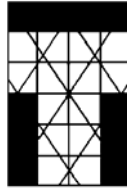




TRAFFIX



**TRAFFIC IMPACT ASSESSMENT REPORT**  
*OF A PROPOSED*  
**STAGE 1 RESIDENTIAL REZONING**  
**(TRIANGULAR Paddock AND MAIN ENTRY PRECINCT)**  
*OF EXISTING LAND KNOWN AS*  
**PASMINCO COCKLE CREEK ALUMINIUM SMELTER**  
**MAIN ROAD/ T.C. FRITH AVENUE**  
**BOOLAROO**

*Prepared on behalf of*

FITZWALTER GROUP PTY LIMITED

*Prepared by*

**TRAFFIX**

TRAFFIC AND TRANSPORT PLANNERS

*Ref: 06 036v1  
February 2006*



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## 1. INTRODUCTION

This report has been prepared in support of an application for a rezoning of a portion of land within the Pasmenco Cockle Creek Smelter site at Boolaroo, within the Lake Macquarie local government area. This represents Stage 1 of the residential precinct that is to be established within the PCCS site, as agreed with Lake Macquarie Council.

This land is presently vacant and can be developed independently of the balance of the Pasmenco site. The application is for the rezoning of this land and associated works as documented in the rezoning application prepared by BBC Consulting Planners.

TRAFFIX has been commissioned by the Fitzwalter Group to undertake a traffic impact assessment in support of the rezoning. This report documents the findings of our investigations and forms part of the overall rezoning report and should be read in the context of that report, which incorporates an assessment of all the relevant matters for consideration as required under the Environmental Planning and Assessment Act.

The concept development assessed under the rezoning application is for residential development of the land with an indicative (worst-case) yield of 20 dwellings per hectare. This potentially overstates the development potential any may be regarded as a worst-case scenario for assessment purposes. With a total area of 16 hectares, this will result in a development yield of 320 dwellings on the site. It would therefore qualify as a Schedule 1 development for the purpose of application of State Environmental Planning Policy Number 11 when assessed at development application stage.

The report is structured as follows:

- Section 2: Location and Site
- Section 3: Overview of Existing Traffic Conditions
- Section 4: Description of the Proposed Development
- Section 5: External Traffic Impacts
- Section 7: Internal Movement Systems
- Section 8: Conclusions

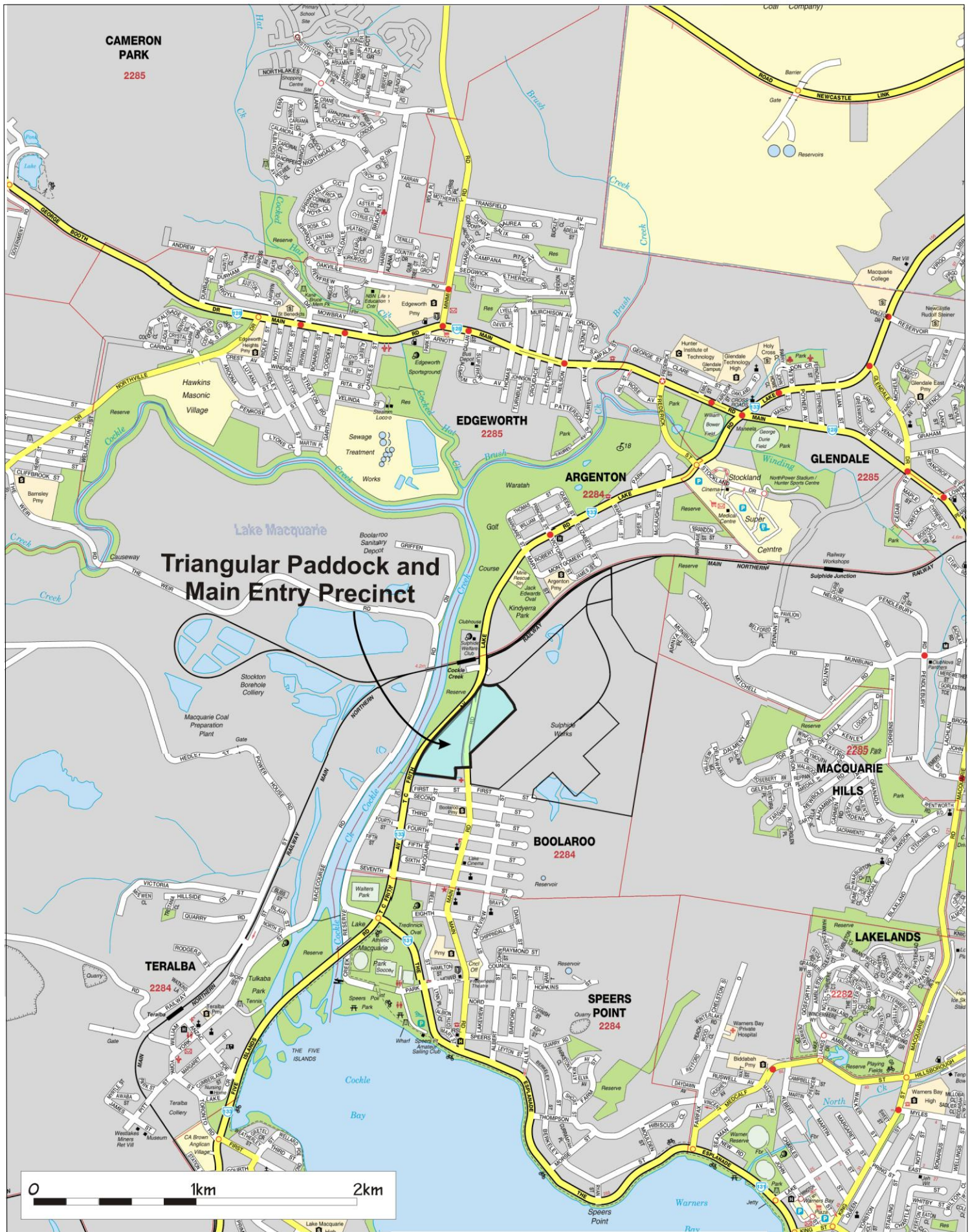
## 2. LOCATION AND SITE

The western portion of the site is generally known as the “Triangular Paddock” and is bounded by T.C. Frith Avenue on its western side, existing residential development on its southern side, and Main Road on its eastern side. The eastern portion of the site occupies a parcel of land that is located on the eastern side of Main Road, located generally between the Railway Employment Zone to the north and existing industrial land within the PCCS site area to the south and is generally referred to as the PCSS main entry residential precinct.

