

ANNEXURE 2: TRAFFIC IMPACT ASSESSMENT

TWO RIVERS URBAN PARK

TRAFFIC IMPACT ASSESSMENT

By

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Cape Town Administration

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1 INTRODUCTION

The Two Rivers Urban Park Site is a relatively undeveloped portion of land that is located between the suburbs of Observatory and Pinelands in the Cape Town Metropolitan Area as shown on Figure 1. The area is approximately 250 Ha in size and comprises sensitive ecological systems and habitats, extensive open space areas and significant institutions, historical buildings and cultural landscapes, providing an ideal space for the creation of an urban park.

Due to the historical importance and environmental sensitivity of the site, the City of Cape Town embarked on the process of drawing up a Development Framework and Environmental Management Plan to provide authorities, landowners and prospective developers with guidance as to the location, appropriate use, scale and intensity of future development opportunities within the site.

The aim of this Traffic Impact Assessment (TIA) is to assist the Development Framework in providing guidance on the effect that development traffic will have on the operation of the local road network, the position and number of accesses and the extent of road infrastructure upgrading that will be required.

The TIA considers a Short Term Development Scenario and a Long Term Development Scenario that comprise the following:

(a) **Short Term Development Scenario**

All development rezoning / consent applications that have either already been submitted to the City of Cape Town for approval or are pending, have been combined to produce a development scenario for the study area that is likely to be achieved within 1 to 5 years.

(b) **Long Term Development Scenario**

The maximum acceptable level of development as identified in the Gibb Africa Black River Urban Park Pre-Feasibility Study has been used to produce a development scenario for the study area that could possibly be achieved within 5 to 10 years.

The remainder of the TIA analyses the possible traffic impact that development on this site will have on the road network and makes recommendations on the extent of access and road infrastructure upgrading required to ensure that traffic congestion levels during the peak periods are kept within acceptable limits.

In places where road infrastructure upgrading is not possible and congestion levels are expected to be unacceptably high, the TIA makes recommendations on development limitations that should be imposed on the site.

2 EXISTING ROAD NETWORK

The following existing roads, shown in Figure 1 and classified according to the CMC Administration: Directorate of Transport's Metropolitan Road Network Map (CMT. R-0007), serve the Park:

- (a) **M5 Freeway / Black River Parkway (Class 1 Freeway)**

This is a four-lane dual carriageway freeway that bisects the Park in a north-south direction. It is a mobility route that does not allow direct access to the Park.
- (b) **N2 Freeway / Settlers Way (Class 1 Freeway)**

This is a six-lane dual carriageway freeway that forms the southern boundary of the Park. It is a mobility route that does not allow direct access to the Park.
- (c) **Berkley Road (Class 2 Primary Arterial)**

This is a four-lane undivided road that terminates in an interchange with the M5. This road forms the north-eastern boundary of the Park.
- (d) **Liesbeek Parkway (Class 3 Secondary Arterial)**

This is a two-lane road that provides direct access to the western portion of the Park. It becomes a 4-lane dual carriageway road south of the N2.
- (e) **Raapenberg Road (Class 3 Secondary Arterial)**

This is a four-lane dual carriageway road that links Pinelands to Mowbray and is a major distributor road for vehicles exiting both the N2 and the M5.
- (f) **Alexandra Road (Class 3 Secondary Arterial)**

This is a two-lane road that provides direct access to the eastern portion of the Park. It terminates in signalised intersections with Berkley Road in the north and Raapenberg Road in the south.
- (g) **Station Road (Class 3 Secondary Arterial)**

This is a two-lane road that links Main Road, Observatory with Liesbeek Parkway. It's junction with Liesbeek Parkway is a signalised intersection.
- (h) **Observatory Road (Class 4 Local Distributor)**

This is a narrow two-lane road that serves as the only access road to the western portion of the Park.

3 BACKGROUND TRAFFIC VOLUMES

Intersection traffic counts were carried out by the City of Cape Town's Transportation Planning Branch from 2001-11-19 to 2001-11-21 during the morning, midday and afternoon peak periods at all major at-grade intersections in the study area. Recent 24hr link counts were also obtained from the CMC Administration's Directorate: Transportation & Traffic for the major freeways in the study area.

These counts are an indication of the current background traffic levels on roads in the study area and are used as the basis for the analysis of operational conditions at the critical intersections. Figure 2 shows the AM peak hour (07:00 - 08:00) and PM peak hour (16:00 - 17:00) background traffic in the study area.

4 TRIP GENERATION

The "South African Trip Generation Rates Manual" published by the Department of Transport was used to estimate the trips that will be generated by the development.

