *Horsley Rd* | | *Lincoln Rd* | | *Horsley Rd* | | |
| **Peak Per** | **T** | **R** | **L** | **R** | **L** | **T** | **TOTAL** |
| 0730 - 0830 | 137 | 2 | 2 | 39 | 13 | 26 | **219** |
| 0745 - 0845 | 131 | 2 | 2 | 43 | 16 | 33 | **227** |
| **0800 - 0900** | 127 | 2 | 1 | 53 | 28 | 46 | **257** |

| | WEST | | SOUTH | | EAST | | |
|---|---|---|---|---|---|---|---|
| | *Horsley Rd* | | *Lincoln Rd* | | *Horsley Rd* | | |
| **Peak Per** | **T** | **R** | **L** | **R** | **L** | **T** | **TOTAL** |
| 1430 - 1530 | 44 | 0 | 2 | 25 | 36 | 80 | **187** |
| 1445 - 1545 | 52 | 0 | 2 | 29 | 42 | 89 | **214** |
| **1500 - 1600** | 44 | 0 | 2 | 31 | 50 | 89 | **216** |

| PEAK HR | 127 | 2 | 1 | 53 | 28 | 46 | 257 |
|---|---|---|---|---|---|---|---|



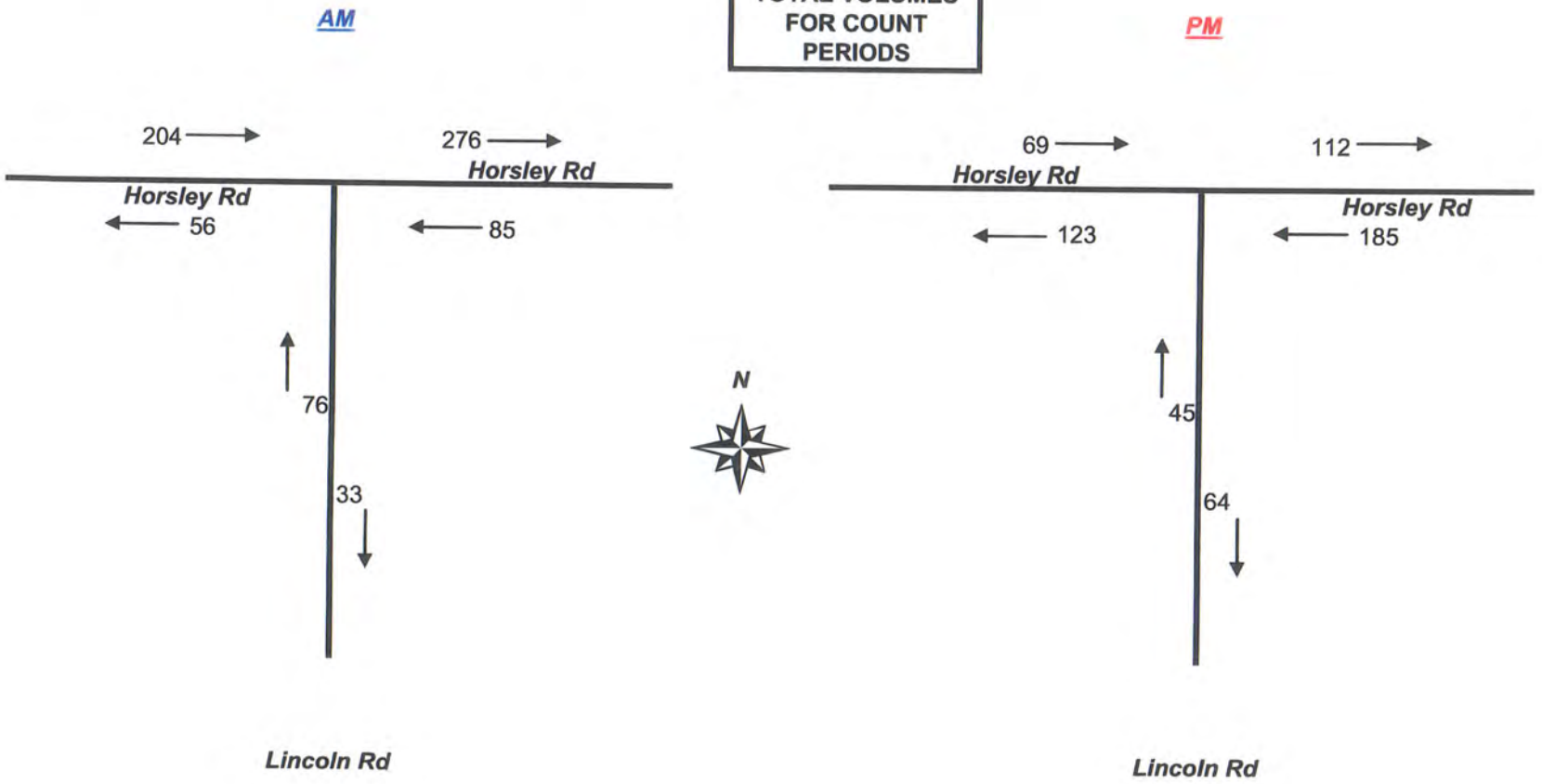

| PEAK HR | 44 | 0 | 2 | 31 | 50 | 89 | 216 |
|---|---|---|---|---|---|---|---|



**R.O.A.R DATA**
***Reliable, Original & Authentic Results***
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :Masson Wilson Twiney
Job No/Name :1627 Prairiewood Parking & Counts
Day/Date :Monday 11th December 06

