



23.05.2012

Precise Planning  
Attn: Jeff Bulfin  
152 Sailors Bay Road  
Northbridge, NSW, 2063

Dear Jeff,

**RE: PRELIMINARY TRAFFIC ASSESSMENT –  
REZONING PROPOSAL, TAHMOOR SOUTH BUSINESS DEVELOPMENT LANDS, LOT 2 DP  
874556, 2710 REMEMBRANCE DRIVEWAY, TAHMOOR, NSW**

#### SCOPE

We have prepared this preliminary traffic assessment to support a rezoning proposal at the above site. Study aims are as follows:

1. Prepare traffic generation estimates for a range of land-use scenarios.
2. In respect of each land-use scenario, provide comment on:
  - a. Remembrance Driveway traffic volume impacts between the site and River Road.
  - b. Safety impacts at the school zone on Remembrance Driveway north of the site.
  - c. Impacts on pedestrian safety and accessibility at Tahmoor shopping precinct.
  - d. Indicative crossing location and type to Remembrance Driveway.

#### TRAFFIC GENERATION

Three preliminary land-use scenarios have been considered:

Scenario 1 – 50 bed hospital, medical centre and ancillary works.

Scenario 2 – Light industrial sub-division with roads and drainage reserves.

Scenario 3 – Large hardware store (e.g. Bunnings or similar) and landscape supplies.

Traffic loads for each scenario has been estimated from NSW RTA (2002) and US ITE (2003) as well as a number of assumptions (Table 1) and are provided in Table 2.

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**Table 1:** Assumptions and factors used in determining traffic generation rates by land-use scenario.

| Element                                     | Scenario 1                        | Scenario 2            | Scenario 3             |
|---------------------------------------------|-----------------------------------|-----------------------|------------------------|
| Developable Land                            | 4.5 ha                            | 4.5 ha                | 4.5 ha                 |
| Building GFA (m <sup>2</sup> ) <sup>4</sup> | 3,400 <sup>1</sup>                | 18,900 <sup>2</sup>   | 6,500 <sup>3</sup>     |
| Hospital Beds                               | 50                                | na                    | na                     |
| Landscape Supplies (m <sup>2</sup> )        | na                                | na                    | 18,000                 |
| AM/PM Peak Rates (VPH) <sup>5</sup>         | RTA (2002)                        | ITE (2003)            | RTA (2002)             |
| Weekday Generation (ADT) <sup>6</sup>       | ITE (2002), Estimate <sup>7</sup> | Estimate <sup>8</sup> | Estimate <sup>9</sup>  |
| Weekend Generation (ADT) <sup>6</sup>       | As above                          | As above              | Estimate <sup>10</sup> |
| Adopted Heavies (%)                         | 5                                 | 20                    | 32                     |

**Notes:**

- <sup>1</sup> Includes 2,500 m<sup>2</sup> for hospital and 900 m<sup>2</sup> for medical centre which includes medical practice, pharmacy, gift shop, cafe, dental unit, pathology and consulting rooms.
- <sup>2</sup> Site area less 30 % for roads and infrastructure and 60 % of lot area as GFA floor area.
- <sup>3</sup> Warehouse size estimate.
- <sup>4</sup> GFA = Ground floor area.
- <sup>5</sup> VPH = peak vehicles per hour rate.
- <sup>6</sup> ADT = Average Daily Traffic (vehicles/day).
- <sup>7</sup> Hospital: 0.189 x GFA. Medical Centre: 0.458 x morning peak rate x 12 hours + 0.375 x afternoon peak rate x 12 hours.
- <sup>8</sup> 0.52 x peak hourly rate x 10 hours site operation.
- <sup>9</sup> Hardware: 0.53 x peak hourly rate (weekday) x 10 hours operation. Landscape Supplier: 0.48 x peak hourly rate (weekday) x 10 hours site operation.
- <sup>10</sup> Hardware: 0.53 x peak hourly rate (weekend) x 10 hours operation. Landscape Supplier: 0.48 x peak hourly rate (weekend) x 10 hours site operation.

**Table 2:** Traffic generation rates by land use scenario.

| Element                  | Scenario 1 | Scenario 2 | Scenario 3 |
|--------------------------|------------|------------|------------|
| Weekday AM Peak (VPH)    | 110        | 206        | 346        |
| Weekday PM Peak (VPH)    | 109        | 219        | 346        |
| Weekend AM Peak (VPH)    | 110        | 206        | 612        |
| Weekend PM Peak (VPH)    | 109        | 219        | 612        |
| Weekday Generation (ADT) | 1,344      | 1,140      | 1,740      |
| Weekend Generation (ADT) | 1,344      | 1,140      | 3,152      |

**IMPACTS ON EXISTING LOCAL TRAFFIC VOLUMES.**

Reference traffic data relied upon are contained in Gabites Porter (2010) and GHD (2011) with approximate traffic counter positions provided in Attachment A. The following route assumptions were made in relation to each land-use scenario:

1. 90% of site traffic will be to or from the north (Tahmoor).
  - a. During AM, 70 % will be southbound and 30 % northbound
  - b. During PM, 30 % will be southbound and 70 % northbound
2. 10% of site traffic will be to or from the south (Bargo).