Trip generation calculations have been carried out for the various land uses as shown in Table 1 below:

Table 1: Short Term and Long Term Land-Use.

Land Use	Short Term Development Scenario	Long Term Development Scenario
<u>Valkenberg East</u> Home Industry Retail Middle Income Residential Suburban Offices Institutional Use Shopping Centre	3 320 m ² 114 units 38 279 m ² 23 020 m ² 2 668 m ²	3 320 m ² 114 units 38 279 m ² 23 020 m ² 2 668 m ²
<u>Maitland Village</u> Low Income Residential		100 units

<u>Valkenberg West</u> Middle Income Residential High Income Residential Suburban Offices NGO Offices Secondary School College		175 units 95 units 765 m ² 213 m ² 500 pupils 640 pupils
<u>RPP Housing</u> High Income Residential	80 units	80 units
<u>River Club</u> Health Club & Gym	2 500 m ²	2 500 m ²
<u>Malta Park</u> Middle Income Residential		255 units
<u>Black River Business Park</u> Suburban Offices Suburban Offices Light Industrial	19 000 m ² 4 900 m ² 2 100 m ²	19 000 m ² 4 900 m ² 2 100 m ²

Tables 2 & 3 overleaf show the detailed trip generation calculations for the Short Term and Long Term Development Scenarios respectively.

The trip generation tables have been divided into two sections: trips generated by the eastern portion of the site that will gain access from Alexandra Road and trips generated by the western portion of the site that will gain access from Liesbeek

Parkway.

5 TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

To determine the effect the proposed development will have on the road network, the generated trips are distributed onto the existing road network. It is assumed that the generated trips will generally follow the same distribution pattern as the existing traffic in the study area. The percentage of generated trips entering and exiting the study area is therefore proportional to the distribution of the existing traffic on the main roads. These distribution percentages along with the assigned Short Term Development Scenario generated traffic is shown in Figure 3.

The assigned generated traffic is then combined with the background traffic to produce the expected total traffic volumes for the Short Term Development Scenario as shown in Figure 4.

Analysis of the Long Term Development Scenario has not been carried out at this stage due to the large number of uncertainties present when predicting traffic volumes more than 5 years in the future. General assumptions on upgrades required in the long term are therefore made.

6 ANALYSIS AND ROAD UPGRADES REQUIRED

All traffic flow to and from the proposed development is required to pass through either the intersection of Liesbeek Parkway / Station Road, Raapenberg Road / Alexandra Road or Berkley Road / Alexandra Road. These intersections are major constraints to traffic flow in the study area where vehicle congestion is most likely to occur and are therefore considered critical. Analysis of these intersections has been carried using the SIDRA 5.20 analysis package.

Analysis of traffic flow on the freeways in the study area has not been carried out as they are predominantly used by traffic travelling through the study area and are not considered critical to the operation of the proposed development.

The analysis of the background traffic and background traffic plus site generated traffic for the Short Term Development Scenario is as follows:

6.1 Background Traffic

Figure 5 shows the current intersection geometry and the results of the analysis of the 2001 background traffic. The level of service (LOS) and 85th percentile queue lengths of all turning movements and the totals for the intersections are shown for both the AM and PM peak hours. A brief explanation of the results follows:

BERKLEY ROAD / ALEXANDRA ROAD INTERSECTION

This intersection operates adequately at LOS B in both AM and PM peak periods.

RAAPENBERG / ALEXANDRA ROAD INTERSECTION

This intersection operates adequately at LOS C in the AM peak. Poor levels of service are, however, experienced at some of the approaches. The high level of congestion experienced at the Raapenberg Road (west) approach is partly due to the close proximity of the N2 off-ramp to the intersection.

This intersection operates adequately at LOS C in the PM peak.

LIESBEEK PARKWAY / STATION ROAD INTERSECTION

This intersection operates adequately at LOS B in the AM peak, but operates poorly at LOS E in the PM peak. The high level of congestion experienced at the Station Road (west) approach in the AM peak can be partly attributed to motorists giving way to vehicles entering from Fir Street.

6.2 Background Traffic And Site Generated Traffic

Figure 6 shows the required intersection geometry and the results of the analysis of the 2001 background traffic plus site generated traffic. A brief explanation of the results follows:

BERKLEY ROAD / ALEXANDRA ROAD INTERSECTION

This intersection will operate adequately at LOS B in both AM and PM peak periods. No improvements to the geometry are therefore required.