**TOTAL VOLUMES FOR COUNT PERIODS**

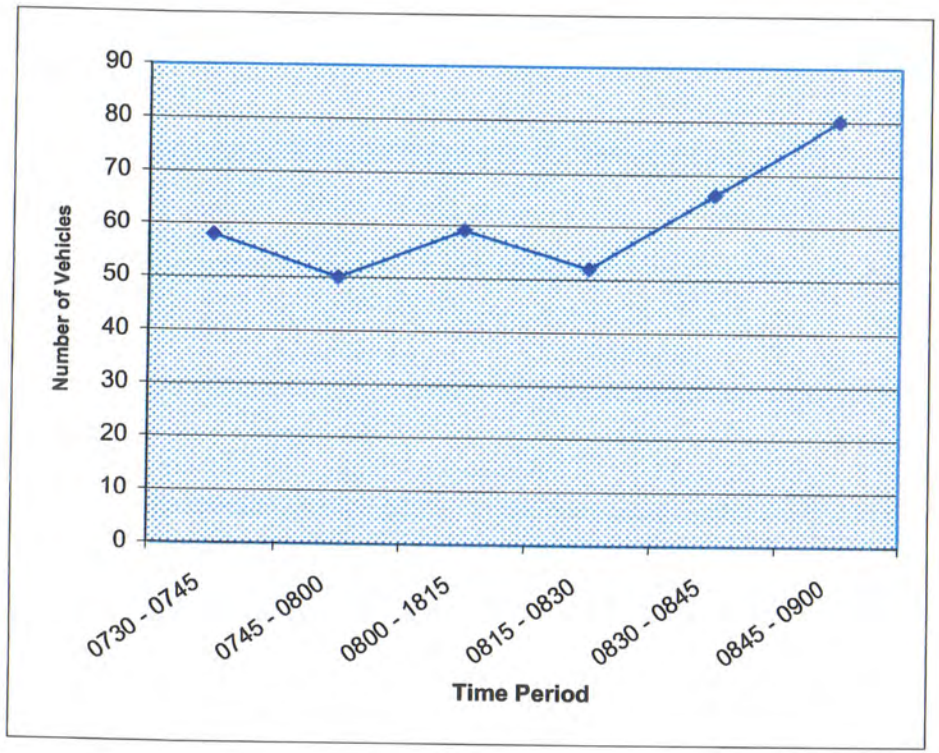


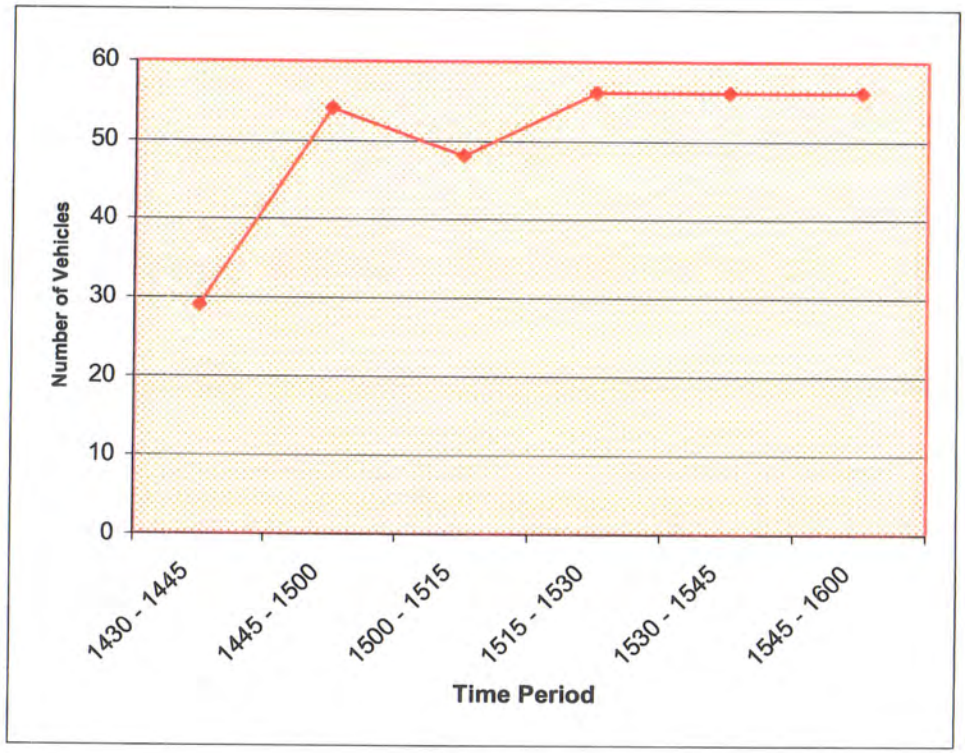
**R.O.A.R DATA**
***Reliable, Original & Authentic Results***
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :Masson Wilson Twiney
Job No/Name :1627 Prairiewood Parking & Counts
Day/Date :Monday 11th December 06