- For peak daily traffic volumes, 50% of existing traffic on Remembrance Drive is assumed to be travelling in each direction, as no data is provided to indicate direction of traffic.

Projected peak hourly volumes (VPH) and daily traffic load (ADT) are provided in Table 3 and Table 4.

**Table 3:** Existing and projected peak hourly traffic volumes for Remembrance Drive (at the site).

| Direction  | Time of Day | Existing Conditions <sup>1</sup> | Scenario 1 | Scenario 2 | Scenario 3 |         |
|------------|-------------|----------------------------------|------------|------------|------------|---------|
|            |             |                                  |            |            | Weekday    | Weekend |
| Northbound | AM Peak     | 452                              | 482        | 508        | 545        | 617     |
|            | PM Peak     | 388                              | 457        | 526        | 606        | 774     |
|            | Interpeak   | 558                              | 588        | 696        | 776        | 944     |
| Southbound | AM Peak     | 337                              | 406        | 467        | 555        | 723     |
|            | PM Peak     | 516                              | 545        | 575        | 609        | 681     |
|            | Interpeak   | 673                              | 742        | 732        | 766        | 838     |

**Notes:** <sup>1</sup> Gabites Porter (2010).

**Table 4:** Existing and projected daily traffic volumes for Remembrance Drive (at the site).

| Direction         | Existing Conditions <sup>1</sup> | Scenario 1   | Scenario 2   | Scenario 3    |               |
|-------------------|----------------------------------|--------------|--------------|---------------|---------------|
|                   |                                  |              |              | Weekday       | Weekend       |
| Northbound        | 4,366                            | 4,971        | 4,879        | 5,149         | 5,784         |
| Southbound        | 4,367                            | 4,972        | 4,880        | 5,150         | 5,785         |
| <b>Total</b>      | <b>8,733</b>                     | <b>9,943</b> | <b>9,759</b> | <b>10,299</b> | <b>11,570</b> |
| Heavy Traffic (%) | 6.25                             | 6.20         | 7.93         | 10.71         | 13.44         |

**Notes:** <sup>1</sup> GHD (2011).

Our comments in relation to the above are as follows:

- Hourly traffic volume increases for Scenario 1 are generally of the order of 5 – 20%, with daily traffic volume estimated to increase by approximately 14%. Heavy traffic is likely to decrease as a percentage of total traffic as a hospital / medical centre development is not expected to generate much heavy traffic.
- Hourly traffic volume increases for Scenario 2 are generally of the order of 10 – 40%, with daily traffic volume estimated to increase by approximately 12%. Results indicate that most of the daily traffic will be arriving / leaving during peak hour periods, which is expected for a light industrial sub-division. Heavy traffic would be expected to increase marginally, however, this would be dependent on the types of industry in the sub-division.
- Hourly traffic volume increases for Scenario 3 are generally of the order of 20 – 65% for weekday conditions and 30 – 115% for weekend conditions. Daily traffic volumes are estimated to increase by approximately 18% for weekday conditions and approximately 32% for weekend conditions. Heavy traffic would be expected to increase significantly as a percentage of total traffic, due to truck movements to and from the landscaping supplier as well as the hardware store.

## IMPACTS ON EXISTING LOCAL TRAFFIC CONDITIONS

Impacts on existing local traffic conditions are assessed based on the above estimated increases in traffic volumes as a result of the development. Impacts are considered in terms of Level of Service (LOS) for Remembrance Drive as well as general comments on pedestrian safety at the school zone and shopping precinct.

### Level of Service (LOS)

LOS for Remembrance Drive for existing and proposed conditions are summarised below and are based on the directional peak hour flows given above and the qualitative measure for LOS of urban roads with one lane in each direction given in Austroads (2009).