RAAPENBERG / ALEXANDRA ROAD INTERSECTION

This intersection will require an additional exit lane at the Alexandra Road approach. It will then operate adequately at LOS D in the AM peak, but still very poorly at LOS F in the PM peak. In addition, poor levels of service will be experienced at a number of approaches in both peak periods.

LIESBEEK PARKWAY / STATION ROAD INTERSECTION

This intersection will require major upgrading to add a number of lanes to all approaches of the intersection. It will then operate adequately at LOS B in the AM peak, but still very poorly at LOS F in the PM peak.

7 PROPOSED ROAD SCHEMES

7.1 Berkley Road Widening And Extension to Liesbeek Parkway Scheme

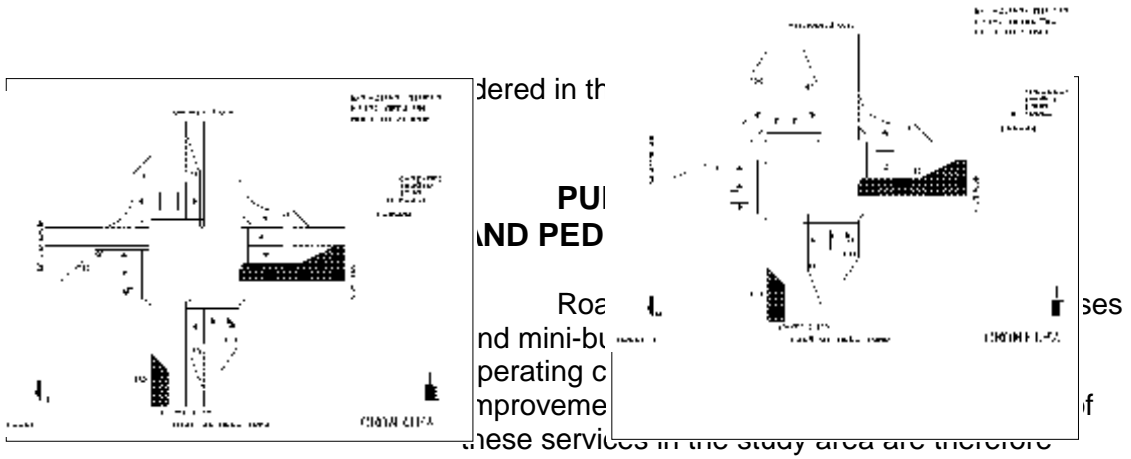
In the late 1940's a scheme was prepared to widen Berkley Road and extend it from its intersection with the M5, across the Black and Liesbeek Rivers, to join Liesbeek Parkway. The scheme was approved by the Provincial Roads Engineer in 1949, but has not yet been implemented. It was briefly analysed in the early 1990's when it was suggested that the extension across the rivers be downgraded to a two lane undivided carriageway with an at-grade intersection with Liesbeek Parkway. The present status of the scheme is that of "Review".

7.2 Alexandra Road Widening Scheme

This scheme involves the widening of Alexandra Road from Berkley Road to Raapenberg Road and was approved in 1965 by the Provincial Roads Engineer. The road presently has a sidewalk on the western side and two roadway lanes, one in each direction. The scheme proposes sidewalks and parallel parking embayments on both sides of the road, but still only two roadway lanes. To date, the demand for parking on Alexandra Road has been low which is probably one of the reasons why the scheme has not been implemented yet. The scheme was reviewed in 1993 where it was decided to be retained.

Neither of these road schemes are expected to be implemented in the near future

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These services in the study area are therefore closely linked to the improved operation of the critical intersections. Additional facilities such as taxi and bus drop-off / pick-up points on Alexandra Road and Liesbeek Parkway will be required and can be designed at the plan-approval stage.

The site is served by two railway stations, Observatory Station on the western boundary of the site and Pinelands Station on the eastern boundary. The maximum walking distance from either of the stations to the middle of the site is 900m.

Pedestrians moving from Observatory Station to the site will travel eastwards along Station Road to the intersection with Liesbeek Parkway. The upgraded Station Road / Liesbeek Parkway intersection should include pedestrian facilities to allow this pedestrian movement to occur safely.

The pedestrians moving from Pinelands Station will cross Alexandra Road at the existing signalised pedestrian crossing. This pedestrian crossing may be incorporated into a signalised intersection in the future.

9 CONCLUSIONS

From the results of the analysis it can be concluded that:

9.1 Short Term Development Scenario

\$ The proposed Valkenberg East Development will create serious congestion problems at the existing Alexandra Road / Raapenberg Road intersection during both the AM and PM peak periods. Approximately only 30% of the proposed development (∇400 new trips in the AM peak and ∇460 new trips in the PM peak) can be accommodated by the existing road infrastructure. Due to the tidal nature of the traffic flow along Raapenberg Road, an improvement in the capacity of the Alexandra Road / Raapenberg Road intersection could be achieved at a relatively low cost by the installation of a SCOOT (Split Cycle Offset Optimisation Technique) system.