The site traverses Main Road and it is proposed that all access be provided onto Main Road in the short term, pending the rerouting of Main Road through the “Triangular Paddock” in the longer term, if and when Munibung Road is extended to create a new intersection with T.C Frith Avenue. This intersection is required to provide access to the Railway Employment Zone.

Reference should be made to the Location Plan shown in **Figure 1** and the Site Plan shown in **Figure 2**. In addition, reference should be made to the Photographic Record that is presented in **Appendix A**, which gives a general appreciation of the traffic environment within and external to the site.

It can be seen that the site lies to the immediate north of the existing Boolaroo Township and residential development of the site can be regarded as a logical expansion of the township in a northerly direction. Cockle Creek is located on the western side of T.C.Frith Avenue, so that the creek forms a natural boundary to residential development to the west of the township.



Source: UBD 2005



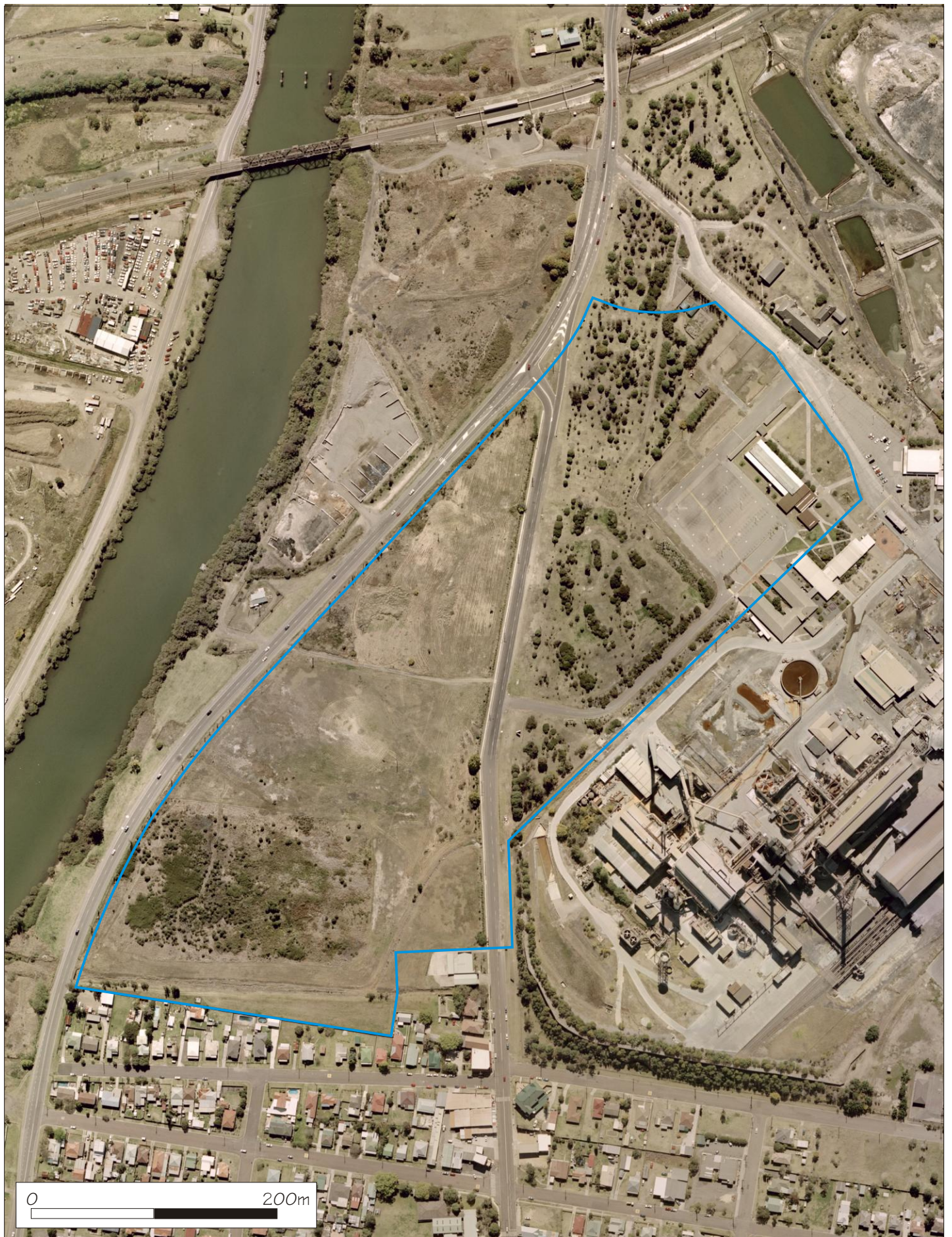
# STAGE 1 RESIDENTIAL REZONING TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT

Prepared for Fitzwalter Group Pty. Limited.

Figure 1

## LOCATION

TRAFFIX Traffic & Transport Planners: Level 2, 55 Mountain Street, Broadway, 2007.



## STAGE 1 RESIDENTIAL REZONING TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT

Prepared for Fitzwalter Group Pty. Limited.

Figure 2

## SITE

TRAFFIX Traffic & Transport Planners: Level 2, 55 Mountain Street, Broadway, 2007.

### 3. OVERVIEW OF EXISTING TRAFFIC CONDITIONS

#### 3.1 General Description of Road Environment

The existing road hierarchy in the vicinity of the site is shown in **Figure 3**.