**Table 5:** Level of Service for urban roads - peak hour flows per direction.

| Level of Service | One Lane (VPH) | Average Travel Speed (km/hr) –<br>Posted Speed 80 km/hr |
|------------------|----------------|---------------------------------------------------------|
| A                | 200            | > 72                                                    |
| B                | 380            | >56 – 72                                                |
| C                | 600            | >40 – 56                                                |
| D                | 900            | >32 – 40                                                |
| E                | 1400           | ≤32                                                     |

**Table 6:** Level of Service for existing and proposed conditions.

| Direction  | Time of Day | Existing<br>Conditions <sup>1</sup> | Scenario 1 | Scenario 2 | Scenario 3 |         |
|------------|-------------|-------------------------------------|------------|------------|------------|---------|
|            |             |                                     |            |            | Weekday    | Weekend |
| Northbound | AM Peak     | C                                   | C          | C          | C          | D       |
|            | PM Peak     | C                                   | C          | C          | D          | D       |
|            | Interpeak   | C                                   | C          | D          | D          | E       |
| Southbound | AM Peak     | C                                   | C          | C          | C          | D       |
|            | PM Peak     | C                                   | C          | C          | D          | D       |
|            | Interpeak   | D                                   | D          | D          | D          | D       |

The above results indicate the following:

1. Changes to LOS for Scenarios 1 and 2 are minimal.
2. Changes to LOS for Scenario 3 indicate that upgrades to Remembrance Drive may be required for this scenario. The most likely upgrade being the addition of traffic lanes to Remembrance Drive north of the site.

### Pedestrian Safety at School Zone

The School zone includes a pedestrian crossing over Remembrance Driveway at the front of the school. Two un-signalised intersections occur within the school zone at Bronzewing St (adjacent to school) and Rockford Road (opposite school). A parking lane is present on both sides of Remembrance Driveway to the north and south of the school. Options for improving pedestrian safety include the following:

1. Construction of a dedicated "kiss and drop" facility on the western side of Remembrance Driveway along with a dedicated U-turn bay / area on the south side

of the school zone to allow for parents to drop students on the western side of Remembrance Driveway.

2. Extension of the 50 km/hr zone to the south of Tahmoor to reduce traffic speeds on the approaches to the school zone.
3. Installation of speed reduction measures such as road lane width reduction or speed humps / dips on the approaches to the pedestrian crossing. This may also include reconstruction of the pedestrian crossing as a raised "wombat crossing" or similar.
4. Installation of speed cameras within the school zone.
5. Installation of traffic signals at the existing pedestrian crossing.
6. Construction of a dedicated pedestrian bridge to replace the existing pedestrian crossing. A brief review of the road reserve to either side of the existing pedestrian crossing indicates that sufficient room may be available for the construction of such a bridge.

A more detailed traffic study, including local traffic counts and modelling should be undertaken at the detailed design stage of the development to ascertain the most appropriate measures to be undertaken to mitigate any adverse impacts.

#### Pedestrian Safety at Tahmoor Shopping Precinct

The shopping precinct currently includes a median strip in the centre of Remembrance Drive to the north of Emmett Street, extending to the north of the intersection with Thirlmere Way. Dedicated angled parking occurs on the western side of Remembrance Driveway with a painted median separating the parking area from the northbound through traffic lane. A kerbside parking lane occurs on the eastern side of Remembrance Driveway. Options for improving pedestrian safety include the following:

1. Installation of dedicated pedestrian crossings over Remembrance Driveway at a number of places within the shopping precinct.
2. Reduction of the speed limit on Remembrance Driveway to 40 km/hr in the shopping precinct.
3. Installation of speed reduction measures such as road lane width reduction or speed humps / dips on the approaches to existing pedestrian facilities.
4. Installation of traffic signals at one or more of the existing pedestrian facilities.

A more detailed traffic study, including local traffic counts and modelling should be undertaken at the detailed design stage of the development to ascertain the most appropriate measures to be undertaken to mitigate any adverse impacts.

#### Impacts on Local Road Network

No detailed modelling has been undertaken as part of this desktop study, however it is likely that the increase in traffic volumes will impact on the existing level of service for all intersections along Remembrance Driveway to the north of the site within the study area. In particular, the existing intersection with Thirlmere Way is likely to be impacted, depending on the amount of traffic coming to and from both Thirlmere and Picton.

A more detailed assessment of this intersection should be undertaken (including traffic counts and computer modelling) to determine if any upgrade to this intersection (e.g. addition of lanes on approaches or replacement of roundabout with a signalised intersection) should be undertaken in conjunction with the development.

#### **SITE ACCESS INTERSECTION WITH REMEMBRANCE DRIVEWAY**

The most likely position of a new intersection between the site and Remembrance Driveway would be approximately 350 m south of Rockford Road, approximately opposite the existing Tahmoor Inn Hotel. This proposed location is noted on the attached locality plan.

We understand that Wollondilly Shire Council have indicated that it is their preference to avoid multiple offset intersections with respect to existing driveways on the eastern side of Remembrance Driveway.

