Road Planning George Airport North Eastern Precinct
Road Master Plan and Cost Apportionment
George
March 2019
### SUMMARY SHEET

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1 INTRODUCTION
The George Airport North Eastern Precinct (GANEP) has several proposed developments, which will lead to an increase in traffic volumes in the area. As a result, the surrounding road network will need to be upgraded to accommodate the expected development trips. The purpose of this Road Master Plan and Cost Apportionment Report is to investigate and steer the implementation of the required road infrastructure and to accommodate the expected precinct development traffic and also to give guidance on the calculations of the cost apportionment payable by the respective developers in this area.

2 STUDY AREA
The study area is known as the GANEP which is triangular shaped and bound by the R102 to the north, the R404 to the west and the future George western Bypass to the east. This area is illustrated in Figure 1 which is an extract of the GANE as it appears in the Gwayang Local Spatial Development Framework (GLSDF, Nov 2015). Refer to Figure A1 in Appendix A for the GLSDF.

Figure 1: Extract of Gwayang Local Spatial Development Framework (GLSDF, Nov 2015)
3 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

An EIA process will be undertaken for the construction of the proposed access road on the property boundary of Farm Portions 130/208 and 4/208 and the expansion and upgrading of the R404 as soon as the road master plan has been finalised and approved by all the parties involved. The contributing parties as stated in Section 9 are responsible for the EIA of these roads. The Western Bypass has already undergone an EIA process and received a ROD issued in 2012.

4 BACKGROUND INFORMATION

The GANEP covers approximately 26 hectares of developable land which is represented by the blue area in Figure 1. The blue area is designated for use defined as Airport Support Zone which is further defined in the GLSDF as follows:

“As explained in par 9.3 it is proposed that an airport support zone be permitted opposite the airport. The intent and context of this node must be noted when considering proposals for development. Only land uses that are supporting the airport facilities or that providing a direct service to tourists must be permitted.”

Based on the above, it is envisaged that the blue area will develop with land uses such as hotels, storage/warehouses, rental car support, filling stations, etc. Compared with similar land uses around Cape Town Airport, the building area could be approximately 50% of the total erf area. It will therefore be possible to develop approximately 11 400 m² of building area in the precinct or approximately 100 000 m² of Gross Leasable Area (GLA).

The GANEP currently consist of eight properties, each with certain land use rights and proposed development plans. The GANEP also includes a future Western Bypass along the eastern periphery.

4.1 Airport Planning

George Airport is in the process of expanding their commercial side of the airport, such as having more commercial flights. They currently investigating three land use concept options that will support and integrate with the airport. Based on the three options, it is evident that an additional entrance to the airport will be required from the R102. All the trips generated by the expansion will lead to higher traffic volumes through the R102/R404 intersection and the upgrading of this intersection to a major intersection therefore should be considered. Once an option has been chosen more information will be available regarding their expansion plans, which will indicate if any intersection upgrades are required.

4.2 Western Bypass

The Western Bypass will link the Outeniqua Pass with the N2. The northern section of the route will go through the farming and peri-urban area of Blanco to the north of the Geelhoutboom intersection, while the southern section will run from the N2/Herold’s Bay interchange past the airport to the Geelhoutboom intersection. The approved route in the northern section is known as the Gwaing
Blanco Alignment and the southern section as the Quarry Alternative 3 Alignment. This is illustrated in Figure 2. Refer to Figure A2 in Appendix A for the Preliminary Design.
Due to the bypass, a new access road needs to be constructed to the Quarry (refer to Figure 3). The proposed access road to the Quarry is approximately 30 metres away from the watercourse. The overpass is designed as a means of a continued operational access to the eastern extremity of the Quarry. Refer to Figure A3 in Appendix A for the proposed overpass to the Quarry.

4.3 Portion 4 of Farm Gwayang No 208

A mixed use industrial development is proposed on Portion 4 of Farm Gwayang No 208. The site is located east of the R404 at the R404/Airport Main Access intersection. The development will consist of a Filling Station and Warehouse land use.

The proposed development will comprise of eight erven. One erf will be zoned Business Zone V for the consent use of a Filling Station, while the other seven erven will be zoned Business Zone IV for the consent use of warehouses.