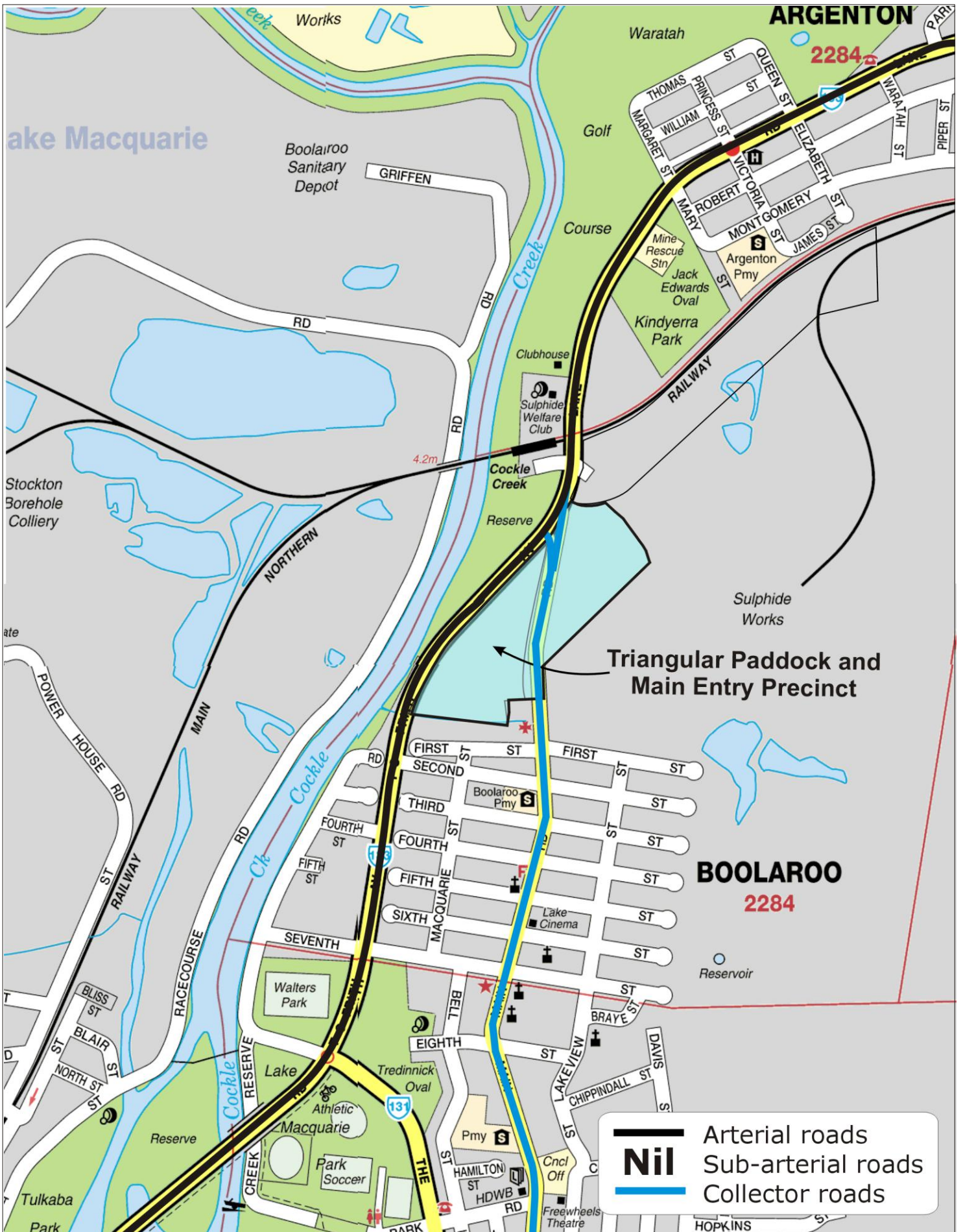
**T.C Frith Avenue** forms part of Main Road 217 and is an arterial road. It is known as Lake Road to the north of Main Road and Five Islands Road to the south of The Esplanade. It carries generally one traffic lane in each direction, with additional lanes provided on approach to key intersections. The intersection of Main Road with T.C.Frith Avenue at the northern boundary of the site is a ‘seagull’ treatment which incorporates a right turn lane on the southern approach of T.C.Frith Avenue and a right turn storage/merge lane in Lake Road for the right turn movement out of Main Road. Main Road approaches this intersection on an acute angle and this approach diverges locally to form a right-angled approach to its intersection with T.C.Frith Avenue/Lake Road. The movement from Lake Road into Main Road operates under free-flow conditions and incorporates a dedicated left turn lane on Lake Road (the northern approach).

T.C Frith Avenue enjoys ‘limited access controls’ over the majority of its length between Main Road and The Esplanade, with access only available via priority controlled intersections with Second Street and Seventh Street. First Street as well as Third to Sixth Streets inclusive on the western side of the Boolaroo Township are all closed on their approaches to T.C.Frith Avenue (eastern side).

**The Esplanade** is also an arterial road and forms part of Main Road 674. It extends to the east of Boolaroo and Speers Point to traverse the eastern side of Lake Macquarie, connecting to MR 527 (Macquarie Drive) south of Warners Bay. The Esplanade forms a cross-intersection with T.C.Frith Avenue to the south of the subject site and this intersection is under roundabout control, with two lanes locally on all approaches and with two lanes for circulating traffic. It carries generally single lane traffic flow in each direction over the majority of its length.

**Main Road** may be described as a local collector road which provides the main ‘spine road’ through the Boolaroo Township. It provides single lane traffic flow in each direction with additional parallel parking lanes on both sides within the township and extending between First Street and The Esplanade. The section between First Street and T.C.Frith Avenue adjacent to the site (including along the entire eastern boundary of the subject site) is constructed with one lane in each direction and unsealed shoulders over the majority of its length (north of the Fire Station). The majority of intersections along Main Road through the township are priority controlled (either Give Way or Stop signs), with the priority movement being along Main Road. It also incorporates pedestrian crossings between First and Second Streets, between Second and Third Streets and at Fourth Street.

To the south of the site (and the Boolaroo Township), Main Road forms the stem of a ‘T’ junction with The Esplanade. This intersection is constructed with a ‘seagull’ treatment, with a right turn bay provided on the eastern approach of The Esplanade. This intersection also provides a dedicated lane in The Esplanade for the left turn movement out of Main Road.



**STAGE 1 RESIDENTIAL REZONING TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT**  
Prepared for Fitzwalter Group Pty. Limited.

**Figure 3 ROAD HIERARCHY**

TRAFFIX Traffic & Transport Planners: Level 2, 55 Mountain Street, Broadway, 2007.



All other roads in the vicinity of the site are local roads which constitute the majority of the Boolaroo Township.

### 3.2 Historic Daily Traffic Flows

Historic daily traffic volumes in the vicinity of the site are available for various locations. These are shown in Table 1.