Based on traffic generation rates for each scenario above, the three options available for a new intersection off the site access road and Remembrance Driveway are given as follows:

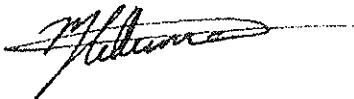
1. Construction of an un-signalised intersection incorporating the existing entrance to the Tahmoor Inn Hotel.
2. Construction of a signalised intersection incorporating the existing entrance to the Tahmoor Inn Hotel.
3. Construction of a roundabout intersection incorporating the existing entrance to the Tahmoor Inn Hotel.

We would recommend that Council consider restricting entrance and exit to the Tahmoor Inn Hotel to the new intersection.

All three of the above options should be considered in a more detailed traffic assessment of the new Intersection undertaken at the detailed design stage of the development. This assessment should include detailed traffic modelling using a recognised computer model such as SIDRA or INTANAL.

If you require any further information, please do not hesitate to contact the writer.

**For and on behalf of**  
**MARTENS & ASSOCIATES PTY LTD**



**MICHAEL DUMAS**  
BEng  
Environmental and Civil Engineer

## REFERENCES

NSW RTA (2002) *Guide to Traffic Generating Developments*

US Institute of Transportation Engineers (ITS, 2003) *Trip Generation Manual*

GHD (2011) *Redbank Tunnel Subsidence Management Modification to Project Approval: Traffic & Access Assessment Report.*

Gabites Porter (May 2010) *Traffic Impact Assessment: For Closure of York Street (Without George Street Extension).*



## ATTACHMENT A – LOCALITY PLAN



**Existing Roundabout at Intersection of Remembrance Drive and Thirlmere Way**  
**Approximate Position of Hourly Traffic Counter in Gabites Report**

**Shopping Precinct**

**School**

**Crossing**

**Site**

**Tahmoor Inn Hotel**

**Approximate Position of Traffic Counter in GHD Report**  
**Position of New Intersection of Site Access and Remembrance Drive**

|                              |          |                    |  |                                                                                                                           |  |
|------------------------------|----------|--------------------|--|---------------------------------------------------------------------------------------------------------------------------|--|
| Martens & Associates Pty Ltd |          | ABN 65 002 346 890 |  | Environment   Water   Wastewater   Geotechnical   Civil   Management                                                      |  |
| Drawn:                       | DMM      |                    |  | Drawing No./ID:                                                                                                           |  |
| Approved:                    | DMM      |                    |  | SK001                                                                                                                     |  |
| Date:                        | 22.05.12 |                    |  | SITE LOCALITY PLAN                                                                                                        |  |
| Scale @A3:                   | 1:100    |                    |  | Project: 027 Lagoon Place, Norbury NSW 2077 Australia Phone: 02 9475 9609 Fax: 02 9475 8767 Email: paul.martens@ma.com.au |  |
|                              |          |                    |  | Revision: J001V01 B                                                                                                       |  |

### Existing Roundabout at Intersection of Remembrance Drive and Thirlmere Way Approximate Position of Hourly Traffic Counter in Gabites Report

Shopping Precinct

School

Site

## Crossing

Approximate Position of Traffic Counter in GHD Report  
Position of New Intersection of Site Access  
and Remembrance Drive

**Tahmoor Inn Hotel**

|                              |                    |                                                                                                                                                 |  |  |  |  |
|------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Martens & Associates Pty Ltd | ABN 45 070 240 850 |                                                                                                                                                 |  |  |  |  |
| Drawing:                     | DMM                |                                                                                                                                                 |  |  |  |  |
| Approved:                    | DMM                |                                                                                                                                                 |  |  |  |  |
| Date:                        | 22.05.12           |                                                                                                                                                 |  |  |  |  |
| Scale @A3                    | 1:110              |                                                                                                                                                 |  |  |  |  |
| Martens & Associates Pty Ltd |                    | Environment   Water   Wastewater   Geotechnical   Civil   Management                                                                            |  |  |  |  |
|                              |                    | Drawing No./ID: SH001                                                                                                                           |  |  |  |  |
|                              |                    | SITE LOCALITY PLAN                                                                                                                              |  |  |  |  |
|                              |                    | 6971 Lagoon Place, Northcote VIC 3071<br>Email: <a href="mailto:m.anderson@martens.com.au">m.anderson@martens.com.au</a><br>Phone: 03-9379 8767 |  |  |  |  |
|                              |                    | Project: J2010056                                                                                                                               |  |  |  |  |
|                              |                    | File: J201001                                                                                                                                   |  |  |  |  |
|                              |                    | Revision: B                                                                                                                                     |  |  |  |  |