

Southlands Remediation and Development Project

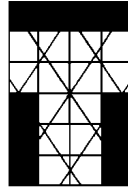
Environmental Assessment

Project Application (MP 06_0191)

Appendix L: Traffic and Transport Assessment



TRAFFIX



***SOUTHLANDS STAGES 1 AND 2
PROJECT APPLICATION
TRAFFIC IMPACT ASSESSMENT
FOR AN INDUSTRIAL/WAREHOUSE DEVELOPMENT
AT
MCPHERSON STREET, BANKSMEADOW***

Prepared on behalf of

ORICA LIMITED &
GOODMAN INTERNATIONAL LIMITED

Prepared by

TRAFFIX

TRAFFIC AND TRANSPORT PLANNERS

*Ref: 06 076 CP/PA v6
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INTRODUCTION

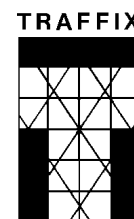
T R A F F I X has been commissioned by Orica Limited and Goodman International to undertake a traffic impact assessment for development of a site that is known as “Southlands.” A Project Application is to be made for the development of the site under the provisions of Part 3A of the EP&A Act and will be determined by the Minister for Planning. The site lies within the Botany Council LGA.

Director General’s Requirements have been issued in respect of the Project requiring an Environmental Assessment to be undertaken. This includes a requirement to assess the following important traffic and transport impacts:

- Preliminary design details for all roadworks proposed as part of the development, and timing for implementation of these works;
- Details of the proposed means of access to/from the site;
- Likely daily and peak traffic movements to be generated by the proposal and the increase in the level and type of traffic associated with the proposal;
- Impacts of the proposal on the surrounding arterial road network and intersections, and any need for road upgrades or improvement works;
- Consideration of any need for the preparation of a local traffic management plan;
- An assessment on the likely impacts of heavy vehicle traffic on the major arterial and local; road network;
- An assessment of the potential for increased transport of dangerous goods or hazardous materials on the arterial and local road network, and the need for an incident management strategy should accidents occur;
- Acknowledgement of the need for a Traffic Management Plan prior to the commencement of the proposal (subject to specific publications as noted);
- Details of future ownership of any new roads created as part of the proposal; and
- Demonstration of adequate carparking and manoeuvring areas associated with the proposal, and for each phase of the works.

These matters are generally mirrored in the issues raised by the RTA in its letter dated 29th August 2006, as authored by its Landuse Development Manager, Network Planning. It is noted however that the RTA identifies the need for a Traffic Management Plan as part of the construction phase of the project, which it is assumed is the intention of the Director General’s Requirements.

This report documents the findings of our investigations and should be read in the context of the overall Environmental Assessment prepared on behalf of Orica and Goodman International. An overall site plan has been developed for the site that establishes a planning framework to guide the delivery of the “Southlands” development and Project. Approval is therefore sought for Stages 1 and 2 of that Plan. Stage 3 will be the subject of a later Project



Application. This report has therefore been prepared to examine development of the total site, with further examination of issues and impacts associated with the various stages.

The three stages of the Project are as follows:

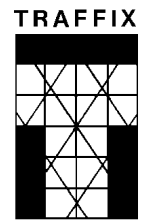
- Stage 1: The western block of Southlands;
- Stage 2: The south of the eastern block of Southlands; and
- Stage 3: The north of the eastern block of Southlands (that will be the subject of a later Project Application).

This report is prepared in support of Stage 1 and 2, which identifies the improvements that are necessary to implement these two stages. The overall site has a total area of 18.2 hectares with a proposed floor area of 79,190m² comprising the following components:

- Stage 1: 47,000m² GFA
- Stage 2: 16,490m² GFA
- Stage 3: 15,700m² GFA

The development is a Schedule 1 development for the purpose of application of State Environmental Planning Policy No. 11 and accordingly will require referral to the RTA's Regional Development Committee. However, discussions have been held with the RTA during the course of the study and this has provided guidance that is acknowledged and appreciated. Consultation has also been undertaken with Council officers and the local community through the conduct of several community workshops. The report is structured as follows:

- Part A: Total Site Development
- Part B: Stage 1 Project Application



PART A

OVERALL DEVELOPMENT OF THE SOUTHLANDS SITE

A.1 LOCATION AND SITE

The site is located on the northern side of McPherson Street at Banksmeadow and extends from the Port Feeder Road in the west to the Sydenham-Botany Goods Railway line in the east. The existing Mobil site and Nant Street Tank farm are situated to the north.

The site is accessible only via McPherson Street along its southern boundary which is the only existing public road to which access can physically be obtained or is required to service the expected traffic demands, as discussed in the following sections.

The Southlands site has never been developed and is therefore the last remaining property in the local traffic catchment to be developed.

Relevant plans, including a concept plan, subdivision plan and staging plan, are presented in **Appendix A1**. A site and location plan are also provided in **Figures 1 and 2** respectively.

A.2 EXISTING TRAFFIC CONDITIONS

The site is presently accessed via McPherson Street, which traverses the southern site boundary. McPherson Street is in turn only accessible via Hills Street and Exell Street, which form a one-way pair connecting McPherson Street with Botany Road in the south. Specifically, Hills Street provides a one-way northbound connection from Botany Road (into the precinct); while Exell Street provides a one-way southbound connection to Botany Road (out of the precinct).

These two intersections provide 'priority' controlled intersections with Botany Road and in addition, only left turn exits are possible from Exell Street into Botany Road. These two intersections therefore provide a capacity constraint to the development of the industrial precinct north of Botany Road (including the subject site, other sites in McPherson Street and sites accessed via the Port Feeder Road).

Other intersections in the locality also present constraints to development of the precinct. These lie generally to the east of Exell Street and include the intersection of the Discovery Cove Industrial Park with Botany Road where a single lane roundabout is presently constructed; while further to the east there are some concerns over the performance of the intersection of Botany Road with Foreshore Drive.

These constraints are of particular relevance in the context of the ultimate development of the industrial precinct north of Botany Road, of which the subject site forms a part. A review of alternate road linkages aimed at improving road capacity in the locality is therefore the focus of this Part A Concept Application, and the timing for the delivery of a new road link.

That overall investigation has determined that some level of development can take place on the site based on local road / intersection upgrades without triggering the need for any new links. This is the subject of Part B of this report, which deals with the proposed Stage 1



Source: UBD 2006



PROJECT APPLICATION STAGE 1 AND 2 INDUSTRIAL DEVELOPMENT, SOUTHLANDS SITE, BOTANY

Prepared on behalf of Goodman International

Figure 1

LOCATION

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



SOUTHLANDS CONCEPT PLAN & STAGE ONE PROJECT APPLICATION

Prepared for Goodman International Limited

Figure 2

SITE

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

development. The improvement measures that are required are a function of the expected traffic generation from the overall Southlands site; and separately from the Stage 1 development and this is discussed further in the following section.

A.3 PREDICTED TRAFFIC GENERATION FROM THE DEVELOPMENT

The overall Southlands site (Stages 1, 2 and 3) yields a developable site area of 15.263 hectares (i.e. total site area of 18.2 hectares less easements, drainage etc). The proposed development is for warehouse/distribution purposes and the rate of 15 trips per hectare has previously been adopted by the RTA in other locations including within the Western Sydney Employment Hub where there is a similarly high proportion of warehouse and distribution facilities. The application of this rate to the 15.263ha of developable area results in 230 vehicle trips/hr in the morning and afternoon peak periods. This is the expected traffic from all sources (light and heavy vehicles) and it may be assumed that 80% of this traffic will be in the direction of peak flow, so that there would be:

- 184 in, 46 out in the AM Peak; and
- 46 in, 184 out in the PM Peak.

This is the traffic generation associated with the entire site by staff, trucks and visitors. An alternative rate may be derived from the RTA's Guidelines, based on the predicted floor area. This can range from a trip rate of 0.5/100m² for warehouse use, to 1.0 trips/100m² for factory use. In this regard, the overall site will result in an expected floor area of 79,190m² and application of these rates results in between 345 veh/hr and 790 veh/hr. The lower rate is more relevant as the development is focussed upon warehouse distribution uses.

The traffic impact assessment undertaken for the Project Application has assumed a total of 465 veh/hr during peak periods. This is 35% higher than the RTA's warehouse rate based on floor area; and 100% higher than the trip rates adopted by the RTA for other large warehouse distribution facilities. It therefore represents a worst-case scenario that potentially overstates the expected level of traffic generation.

The assessment is also a worst-case scenario as it is assumed that goods movements occurs by road, based on the RTA's guideline trip rates, which are car-dependent. In this regard, there is the possibility that for some end-users, rail may be an option and this would potentially result in a significantly reduced level of traffic activity. Similarly, the assessment is based on the existing level of public transport services and this may be enhanced in the future, with improved accessibility via the proposed new link road.

These 465 veh/hr (which is a worst-case maximum adopted for assessment purposes) will only occur during peak periods and the majority of these trips are staff arrivals and departures. Flows at all other times will be significantly less.

A.4 2016 ROAD NETWORK CONDITIONS

Consideration of the Southlands development for Stages 1 and 2 is underpinned by strategic computer modelling, based on a 2016 modelled scenario. This modelling is contained in a separate report undertaken by Mr. Glen Varley of Sims Varley, which is presented in a report dated October 2006 which is published under the auspices of URS. This assessment considers the Southlands development in the context of the overall cumulative traffic generation associated with other development in the region.

This is a very strategic approach and it is more usual for the development impacts of a proposal to be assessed in relative isolation, though with some account taken of the growth in 'background' traffic levels. The cumulative impacts are generally regarded as the responsibility of Council and/or the Roads and Traffic Authority in fulfilling their own strategic planning responsibilities. This approach is however warranted in the circumstances as the development raises the potential need for a new road link and this raises broader implications for performance of the wider road network.

The URS report is presented in **Appendix A2**. It is based on use of the NETANAL model, with optimisation using SCATES. The strategic nature of the study is evident when it is considered that the study has assessed 2016 traffic conditions based on 2006 surveys, plus the southlands development, plus the following additional development:

- Proposed Port Botany expansion with new berths that will increase peak hour traffic generation from 200 veh/hr presently to 1,555 veh/hr; plus
- Development of the Green Square urban renewal project in Zetland with 5,000 residents and an additional 7,000 workforce (an additional 16,100 veh/hr); plus
- Implementation of the Sydney Airport master Plan with 120,000 sq.m of commercial office space (an additional 8,200 veh/hr); and
- Development of the Prince Henry Hospital site over 33.5Ha (an additional 755 veh/hr).

The above developments account for a total additional 26,700 veh/hr. In this context, the Southlands development site accounts for an additional 465 veh/hr as discussed above which is a small proportion of overall trips (less than 2%). The strategic traffic planning issues within the locality are therefore not related to any significant extent to the Southlands site. Rather, Southlands raises local issues and these are fundamentally concerned with the need to provide improved access to the precinct north of Botany Road.

In summary, Southlands should not be expected to resolve all strategic planning issues arising from the above developments, which will be the subject of ongoing assessment by Council and the RTA. The investigations that have been undertaken are however sufficient to establish the optimal arrangement for access to the precinct. The NETANAL model also includes all planned road improvements to 2016 as documented.

Furthermore as the last undeveloped site in the area, there is a question of equity in that the capacity of the existing road system has been absorbed and enjoyed by other properties and their developments. Southlands should therefore reasonably not be required to improve a

traffic system where all other sites have effectively taken its reasonable share of that capacity.

A.5 REVIEW OF ROAD ACCESS OPTIONS

The constraints to development imposed by the road network have resulted in an assessment of other strategic road options which are potentially available to improve access to the precinct north of Botany Road and which are presently limited to the Hills Street/Exell Street one-way paired road system.

These have been assessed in the URS report for several new road link options, based on conditions in 2016 and full development of the Southlands Concept. The options considered include an assessment during both AM and PM peak conditions as discussed in the URS report and as summarised below:

- Option 1: A new access road connecting the existing roundabout access to Discovery Cove (at Botany Road) to McPherson Street;
- Option 2: A new access road connecting Botany Road at the existing left-in/left-out access to Foreshore Drive that is located east of the intersection of Botany Road with Foreshore Drive (note that the extension of Foreshore Road east of Botany Road is in fact part of Botany Road);
- Option 3: A new road access on the alignment of McPherson Street over the railway line connecting to Beauchamp Road at its intersection with Perry Street. This has also been separately assessed for 2 sub-options with different alignments onto Beauchamp Road, although these do not result in different modelling results beyond the influence of any new intersection; and
- Option 4: Reliance on the existing road access via Hills Street and Exell Street.

Option 1 was not considered appropriate as it places undue traffic concentrations onto Botany Road (west of Foreshore Drive) in a location where there is already extensive queuing. It results in unsatisfactory performance at the existing roundabout as well as at the intersection of Botany Road with Foreshore Drive. Importantly, it also provides a direct access to Botany Road in a location where it will potentially cause traffic to divert along Botany Road to/from the north, which traverses residential and shopping areas and will therefore create amenity impacts. Finally, it is compromised by poor sight lines due to existing buildings.

Option 3 (and the sub-options considered) was not considered suitable as although it operates satisfactorily, it provides an access onto a lower-order road (Beauchamp Road) which creates a potential for traffic intrusion into residential areas to/from the north. It provides indirect and circuitous access to/from the west (along Foreshore Drive) which represents the majority of traffic and causes this traffic to unnecessarily make use of the intersection of Beauchamp Road with Botany Road, which is on a poor vertical and horizontal alignment. It also requires an overpass of the railway line in circumstances where the level changes required are so significant as to preclude access to existing properties to/from the new link, removing accesses to many existing sites. An over-bridge on the

McPherson Street alignment for example would sever all access to existing properties between the railway goods line and Beauchamp Road; as well as for a significant distance west of the goods line. This option would also involve substantial costs which would be a waste of resources given that there is a more viable option.

Option 4 was not considered suitable in 2016 as the Hills Street intersection with Botany Road operates unsatisfactorily, as does the existing roundabout at the access to Discovery Cove. Hills Street also has a poor road geometry at its intersection with McPherson Street (where a sharp right-angle bend exists) and the one-way paired road system provided by Hills and Exell Streets is a sub-standard access even under existing traffic conditions. In particular, the left-turn only exit from Exell into Botany Road results in extensive queuing at peak times, with many vehicles undertaking 'U' turn manoeuvres at the roundabout to travel north along Botany Road, which raises safety concerns. Notwithstanding this, some improvements to this route result in significant benefits and this is discussed further in Part B of the study, in the context of the Stage 1 project application.

In summary, the modelling has shown that Option 2 is the preferred arrangement. It makes use of the existing left-in/left-out access onto "Foreshore Drive" (in fact Botany Road) via a substantially improved signal-controlled intersection, with a new public road that connects to McPherson Street and extends into the subject site. This road, which is noted as a long-term objective of Council as identified in Council's planning instruments, provides the following benefits:

- It will serve the entire precinct, not just the subject site;
- The new link will enable bus services to access the industrial precinct north of Botany Road which will result in a significant potential increase in public transport patronage. This can be achieved through the diversion of existing services or the introduction of new services;
- It makes use of an existing intersection and is easily staged;
- The road system has been shown to operate satisfactorily;
- The proposed link is the most direct link to Foreshore Drive, avoiding any unnecessary local traffic diversions either via Botany Road or Beauchamp Street;
- The proximity of the intersection to the existing traffic signals at Botany Road (which is 140 metres to the west) has been discussed with RTA officers and agreed in principle;
- The new road will take significant pressure off the use of Hills Street and Exell Street which will improve traffic conditions along these existing routes; and
- The difficulties presented by traversing through Discovery Cove have been overcome. In particular, all access to Discovery Cove on both sides of the new link will be via left-in and left-out movements with a central median along the new road. Traffic circulation will be facilitated by a proposed new roundabout at the intersection of the new road with McPherson Street.

The preferred road option is possible due to Goodman International's project involvement, and the inclusion of the Discovery Cove Estate in the project. Further, the project team has liaised with the other land owners along the proposed road alignment and has received their consent to the lodgement of this Application.

During community workshops held for the project, Council representatives have noted that they consider the proposed access road to be the best of the options considered.

A.6 DESCRIPTION OF LINK

The alignment of the proposed link is shown in the drawing presented in **Appendix A3**. It can be seen that the road is designed to accommodate two lanes in each direction adjacent to Discovery Cove, including on approach to the traffic signals, with a dividing median along this length. North of Discovery Cove, only one lane in each direction is required. The road forms part of the public road system and will benefit all landowners within the precinct.

A.7 STAGING/ TIMING OF DELIVERY

The proposed road is not required for the Stage 1 development as assessed in Part B of this report. Stage 1 represents about 50% of the overall site. It is proposed that the link therefore be constructed as part of the Stage 2 development, which will provide additional capacity for Stages 2 and 3 to follow. Depending upon the timing for the delivery of Stages 2 and 3 it may be appropriate to review the road link based on prevailing traffic conditions at that time. At the present time however, the proposed road link represents the best available option.

A.8 CONCLUSIONS

Based on the extensive modelling undertaken, the proposed new road link through Discovery Cove (Option 2), which provides the most direct and efficient access from the industrial precinct north of Botany Road (including the subject site), is recommended for adoption. This can be staged as discussed further in Part B of this report.

It is emphasised however that the area is in a state of significant change, with major new port expansion and the Proponents have agreed that the terms and assumptions used to arrive at the new link proposal should be reviewed prior to any development of Stage 2 of the Concept.

PART B

STAGING OF THE SOUTHLANDS SITE

B1 DESCRIPTION OF STAGE 1 DEVELOPMENT

A detailed description of the proposed Stage 1 development is provided in the Environmental Assessment for the Project prepared on behalf of Orica and Goodman International. This is based on the plans prepared by Goodman International which are reproduced at reduced scale in **Appendix B1**. In summary, the development for which approval is now sought has a building area of 47,000m², comprising 43,000m² of warehouse area and 4,000m² of ancilliary office as follows: These will all operate 24 hours per day, 7 days per week. The development will be served by a total of 440 parking spaces, plus an allowance for a future decked area offering another 300 spaces if required.