There is currently no access to the property. Access to the property is proposed via a new single lane roundabout opposite the R404/Airport Main Access intersection. The properties to the immediate north and south of the proposed development will also receive access via the new development (refer to Figure 3).
Portion 4 of Farm Gwayang No 208 is zoned Agricultural Zone I and the proposed land uses have not yet been approved by the Council. This proposed access road from the R404 is not equitable for all the land owners. If the access road to the development on Portion 4 is situated on property boundary, it can serve as direct access to both adjacent erven. The cost of the road can therefore also be split amongst all the land owners who gain access from the proposed road.

The planners for Portion 4 also indicated a possible layout of roads and buildings on Portions 130, 131 and 132. This layout is obviously only indicative since the owner of these portions may have other ideas of what should happen on the land. In fact a concept plan for these portions was provided by the owner, which is different from the above plan. This is provided and discussed in more detail in the following section. The proposed plans are totally different and specifically the proposal of where the access and internal roads should be. The above plan indicates a diagonal route, while the plan included in the next section, indicates an access road running along the boundary between Portions 4 and 130.

### 4.4 Portion 130, 131 and 132 of Farm Gwayang No 208

These erven were subdivided and re-zoned from agricultural use in the recent past. The relevant approved zoning on each of portions are as follows:

**Farm Portion 130/208:**
- Zoned: General Residential Zone VI
- Limited to a hotel
- Zoned: Agricultural Zone I
- Has consent for tourist facilities

**Farm Portion 131/208:**
- Zoned: Business Zone V
- Limited to a filling station, excluding vehicle sales and repairs

**Farm Portion 132/208:**
- Zoned: Agricultural Zone II
- With consent use for tourist facilities (theatre, crafts market, curio (gifts) shop, micro-brewery, museum and info centre)

The most recent proposed concept plan for all three the abovementioned portions as obtained from the land owner is illustrated in Figure 4. This is only a proposal which still needs to be approved by all the relevant authorities and probably would require detailed SDP proposals. The roads indicated on this plan are different to that proposed by the owner of Portion 4.
Access to Portions 130 to 132 is challenging since access is only possible across Portion 4 of Farm Gwayang No 208. Currently Portions 131 and 132 can get access across Portion 130 via a 10m servitude in their favour. However, the servitude does not provide access up to a public road. It abuts Portion 4 and there is currently not servitude across Portion 4. Hence, once Portion 4 develops a servitude is required in favour of Portions 130 to 132 or a public road needs to be established providing access to all these properties. However, the latter option of a public road is reliant on favourable phasing of the development on the various portions.

The 10m wide access servitude as reserved for Farm Portions 131/208 and 132/208 is illustrated in Figure 5. However, the servitude is not practical at the given location. These servitudes need to be re-evaluated and a public road needs to be considered through Farm Portion 130/208, linking to the proposed access road along the property boundary.
Access to Portion 131 and 132 is constrained specifically given the zoning rights on the properties and the limitation of the access servitudes for these properties. For this reason, the owner of these properties have applied for direct access off the R404 at a location midway between the R102 and the Airport Access. As a minimum the owner was seeking a left-in left-out (LILO) access only off the R404 for access to Portions 130 to 132. To date, there has been no agreement by the provincial authorities for such an access. The proposal and detail for such an access is not addressed in the road master plan since it does not affect any of the other land owners. The owner of Portions 131 and 132 is still pursuing this LILO as an option, but will have to happen outside of the roads master plan process.

4.5 Portion 139 of Farm Gwayang No 208

This farm portion is zoned Agricultural Zone I, which allows for a shed to be constructed. This land owner would like to apply for land use rights for tourist activities. However, access to this farm portion is currently impossible. If the proposed access road is situated on the property boundary, access to this farm will no longer be a problem.
5 ROAD GEOMETRY AND ACCESS

5.1 Road Geometry and Servitudes

The R102 is a trunk road (TR209). It is classified as a Class 2 road with a lane width of 3m and a 1m shoulder on both sides. The speed limit is 100km/h.

The R404 (also known as a provincial main road, MR 347), it is a Class 3 road with a lane width of 3.4m and gravel shoulders on both sides. The speed limit varies between 60km/h to 100km/h. The cross-section recommended is shown in Figure 6:

A change to the recommended Class 3 dual carriageway cross section is proposed by increasing the sidewalk from 1.5m to 2m. This increase is to accommodate both pedestrians and cyclists.