**Table 1 - Historic Daily Traffic Flows**

Location	RTA Site No	AADT (1998)	AADT (2001)	AADT (2003)
Lake Road (MR 217), north of the railway line	05 208	24,356	24,678	24,588
The Esplanade (MR 674) east of T.C Frith Avenue	05 990	19,631	19,947	-

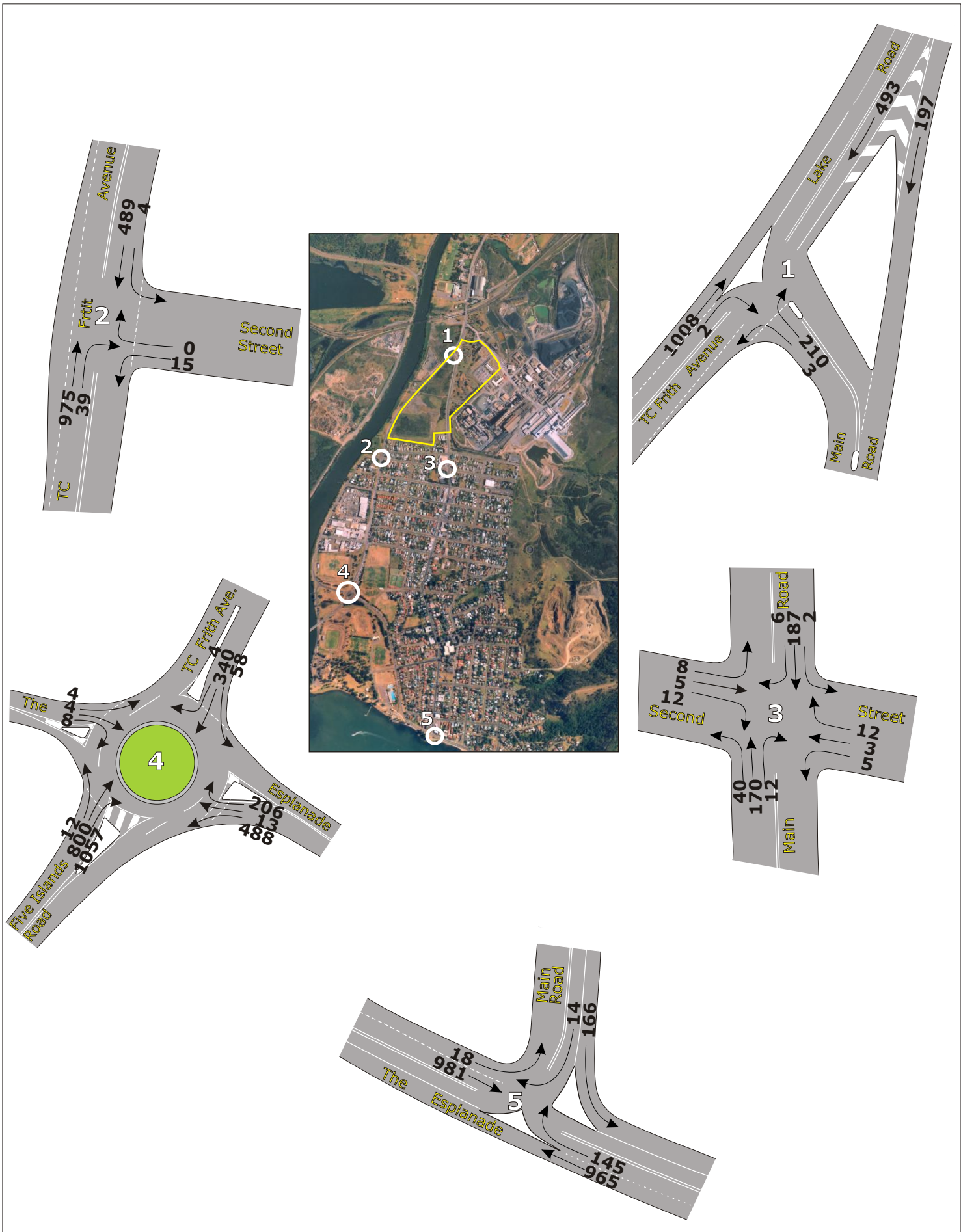
Source: Traffic Volume Data for Hunter Region, RTA 2001, plus unpublished RTA Counts

It can be seen that no significant growth has occurred since 1998 at either monitoring site between 1998 and 2001, with a growth rate of about 1% over this period. Indeed, a reduction in volumes occurred at Station 05208 between 2001 and 2003. This result underscores the reliance on existing intersection volumes as surveyed in 2004 as the background traffic levels in the future, when the development is fully operational.

### 3.3 Existing Intersection Performances

For the purposes of the assessment of traffic impacts, all key intersections in the locality of the site were surveyed during the morning and evening peak periods, between 7am and 9am and between 3pm and 6pm. The resulting turning movements are shown in **Figures 4 and 5** for the times of maximum traffic volumes over the period surveyed, being 7.45am – 8.45am; and 3.45pm – 4.45pm. The surveys included heavy vehicle counts at the intersection of Main Road with T.C Frith Avenue.

The results of these surveys were analysed using the INTANAL computer program to determine their performance characteristics under existing traffic conditions. The Intanal model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