All access to the Stage 1 site is via a proposed new access road onto McPherson Street. This access road is in the ultimate alignment that will occur with the new road link through Discovery Cove from Botany Road (proposed for Stage 2 & 3). This connects to a new east-west roadway that forms a cul-de-sac within the centre of the Stage 1 development, providing access to all Stage 1 units.

It is emphasised that the total office space for the Stage 1 development is 4,000m² which represents only 8.5% of the total floor area. This is substantially below the 20% limit for ancilliary office area within an industrial development, as embodied in the RTA's Guidelines. The traffic and parking impacts arising from the development are discussed in the following sections.

B2 TRAFFIC GENERATION

The proposed Stage 1 development embodies areas as shown in Table 1 below, with trip rates adopted by the Roads and Traffic Authority for the relevant land use components.

Table 1: Traffic Generation Under RTA Trip Rates (Peak Periods)

| Floor Space Component | Area (m ²) | RTA Trip Rate | Trips Per Hour |
|-----------------------------------|------------------------|------------------------|----------------|
| Free Standing Office ¹ | Nil | 2.0/ 100m ² | - |
| Warehouse ² | 47,000 (100%) | 0.5/100m ² | 235 |
| Total | 47,000 (100%) | | 235 |

Note 1: No Free Standing Office Proposed

Note 2: Includes 4,000m² ancillary office areas (8.5% of total area)

It can be seen that a total of 235 vehicle trips per hour would result from application of the Roads and Traffic Authority's 'generic' trip rates to the Stage 1 development area. This is about 50% of the total site generation as assessed for the Concept Plan application discussed in Part A. If it is assumed that 80% of trips are in the direction of peak flow, this results in 188 veh/hr in and 47 veh/hr out in the morning peak, with this reversed in the afternoon peak. The following factors are noted:

- Large warehouse developments typically operate 24 hours per day and 7 days per week, thereby spreading traffic loads and minimising peak period generation;
- Warehouse staff are usually rostered over this 24 hour shift with changeover times that do not generally coincide with the on-street peak period; and
- Peak period travel is usually associated with administrative staff, which is a small proportion of the overall workforce.

Having regard for these, the adoption of 235veh/hr is considered to represent a worst-case scenario, which is nevertheless appropriate for assessment. With a total of 442 parking spaces, this represents 0.53 trips/space/hr which is also within the expected range.

B3 IMPACTS OF STAGE 1 TRAFFIC

The above traffic impacts would be assigned to the existing road network, with all entries via Hills Street and all exits via Exell Street. The peak flow increase at Hills Street in the morning would be 188 veh/hr, while this would also be the peak flow increase in Exell Street during the PM peak. This equates to about three additional vehicle movements per minute on each road during the respective peak periods.

These flow increases do not trigger the need for the proposed new access road that is discussed in Part A. They do however require improvements to the capacity of the Hills-Exell one way system as discussed further below.

The URS traffic report has assessed the impacts of this additional Stage 1 traffic based on a 2011 land use scenario, with 50% of the traffic levels that were assumed for the total Southlands development under the Concept Plan application. This is presented as Option 5 in the URS report and is termed “construction phase”. It is however more correctly referred to as the Stage 1 traffic impact scenario. It assumes 50% of the traffic generated by the various land uses outlined in Section A4 which introduces increased ‘background’ traffic levels. The modelling assumes the following improvements:

- Provision of a independent left turn and right turn entries into Hills Street from Botany Road, so that these movements can occur concurrently; and
- Provision of traffic signals at the intersection of Exell Street with Botany Road.

These measures are shown in Figure 23 of the URS report and provide satisfactory performance under 2011 conditions, with a good ‘level of service’ at both intersections. The assessment assumes no change at any other intersection. In this regard, the ability of traffic to turn right out of Exell Street into Botany Road under traffic signal control removes the existing ‘U’ turn movements at the Discovery Cove roundabout, which assists the safety and efficiency of this roundabout. It will also reduce the existing queues that occur in Exell Street at peak times, as existing merge conflicts will be removed. The provision of traffic signals at this intersection also provides pedestrian crossing facilities across all approaches of the Exell Street/Botany Road intersection and this will improve pedestrian safety and amenity.

The two parallel entry lanes along Hills Street (one for the right turn from Botany Road and one for the left turn from Botany Road) will require an appropriate merge length prior to the sharp right turn bend in Hills Street. This is likely to prevent traffic turning left from Botany Road into Hills Street from then turning right into Greenfield Street, to avoid a cross-over movement. This is a minor restriction on accessibility and these vehicles will simply need to undertake the short loop using McPherson and Exell Street to access Greenfield Street. Vehicles turning right from Botany Road into Hills Street will be able to turn into Greenfield Street as at present. This limitation is considered justified in light of the significant benefits to accessibility to the precinct generally that will be created by the proposed improvements.

The improvements at the intersection of Hills Street and Botany Road are shown conceptually in **Appendix B2** and the left turn entry into Hills Street requires a slight local widening on the north-west corner to facilitate this movement. This land is under the ownership of the Department of Defence and can be accommodated with minimal impact. Otherwise, the improvements at this intersection can be accommodated within the existing road reservation.

B4 OTHER POSSIBLE IMPROVEMENTS

It is noted that there are other possible improvements that can be implemented to improve traffic conditions in the locality. Some improvement suggestions have developed in discussion with participants at various public workshops during development of the project EA (detail of the feedback provided at these workshops is included in the community consultation section of the EA). These are mainly required to overcome existing problem areas and it is emphasised that they are not required for the Southlands development at any stage. These improvements include the following:

- The possible removal of the existing roundabout at the intersection of Discovery Cove with Botany Road and the introduction of priority control with two southbound through traffic lanes in Botany Road and with a right turn bay in Botany Road;
- The installation of traffic signals at the intersection of the proposed link road with Botany Road (ie the existing Discovery Cove left in/left out entry), which would serve Discovery Cove and provide full movements into and out of Discovery Cove.. This would subsequently be extended to McPherson Street in Stages 2/3 as the new link road. This would then enable light traffic only to use the western access (with the roundabout removed); and
- The construction of an additional southbound lane in Botany Road (eastern side) on approach to Foreshore Drive, enabling four lanes on approach to the intersection comprising a left turn lane, a through lane and two right turn lanes.

These are matters that are independent of the Southlands Stage 1 development. They could however be included in the Stage 1 works as a public benefit in association with subsequent development stages, in which case they would then be considered as “works in kind” as an offset to Section 94 contributions. The S.94 review for the project undertaken by Connell Wagner and submitted with this Application considers the delivery of these works in kind as part of the S.94 contribution for the site, but it is noted that these works are not required to

satisfy the traffic needs of the Stage 1 development. A concept plan showing these works is presented in Appendix B3.

B5 PARKING REQUIREMENTS

The parking requirements can be assessed on the basis of Botany Bay City Council's DCP as well as the RTA's Guidelines for warehouse uses as contained in the document entitled "Guide to Traffic Generating Developments." The application of Council and RTA parking rates to the proposed Stage 1 development results in parking requirements as shown in Table 2.

Table 2: Comparative Parking Requirements – Stage 1

| Use | Area (m ²) | Council DCP Requirement | | RTA Guideline Requirement | |
|-----------|------------------------|-------------------------|--------|---------------------------|--------|
| | | Rate | Spaces | Rate | Spaces |
| Warehouse | 40,000 | 1/80m ² | 500 | 1/300m ² | 134 |
| Office | 4,000 | 1/40m ² | 100 | 1/300m ² | 14 |
| TOTAL | 47,000 | | 600 | | 148 |

It can be seen that the development would require between 148 spaces based on the RTA's requirements and 600 spaces if based on Council's DCP requirement. It is noted that the above parking rates are 'generic' rates that are averaged across the LGA/metropolitan area and do not take due account of the particular requirements of specific tenants or the wide variation in surveyed parking demands for industrial uses. Accordingly, a significant degree of flexibility is required.

Nevertheless, the plans incorporate 440 spaces (plus a possible additional decked area of some 300 spaces) which is considered satisfactory in the circumstances and is substantially more (200%) than would be required by the RTA. This demonstrates that all parking demands will be fully accommodated within the site, with the prospect of spare parking being available. This can be reviewed during subsequent development stages if necessary. Council's requirement is considered excessive for warehouse uses, particularly when the following factors are considered:

- Large warehouse developments typically operate 24 hours per day and 7 days per week, thereby spreading traffic loads and resultant parking demands; and
- Warehouse staff is usually rostered over this 24 hour shift which spreads the peak parking demands.

In summary, provision for 440 parking spaces is supported for Stage 1. This includes provision for disabled parking and visitors. It is recommended that 5 disabled spaces be provided in accordance with the minimum requirements of AS 2890.1 and these should be dispersed throughout the site and be convenient to the offices.

The cumulative parking requirements for Stages 1 and 2 would be as shown in Table 3:

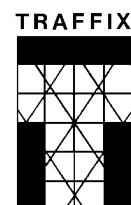


Table 3: Comparative Parking Requirements – Stages 1 and 2

| Use | Area (m ²) | Council DCP Requirement | | RTA Guideline Requirement | |
|---------------|------------------------|-------------------------|--------|---------------------------|--------|
| | | Rate | Spaces | Rate | Spaces |
| Stage 1 | 47,000 | | 600 | | 148 |
| Stage 2 | | | | | |
| Warehouse | 14,850 | 1/80m ² | 186 | 1/300m ² | 50 |
| Office | 1,400 | 1/40m ² | 35 | 1/300m ² | 5 |
| Stage 2 Total | 16,250 | | 221 | | 55 |
| TOTAL | 63,250 | | 821 | | 203 |

It can be seen that the Stage 1 and 2 development would together require between 203 spaces based on the RTA's requirements and 821 spaces if based on Council's DCP requirement. The plans incorporate 440 spaces for Stage 1 (assuming no decking) and an additional 260 spaces for Stage 2. Hence a total of 700 spaces would be available for Stages 1 and 2 which is considered very satisfactory and towards the upper end of the range.

It is expected that 10-20% of all parking will be allocated for visitors and this will be subject to the needs of individual tenants. It is also proposed that disabled parking be provided on the basis of compliance with AS 2890.1, with 2% of all parking being disabled spaces.

B6 ACCESS AND INTERNAL DESIGN ASPECTS

The access and internal design aspects of the Stage 1 and 2 development have been reviewed and comply with the requirements of AS 2890.1 (off Street Parking) and AS 2890.2 (Commercial Vehicle Facilities). The internal design makes provision for 25 metre long B Doubles which is the longest truck expected to require access. The following factors are noteworthy:

Access

The access arrangements comply with all relevant standards. The following factors are noted:

- The access to Stage 1 and 2 is via a new public roadway onto McPherson Street which will operate as a standard 'T' junction under priority control;
- The internal access road is provided with a turning area (cul-de-sac) to accommodate turning vehicles;
- The access and internal design has been designed to accommodate a 25 metre B-Double. The ability of this truck to access the site has been demonstrated by swept path analysis and is satisfactory;

- Extensive internal queuing capacity is provided for all sites, so that no on-street queuing will occur;
- Separate car entry and exit driveways are provided which are separate from the truck driveways, providing maximum safety for both car drivers and pedestrians;
- Available sight distances at all driveways will be satisfactory; and
- Pedestrian amenity and safety will be achieved by the provision of pedestrian footpaths and internal linkages.

Internal Design

The internal design complies with the requirements of AS 2890.1 and AS 2890.2 and incorporates the following elements:

- Driveways comply as discussed above;
- Parking bays and aisles comply with the requirements of AS 2890.1 and generally incorporate bays of minimum width 2.5 metres with aisles of minimum width 6.0 metres; and
- Provision of sufficient clearances to accommodate a B Double operating with a 12.5 metre radius turn, as defined by Austroad Guidelines. The detailed design of these areas will require further assessment at construction certificate stage, taking account also of Botany Council's requirements for driveway crossings.

In addition to the above, it is noted that the access and internal design aspects are consistent with the requirements for the overall development under the Concept Plan (i.e. including Stages 2 and 3). In summary, the access and internal design is considered to be satisfactory and will provide a very good level of safety, convenience and amenity.

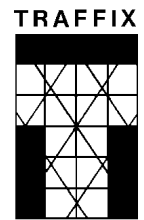
B7 CONSTRUCTION TRAFFIC IMPACTS

Stage 1

Construction of the Stage 1 development is expected to be undertaken over an 18 month period, with peak truck visitation occurring during the initial 9 month period when the site will be filled. Preliminary advice indicates an average of 50 to 60 trucks per day, with peak activity periods (such as the importation of fill material) generating up to 100 trucks per day. Under normal conditions, the average truck level is appropriate for assessment and this will be spread over a 10 hour day, with an average of 6 trucks per hour (i.e. 6 in and 6 out). This equates to one truck arrival every 10 minutes along Hills Street; or one truck departure every 10 minutes in Exell Street. This is very moderate and can be readily accommodated in the context of existing traffic conditions, with no requirement for any upgrading.

Stage 2

The construction traffic assessment for Stage 2 needs to consider not only the filling and site works for this stage but also the construction of the new link road.

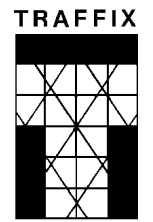


Construction of the new link road will require access from both the Discovery Cove and the McPherson Street ends of the new road. This therefore will involve construction vehicles accessing and carrying out works within Discovery Cove; accessing the MCS property via Botany Road; and accessing the site via Hills Street and onto Macpherson Street while Stage 1 is operational.

It is expected that the majority of construction vehicles associated with the new link road will enter via Discovery Cove, with an expected 50 truck movements per day (50 in, 50 out). This will have a moderate impact when it is considered that these vehicles will be dispersed over the entire day. Nevertheless, a detailed Construction Traffic Management Plan will be developed to ensure that Discovery Cove and the Stage 1 development can operate satisfactorily, while minimising impacts on Hills Street and Exell Street.

B8 CONCLUSIONS

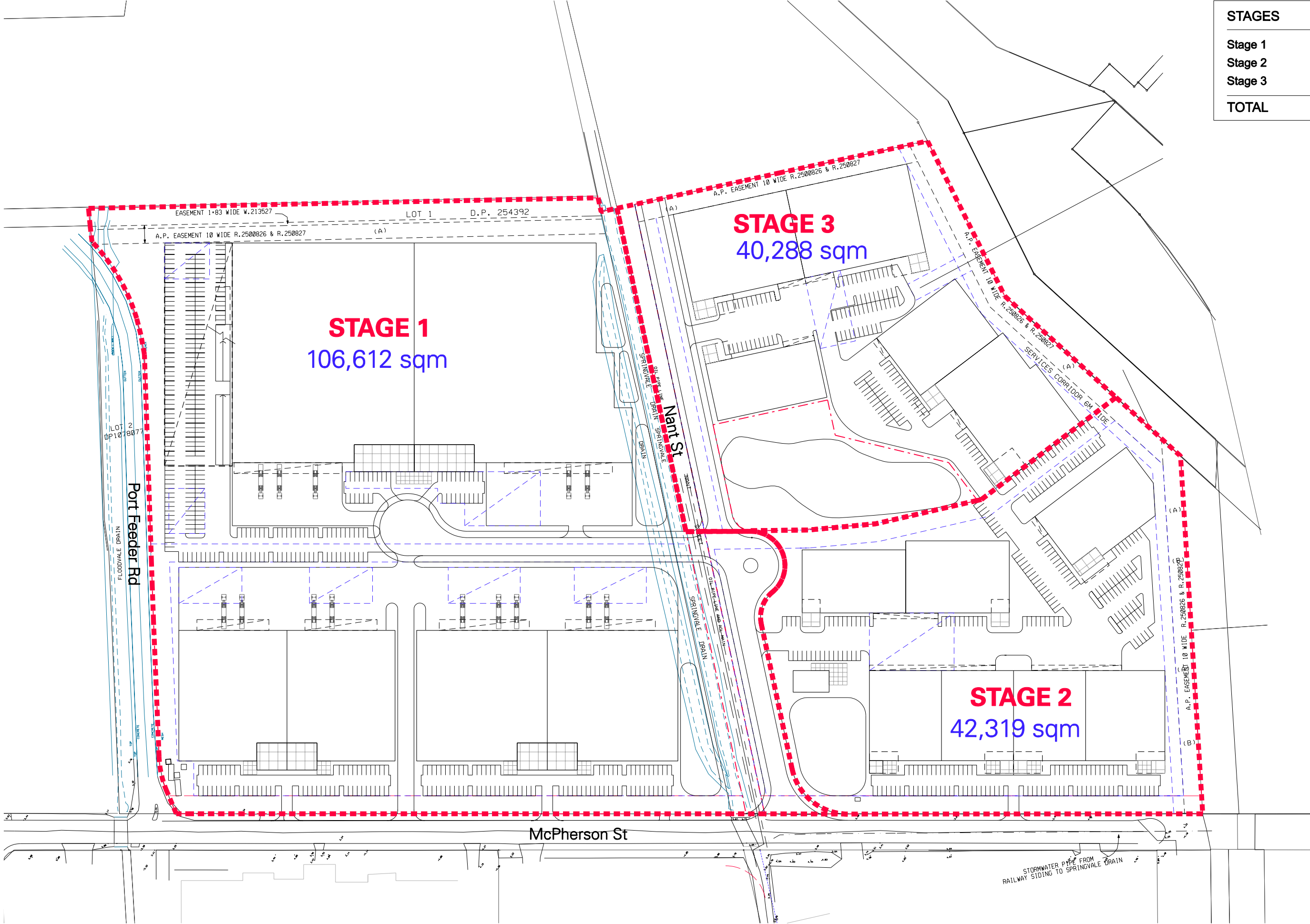
- *The traffic generation associated with the overall Southlands development is expected to be about 465 veh/hr during peak periods (232 in, 233 out) and this is a moderate level of generation for a site of this size and is a direct consequence of the warehouse distribution uses which are low traffic generators;*
- *The traffic generation arising from the Stage 1 Project is 235 veh/hr (in and out combined). This traffic can be accommodated subject to the proposed improvements at the intersections of Hills Street and Exell Street with Botany Road;*
- *Further improvements are available and have been discussed with community representatives. These relate to the replacement of the existing roundabout access to the Discovery Cove industrial park and the provision of an additional lane in Botany Road on approach to Foreshore Drive. These improvements are not required for the Stage 1 development but are offered as “works in kind” as an offset to Section 94 contributions;*
- *The Stage 2 development will generate an additional 120 veh/hr which is a moderate further increase which triggers the need to consider the construction of a new link road which would provide the capacity to serve Stages 2 and 3. In this regard, Stage 3 generates an additional 110 veh/hr;*
- *Parking for 440 spaces is provided in Stage 1 which is substantially more than required under the RTA’s Guidelines (148 spaces) and less than required under Council’s DCP (600 spaces). The level of provision is at the upper end of this range and is supported in the circumstances for the reasons discussed;*
- *Parking for 700 spaces is provided for Stages 1 and 2 combined which is also towards the upper end of the range;*
- *Provision will be made for visitors as well as disabled parkers;*
- *The proposed means of site access is considered satisfactory and traffic will be able to enter and exit the site safely and efficiently in a forward direction, including B-Doubles. In addition, cars and heavy vehicles are physically separated; and*
- *The internal design arrangements comply with the requirements of AS 2890.1 and AS 2890.2 and will accommodate all required vehicles. The detailed design of the facility, including driveway crossing levels and on-street parking controls, will need to be reviewed prior to construction.*

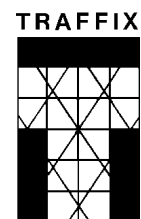


APPENDIX A1

Overall Site Plan

| STAGES | |
|---------|-----------|
| Stage 1 | 10.661 ha |
| Stage 2 | 4.231 ha |
| Stage 3 | 4.028 ha |
| TOTAL | 18.920 ha |





APPENDIX A2:

URS Traffic Report

ORICA
Southlands Development
Botany
Access Implications Assessment

16 October, 2006

Client

Traffix
ABN 66 065 132 961



Project Manager / Author

Glen Varley
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Disclaimer

URS Australia assumes no responsibility or liability for the predictive findings detailed in this document. The projections are subject to significant uncertainties and unanticipated change. While all source data employed in the preparation of this document has been diligently collated and checked URS Australia is unable to assume responsibility for any errors or omissions.