The road reserve width recommended for the R404 is 32m, however the existing road reserve is only 25m. It is thus recommended that the road reserve be increased to 32m between KM9.2 and KM9.9 by adding 3.5m on both sides of the current road reserve. This will have implications for the landowners on either side of the road, specifically for the airport (Portion 84/208), since there has been some development up to the edge of the existing fence. The existing road is constructed in the middle of the existing 25m road reserve, which means that in future the current roadway will be replaced by two new carriageways and a median island. Refer to Figure D1 and D2 in Appendix D for the proposed layout of the R404.
5.2 Public Transport

George recently implemented the Go George bus system for transporting passengers to the different areas in George. This is implemented in phases with routes of the first phases illustrated in the Figure 7. The planned future routes are shown in Figure 8.

![Figure 7: Existing Go George Routes](image-url)
Figure 8: Future Go George Routes
It is evident that currently none of the planned future routes will serve the GANEP area. However, based on discussions with the municipality it may still be included as part of the future system. Therefore, provision needs to be made for bus facilities at least along the R404 and also into the airport. With public transport (PT) embayments along the R404, PT passengers will be able to access the GANEP although they will have to walk distances varying between 500m and 800m depending on where they want to be within the precinct. A Go George station would probably be eventually implemented at the George Airport, allowing for access for passengers with luggage. The Go George buses can then enter the George Airport at the main access of the R404, drop-off and pick-up passengers at the terminal and make use of the planned George Airports ring road to get to the R404 again.

In summary, it is necessary to allow for PT facilities, at least along the R404. Based on the walking distances it is unlikely that the major bus routes would enter the GANEP precinct. At a minimum PT passengers will have to walk into the area, but this could be subvented by adding minibus taxi feeders. Although the demand for such a feeder system will be low, unless a larger area is served.

5.3 Access

The R404 provides access to the George Airport and the Quarry. This road will also be the access to the GANEP where future developments have been proposed. The GANEP will require at least two full intersections namely the R102/R404 priority stop and the R404/Airport Main Access’s unsignalised T-intersection.

The R102/R404 priority stop control will need to be upgraded to either a signalised intersection or a double lane roundabout to accommodate the new trips generated by the airport expansion and the proposed developments in the site vicinity.

The R404/Airport Main Access unsignalised T-intersection will be upgraded to a double lane roundabout, refer to Figure D1 and D2 in Appendix D for the conceptual design of the roundabout. The intersection is currently situated approximately 300m south of the R102/R404 intersection. According to the WCG Road Access Management Guidelines (AMG, 2016) a roundabout (unsignalised full intersection) spacing of 225m is acceptable for a Class 3 road with an Intermediate Roadside Development Environment. This spacing is therefore acceptable.

5.4 Short term planning

A Class 4 road is proposed on the property boundary of Portions 4 and 130 of Farm Gwayang No 208. This will give access to the following Farm Portions: 4/208, 131/208, 132/208, 139/208 and 130/208.

Two Class 5 roads are proposed. The one is proposed by the George Airport as a local ring road for the airport. The other road will give access to the Quarry.

Refer to Figure B1 in Appendix B for the short-term road network.
5.5 Long term planning

A Class 1 Western Bypass is proposed linking the N2 to the Outeniqua Pass. For the Western Bypass to be constructed, a section of the R102 needs to be realigned.

Although the R404 is classified as a Class 3 road, it is likely that the mobility function of the road will change significantly in the future once the Western Bypass is constructed. Once the bypass is constructed, the northern section of the R404 will be closed and in the south it will intersect with the bypass at an unsignalised T-intersection.

Refer to Figure B2 in Appendix B for the long-term road network. A more detailed layout of the R404 between the airport access road and the R102 is included in Appendix D to indicate the impact on the adjacent properties.
6 TRAFFIC AND TRIP GENERATION

Various new layout plans have been prepared for the development in the GANEP area. It is therefore necessary that this section of this report be updated regularly with the latest development plans.

6.1 Developable area

The GANEP has a total developable area of 26.1 hectare of which 13% is allocated towards roads. Table 1 illustrates the developable area calculations for the GANEP.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Rate (trips per hour)</th>
<th>Peak Hour Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehousing &amp; Distribution</td>
<td>0.5</td>
<td>483</td>
</tr>
<tr>
<td>Hotel</td>
<td>0.5</td>
<td>483</td>
</tr>
<tr>
<td>Motor Dealership</td>
<td>2.2</td>
<td>2123</td>
</tr>
</tbody>
</table>

6.2 Trip Generation

It is envisaged that the GANEP will develop with land uses such as hotels, storage/warehouses, rental car support, filling stations and tourist facilities. Table 2 indicates the trip generation rates and trips generated for these land uses, based on The Committee of Transport Officials Trip Data Manual (TMH17 – COTO 2013).