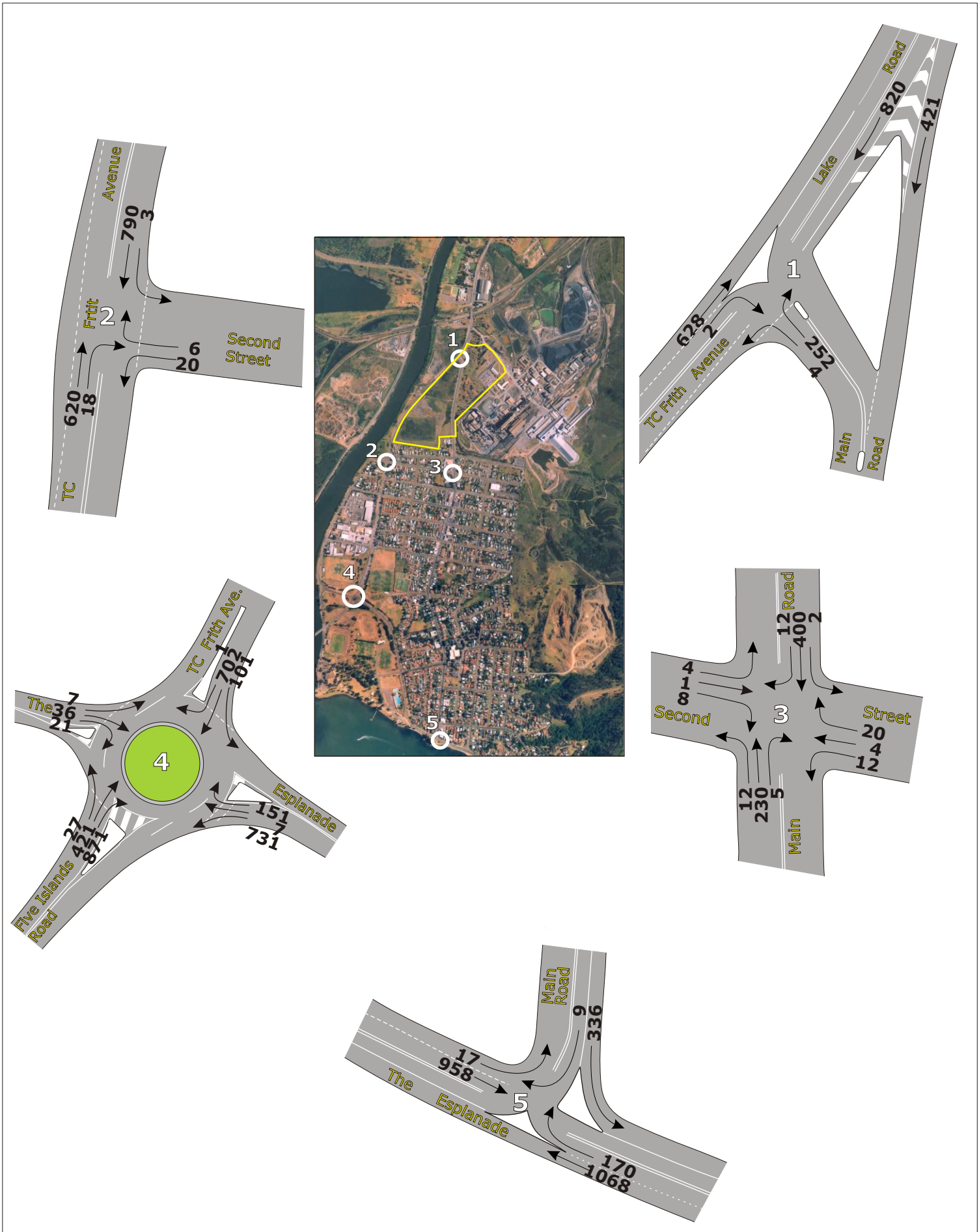


**STAGE 1 RESIDENTIAL REZONING  
TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT**

Prepared for Fitzwalter Group Pty. Limited.

**Figure 4 EXISTING AM PEAK  
TRAFFIC VOLUMES (7:45-8:45)**

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**STAGE 1 RESIDENTIAL REZONING  
TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT**

Prepared for Fitzwalter Group Pty. Limited.

**Figure 5 EXISTING PM PEAK  
TRAFFIC VOLUMES (3:45-4:45)**

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- **DOS** - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.
- **AVD** - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).
- **LOS** - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

The results of the modelling, based on existing flows and intersection geometries, are shown in Table 2:

**Table 2: Existing Intersection Performances: Peak Hours**

Intersection		Control <sup>1</sup>	Peak Period	Degree of Saturation	Intersection Delay	Level of Service
No	Description					
1	Main Road/ T.C.Frith Avenue	Seagull	AM	0.24	12.9	A
			PM	0.24	16.9	A
2	Second Street/Frith Avenue	Priority	AM	0.03	12.7	A
			PM	0.06	17.0	A
3	Second Street/Main Road	Priority	AM	0.06	7.3	A
			PM	0.13	9.5	A
4	T.C.Frith Ave/The Esplanade	Roundabout	AM	0.66	15.2	B
			PM	0.57	14.2	B
5	Main Road/The Esplanade	Seagull	AM	0.17	9.6	A
			PM	0.20	9.8	A

It can be seen from Table 1 that these intersections all operate satisfactorily, with levels of service A or B and with moderate delays. It is stressed however that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in Section 5.

### 3.4 Public Transport

The centroid of the site lies 500 metres from the Cockle Creek Railway Station, with the northernmost part of the site being about 250 metres away and the southernmost part of the site being 800 metres away. These distances are considered reasonable for commuter trips to the railway station and are in accordance with current practice.

In addition, it is noted that regular scheduled bus services operate along Main Road including STA Route 363 which operates between Cockle Street Station and Lake Road, traversing the township of Boolaroo.

## 4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development is documented in detail in the rezoning report prepared by BBC Consulting Planners. The development is Stage 1 of the residential rezoning of the PCCS site and comprises the “Triangular Paddock” as well as the main entry precinct to the PCCS site on the eastern side of Main Road.

For the purpose of assessment, Option 3 in **Appendix C** documents an indicative concept subdivision layout on the site, based upon the planned future road system with Main Road realigned to create a new intersection with T.C. Frith Avenue. This is accompanied by a staging plan which demonstrates how the development can be implemented in the short term based on the retention of the existing road system, with Main Road retained on its existing alignment until such time as the REZ (industrial) land is developed, which will be the ‘trigger’ for the realignment of Main Road.

The rezoning will permit residential development on the existing vacant land, with a maximum yield of about 320 dwellings under the ‘maximum development’ scenario shown in Option 3. The available lots are understood to enable a range of housing types to be constructed with an overall site density of about 20 dwellings per hectare. This higher yield will also take account of traffic associated with any commercial development that may occur on the site.

The opportunity has been taken to minimise the number of access points to the realigned road. This is due to the reduced site frontage length of Main Road and the provision of traffic signal control at the new intersection of Main Road with T.C. Frith Avenue, which will require additional queuing capacity.

The impacts of the proposed rezoning are discussed in the following sections.