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Executive Summary

| Option | Access Condition | Access Control | Access Performance at End State (LoS in Year 2016) | | Benefits | Disbenefits |
|-----------------------|---|------------------------------------|--|----|---|---|
| | | | AM | PM | | |
| 1 | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising the current roundabout on Botany Road | Roundabout | F | F | * Turn restrictions reduce potential for vehicular conflict within Discovery Cove | * Poor exiting sight lines * Right turn movements to/from Discovery Cove impede the through movement on Botany Road reflected in roundabout performance * Necessary turn bans restrict access and egress within Discovery Cove |
| 2 Preferred Option | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising a new set of traffic signals 140metres, east, of Foreshore Road | Traffic Signals | A | A | * Direct access through Discovery Cove to proposed Southlands development * Good intersection performance * Good traffic signal coordination on Botany Road * Good accessibility to the arterial road network * Improves the operational performance of the Botany Road intersections with Discovery Cove and Hill Street | * Introduces a new set of traffic signals on Botany Road, increasing the incidents of stops * Introduces additional traffic within Discovery Cove |
| 3 | Construction of a road link, eastbound between McPherson Street and Beauchamp Road at Perry Street | Traffic Signals | A | B | * Good operational performance of new traffic signals * Intersection of Botany Road and Beauchamp Road suffers from increased right turn volume from Beauchamp Road during the evening peak | * Excessive costs associated with a rail overbridge * Steep gradients required on new road link to tie back into existing in McPherson Street |
| 4 | Utilisation of existing infrastructure at the intersection of Botany Road with Hill Street and Exell Street | Hill Street Priority Sign Control | F | B | * Inexpensive option evoked through use of existing infrastructure * Access maintained during construction of development site | * Indirect, circuitous access to development site * Poor existing horizontal and vertical alignment * Westbound motorists, egressing Exell Street, necessitate an undesirable U-Turn movement resulting in an unsatisfactory LoS at the Discovery Cove roundabout |
| | | Exell Street Priority Sign Control | A | E | | |

Table E1: Option Summary

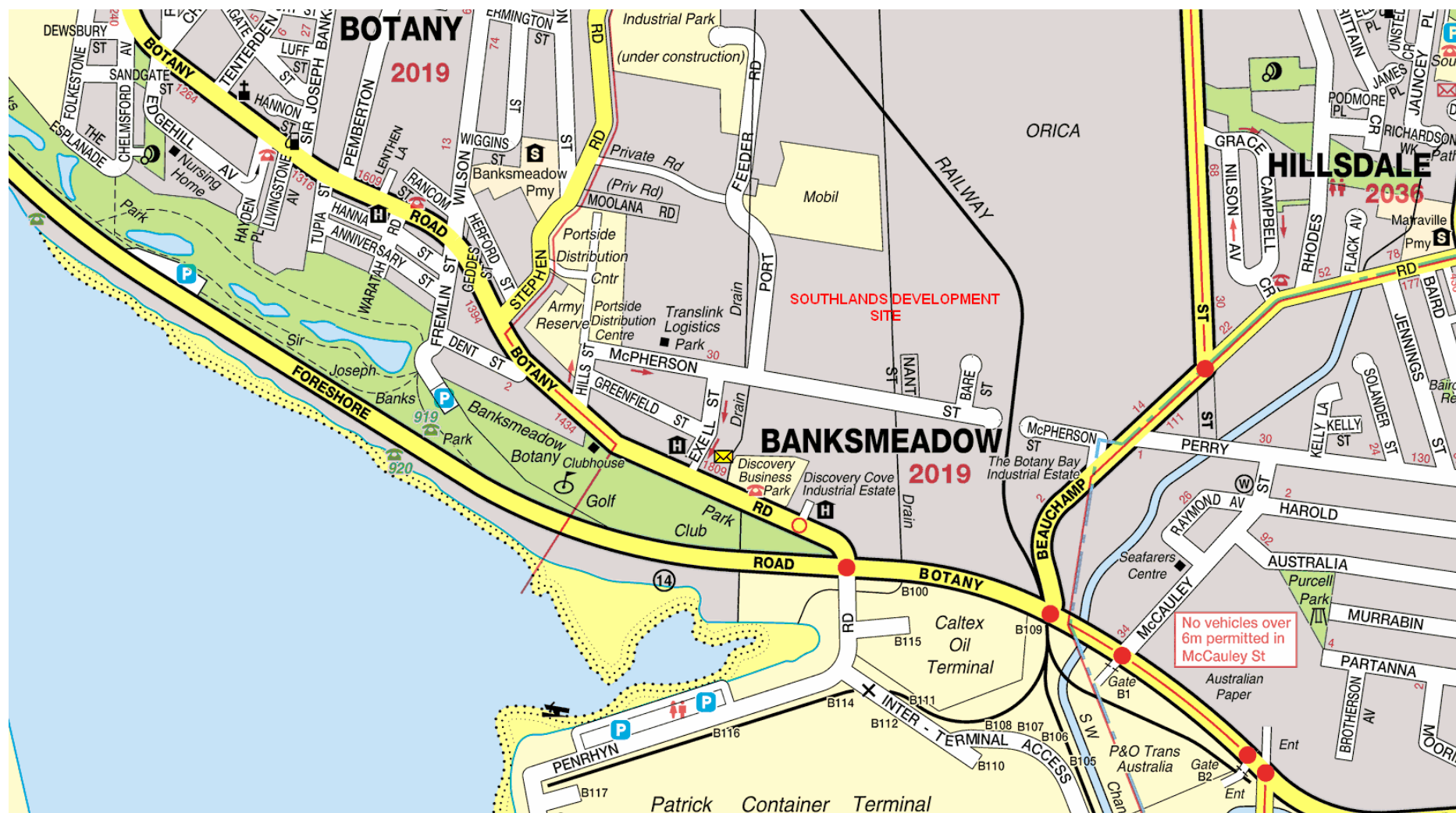
Forward

Traffix engaged URS Australia Pty Ltd to prepare an assessment of the operational performance of the access conditions on the arterial road system of the Southland Development on the ORICA Site, Botany.

The proposed Southland Development site is generally bounded by McPherson Street to the south, the Sydenham-Botany heavy rail corridor to the east and north, and Port Feeder Road to the west, as shown in *Figure 1*.

Computer based intersection analysis and assignment modelling, Scates and Netanal, respectively, have been employed to assess the implications of three (3) alternate access arrangements for the site, as shown in *Figures 2-4*.

The assessment considers, in detail, the operation of the coordinated traffic signals along Botany Road and Beauchamp Road endeavouring to achieve conditions commensurate with the demands and expectations of the Roads and Traffic Authority (RTA).



Source: UBD Australian City Streets - Version 3, 2005

SOUTHLANDS DEVELOPMENT SITE

Figure 1: Study Area

Executive Summary

| Option | Access Condition | Access Control | Access Performance at End State (LoS in Year 2016) | | Benefits | Disbenefits |
|-----------------------|---|------------------------------------|--|----|---|---|
| | | | AM | PM | | |
| 1 | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising the current roundabout on Botany Road | Roundabout | F | F | * Turn restrictions reduce potential for vehicular conflict within Discovery Cove | * Poor exiting sight lines * Right turn movements to/from Discovery Cove impede the through movement on Botany Road reflected in roundabout performance * Necessary turn bans restrict access and egress within Discovery Cove |
| 2 Preferred Option | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising a new set of traffic signals 140metres, east, of Foreshore Road | Traffic Signals | A | A | * Direct access through Discovery Cove to proposed Southlands development * Good intersection performance * Good traffic signal coordination on Botany Road * Good accessibility to the arterial road network * Improves the operational performance of the Botany Road intersections with Discovery Cove and Hill Street | * Introduces a new set of traffic signals on Botany Road, increasing the incidents of stops * Introduces additional traffic within Discovery Cove |
| 3 | Construction of a road link, eastbound between McPherson Street and Beauchamp Road at Perry Street | Traffic Signals | A | B | * Good operational performance of new traffic signals * Intersection of Botany Road and Beauchamp Road suffers from increased right turn volume from Beauchamp Road during the evening peak | * Excessive costs associated with a rail overbridge * Steep gradients required on new road link to tie back into existing in McPherson Street |
| 4 | Utilisation of existing infrastructure at the intersection of Botany Road with Hill Street and Exell Street | Hill Street Priority Sign Control | F | B | * Inexpensive option evoked through use of existing infrastructure * Access maintained during construction of development site | * Indirect, circuitous access to development site * Poor existing horizontal and vertical alignment * Westbound motorists, egressing Exell Street, necessitate an undesirable U-Turn movement resulting in an unsatisfactory LoS at the Discovery Cove roundabout |
| | | Exell Street Priority Sign Control | A | E | | |

Table E1: Option Summary

1 Existing Conditions

Current access to the site is achieved from McPherson Street and Port Feeder Road via the Botany Road circulatory one way system at Hill Street and Excel Street.

The circulatory one way system currently experiences significant delays as a consequence of poor horizontal alignment, inadequate intersection geometries, high number of heavy vehicle movements and the volume of traffic on Botany Road.

The existing volumes on the surrounding arterial road system are shown in *Figure 2*.

As a base for comparison with the projected Southlands Development outcomes, presented in this assessment, the Year 2006 traffic figures¹ have been used in the calibration of the study area road network for the base models.

1.1 Calibration Process

To assess the performance of the existing network, Netanal modelling has been carried out. The 2006 Sydney Metropolitan Road Network incorporates State, Regional, Arterial, Sub-arterial, Collector and Sydney CBD roads, as classified by RTA and Local Government areas. Significant Local Roads, which carry substantial volumes of traffic, have also been included in the networks for the base year models.

The 2006 base network includes all RTA road works programmed or completed road works up to year 2006.

Select link and Screen Line data, collated from the traffic counts were employed in the calibration procedure to ensure uniform accuracy throughout the study area road network.

¹ R.O.A.R. Traffic Counts – 17 September, 2006

Traffic volume data extracted from the report was used in the calibration and validation of 16 links within the study area. A cordon, encompassing the study area, was employed to assess the calibration accuracy of the road network modelling in the base year 2006.

1.2 Calibration Accuracy

The accuracy of calibration is explained either by the absolute Mean Absolute Difference (MAD) or the Mean Absolute Difference \pm 10% (10% MAD) of the traffic count ranges. The MAD represents the mean difference between the averaged count volume for the particular traffic flow and the average modelled value for the same. A 10% MAD count variation is used to allow for the inherent 20% variation in daily traffic volumes, errors and discrepancies in SCATS and manual counting methods.

The calibration, as shown in the MAD analyses, indicate both peak models present a satisfactory level of calibration accuracy and accordingly, have been adopted as the base models for this project.

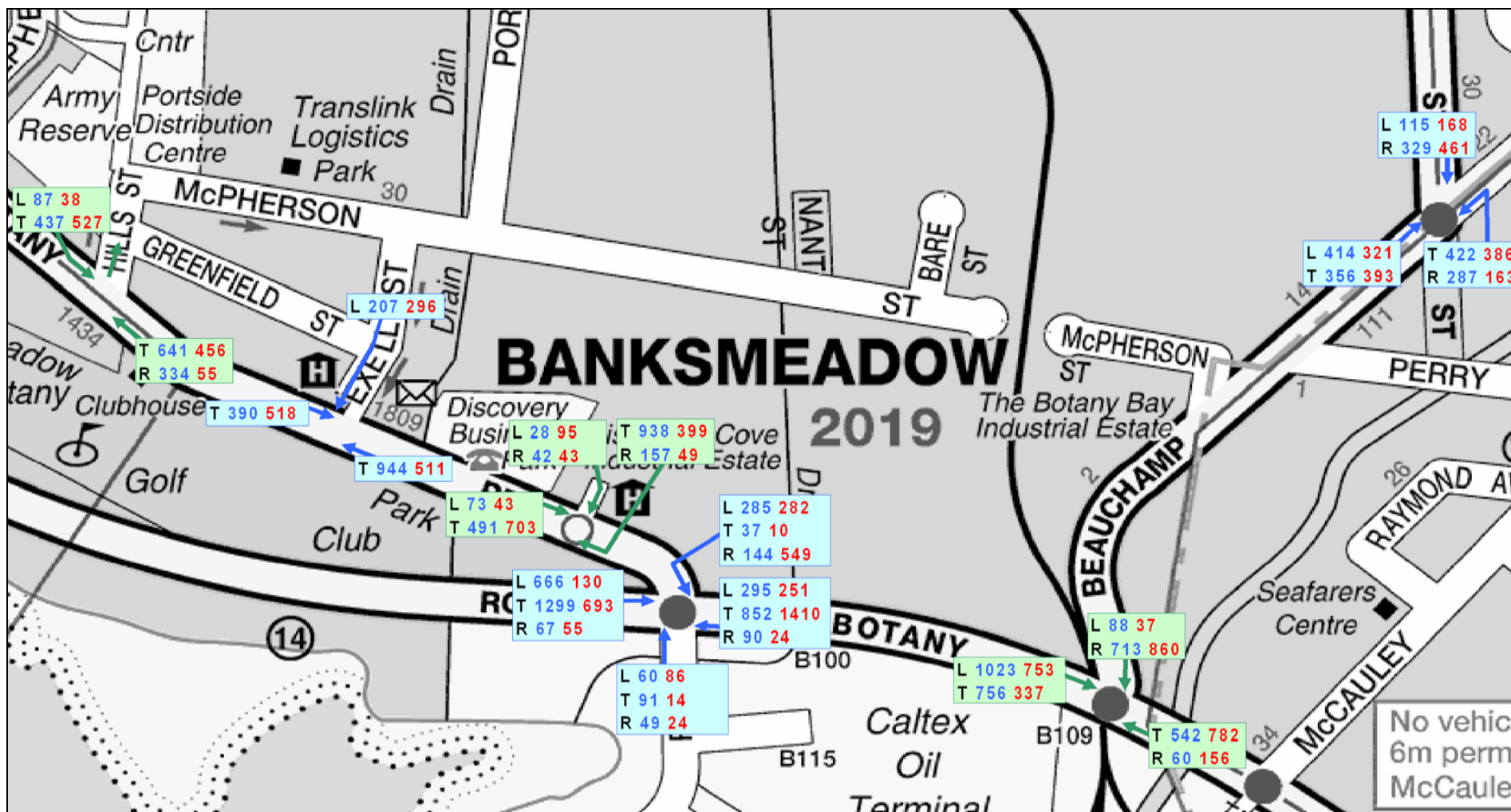


Figure 2: Existing Traffic Counts

Calibration Summary for Model 06AM14
Network = 06ORICA Trip Table = 06AM14
2006 AM PEAK ORICA BASE MODEL
Observed Counts versus Modelled Volumes

| Location..... | Node | Node | Count | Model | Diff | Diff% | GEH |
|--------------------------|-------|-------|-------|-------|------|-------|-----|
| BOTANY EB W HILLS | 6593 | 1000 | 524 | 527 | 3 | 1 | 0 |
| HILLS NB N BOTANY | 1000 | 11487 | 421 | 469 | 48 | 11 | 2 |
| EXELL SB N BOTANY | 11486 | 1001 | 207 | 181 | -26 | -13 | 2 |
| BOTANY EB W DISCOVERY ! | 1001 | 6932 | 564 | 452 | -112 | -20 | 5 |
| DISCOVERY N BOTANY SB ? | 1059 | 6932 | 70 | 51 | -19 | -27 | 2 |
| BOTANY E DISCOVERY WB ! | 6933 | 6932 | 1095 | 779 | -316 | -29 | 10 |
| BOTANY W FORESHORE WB | 6932 | 6933 | 466 | 439 | -27 | -6 | 1 |
| BOTANY E FORESHORE WB | 6934 | 6933 | 1237 | 1250 | 13 | 1 | 0 |
| FORESHORE W BOTANY EB | 6931 | 6933 | 2032 | 1965 | -67 | -3 | 1 |
| PENRHYN S BOTANY NB | 11518 | 6933 | 200 | 212 | 12 | 6 | 1 |
| BOTANY W BEAUCHAMP EB | 6933 | 6934 | 1781 | 1556 | -225 | -13 | 6 |
| BOTANY E BEAUCHAMP WB * | 1003 | 6934 | 602 | 667 | 65 | 11 | 3 |
| BEAUCHAMP N BOTANY SB | 6935 | 6934 | 801 | 804 | 3 | 0 | 0 |
| BEAUCHAMP S DENISON NB * | 6935 | 6936 | 770 | 842 | 72 | 9 | 3 |
| BEAUCHAMP N DENISON SB | 11481 | 6936 | 709 | 606 | -103 | -15 | 4 |
| DENISON N BEAUCHAMP SB ? | 1062 | 6936 | 444 | 327 | -117 | -26 | 6 |