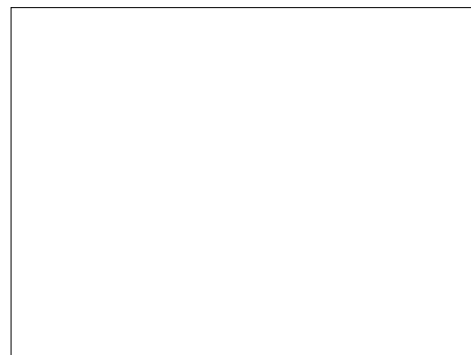
\$ However, if the Alexandra Road / Raapenberg Road Intersection is upgraded as shown below and Alexandra Road is upgraded to four-lane dual-carriageway between Raapenberg Road and the development access, the size of the development can be increased to approximately 65% of the proposed size (∇860 new trips in the AM peak and ∇1000 new trips in the PM peak). The position of the Alexandra Road / Raapenberg Road intersection on top of the railway bridge, does however, make any upgrading of this intersection to improve capacity extremely difficult and costly.

Existing Geometry Proposed Geometry

\$The Liesbeek Parkway / Station Road intersection is currently at capacity and experiences high levels of congestion during the PM peak. This intersection cannot therefore accommodate any further development traffic in its current form.

\$ The development of the Black River Business Park, The River Club Gym & Health Club and the RPP Housing Development could proceed provided that the intersection is upgraded as shown below:

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Proposed Geometry

\$ In addition, the Black River Business Park requires the construction of an additional access road linking Malta Road to Fir Street to provide improved access to the precinct.

\$ The Berkley Road / Alexandra Road Intersection could accommodate the full development traffic satisfactorily and therefore will not require any upgrading.

9.2 Long Term Development Scenario

\$ The further development of Maitland Village, Valkenberg West, Valkenberg East and Malta Park cannot be accommodated by the Short Term Development Scenario upgraded road network. A new access point to the site would be required off Liesbeek Parkway and Liesbeek Parkway would require upgrading to a four-lane dual-carriageway road between Station Road and the N2.

\$ The private bridge over Black River Parkway that connects Valkenberg East with Valkenberg West would require upgrading to allow vehicles to move between the two precincts.

A summary of the upgrades required for both Development Scenarios is shown in Figure 7.

10 RECOMMENDATIONS

It is therefore recommended that:

- \$ If the upgrading of the Alexandra Road / Raapenberg Road Intersection and the widening of Alexandra Road proves not to be feasible, then the extent of the proposed Valkenberg East Development be limited to approximately 30% of its proposed size (∇400 new trips in the AM peak and ∇460 new trips in the PM peak) and a SCOOT system installed at the Alexandra Road / Raapenberg Road Intersection.
- \$ If the upgrading of the Alexandra Road / Raapenberg Road Intersection and the widening of Alexandra Road proves to be feasible, then the extent of the proposed Valkenberg East Development be limited to approximately 65% of its proposed size (∇860 new trips in the AM peak and ∇1000 new trips in the PM peak).
- \$ The RPP Housing Development and the River Club Gym & Health Club could be approved subject to the upgrading of the Station Road / Liesbeek Parkway intersection and any other upgrades required to the internal road network.
- \$ The Black River Business Park could be approved subject to the upgrading of the Station Road / Liesbeek Parkway intersection and the construction of the Malta Road / Fir Street linking road.
- \$ No further development in the Two Rivers Urban Park should be considered until a detailed investigation of the feasibility of providing an additional access point off Liesbeek Parkway, the widening of Liesbeek Parkway and making use of the internal bridge over the M5, is carried out.

12 REFERENCES

12.1	South African Trip Generation Rates Manual	Dept of Transport	June 1995
12.2	Black River Park Pre-Feasibility Study	Gibb Africa	June 1999
12.3	Two Rivers Urban Park Spatial Development Framework and Phase One Management Plan	Cape Town Admin	Aug 2001
12.4	Black River Business Park TIA	Ninham Shand	Mar 2001
12.5	Black River Business Park: Revised Access Prop	Ninham Shand	Aug 2001
12.6	Valkenberg East TIA	Arcus Gibb	June 2001
12.7	Erf 160695 Site Data Sheet	RPP Developments	Aug 1999
12.8	Metropolitan Road Network Map CMT. R-0007	CMC Administration	2001