## 5. EXTERNAL TRAFFIC IMPACTS

### 5.1 Trip Generation

The predicted land use components arising from the development of the site discussed in Section 4 have been assessed on the basis of application of the Roads and Traffic Authority's trip generation rates as published in its "Guide to Traffic Generation Development". It has been assumed that a trip rate of 0.575 trips per dwelling would occur during peak periods. This rate is an average between the range for large medium density developments (0.5 to 0.65 trips per dwelling) and this reflects a range of dwelling sizes. This results in trips as follows for the development site with 320 dwellings, assuming that 75% of trips occur in the direction of peak flow:

*AM Peak Period.*

46 in trips      138 out trips      184 trips per hour

*PM Peak Period.*

138 in trips      46 out trips      184 trips per hour

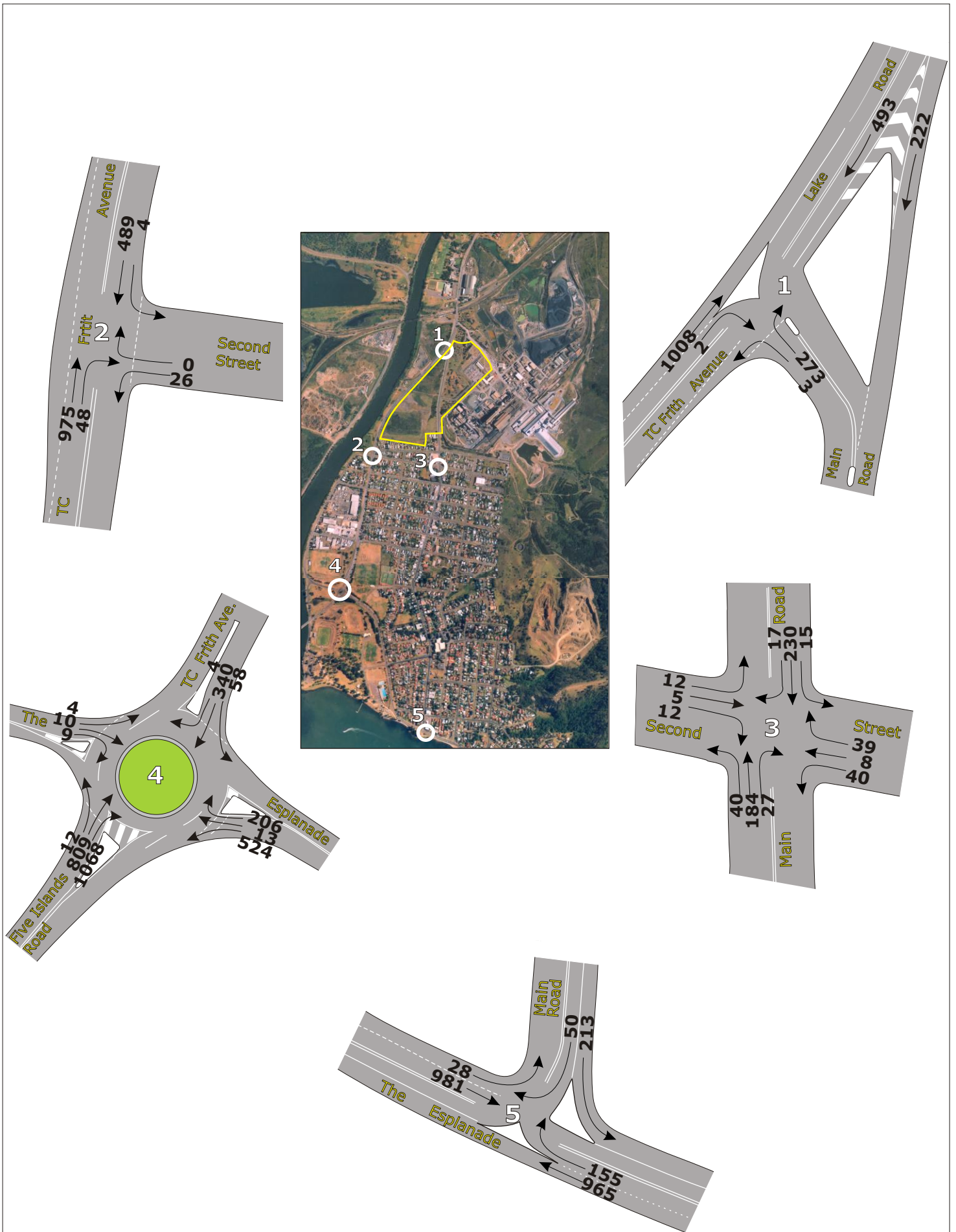
### 5.2 Short Term Traffic Impacts

In the short term, it is proposed that access to the site will occur via Main Road on its existing alignment as shown in the staged plan included in **Appendix C** and this is the basis of the traffic assessment reported upon in Table 3 above. This demonstrates that Option 3 can be staged to achieve safe and convenient access in the short term.

The above trip rates are an overestimate as in practice, some of these trips will be attracted to land uses within Boolaroo (e.g. school, local shopping and local employment trips) and will therefore be 'internalised' and will not create impacts on the 'external' road system as assessed below. These factors have however been ignored to assess a worst-case scenario.

In this regard, the above trips (184 veh/hr) are less than the 220 veh/hr assessed in the previous traffic report prepared for the "Triangular Paddock" dated December 2004, which included the cumulative impacts associated also with the redevelopment of Site 03. Accordingly, the conclusions made in that report remain valid and are based upon the traffic volumes as shown in **Figures 6 and 7**.

The result of the analysis that was undertaken with these higher volumes is reproduced in Table 3 for ease of reference.