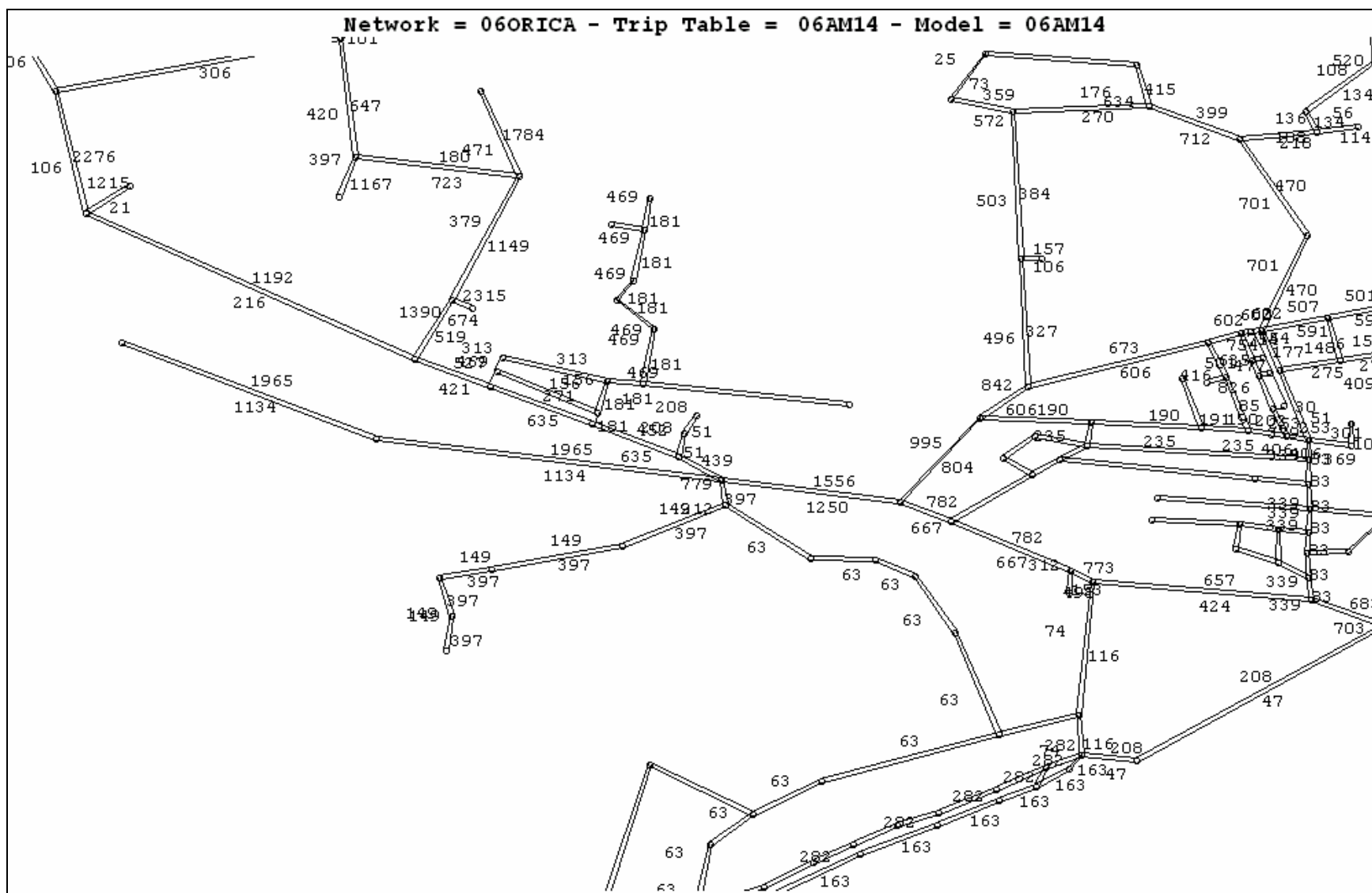
Summary of GEH Calibration Validation

| | Counts | % |
|--------------------------|--------|-----|
| GEH <= 5 Target = > 60% | 13 | 81 |
| GEH <= 7 Target = > 80% | 15 | 94 |
| GEH <= 10 Target = > 95% | 16 | 100 |
| GEH <= 12 Target = 100% | 16 | 100 |
| GEH > 12 Target = 0% | 0 | 0 |
| Total Counts | 16 | |

Mean, Mean Absolute Difference (MAD) & +/- 10% MAD Analysis - Model 06AM14
Note.... A Mean, a Mean Absolute Difference (MAD) & a MAD +/- 10% Count
Variability Analysis is calculated and the results given below.
The 10% MAD count variation endeavours to cater for the known
20% variation in daily traffic volumes, errors and discrepancies
in SCATS and other count methods.

| Observed Count Range | Mean | MAD ABS | MAD +-10% | Counts |
|---------------------------------------|-------|------------|--------------|--------|
| | % | % | % | |
| 0001 to 0500 | 7.13 | 13.77 | 3.77 | 6 |
| 0501 to 1000 | 1.81 | 9.02 | 0.00 | 6 |
| 1001 to 1500 | 12.99 | 14.11 | 4.11 | 2 |
| 1501 to 2000 | 25.27 | 12.63 | 2.63 | 1 |
| 2001 to 2500 | 3.30 | 3.30 | 0.00 | 1 |
| 2501 to 3000 | 0.00 | 0.00 | 0.00 | 0 |
| 3001 to 3500 | 0.00 | 0.00 | 0.00 | 0 |
| 3501 to 4000 | 0.00 | 0.00 | 0.00 | 0 |
| 4001 to 5000 | 0.00 | 0.00 | 0.00 | 0 |
| 5001 to Maximum | 0.00 | 0.00 | 0.00 | 0 |
| Total of Counts 0001 to Maximum Range | 6.68 | 10.30 | 0.30 | 16 |
| Total of Counts 0501 to Maximum Range | 6.59 | 9.68 | 0.00 | 10 |

Table 3: AM Calibration Report



Calibration Summary for Model 06PM20
Network = 06ORICA Trip Table = 06PM20
2006 PM PEAK ORICA BASE MODEL
Observed Counts versus Modelled Volumes

| Location..... | Node | Node | Count | Model | Diff | Diff% | GEH |
|--------------------------|-------|-------|-------|-------|------|-------|-----|
| BOTANY EB W HILLS | 6593 | 1000 | 565 | 573 | 8 | 1 | 0 |
| HILLS NB N BOTANY | 1000 | 11487 | 93 | 96 | 3 | 3 | 0 |
| EXELL SB N BOTANY | 11486 | 1001 | 296 | 292 | -4 | -1 | 0 |
| BOTANY EB W DISCOVERY | 1001 | 6932 | 814 | 774 | -40 | -5 | 1 |
| DISCOVERY N BOTANY SB | 1059 | 6932 | 138 | 140 | 2 | 1 | 0 |
| BOTANY E DISCOVERY WB | 6933 | 6932 | 168 | 173 | 5 | 3 | 0 |
| BOTANY W FORESHORE WB | 6932 | 6933 | 841 | 833 | -8 | -1 | 0 |
| BOTANY E FORESHORE WB | 6934 | 6933 | 1685 | 1710 | 25 | 1 | 1 |
| FORESHORE W BOTANY EB | 6931 | 6933 | 878 | 873 | -5 | -1 | 0 |
| PENRHYN S BOTANY NB | 11518 | 6933 | 124 | 140 | 16 | 13 | 1 |
| BOTANY W BEAUCHAMP EB | 6933 | 6934 | 1090 | 1012 | -78 | -7 | 2 |
| BOTANY E BEAUCHAMP WB | 1003 | 6934 | 938 | 895 | -43 | -5 | 1 |
| BEAUCHAMP N BOTANY SB | 6935 | 6934 | 997 | 1021 | 24 | 2 | 1 |
| BEAUCHAMP S DENISON NB | 6935 | 6936 | 714 | 661 | -53 | -7 | 2 |
| BEAUCHAMP N DENISON SB * | 11481 | 6936 | 549 | 600 | 51 | 9 | 2 |
| DENISON N BEAUCHAMP SB ! | 1062 | 6936 | 629 | 495 | -134 | -21 | 6 |

Summary of GEH Calibration Validation

| | Counts | % |
|--------------------------|--------|-----|
| GEH <= 5 Target = > 60% | 15 | 94 |
| GEH <= 7 Target = > 80% | 16 | 100 |
| GEH <= 10 Target = > 95% | 16 | 100 |
| GEH <= 12 Target = 100% | 16 | 100 |
| GEH > 12 Target = 0% | 0 | 0 |
| Total Counts | 16 | |

Mean, Mean Absolute Difference (MAD) & 10% MAD Analysis - Model 06PM20
Note.... A Mean, a Mean Absolute Difference (MAD) & a MAD 10% Count
Variability Analysis is calculated and the results given below.
The 10% MAD count variation endeavours to cater for the known
20% variation in daily traffic volumes, errors and discrepancies
in SCATS and other count methods.

| Observed Count Range | Mean | MAD ABS | MAD +10% | Counts |
|---------------------------------------|-------|------------|-------------|--------|
| | % | % | % | |
| 0001 to 0500 | -2.69 | 3.66 | 0.00 | 5 |
| 0501 to 1000 | 2.89 | 5.29 | 0.00 | 9 |
| 1001 to 1500 | 7.16 | 7.16 | 0.00 | 1 |
| 1501 to 2000 | 0.00 | 1.48 | 0.00 | 1 |
| 2001 to 2500 | 0.00 | 0.00 | 0.00 | 0 |
| 2501 to 3000 | 0.00 | 0.00 | 0.00 | 0 |
| 3001 to 3500 | 0.00 | 0.00 | 0.00 | 0 |
| 3501 to 4000 | 0.00 | 0.00 | 0.00 | 0 |
| 4001 to 5000 | 0.00 | 0.00 | 0.00 | 0 |
| 5001 to Maximum | 0.00 | 0.00 | 0.00 | 0 |
| Total of Counts 0001 to Maximum Range | 2.20 | 4.74 | 0.00 | 16 |
| Total of Counts 0501 to Maximum Range | 2.61 | 4.84 | 0.00 | 11 |

Table 5: PM Calibration Report

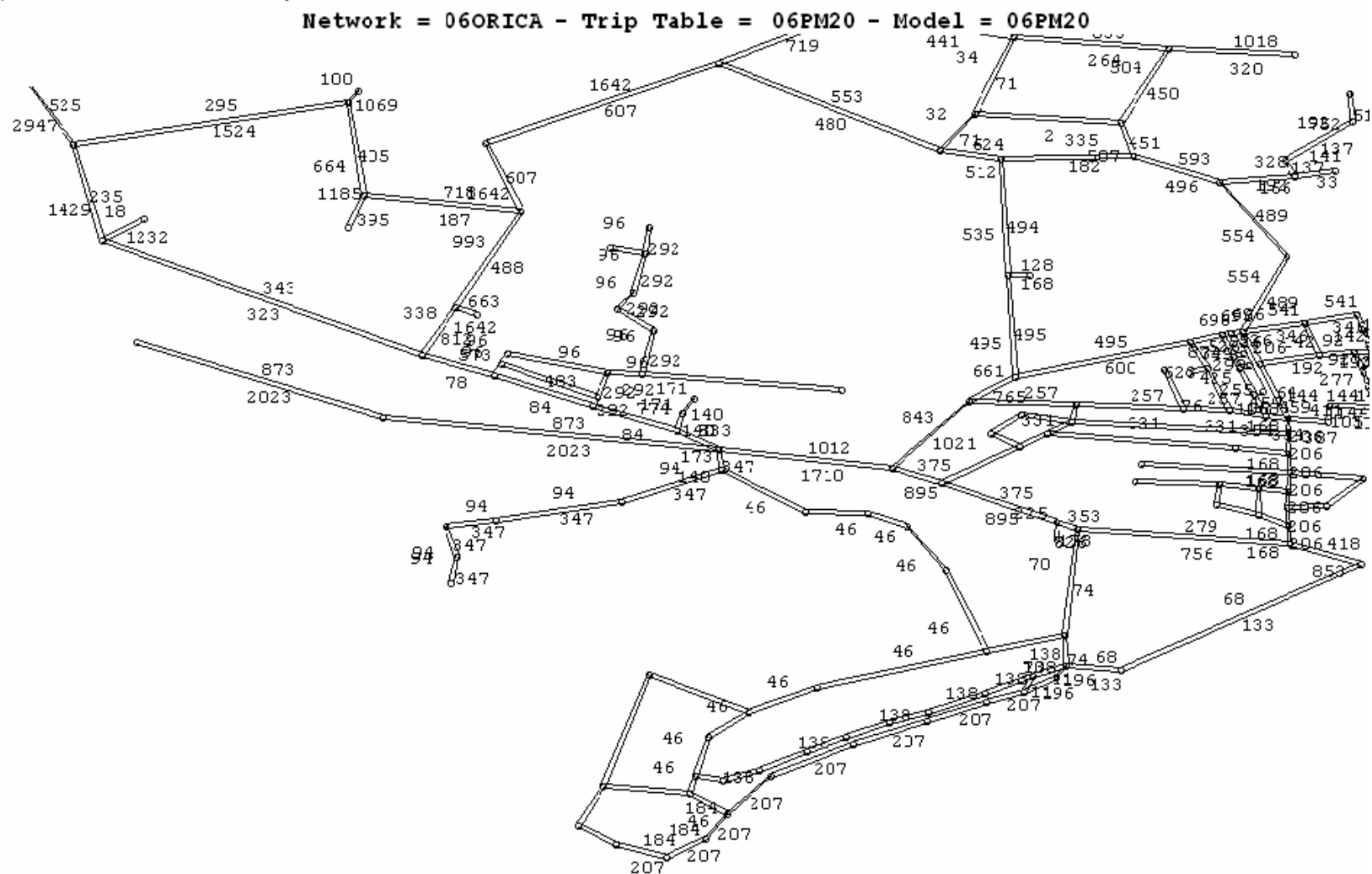


Figure 6: 2006 PM Base Model

2 Future Conditions

The proposed Southlands Development is an 18.2ha commercial site anticipated to yield 465vph² during peak periods. In particular, attracting 325vph and initiating 140vph during the morning peak of which some 20% of trips will be made by heavy vehicles. The evening peak is assumed to be the converse of the morning peak.

In conjunction with further significant developments through the region, computer based strategic Netanal assignment modelling has been undertaken to assess four (4) access arrangements. Each option assumes secondary access to the Southlands site via a proposed roundabout on McPherson Street. The future year 2016 scenario models developed for the project are...

- The anticipated Metropolitan growth on the year 2016 road network without the proposed Southlands Development (16AMBASE.PLT and 16PMBASE.PLT),
- The proposed Southlands Development with primary access from the existing roundabout on Botany Road at Discovery Cove, west of Foreshore Drive (16AM1.PLT and 16PM1.PLT),
- Preferred Option - The proposed Southlands Development with Botany Road Access, 140m east of Foreshore Drive (16AM2.PLT and 16PM2.PLT),
- The proposed Southlands Development with Beauchamp Road Access, at Perry Street (16AM3.PLT and 16PM3.PLT), and
- The proposed Southlands Development with arterial access and egress from the existing one way circulatory system of Hill Street and Exell Street, respectively (16AM4.PLT and 16PM4.PLT).

Year 2016 morning and evening peak traffic period models have been developed reflecting the anticipated growth within the Sydney Metropolitan Area, as prescribed by the Transport and Population Data Centre (TPDC) in the land use projections from the 2001 Census data.

² *Orica Limited Site, Botany: Southlands Project: Due Diligence*, Traffix, 27 September, 2005

A fifth option involves the determination of the remedial treatments necessary to facilitate access, via the current road network, in Year 2011 during construction of the proposed Southlands site.

The one way circulatory system of Hill Street and Exell Street is to be employed for access during the construction phase of the project.

A number of planned developments reflecting significant increases in generation rates to those expressed in the year 2016 morning peak TPDC trip matrices, have also been included...

- Port Botany Expansion – The port facility currently generates some 200 vehicle trips per hour (vph) during the morning peak while the evening peak reports 125vph. The proposed expansion of 51ha incorporates the introduction of four (4) new berths, while retaining the potential to add a fifth berth, subject to further assessment. The projected vehicle generation from the port, as modelled, is 1,155vph,
- Green Square – The Urban Renewal Project at Zetland covers an area of some 14ha and focuses on enhancing the commercial, residential and recreational activities within the community. The plan caters for a workforce of some 7,000 persons while home to 5,500 residents. The projected generation in year 2016 is 16,076vph, as modelled,
- Sydney Airport Master Plan – The expansion of the Sydney Airport Precinct will see the potential introduction of up to 120,000 sq m of commercial floor space and car parking provision presenting a vehicle generation of 8,300vph, and
- Prince Henry Site –The former Prince Henry Hospital site will yield some 33.5ha of developable land as a mix of residential, aged care facility and community use. The traffic generation from the site is anticipated and modelled as 755vph.

Each model has been assessed from the strategic regional perspective and micro Scates analysis of critical, traffic signal controlled, local intersections under the coordinated management of SCATS. For those options reflecting roundabout and priority controlled intersections on Botany Road, west of Foreshore Drive, Intanal analysis has been employed to assess the operational performance.