***AM*** ***PM***

***Horsley & Lincoln***



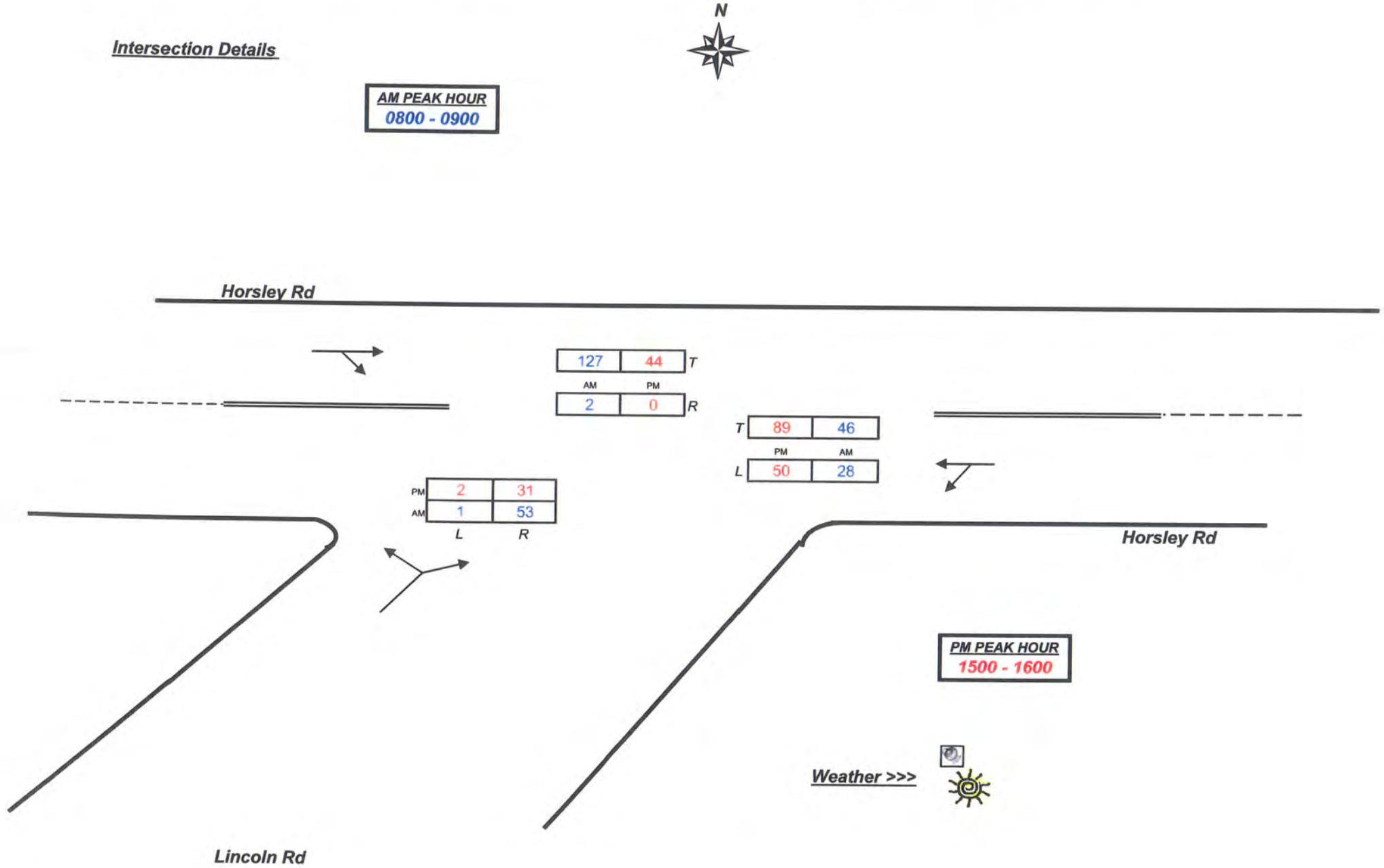



**R.O.A.R. DATA**
***Reliable, Original & Authentic Results***
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : sson Wilson Twiney
Job No/Name : 1627 Prairiewood Parking & Counts
Day/Date : Monday 11th December 06

***Intersection Details***

***AM PEAK HOUR***
***0800 - 0900***




***PM PEAK HOUR***
***1500 - 1600***

***Weather >>>***

# Appendix C - Site Plan








**LEGEND**

- New Tree
- Hard Landscape
- Turf
- Embankment
- Roof 01- Metal sheet roofing
- Fence
- Boundary

| ISSUE | DATE | REVISION |
|---|---|---|
| C | 26/2/13 | Client Issue |
| B | 20/2/13 | Client Issue |
| A | 31/1/13 | Council Review |

0mm 50mm 100mm

DO NOT SCALE FROM DRAWING, USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION.

pmdl ARCHITECTURE INTERIORS MASTERPLANNING

**PMDL Architecture + Design Pty Ltd**
Andrew Pender 5317 David Morris 5965
Peter Doddrell 5134

**Sydney**
Phone: + 61 2 8458 5500
**Melbourne**
Phone: + 61 3 9427 8885
**Hong Kong**
Phone: +852 2 2836 6992

www.pmdl.com.au

PROJECT
**Mar Narsai Assyrian College**

CLIENT
**Assyrian School Ltd**

DRAWING
**Site Plan**

CLIENT REF & CONTACT
217-233 Horsley Rd, Horsley Park NSW