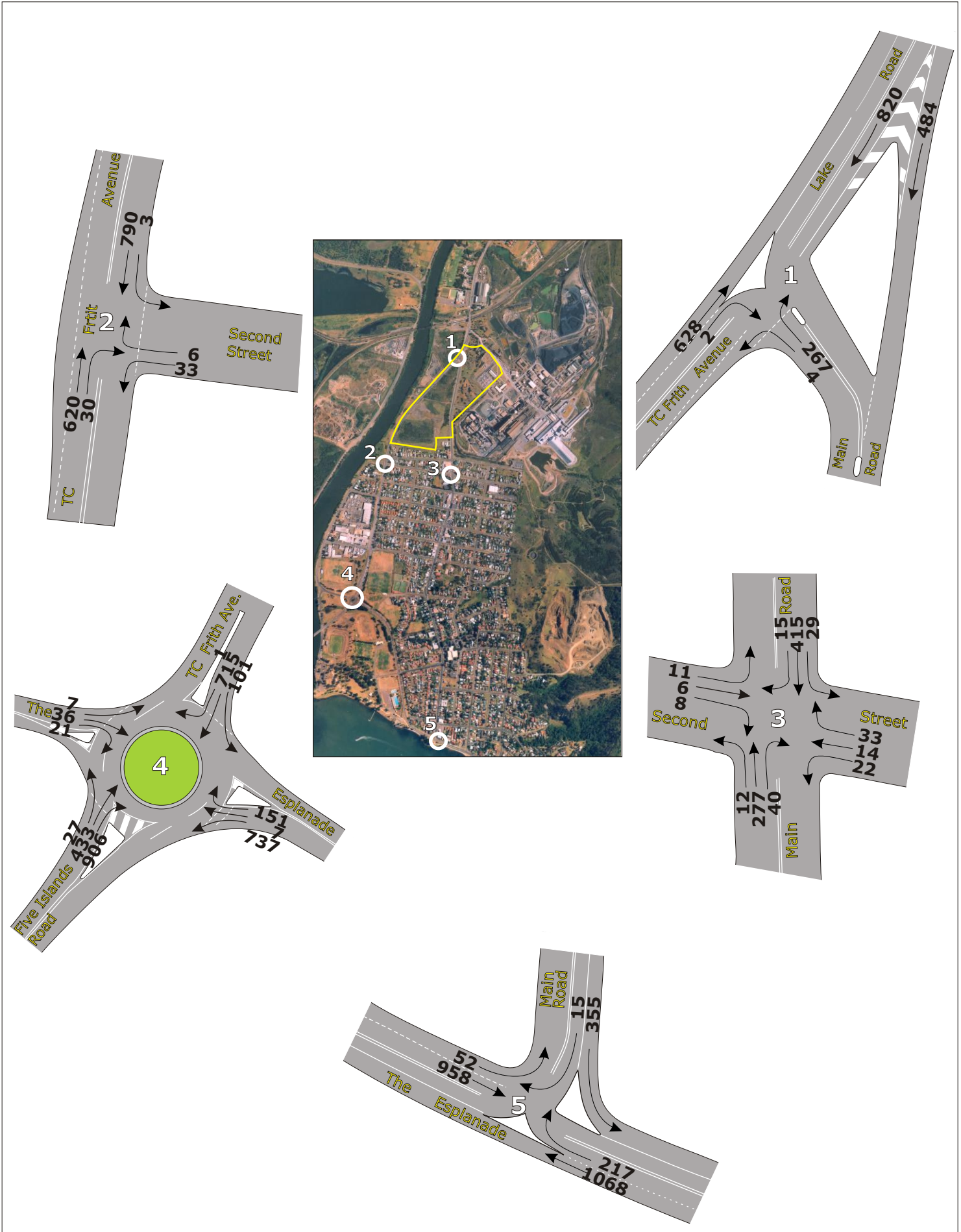


**STAGE 1 RESIDENTIAL REZONING  
TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT**

Prepared for Fitzwalter Group Pty. Limited.

**Figure 6 FUTURE AM PEAK  
TRAFFIC VOLUMES (7:45-8:45)**

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**STAGE 1 RESIDENTIAL REZONING  
TRIANGULAR PADDOCK AND MAIN ENTRY PRECINCT**

Prepared for Fitzwalter Group Pty. Limited.

**Figure 7 FUTURE PM PEAK  
TRAFFIC VOLUMES (3:45-4:45)**

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**Table 3: Future Intersection Performances Under Cumulative Traffic Generation (220 veh/hr) During Peak Periods**

Intersection		Control <sup>1</sup>	Peak Period	Degree of Saturation	Intersection Delay	Level of Service
No	Description					
1	Main Road/ T.C.Frith Avenue	Seagull	AM	0.31	13.5	A
			PM	0.25	17.1	A
2	Second Street/Frith Avenue	Priority	AM	0.05	12.8	A
			PM	0.10	17.3	A
3	Second Street/Main Road	Priority	AM	0.10	11.3	A
			PM	0.14	16.4	B
4	T.C. Frith Ave/The Esplanade	Roundabout	AM	0.66	15.3	B
			PM	0.57	15.2	B
5	Main Road/The Esplanade	Seagull	AM	0.19	10.0	A
			PM	0.26	10.2	A

It can be seen (when compared with Table 2) that with the additional 220 veh/hr as previously assessed, the increased delays are very moderate at all intersections and will generally result in only minimal changes in traffic conditions. This is not unexpected as residential uses on the site are a low-order land use in terms of the traffic generating potential of the site.

Thus, the subject rezoning of the Triangular Paddock and the main PCSS entry precinct (with only 184 veh/hr generated) can proceed without any external traffic improvements required at critical intersections.

In a more local context, the staged (short term) traffic arrangements for the Main Entry Precinct as shown in Appendix C incorporates multiple access roadways such that the volumes carried by any one intersection created with Main Road will be less than 40 veh/hr which can be readily accommodated with priority (stop or give way) control.

### 5.3 Cumulative Impacts of Residential Site 03

It is not known whether the cumulative impacts associated with the subject site will occur at the same time as the residential development from the second residential site (Site 03) lying generally to the east of First, Second and Third Streets, which was the subject of a separate application and assessment report in 2004.

In this regard, Site 03 was assessed at a yield of up to 160 dwellings. This area is also potentially more suited to a range of dwelling types. Accordingly, a trip rate of between 0.60 and 0.85 trips per dwelling was assumed, resulting in a total of 110 vehicle trips per hour during peak periods. This results in the following additional trips:



*AM Peak Period.*

28 in trips      82 out trips      110 trips per hour

*PM Peak Period.*

82 in trips      28 out trips      110 trips per hour

The previous traffic assessment based on an additional 220 veh/hr therefore takes account of 36 veh/hr of the trips generated by this application (220 less 184) so that the increase above the traffic levels assessed in Table 3 would relate to a net additional 74 veh/hr. These trips would also be assigned to the road system on the basis of the following trip distributions:

- 40% to/from the north along Lake Road
- 30% to/from the east along The Esplanade; and
- 30% to/from the south along Five Islands Road

In this regard, a maximum additional 30 veh/hr would be distributed onto the road system on any one route ( $74 \text{ veh/hr} \times 0.4$ ), which equates to a single additional vehicle every 2 minutes through any intersection. The computer models available to assess intersection performance are not sensitive to such small changes and accordingly, the previous assessment remains valid, even if Site 03 were to be developed for residential purposes at the same time as the subject site.

## **5.4 Long Term Access Arrangements**

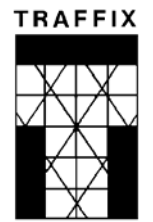
The residential development shown in Option 3 is served by two accesses on the eastern side of the realigned Main Road. They will also be served by the proposed links to the extended section of Munibung Road. About 70% of the residential development is expected to make use of these two accesses, which equates to about 110 dwellings served by each access. This equates to about 60 veh/hr at peak times which is moderate and the intersections formed by these roads and the realigned Main Road can readily accommodate these flows as priority controlled 'T' junctions. Notwithstanding, it will be appreciated that other options are available and can be pursued, subject to further detailed assessment at development application stage.