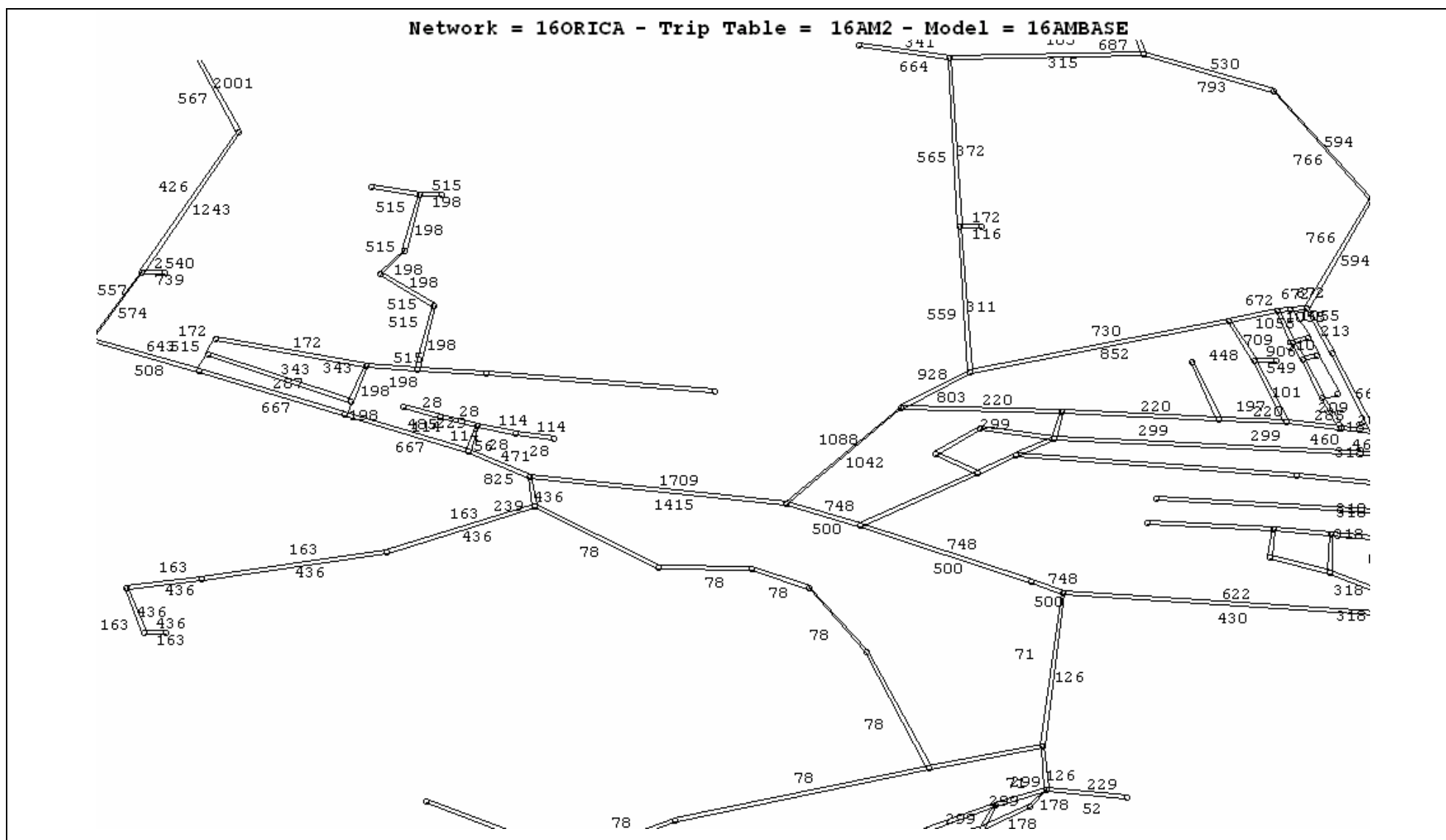
Following discussions with the RTA, the proposed signals in Option 2, 140 metres east of Foreshore Road ,are permissible on the proviso that the lantern displays at the proposed signals and those at Foreshore Road can be focused to avoid coincidence.

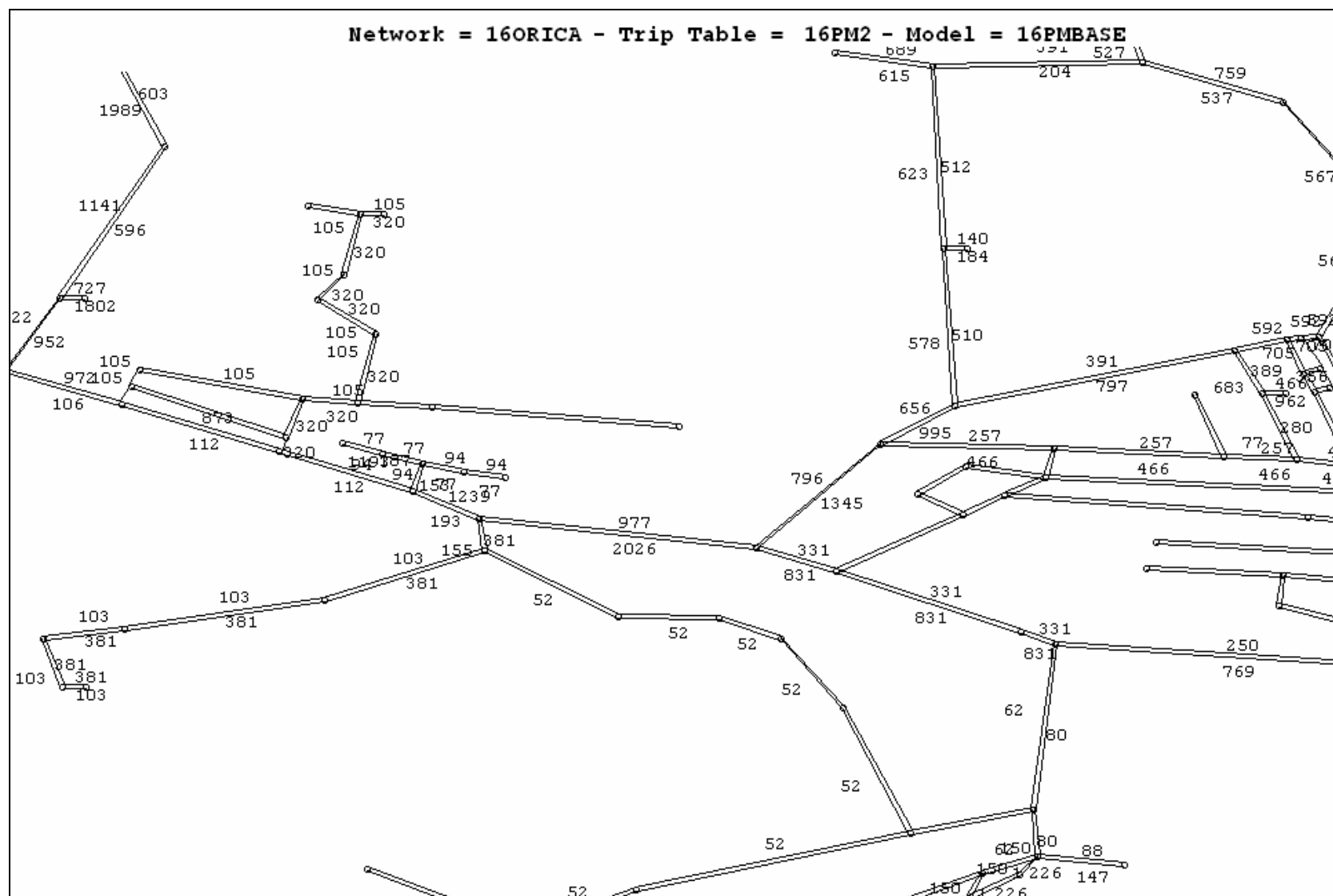
| Location | 2006 AM Base | | | 2016 AM Base | | | 2016 AM Botany Rd Option 1 | | | 2016 AM Botany Rd Option 2 Preferred Option | | | 2016 AM Beauchamp Rd Option 3 | | | 2016 AM Botany Rd Option 4 | | |
|-------------------|--------------|-----|-----|--------------|-----|-----|----------------------------|-----|-----|---|-----|-----|-------------------------------|-----|-----|----------------------------|-----|-----|
| | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS |
| BOTANY/HILL | 0.21 | 2 | A | 0.31 | 5 | A | 0.17 | 0 | A | 0.22 | 0 | A | 0.23 | 0 | A | 0.91 | 63 | E |
| BOTANY/EXEL | 0.2 | 3 | A | 0.27 | 15 | B | 0.12 | 0 | A | 0.17 | 2 | A | 0.17 | 2 | A | 0.27 | 15 | B |
| BOTANY/DISCOVERY | 0.27 | 25 | B | 0.56 | 53 | D | 0.57 | 85 | F | 0.38 | 30 | C | 0.39 | 33 | C | 0.8 | 53 | E |
| BOTANY/FORESHORE | 0.69 | 38 | C | 0.8 | 57 | E | 0.81 | 60 | E | 0.74 | 51 | D | 0.75 | 55 | D | 0.76 | 57 | D |
| BOTANY/BEAUCHAMP | 0.51 | 26 | B | 0.56 | 39 | C | 0.56 | 39 | C | 0.54 | 30 | C | 0.55 | 42 | C | 0.56 | 39 | C |
| BEAUCHAMP/PERRY | 0.22 | 4 | A | 0.27 | 6 | A | 0.27 | 6 | A | 0.26 | 6 | A | 0.48 | 24 | B | 0.27 | 6 | A |
| BEAUCHAMP/DENISON | 0.42 | 20 | B | 0.5 | 25 | B | 0.5 | 25 | B | 0.48 | 24 | B | 0.38 | 22 | B | 0.5 | 25 | B |

| Location | 2006 PM Base | | | 2016 PM Base | | | 2016 PM Botany Rd Option 1 | | | 2016 PM Botany Rd Option 2 Preferred Option | | | 2016 PM Beauchamp Rd Option 3 | | | 2016 PM Botany Rd Option 4 | | |
|-------------------|--------------|-----|-----|--------------|-----|-----|----------------------------|-----|-----|---|-----|-----|-------------------------------|-----|-----|----------------------------|------|-----|
| | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS | DS | AVD | LoS |
| BOTANY/HILL | 0.12 | 7 | A | 0.21 | 8 | A | 0.19 | 0 | A | 0.23 | 0 | A | 0.23 | 0 | A | 0.21 | 0 | A |
| BOTANY/EXEL | 0.16 | 9 | A | 0.29 | 10 | A | 0.19 | 3 | A | 0.23 | 5 | A | 0.22 | 3 | A | >1.0 | >200 | F |
| BOTANY/DISCOVERY | 0.23 | 31 | C | 0.61 | 82 | F | 0.62 | 84 | F | 0.5 | 58 | E | 0.48 | 53 | D | 0.61 | 82 | F |
| BOTANY/FORESHORE | 0.63 | 38 | C | 0.8 | 44 | D | 0.8 | 45 | D | 0.72 | 34 | C | 0.73 | 37 | C | 0.8 | 44 | D |
| BOTANY/BEAUCHAMP | 0.49 | 25 | B | 0.58 | 36 | C | 0.57 | 36 | C | 0.56 | 30 | C | 0.5 | 30 | C | 0.58 | 36 | C |
| BEAUCHAMP/PERRY | 0.23 | 6 | A | 0.31 | 10 | A | 0.3 | 10 | A | 0.3 | 10 | A | 0.47 | 29 | C | 0.31 | 10 | A |
| BEAUCHAMP/DENISON | 0.42 | 20 | B | 0.52 | 32 | C | 0.52 | 32 | C | 0.51 | 31 | C | 0.37 | 27 | B | 0.52 | 32 | C |

Note: The above table is calculated on the current intersection capacities with the exceptions of the proposed access, traffic signals and roundabout controls.

Table 7: Strategic Performance based on Current Intersection Capacities





3 Options Considered

3.1 Option 1



Source: 'Southlands Project: Due Diligence', Traffix, 27 September, 2005

BOTANY ROAD OPTION 1

Figure 10: Access Option 1

Considerations...

...Unsatisfactory level of service, restrictive access to Discovery Cove as a result of turn prohibitions and poor exiting sight lines eliminate this option from further consideration...

- Botany Road roundabout reports LoS F in both the morning and evening peak periods,
- Westbound, right turn traffic from Botany Road into Discovery Cove delays the eastbound movement of vehicles on Botany Road in the morning peak, while right turn traffic from Discovery Cove impede the westbound movement on Botany Road during the evening peak, and
- Turn prohibitions within Discovery Cove improve internal safety but hinder access and necessitate use of the one way circulatory system of Hill Street and Exell Street.

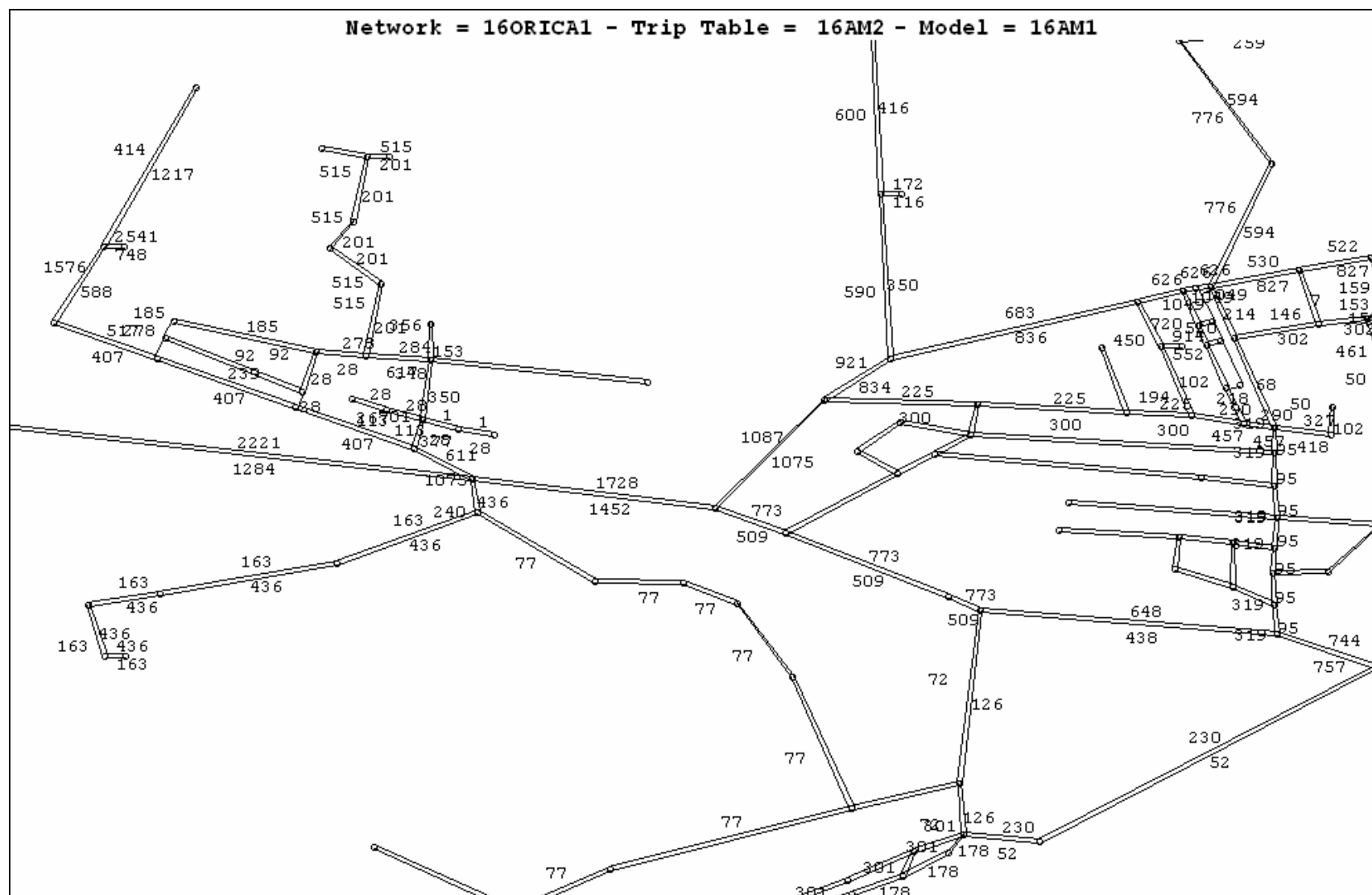
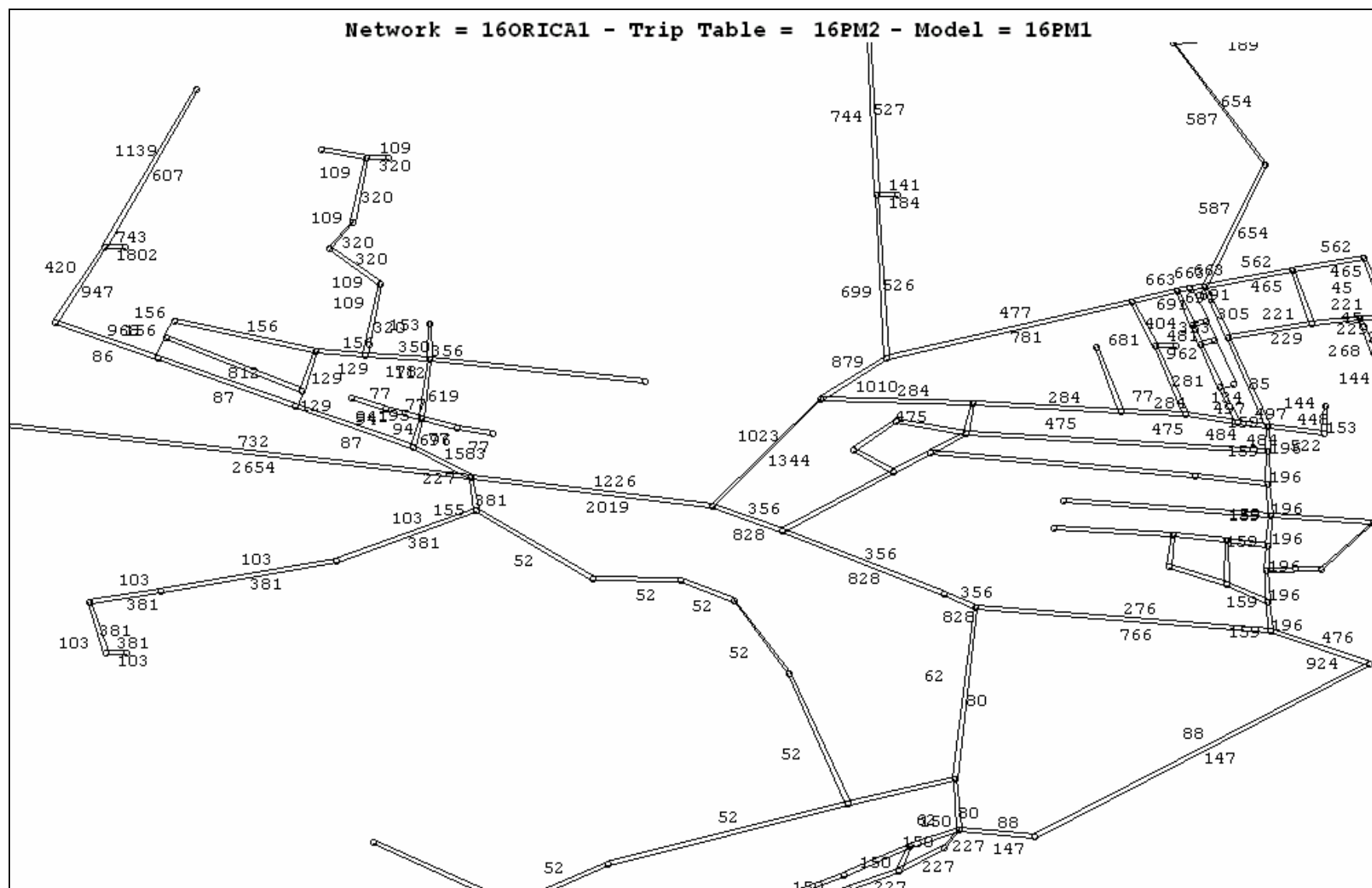


Figure 11: Option 1 - 2016 AM Traffic Flows



3.2 Preferred Option 2



Source: 'Southlands Project: Due Diligence', Traffix, 27 September, 2005

BOTANY ROAD OPTION 2

Figure 13: Preferred Access Option 2

Considerations...