A realistic peak hour trip generation rate for the expected land uses in the precinct will be between 0.8 to 1.0 trips per 100 m² with a directional 60/40 split. Based on these trip generation rates, the land uses in the GANEP could generate between 770 and 965 peak hour trips. Both these peak hour trips were analysed to determine whether the roads have enough capacity to accommodate these trips. It is assumed that the airport currently generates approximately 500 peak hour trips. Refer to Figures C4.1 and C5.1 in Appendix C for the trips generated.
7 TRIP DISTRIBUTION
For the purposes of this study, based on the current planned road network in the site vicinity, the assumption of the trips are as follows:

- 20% eastbound via the R102 to George
- 30% northbound via the R404 to Fancourt
- 10% westbound via the R102 to Groot-Brak
- 30% southbound via the R404 to Herold’s Bay
- 5% to the Quarry
- 5% to the Airport

8 OPERATIONAL ANALYSIS
An operational analysis was conducted to assess the following three intersection namely, the R102/R404, R404/Airport Main Access and the R404/Airport Second Access intersection. The existing and total traffic conditions will be discussed for these intersections.

8.1 Existing Traffic Conditions
All three intersections are priority stop-controlled intersections. Theses intersections were analysed using both their existing geometry and existing traffic volumes. The study intersections are operating with adequate spare capacity. Refer to Figure C1 in Appendix C for existing a.m. and p.m. traffic analysis results.

The intersections were also analysed as a roundabout and a traffic signal. Using the existing traffic volumes it was determined that these intersections will continue operating acceptably, irrespective of whether their controls are a roundabout or a traffic signal. Refer to Figure C2 and C3 in Appendix C. It is clear from the results that the roundabout configuration would operate better than a traffic signal, given the existing traffic volumes.

8.2 Traffic Growth
Traffic growth rates were used to estimate the future traffic. A growth rate of approximately 3% per annum over 20 years was applied to the existing traffic volumes. Due to the airport’s proposed expansion it is expected that the number of trips generated will double within the next 20 years.

8.3 Total Traffic Conditions
The total traffic analysis results indicate that all the intersections will operate at capacity with the existing intersection geometries. For the roundabout geometry analysis, all intersections will operate at an acceptable Level-of-Service (LOS). A two-lane roundabout configuration was assumed for the R102/R404 and R404/Airport Main Access intersections. The traffic signal’s traffic analysis indicates that all the intersections will also operate at an acceptable Level-of-Service although generally worse than the roundabout configuration. Dedicated turning phases were added at the R102/R404 and R404/Airport Main Access intersections. Refer to Figures C4 and C5 sub figures in Appendix C for the 770 and 965 peak hour development trip scenarios respectively.
8.4 Summary

Below is a summary of the LOS for the different controls and intersections in the study area.

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Existing Geometry AM</th>
<th>Existing Geometry PM</th>
<th>Roundabout AM</th>
<th>Roundabout PM</th>
<th>Traffic Signals AM</th>
<th>Traffic Signals PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>R404/R102</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>R404/George Airport</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>R404/Quarry</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

| Total Traffic               |                      |                      |               |               |                    |                    |
| R404/R102                   | F                    | F                    | C             | B             | C                  | C                  |
| R404/George Airport         | F                    | F                    | C             | C             | D                  | D                  |
| R404/Quarry                 | F                    | F                    | B             | A             | B                  | B                  |

860 TRIPS GENERATED BY PROPOSED DEVELOPMENT

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Existing Geometry AM</th>
<th>Existing Geometry PM</th>
<th>Roundabout AM</th>
<th>Roundabout PM</th>
<th>Traffic Signals AM</th>
<th>Traffic Signals PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>R404/R102</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>R404/George Airport</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>R404/Quarry</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

| Total Traffic               |                      |                      |               |               |                    |                    |
| R404/R102                   | F                    | F                    | C             | B             | C                  | C                  |
| R404/George Airport         | F                    | F                    | C             | E             | D                  | D                  |
| R404/Quarry                 | F                    | F                    | B             | B             | B                  | B                  |

It is clear from the results that the roundabout configuration would operate better than a traffic signal, during the peak period. These controls will operate even better during the off peak period. Upgrading both the R102/R404 intersection and the R404/Airport Main Access to either a roundabout or a traffic signal is recommended.
9 COST APPORTIONMENT

Due to the varying nature of the developments coupled with their location relative to the existing infrastructure, the demand for the upgrading of the existing infrastructure or the provision of new infrastructure can vary substantially. While the cost of the provision of new infrastructures is generally carried by the developer, the cost of upgrading the existing infrastructure is generally carried by the municipality, especially if the upgrading is not required in the immediate vicinity of the development.