The strategic implications of the realignment of Main Road, together with the proposed extension of Munibung Road to connect with T.C Frith Avenue, are the subject of assessment in the separate report prepared in support of the REZ rezoning, which in effect may be considered as a 'master plan' traffic assessment.

## 6. CONCLUSIONS

It is concluded that the proposed rezoning is supportable on traffic planning grounds. The traffic impacts associated with the development are moderate and the following matters are noteworthy:

- *The concept development proposal assumed for the rezoning (Option 3) for residential purposes may be regarded as a low traffic generating land use that will minimise impacts on the locality, while providing an opportunity for the future expansion of the Boolaroo Township;*
- *The assessment undertaken has assumed a worst-case scenario with the land developed at a density of 20 dwellings per hectare, yielding 320 dwellings with various dwelling types. This will generate about 184 vehicle trips per hour to/from the site during peak periods, with these trips spread over multiple accesses onto Main Road;*
- *In the long term when the REZ site is developed, Main Road will be realigned as shown in Options 1 and 2. The traffic generation associated with the REZ site, with the entire PCCS site and with other strategic development can all be accommodated based on the 'master plan' traffic assessment documented in a separate traffic report prepared for the REZ site rezoning;*
- *The long term Option 3 can be staged with reliance made on the existing road system. The traffic generated by the site (184 veh/hr) is less than the 220 veh/hr assessed in the 2004 traffic assessment undertaken for Site 03 (east of First and Second Avenues) and the conclusions in that report therefore remain valid. In particular, the existing road system is readily capable of accommodating this traffic without any need for intersection improvements or for Main Road to be altered other than to provide safe site access, with appropriate kerbing and guttering; and*
- *The internal road system, including pedestrian and bicycle facilities, will be further developed at development application stage in accordance with the principles established in Council's DCP.*



*APPENDIX A:*

*Photographic Record*



View looking south along TC Frith Avenue at Main Road.  
The Triangular Paddock is on the left of the photo.



View looking south along Main Road adjacent to the Triangular Paddock



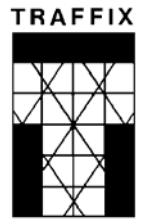


View looking south along TC Frith Avenue midway along the Triangular Paddock



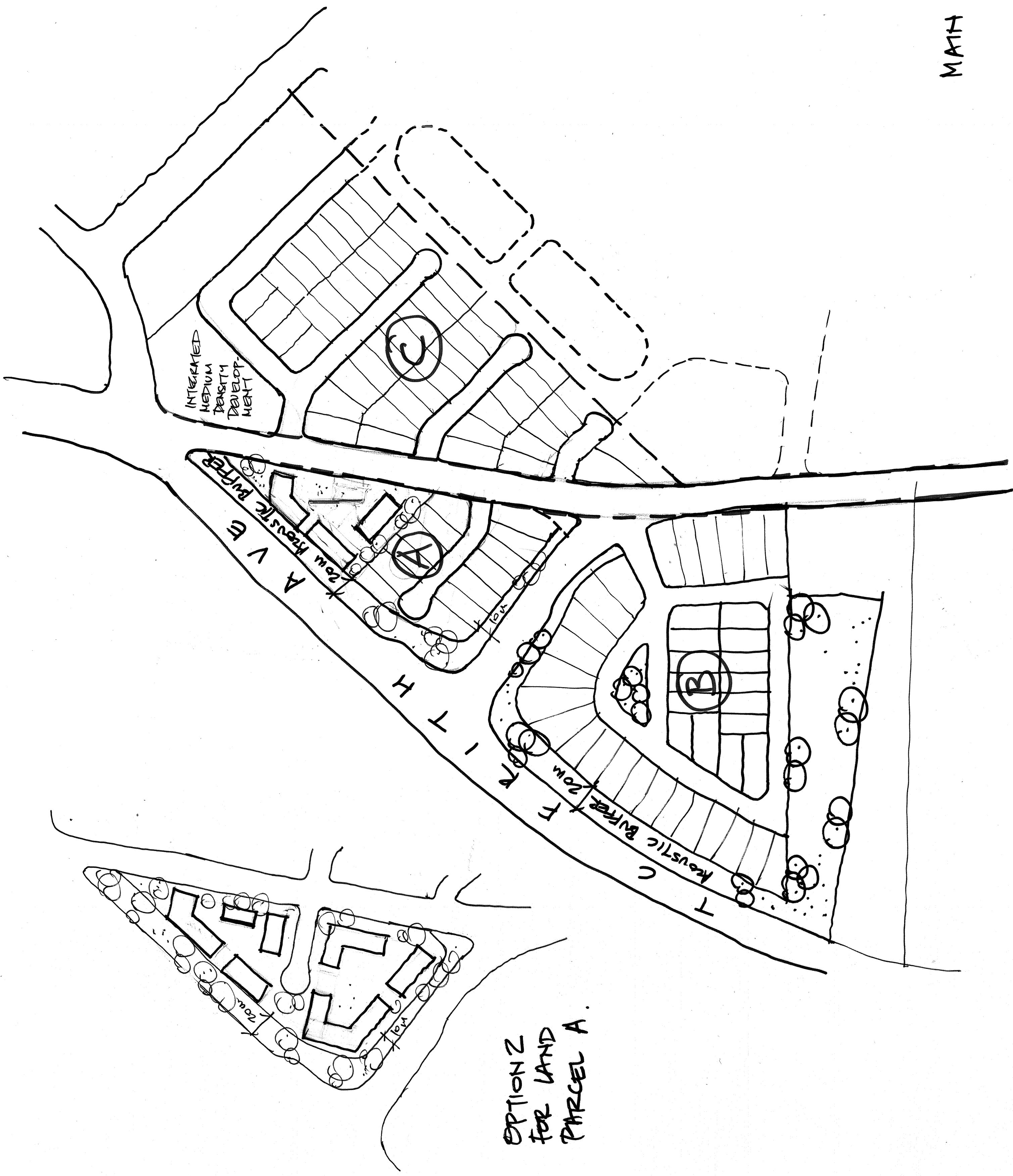
Reverse view looking north along TC Frith Avenue.





*APPENDIX B:*

*Option 3 Concept Plan*



MAIN ENTRY PRECINCT

FEB 2006

CM+



**PASMINCO COCKLE CREEK SMELTER SITE**

**Proposed Urban Structure Plan for Superlot 5  
OPTION 3: New Main Road alignment – Adjoining Residential Uses**