...Provides a direct access corridor to the site while the proposed traffic signals on Botany Road are located to reduce the impact of development traffic with the planned Port Botany expansion.

- Good coordinated traffic signal operation reported on Botany Road between Foreshore Drive and Beauchamp Road. Modelling indicates a LoS A during both peak periods at the proposed traffic signals, 140m east of Foreshore Drive,
- Access exhibits direct alignment through Discovery Cove,
- Relieves pressure and improves operation at the Botany Road/Discovery Cove roundabout, west of Foreshore Drive, and
- Reduces the volume of right turn vehicles from Botany Road into Hill Street.

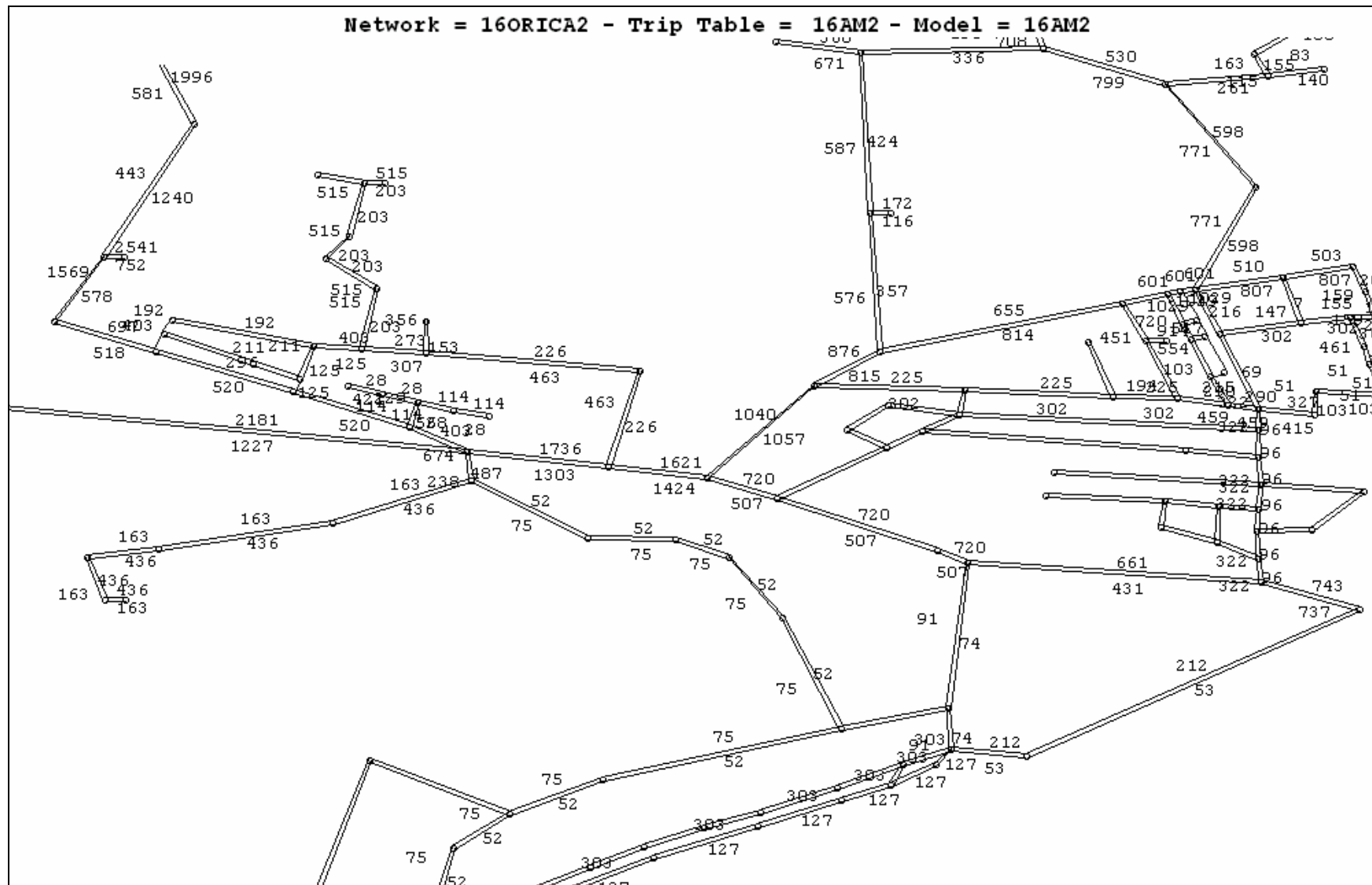


Figure 14: Preferred Option 2 - 2016 AM Traffic Flows

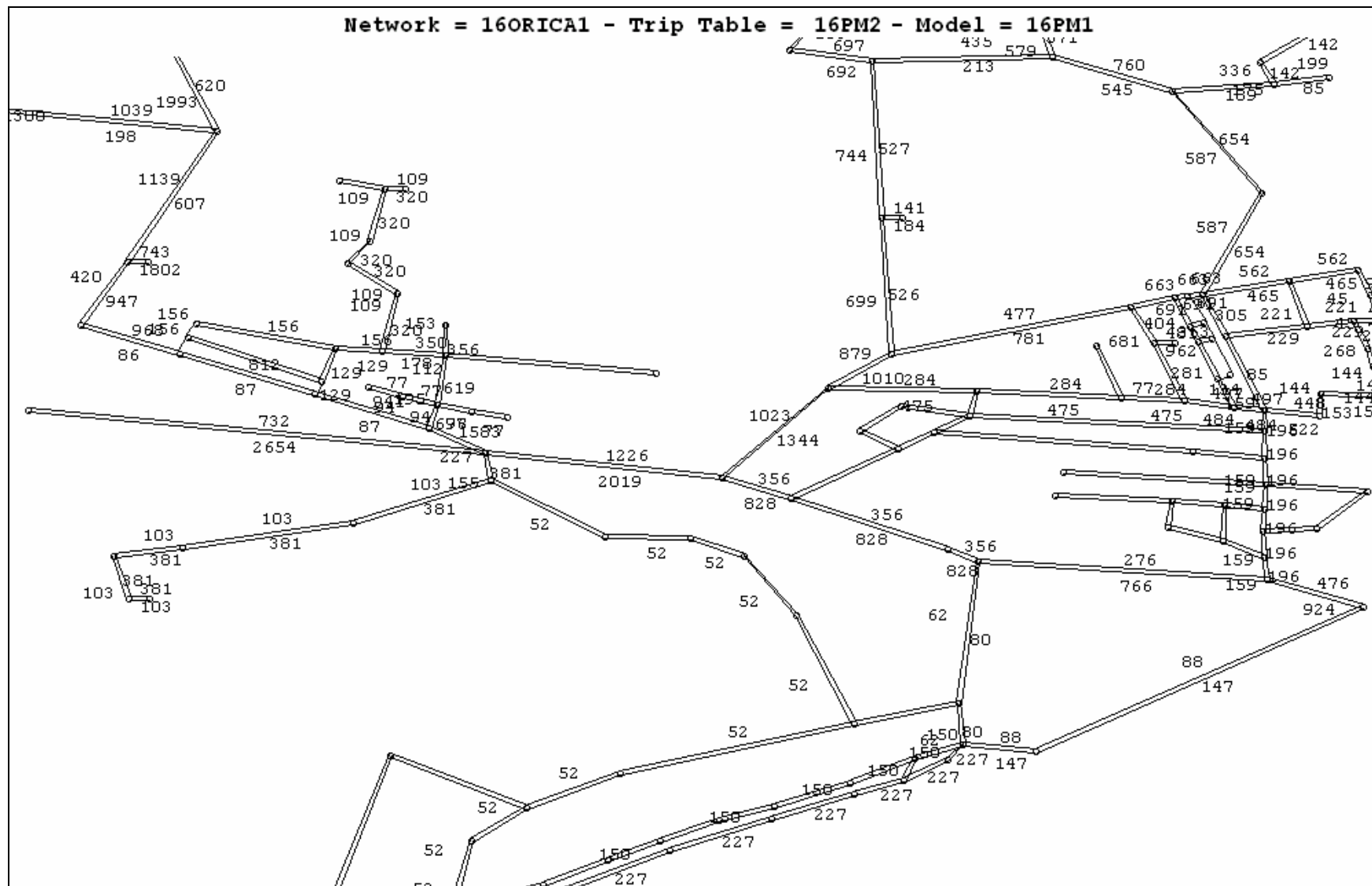


Figure 15: Preferred Option 2 - 2016 PM Traffic Flows

**OPTION 2
BOTANY ROAD, EAST OF FORESHORE DRIVE
2016 ORICA**

| INTERSECTION DELAY PERFORMANCE for BUSINESS PEAK for FILE 16FOR | | | | | | | | | | | | | | | | |
|---|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|------|
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6934A | 3 | 2 | 4 | 1558 | 0.45 | 2 | 2 | 7 | 899 | 0.45 | 5 | 3 | 5 | 2457 | 0.45 | |
| 1066A | 4 | 6 | 10 | 2268 | 0.75 | 0 | 1 | 8 | 267 | 0.75 | 4 | 7 | 10 | 2535 | 0.75 | |
| 6933B | 18 | 8 | 12 | 2339 | 0.78 | 4 | 4 | 20 | 757 | 0.78 | 22 | 12 | 14 | 3096 | 0.78 | |
| ----- | | | | | | | | | | | | | | | | |
| TOT | 25 | 16 | 9 | | | 7 | 7 | 12 | | | 31 | 23 | 10 | | L/S = A | |
| ----- | | | | | | | | | | | | | | | | |
| HIGHEST DS | | | | | 0.78 | | | | | 0.78 | | | | | | 0.78 |
| ----- | | | | | | | | | | | | | | | | |

| INTERSECTION DELAY PERFORMANCE for PM PEAK for FILE 16FOR | | | | | | | | | | | | | | | | |
|---|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|------|
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6934B | 5 | 14 | 25 | 2016 | 0.80 | 2 | 2 | 7 | 1334 | 0.73 | 7 | 17 | 18 | 3350 | 0.80 | |
| 1066A | 5 | 1 | 2 | 2765 | 0.38 | 1 | 3 | 20 | 473 | 0.56 | 7 | 4 | 4 | 3238 | 0.56 | |
| 6933C | 51 | 21 | 28 | 2733 | 0.92 | 18 | 19 | 49 | 1363 | 0.92 | 69 | 40 | 35 | 4096 | 0.92 | |
| ----- | | | | | | | | | | | | | | | | |
| TOT | 61 | 36 | 17 | | | 21 | 24 | 27 | | | 83 | 60 | 20 | | L/S = B | |
| ----- | | | | | | | | | | | | | | | | |
| HIGHEST DS | | | | | 0.92 | | | | | 0.92 | | | | | | 0.92 |
| ----- | | | | | | | | | | | | | | | | |

| INTERSECTION DELAY PERFORMANCE for AM PEAK for FILE 16FOR | | | | | | | | | | | | | | | | |
|---|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|------|
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6934B | 8 | 20 | 31 | 2285 | 0.72 | 3 | 4 | 11 | 1135 | 0.72 | 11 | 23 | 24 | 3420 | 0.72 | |
| 1066A | 11 | 1 | 1 | 3456 | 0.47 | 2 | 2 | 24 | 247 | 0.47 | 13 | 2 | 2 | 3703 | 0.47 | |
| 6933A | 20 | 11 | 11 | 3744 | 0.65 | 4 | 5 | 26 | 696 | 0.65 | 24 | 16 | 13 | 4440 | 0.65 | |
| ----- | | | | | | | | | | | | | | | | |
| TOT | 39 | 32 | 12 | | | 9 | 10 | 18 | | | 47 | 42 | 13 | | L/S = A | |
| ----- | | | | | | | | | | | | | | | | |
| HIGHEST DS | | | | | 0.72 | | | | | 0.72 | | | | | | 0.72 |
| ----- | | | | | | | | | | | | | | | | |

Table 16: Preferred Option 2 Scates Analysis

3.3 Option 3



Source: Google Earth, September, 2006

BOTANY ROAD OPTION 3

Figure 17: Access Option 3

Considerations...

...The connection to Beauchamp Road was considered given the obvious availability of a potential access corridor and the potential to disperse development traffic away from Foreshore Drive and Botany Road. The scope of work necessary to facilitate the access negates the viability of the option...

- Circuitous route for westbound motorists leaving the site,
- Expensive construction costs associated with a rail overbridge,
- Mandatory clearance over rail line dictates adverse gradients to existing levels in McPherson Street and Beauchamp Road, and
- Increased right turn volume from Beauchamp Road, southbound, into Botany Road, westbound.