| DATE | DRAWN | PROJECT# | DWG# | REVISION |
|---|---|---|---|---|
| 26.02.13 | JC | 2305 | SK100a | C |
| SCALE 1:500@A1 | CHKD VVD | | | |

# Appendix D - Lane Capacity Calculations

Austroads Guide to Engineering Practice – Roadway Capacity provides the following formula to calculate the lane capacity of a single lane rural road:

$$C = 1{,}800 f_w f_{HV}$$

Where:

C = capacity in vehicles per hour under prevailing roadway and traffic conditions

$f_w$ = adjustment factor for narrow lanes and lateral clearances as per the following table

| Lateral Clearances on each side (m) | Lane Width 3.7m | 3.2m | 2.7m |
|---|---|---|---|
| 2 | 1.00 | 0.90 | 0.70 |
| 1 | 0.90 | 0.80 | 0.63 |
| 0 | 0.65 | 0.60 | 0.50 |

$f_{HV}$ = adjustment factor for heavy vehicles

$$= \frac{1}{1 + [P_{HV}(E_{HV}-1)]}$$

Where:

$P_{HV}$ = the proportion of heavy vehicles in the traffic stream , expressed as a decimal

$E_{HV}$ = the average passenger car equivalents for heavy vehicles obtained from the table below:

| Grade | Passenger Car Equivalents |
|---|---|
| Level | 2.0 |
| Moderate | 4.0 |
| Long Sustained | 8.0 |

Applying the following factors:

- Assumed 5% heavy vehicles
- Measured lane width of 3.2m with lateral clearance of 2.0m
- Moderate grade

Therefore C = 1,409