The George Municipality has decided on a more detailed approach for determining the capital contribution towards the new and existing road infrastructure of which a certain contribution can be collected from the prospective developers. Figure E1 in Appendix E indicates the different land owners that will need to contribute to the different roads and intersections.

9.1 Cost Estimate of the Roads

A high-level construction cost estimate was prepared for the roads and intersections (refer to Table 3). This estimate was calculated based on a unit-cost per area of the road construction. The intersections and roads included in the cost estimate are illustrated on Figure E1 in Appendix E.

Table 3: Construction Cost Estimate

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Area (sqm)</th>
<th>Rate (R/sqm)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road A</td>
<td>250</td>
<td>32</td>
<td>8000</td>
<td>R1 500</td>
<td>R12 000 000</td>
</tr>
<tr>
<td>Road B</td>
<td>300</td>
<td>32</td>
<td>9600</td>
<td>R1 500</td>
<td>R14 400 000</td>
</tr>
<tr>
<td>Road C</td>
<td>300</td>
<td>10.3</td>
<td>3090</td>
<td>R1 500</td>
<td>R4 635 000</td>
</tr>
<tr>
<td>Roundabout/Traffic Signal 1</td>
<td>4500</td>
<td></td>
<td></td>
<td>R1 500</td>
<td>R6 750 000</td>
</tr>
<tr>
<td>Roundabout 2</td>
<td>4500</td>
<td></td>
<td></td>
<td>R1 500</td>
<td>R6 750 000</td>
</tr>
<tr>
<td>Roundabout 3</td>
<td>3000</td>
<td></td>
<td></td>
<td>R1 500</td>
<td>R4 500 000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R49 035 000</td>
</tr>
</tbody>
</table>

9.2 Cost Apportionment

The cost apportionment for the road infrastructure was calculated by dividing the total estimated construction costs of the required infrastructure by the total number of expected development trips during the critical peak period. The critical peak being the hour in which the developments as a collective generate the most number of trips. Due to the report focusing on two trip generation rates, an average of the trips generated by the GANEP was used. Road B was not considered in the cost apportionment calculations as no developer’s contribution is required for the dualling of this road.

The total estimated infrastructure cost included in apportionment: R 34 635 000
The total estimated number of peak hour trips generated: 1 868 trips

Hence the contribution per trip amounts to approximately R18 550.

The individual farm portion contributions will be determined as the roads are ready to be constructed as the number of trips generated by each individual farm portion will change as the land uses change.
REFERENCES

1. Arcus GIBB (Pty) Ltd, Archaeological Impact Assessment, The Proposed George Western Bypass Road, January 2009
3. Provincial Administration: Western Cape, Department of Economic Affairs, Agriculture and Tourism: Transport Branch, Road Access Guidelines and Policies, 2002
TR 89 km9.1 Overpass : Design notes

1. Economics dictated that the TR89 cross the 'quarry' valley at minimum height.
2. This height was dictated by the required overpass access to the operational quarry.
3. The quarry access road position (on the valley slope) was in turn dictated by having to be (conservatively) some 8m above the 'river' watercourse.
4. The resultant design places the access road some 30m away from the river watercourse.
Appendix B
Road Planning Figures
FIGURE C4.1 AM & PM: TOTAL ADDED TRIPS

ROAD MASTER PLAN: GEORGE AIRPORT NORTH EASTERN PRECINT

80% BACKGROUND GROWTH
GEANE DEVELOPMENT AREA: 96 500m² GLA
GEANE TOTAL TRIPS: ±770 VEHICLES PER HOUR
AIRPORT EXPANSION 100% GROWTH: 500 TRIPS

AM PEAK HOUR
1
320
105
70
40
210
210

PM PEAK HOUR
1
210
320
105
70
40
210

PROJECT:

GEORGE AIRPORT NORTH EASTERN PRECINT

FIGURE:

AM & PM: TOTAL ADDED TRIPS

NUMBER:

C4.1

LEGEND

CONTROL LEGEND

CRITICAL MOVEMENT (UNSIGNALED)
INTERSECTION LEVEL OF SERVICE (SIGNALED) / CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALED)
INTERSECTION AVERAGE DELAY (SIGNALED) / CRITICAL MOVEMENT DELAY (UNSIGNALED)
CRITICAL VOLUME-TO-CAPACITY RATIO