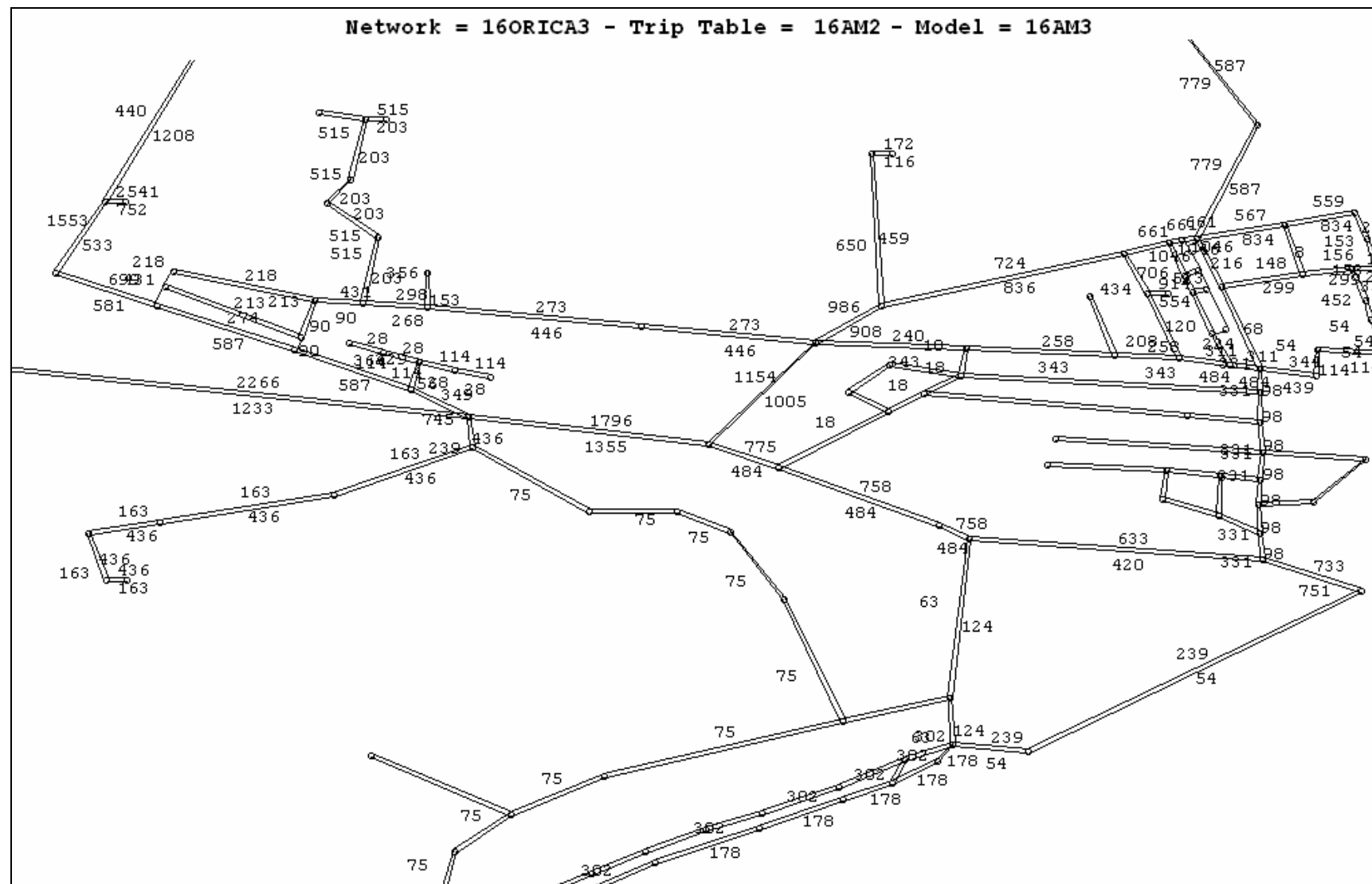


Figure 18: Option 3 - 2016 AM Traffic Flows

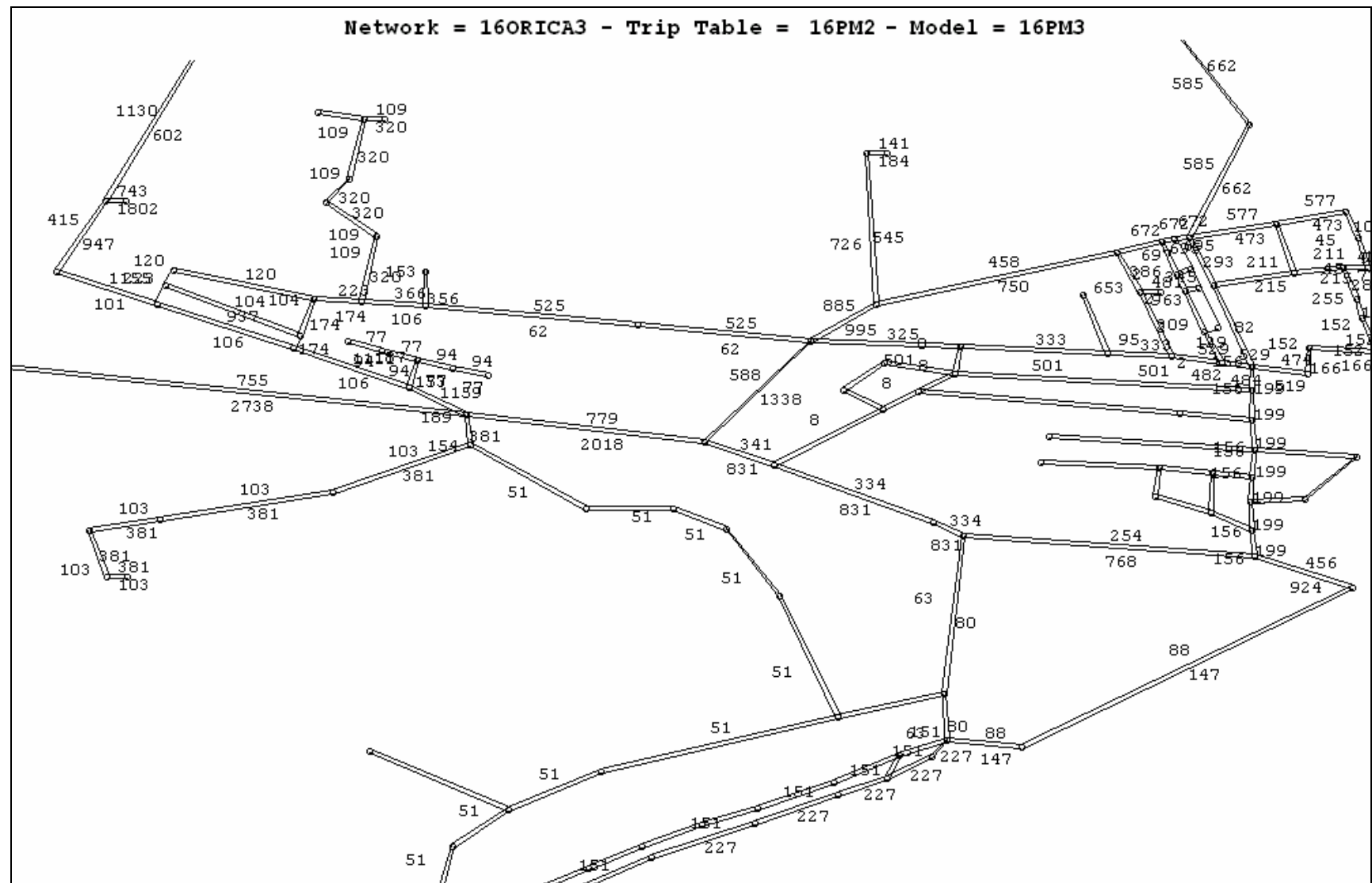


Figure 19: Option 3 - 2016 PM Traffic Flows

**OPTION 3
BEAUCHAMP ROAD
2016 ORICA**

| INTERSECTION DELAY PERFORMANCE for BUSINESS PEAK for FILE 16BEA | | | | | | | | | | | | | | | | |
|---|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|-----------|-----------|----------|--------------|---------|--|
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6936A | 2 | 2 | 5 | 1322 | 0.63 | 1 | 1 | 12 | 384 | 0.63 | 3 | 3 | 6 | 1706 | 0.63 | |
| 6935A | 9 | 3 | 9 | 1302 | 0.75 | 0 | 0 | 2 | 577 | 0.75 | 9 | 3 | 7 | 1879 | 0.75 | |
| 6934B | 5 | 6 | 24 | 877 | 0.67 | 4 | 4 | 10 | 1459 | 0.54 | 9 | 10 | 15 | 2336 | 0.67 | |
| TOT | 16 | 11 | 11 | | | 5 | 6 | 8 | | | 21 | 16 | 10 | | L/S = A | |
| HIGHEST DS | | | | | 0.75 | | | | | 0.75 | | | | | 0.75 | |
| INTERSECTION DELAY PERFORMANCE for PM PEAK for FILE 16BEA | | | | | | | | | | | | | | | | |
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6936A | 8 | 4 | 8 | 1789 | 0.65 | 2 | 4 | 25 | 595 | 0.65 | 10 | 8 | 12 | 2384 | 0.65 | |
| 6935B | 43 | 17 | 38 | 1614 | 0.93 | 3 | 3 | 12 | 1035 | 0.93 | 47 | 20 | 28 | 2649 | 0.93 | |
| 6934D | 9 | 24 | 61 | 1432 | 0.78 | 6 | 19 | 39 | 1732 | 0.84 | 16 | 43 | 49 | 3164 | 0.84 | |
| TOT | 61 | 45 | 34 | | | 12 | 26 | 28 | | | 73 | 71 | 31 | | L/S = C | |
| HIGHEST DS | | | | | 0.93 | | | | | 0.93 | | | | | 0.93 | |
| INTERSECTION DELAY PERFORMANCE for AM PEAK for FILE 16BEA | | | | | | | | | | | | | | | | |
| Main Road | | | | | | Side Road | | | | | | Total | | | | |
| TCS No. | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | Isol dlay | Cord dlay | Cord Sec | Pcu per Hour | Cord DS | |
| & Rate | Rate | Rate | per | | | Rate | Rate | per | | | Rate | Rate | per | | | |
| L/S | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | Pc/h | Pc/h | Pcu | | | |
| 6936B | 16 | 8 | 14 | 1992 | 0.90 | 5 | 5 | 39 | 501 | 0.90 | 21 | 13 | 19 | 2493 | 0.90 | |
| 6935A | 18 | 6 | 10 | 2101 | 0.82 | 1 | 1 | 9 | 616 | 0.82 | 19 | 7 | 10 | 2717 | 0.82 | |
| 6934B | 14 | 10 | 35 | 1075 | 0.85 | 9 | 10 | 14 | 2439 | 0.74 | 23 | 20 | 21 | 3514 | 0.85 | |
| TOT | 49 | 24 | 17 | | | 14 | 17 | 17 | | | 63 | 41 | 17 | | L/S = B | |
| HIGHEST DS | | | | | 0.90 | | | | | 0.90 | | | | | 0.90 | |

Table 20: Option 3 Scates Analysis

3.4 Option 4



Source: Google Earth, September, 2006

BOTANY ROAD EXISTING CONDITIONS OPTION 4

Figure 21: Access Option 4

Considerations...

...Exell Street will exhibit LoS E in the evening peak and Hill Street will experience LoS F in the morning. The models would suggest that left turn vehicles in the morning peak will conflict with right turning vehicles at the Hill Street intersection while the evening peak left turn from Exell Street will be hindered by the eastbound through movement on Botany Road...

- Increased volumes at Hill Street and Exell Street,
- No direct westbound egress on Botany Road resulting in increased U-turn movements in Botany Road at the Discovery Cove roundabout. and
- Indirect circuitous access to and from the proposed Southlands Development site.

**OPTION 4
BOTANY ROAD
2016 HILL STREET SIGN CONTROL**

| | SIGNS | | | | | | | | Total |
|---------------------|-------------------|----------------|--------------------|--------------|-------------------|--------------|-------------------|--------------|--------|
| | Off Peak Light | Peak Medium | Business Medium | Peak Peak | AM Peak Medium | Peak Peak | PM Peak Medium | Peak Peak | |
| Delay Hours | 100 | 534 | 1091 | 2833 | 258 | 861 | 17126 | 315063 | 337867 |
| Rate/Delay | 0.1 | 0.3 | 0.7 | 6.6 | 0.6 | 10.1 | 42.8 | 37.0 | |
| Stops * 1000 | 6 | 75 | 215 | 626 | 53 | 205 | 256 | 704 | 2141 |
| Stops/Hour | 6 | 46 | 130 | 1081 | 132 | 1580 | 640 | 2197 | |
| Fuel (Litres) | 432 | 3864 | 10107 | 28668 | 2459 | 9254 | 46211 | 705868 | 806862 |
| AADT Main Rd | 416 | 1835 | 2988 | 5010 | 1159 | 2675 | 961 | 2216 | 17261 |
| AADT Side Rd | 205 | 909 | 1478 | 2481 | 359 | 830 | 690 | 1595 | 8547 |
| Av Delay(sec) | 1.62 | 1.97 | 2.48 | 3.83 | 1.68 | 2.42 | 102.28 | 815.52 | 131.18 |
| Delay \$ (m) | 0.002 | 0.011 | 0.027 | 0.070 | 0.004 | 0.014 | 0.272 | 5.013 | 5.412 |
| Delay \$/Veh | 0.009 | 0.011 | 0.017 | 0.026 | 0.007 | 0.011 | 0.452 | 3.604 | 0.584 |
| Fuel Cost \$ | 175 | 1565 | 4093 | 11611 | 996 | 3748 | 18715 | 285877 | 326779 |
| Total \$ (m) | 0.002 | 0.015 | 0.039 | 0.106 | 0.007 | 0.025 | 0.301 | 5.326 | 5.822 |
| Total \$/Veh | 0.011 | 0.016 | 0.025 | 0.040 | 0.013 | 0.020 | 0.500 | 3.829 | 0.628 |
| Cycle Length D/S | | | | | | | | | |

2016 EXELL STREET SIGN CONTROL

| | SIGNS | | | | | | | | Total |
|---------------------|-------------------|----------------|--------------------|--------------|-------------------|--------------|-------------------|--------------|--------|
| | Off Peak Light | Peak Medium | Business Medium | Peak Peak | AM Peak Medium | Peak Peak | PM Peak Medium | Peak Peak | |
| Delay Hours | 220 | 1693 | 4191 | 11840 | 5455 | 167368 | 1621 | 6570 | 198960 |
| Rate/Delay | 0.2 | 1.0 | 2.5 | 3.3 | 13.6 | 51.0 | 4.1 | 2.5 | |
| Stops * 1000 | 13 | 152 | 400 | 1032 | 362 | 1238 | 158 | 560 | 3913 |
| Stops/Hour | 13 | 92 | 242 | 456 | 905 | 2691 | 394 | 286 | |
| Fuel (Litres) | 938 | 9124 | 23452 | 62725 | 24819 | 406071 | 9173 | 34336 | 570638 |
| AADT Main Rd | 710 | 3133 | 5086 | 8532 | 2108 | 4867 | 1500 | 3464 | 29399 |
| AADT Side Rd | 3 | 5 | 5 | 10 | 1 | 2 | | | 24 |
| Av Delay(sec) | 3.06 | 5.33 | 8.13 | 13.69 | 25.50 | 339.03 | 10.66 | 18.71 | 66.74 |
| Delay \$ (m) | 0.004 | 0.034 | 0.103 | 0.291 | 0.087 | 2.663 | 0.026 | 0.105 | 3.312 |
| Delay \$/Veh | 0.017 | 0.029 | 0.056 | 0.093 | 0.113 | 1.498 | 0.047 | 0.083 | 0.309 |
| Fuel Cost \$ | 380 | 3695 | 9498 | 25404 | 10052 | 164459 | 3715 | 13906 | 231108 |
| Total \$ (m) | 0.005 | 0.043 | 0.128 | 0.357 | 0.111 | 2.876 | 0.036 | 0.140 | 3.696 |
| Total \$/Veh | 0.020 | 0.038 | 0.069 | 0.115 | 0.144 | 1.618 | 0.065 | 0.111 | 0.344 |
| Cycle Length D/S | | | | | | | | | |

Table 22: Intanal Analysis of Sign Controlled System

3.5 Option 5



Source: Google Earth

CONSTRUCTION PHASE

Figure 23: Option 5

Considerations...

...Retention of the existing one way circulatory system at Hill Street and Exell Street in Year 2011 to achieve access during the construction phase of the project requires improvement to intersection controls at Botany Road...

Interpolated year 2011 morning and evening peak trip tables have been prepared to reflect the construction phase of the project.

Sensitivity models from 50% to 85% vehicle generation levels from the Southlands site during construction were tested and the preferred infrastructure treatment, as shown in *Figure 23*, resulted in a good LoS at Hill Street and Exell Street.

The sensitivity tests, developed to determine the required infrastructure during construction, revealed 40% of development can be sustained on the existing road network with...

- The introduction of a protected, left turn slip lane, from the current shared through and left kerb side lane, in Botany Road at Hill Street, and
- Retention of the current left out only from Exell Street.

Signalisation of the Exell Street intersection is necessary with a Southlands development vehicular generation in excess of 41%. Modelling suggests that the 41% generation level will adversely increase the number of U-Turn movements yielding a LoS E at the Discovery Cove roundabout on Botany Road.

| HILL STREET DELAY - STOPS - CYCLE LENGTH - PHASE SPLITS DATA SCREEN | | | | | | | | | | | |
|---|---------|-------|---------|-----------------------|-------|---------|---------|----------|---------|------|--|
| AM PEAK | | | | PM PEAK | | | | BUSINESS | | | |
| Phse | PT%o | CLo | Yo | PT%o | CLo | Yo | PT%o | CLo | Yo | | |
| A | 67.9 | 50 | 0.46 | 84.0 | 66 | 0.24 | 69.3 | 40 | 0.22 | | |
| B | 32.1 | | | 16.0 | | | 30.7 | | | | |
| C | | | | | | | | | | | |
| D | | Peds | @ CLm= | 140 | Peds | @ CLm= | 140 | Peds | @ CLm= | 140 | |
| E | | DeLo | DSm= | 0.49 | DeLo | DSm= | 0.26 | DeLo | DSm= | 0.23 | |
| F | | 0 | Ym= | 0.46 | 0 | Ym= | 0.24 | 0 | Ym= | 0.22 | |
| G | | | Delaym= | 6.85 | | Delaym= | 2.16 | | Delaym= | 3.38 | |
| Seq | AB | | | AB | | | AB | | | | |
| | Signals | Signs | Round | Signals | Signs | Round | Signals | Signs | Round | | |
| DeLo | 4.0 | 2.9 | 2.1 | 1.8 | 3.0 | 1.3 | 2.0 | 1.3 | 1.1 | | |
| Stpo | 627 | 252 | 138 | 313 | 290 | 31 | 370 | 109 | 27 | | |
| D/So | 0.55 | 0.33 | 0.62 | 0.27 | 0.29 | 0.63 | 0.27 | 0.16 | 0.41 | | |
| L/So | A | A | A | A | A | A | A | A | A | | |
| File = 11IA1000 | | | | Required Bays | | | | | | | |
| | | | | A RHT Lanes LHT Lanes | | | | | | | |
| | | | | Length No.Length No. | | | | | | | |
| | | | | 1 25 1 | | | | | | | |
| | | | | 2 | | | | | | | |
| | | | | 3 29 1 | | | | | | | |
| | | | | 4 | | | | | | | |

| EXELL STREET DELAY - STOPS - CYCLE LENGTH - PHASE SPLITS DATA SCREEN | | | | | | | | | | | |
|--|---------|-------|---------|-----------------------|-------|---------|---------|----------|---------|------|--|
| AM PEAK | | | | PM PEAK | | | | BUSINESS | | | |
| Phse | PT%o | CLo | Yo | PT%o | CLo | Yo | PT%o | CLo | Yo | | |
| A | 64.8 | 50 | 0.30 | 50.7 | 50 | 0.42 | 48.4 | 40 | 0.20 | | |
| B | 35.2 | | | 49.3 | | | 51.6 | | | | |
| C | | | | | | | | | | | |
| D | | Peds | @ CLm= | 140 | Peds | @ CLm= | 140 | Peds | @ CLm= | 140 | |
| E | | DeLo | DSm= | 0.31 | DeLo | DSm= | 0.44 | DeLo | DSm= | 0.22 | |
| F | | 0 | Ym= | 0.30 | 0 | Ym= | 0.42 | 0 | Ym= | 0.20 | |
| G | | | Delaym= | 8.09 | | Delaym= | 12.78 | | Delaym= | 7.68 | |
| Seq | AB | | | AB | | | AB | | | | |
| | Signals | Signs | Round | Signals | Signs | Round | Signals | Signs | Round | | |
| DeLo | 4.5 | 0.8 | 1.9 | 6.8 | 16.3 | 11.5 | 3.7 | 0.8 | 1.4 | | |
| Stpo | 742 | 112 | 112 | 1031 | 518 | 564 | 630 | 105 | 94 | | |
| D/So | 0.35 | 0.46 | 0.52 | 0.50 | 1.05 | 0.87 | 0.25 | 0.38 | 0.27 | | |
| L/So | A | A | A | B | F | E | A | A | A | | |
| File = 11IA1001 | | | | Required Bays | | | | | | | |
| | | | | A RHT Lanes LHT Lanes | | | | | | | |
| | | | | Length No.Length No. | | | | | | | |
| | | | | 1 | | | | | | | |
| | | | | 2 21 1 26 1 | | | | | | | |
| | | | | 3 | | | | | | | |
| | | | | 4 | | | | | | | |

Table 24: Intersection Performances – Construction Option 5

3.6 Economic Summary of Access Options

| ANNUAL SUMMARY of FILES COMPARED for SCATS OPERATION. | | | | | | | | | |
|--|--|-----------|---------|------------------|---------|------------------------|----------------------|---------------|-------|
| FILE NAME | | | | | | | | | |
| 16BEA | BEAUCHAMP (PERRY) – 2016 OPTION 3 | | | | | | | | |
| 16BASBEA | (BEAUCHAMP) - 2016 BEAUCHAMP ROAD BASE WITHOUT SOUTHLANDS DEV | | | | | | | | |
| 16BOT | BOTANY - 2016 OPTION 1 | | | | | | | | |
| 16FOR | BOTANY ROAD EAST - 2016 PREFERRED OPTION 2 | | | | | | | | |
| 16BASFOR | BOTANY ROAD EAST - 2016 BOTANY ROAD EAST BASE WITHOUT SOUTHLANDS DEV | | | | | | | | |
| ----- | | | | | | | | | |
| TCS NUMBERS FOR INTERSECTIONS IN FILE | | | | | | | | | |
| ----- | | | | | | | | | |
| FILE NAME | | | | | | | | | |
| 16BEA | 6936 | 6935 | 6934 | | | | | | |
| 16BASBEA | 6936 | 6934 | | | | | | | |
| 16BOT | 6933 | 1 | | | | | | | |
| 16FOR | 6934 | 1066 | 6933 | | | | | | |
| 16BASFOR | 6934 | 6933 | | | | | | | |
| ----- | | | | | | | | | |
| ANNUAL ROUTE COSTS AS CALCULATED | | | | | | | | | |
| ----- | | | | | | | | | |
| -----TOTAL COST----- | | | | | | | | | |
| FILE | Total | Fuel | \$Per | -----AADT's----- | | --DELAY & STOPS COST-- | | | |
| Name | \$Million | \$Million | Vehicle | Main | Side | Total | \$Per | | |
| | | | | Road | Roads | \$Million | Vehicle | | |
| 16BEA | 4.56 | 0.47 | 0.20 | 21456 | 40354 | 2.81 | 0.12 | | |
| 16BASBEA | 3.61 | 0.39 | 0.19 | 24174 | 28260 | 1.65 | 0.09 | | |
| 16BOT | 2.14 | 0.25 | 0.11 | 12736 | 40515 | 1.88 | 0.10 | | |
| 16FOR | 5.35 | 0.60 | 0.23 | 33696 | 30989 | 3.35 | 0.14 | | |
| 16BASFOR | 4.65 | 0.55 | 0.21 | 35926 | 26044 | 2.51 | 0.11 | | |
| ----- | | | | | | | | | |
| ANNUAL ROUTE STATISTICS AS CALCULATED | | | | | | | | | |
| ----- | | | | | | | | | |
| -----TOTALS----- | | | | | | | | | |
| FILE | Cruise | Total | Main | Stops | Fuel | Vehicle | ---DELAY AVERAGES--- | | |
| Name | Hours | Delay | Road | Million | Million | Km's | -Seconds | Per Vehicle - | |
| | | Hours | Delay | | Litres | Million | Total | Main | Side |
| | | | | | | | Roads | Road | Roads |
| Hours | | | | | | | | | |
| -----Vehicles----- | | | | | | | | | |
| 16BEA | 72831 | 140420 | 87627 | 16.18 | 1.44 | 5.10 | 22.41 | 40.28 | 12.90 |
| 16BASBEA | 81553 | 68525 | 24723 | 13.05 | 1.20 | 5.71 | 12.89 | 10.09 | 15.29 |
| 16BOT | 10427 | 86042 | 13475 | 12.32 | 0.76 | 0.73 | 15.94 | 10.43 | 17.67 |
| 16FOR | 83283 | 146739 | 101658 | 23.77 | 1.83 | 5.83 | 22.37 | 29.76 | 14.35 |
| 16BASFOR | 89168 | 95246 | 65312 | 22.10 | 1.67 | 6.24 | 15.16 | 17.93 | 11.34 |
| ----- | | | | | | | | | |

Table 25: Annual Economic Option Summary

4 Summation

In determining the preferred access to sustain the level of development proposed at the Southlands site, north of McPherson Street, Botany, it was recognised the impedance to vehicle movements, suffered by the location and existing road structure, necessitated consideration of alternative access.

The proposed Southlands Development is centrally located within the bounds of McPherson Street to the south, the Sydenham-Botany heavy rail corridor to the east and north, and Port Feeder Road to the west.

The task of determining the preferred access option was undertaken with the view to ensuring a satisfactory level of service on the surrounding arterial road network, achieving a safe motoring environment and providing an economic solution satisfying the requirements of the key stakeholders.

Each option has been assessed based upon the fore mentioned criteria and it is concluded that Option 2, a traffic signalised access onto Botany Road, some 140 metres east of Foreshore Drive, best satisfies the design parameters. The following summarises the key selection criteria...

- The growth in traffic, forecast in year 2016, and in combination with the projected Southlands Development generations result in a satisfactory level of service for each peak period at the coordinated signal sites along Botany Road between Foreshore Drive and Beauchamp Road,
- With the planned Port Botany Expansion the introduction of traffic signals, east of Foreshore Drive, under Option 2 is considered desirable to reduce the impact on heavy vehicle movements to and from the port terminus from the west, and
- The relatively low economic considerations, given the level gradient of the access corridor and at grade connection with Botany Road.

| Option | Access Condition | Access Control | Access Performance at End State (LoS in Year 2016) | | Benefits | Disbenefits |
|-----------------------|---|------------------------------------|--|----|---|---|
| | | | AM | PM | | |
| 1 | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising the current roundabout on Botany Road | Roundabout | F | F | * Turn restrictions reduce potential for vehicular conflict within Discovery Cove | * Poor exiting sight lines * Right turn movements to/from Discovery Cove impede the through movement on Botany Road reflected in roundabout performance * Necessary turn bans restrict access and egress within Discovery Cove |
| 2 Preferred Option | Construction of a road link between McPherson Street and Botany Road through Discovery Cove utilising a new set of traffic signals 140metres, east, of Foreshore Road | Traffic Signals | A | A | * Direct access through Discovery Cove to proposed Southlands development * Good intersection performance * Good traffic signal coordination on Botany Road * Good accessibility to the arterial road network * Improves the operational performance of the Botany Road intersections with Discovery Cove and Hill Street | * Introduces a new set of traffic signals on Botany Road, increasing the incidents of stops * Introduces additional traffic within Discovery Cove |
| 3 | Construction of a road link, eastbound between McPherson Street and Beauchamp Road at Perry Street | Traffic Signals | A | B | * Good operational performance of new traffic signals * Intersection of Botany Road and Beauchamp Road suffers from increased right turn volume from Beauchamp Road during the evening peak | * Excessive costs associated with a rail overbridge * Steep gradients required on new road link to tie back into existing in McPherson Street |
| 4 | Utilisation of existing infrastructure at the intersection of Botany Road with Hill Street and Exell Street | Hill Street Priority Sign Control | F | B | * Inexpensive option evoked through use of existing infrastructure * Access maintained during construction of development site | * Indirect, circuitous access to development site * Poor existing horizontal and vertical alignment * Westbound motorists, egressing Exell Street, necessitate an undesirable U-Turn movement resulting in an unsatisfactory LoS at the Discovery Cove roundabout |
| | | Exell Street Priority Sign Control | A | E | | |

Table 26: Option Summary

Appendix A

Intersection Performance Indicators

Performance is best described by the indicators of Level of Service (LoS), Average Vehicle Delay (AVD) and the Degree of Saturation (DS) during peak hours. The intersection performance indicators adopted in this assessment are presented below.

A.1 Level of Service (LoS)

Table A1: Level of Service Indicators

| <i>LOS</i> | <i>Traffic Signal Operation</i> |
|------------|--|
| <i>A</i> | <i>Good</i> |
| <i>B</i> | <i>Good with acceptable delays and spare capacity</i> |
| <i>C</i> | <i>Satisfactory</i> |
| <i>D</i> | <i>Operating near capacity</i> |
| <i>E</i> | <i>At capacity excessive delay; roundabout requires other control mode</i> |
| <i>F</i> | <i>Unsatisfactory, requires other control mode or additional capacity</i> |

A.2 Average Vehicle Delay (AVD)

The AVD is a measure of the operational performance of a road network or an intersection.

AVD is determined globally over a road network or within a cordon during an assignment model run. The AVD exhibited on comparable network models, for analogous peak periods, forms the basis of comparing the operational performance of the road network.

AVD is used in the determination of intersection Level of Service. Generally, the total delay incurred by vehicles through an intersection is averaged to give an indicative delay on any specific approach. Longer delays do occur but only the average over the peak hour period is reported.

Table A2: Average Vehicle Delay Indicators

| <i>LOS</i> | <i>AVD (secs)</i> | <i>Traffic Signal Operation</i> |
|------------|-----------------------|---|
| <i>A</i> | <i>1 to 14</i> | <i>Good operation</i> |
| <i>B</i> | <i>14 to 28</i> | <i>Good with acceptable delays and spare capacity. Satisfactory</i> |
| <i>C</i> | <i>28 to 42</i> | <i>Operating near capacity</i> |
| <i>D</i> | <i>42 to 56</i> | <i>At capacity, excessive delays; R/bout requires other control mode</i> |
| <i>E</i> | <i>56 to 70</i> | <i>Unsatisfactory; requires additional capacity</i> |
| <i>F</i> | <i>Exceeding 70</i> | <i>Unsatisfactory, requires other control mode or improved channelisation</i> |

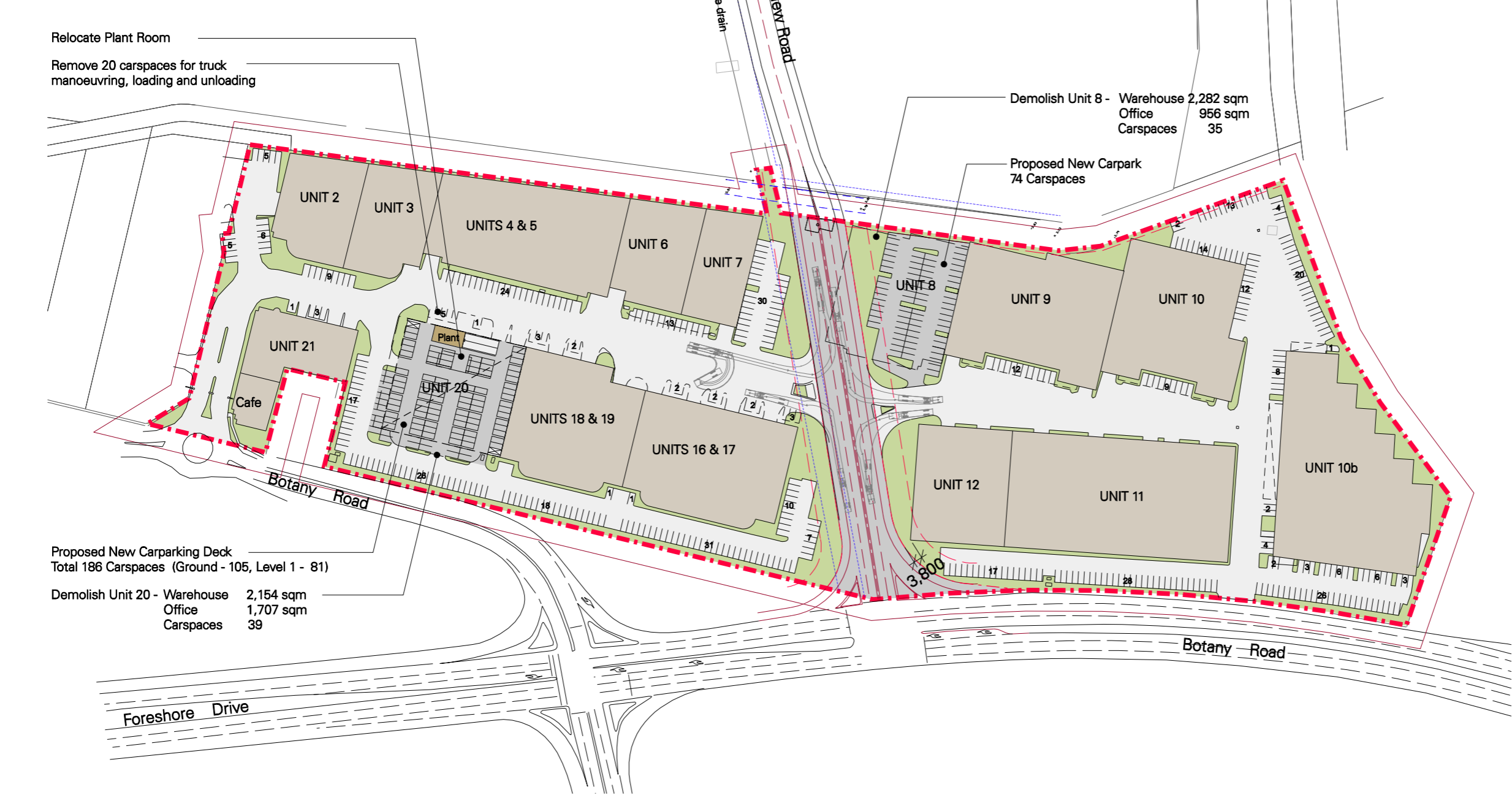
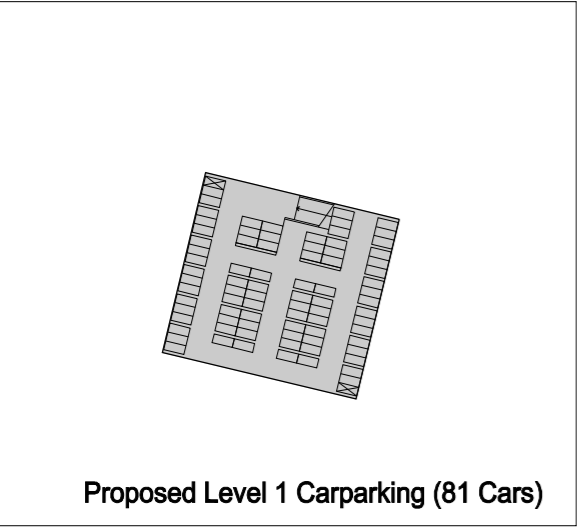
A.4 Degree of Saturation (DS)

The DS of an intersection is usually taken as the highest ratio of traffic volume on an approach to the intersection compared with its theoretical capacity, and is a measure of the utilisation of available green time. The DS reported is generally of a critical movement through the intersection rather than the DS of the intersection unless equal saturation occurs on all approaches.

For intersections controlled by traffic signals, generally both queue length and delay increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its DS is kept below 0.875. When the DS exceeds 0.9, extensive queues can be expected.

APPENDIX A3:

Proposed New Road Link

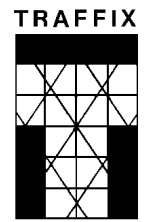


| Site Area Schedule | |
|---|------------|
| Total Site Area | 75,790 sqm |
| Less: | |
| Proposed New Road | 4,245 sqm |
| Total Developable | 71,545 sqm |
| Site 1 | 36,710 sqm |
| Site 2 | 34,835 sqm |
| Building Area - Total Existing | 49,928 sqm |
| Building Area Demolished (Units 8 & 20) | 6,954 sqm |
| Carparking - Total Existing | 547 |
| less Carspaces leased to Units 8 & 20 | 74 |
| Total required carparking | 473 |

| | |
|---------------------------------------|-----|
| Carparking - Total Existing | 547 |
| Carparking lost to Road and Hardstand | 148 |
| Carparking remaining | 399 |
| Proposed New Carparking Deck (2 lev) | 186 |
| Proposed New Carparking on Site 2 | 74 |
| | 260 |
| Total Proposed Carparking | 659 |

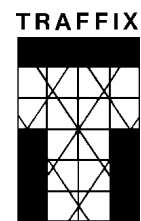
| Site 1 | Units 2-7, 16-21 |
|----------------------------------|------------------|
| Carparking Existing | 297 |
| less Carspaces leased to Unit 20 | 39 |
| Total required carparking | 258 |
| Total Proposed Carparking | 393 |

| Site 2 | Units 8-12 |
|---------------------------------|------------|
| Carparking Existing | 250 |
| less Carspaces leased to Unit 8 | 35 |
| Total required carparking | 215 |
| Total Proposed Carparking | 266 |



APPENDIX B1

Stage 1 Plans



APPENDIX B2:

Stage 1 Improvements



SOUTHLANDS CONCEPT PLAN & STAGE ONE PROJECT APPLICATION

Prepared for Goodman International Limited

INTERSECTION CONCEPT

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

APPENDIX B3:

*Other Possible Improvements
(not relied upon for Stage 1)*



Relocate Plant Room

Remove 20 carspaces for truck manoeuvring, loading and unloading

Demolish Unit 8 - Warehouse 2,282 sqm
Office 956 sqm
Carspaces 35

Proposed New Carpark
74 Carspaces

Proposed New Carparking Deck
Total 186 Carspaces (Ground - 105, Level 1 - 81)

Demolish Unit 20 - Warehouse 2,154 sqm
Office 1,707 sqm
Carspaces 39

See enlargement

0 100m

Discovery
Cove
Access

Botany

Road

Additional
Lane



SOUTHLANDS STAGES 1 AND 2 PROJECT APPLICATION
INDUSTRIAL/WAREHOUSE DEVELOPMENT
MCPHERSON STREET, BANKSMEADOW
Prepared on behalf of Orica Limited and Goodman International Limited

App B3

PROPOSED ROAD GEOMETRY
Concept Only

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