TRAFFIC SIGNAL
STOP YIELD CONTROL
ROUNDABOUT
LANE CONFIGURATION

AM PEAK HOUR

1. 1
   CM=EB
   LOS=C
   Del=16.7
   V/C=0.77
2. 2
   CM=EB
   LOS=B
   Del=15.6
   V/C=0.72
3. 3
   CM=EB
   LOS=B
   Del=16.8
   V/C=0.71
4. 4
   CM=EB
   LOS=B
   Del=19.4
   V/C=0.68
5. 5
   CM=EB
   LOS=B
   Del=22.4
   V/C=0.66
6. 6
   CM=EB
   LOS=B
   Del=25.4
   V/C=0.60
7. 7
   CM=EB
   LOS=B
   Del=28.4
   V/C=0.50
8. 8
   CM=EB
   LOS=B
   Del=31.4
   V/C=0.40

PM PEAK HOUR

1. 1
   CM=EB
   LOS=B
   Del=12.5
   V/C=0.70
2. 2
   CM=EB
   LOS=B
   Del=21.9
   V/C=0.80
3. 3
   CM=EB
   LOS=B
   Del=44
   V/C=0.60

LEGEND

TRAFFIC SIGNAL
STOP/YIELD CONTROL
ROUNDABOUT

PROJECT:
ROAD MASTER PLAN:
GEORGE AIRPORT NORTH EASTERN PRECINT

FIGURE:
2038 AM & PM: ROUNDBOOUTS (TOTAL TRAFFIC)
To Groot Brak
To George
To George Airport
To Quarry
To Herolds Bay
To Fancourt
To R404

AM & PM: TOTAL ADDED TRIPS

LEGEND

<table>
<thead>
<tr>
<th>Control Legend</th>
<th>Traffic Signal</th>
<th>Stop/Yield Control</th>
<th>Roundabout</th>
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<tr>
<td>O = CRITICAL MOVEMENT (UNSIGNALED)</td>
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<tr>
<td>LOS = INTERSECTION LEVEL OF SERVICE (SIGNALED) / CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALED)</td>
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<td>Del = INTERSECTION AVERAGE DELAY (SIGNALED) / CRITICAL MOVEMENT DELAY (UNSIGNALED)</td>
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<td>V/C = CRITICAL VOLUME-TO-CAPACITY RATIO</td>
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FIGURE:

PROJECT:
ROAD MASTER PLAN:
GEORGE AIRPORT NORTH EASTERN PRECINT

FIGURE:
AM & PM: TOTAL ADDED TRIPS

NUMBER:
C5.1

80% BACKGROUND GROWTH
GANEPE DEVELOPMENT AREA: 96 500m² GLA
GANEPE TOTAL TRIPS: ±965 VEHICLES PER HOUR
AIRPORT EXPANSION 100% GROWTH: 500 TRIPS
LANE CONFIGURATION

AM PEAK HOUR

1. CM = SB, LOS = F, Del = 50, V/C = >1.0
   35  605  275  525  115
   25  525  115

2. CM = SB, LOS = F, Del = 50, V/C = >1.0
   280  350  85  320  290
   70  490

3. CM = SB, LOS = F, Del = 50, V/C = >1.0
   105  495  125  565  90
   70  490

PM PEAK HOUR

1. CM = SB, LOS = F, Del = 50, V/C = >1.0
   20  25  525  360  185
   80  595  185

2. CM = SB, LOS = F, Del = 50, V/C = >1.0
   185  330  60  340  270
   410  210

3. CM = SB, LOS = F, Del = 50, V/C = >1.0
   85  575  95  485  60
   390  210

LEGEND

- CM = CRITICAL MOVEMENT (UN SIGNALISED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALISED) / CRITICAL MOVEMENT LEVEL OF SERVICE (UN SIGNALISED)
- Del = INTERSECTION AVERAGE DELAY (SIGNALISED) / CRITICAL MOVEMENT DELAY (UN SIGNALISED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

TRAFFIC SIGNAL
STOP/YIELD CONTROL
ROUNDABOUT

PROJECT:
ROAD MASTER PLAN:
GEORGE AIRPORT NORTH EASTERN PRECINT

FIGURE:
2038 AM & PM: EXISTING GEOMETRY (TOTAL TRAFFIC)

NUMBER:
C5.2
LANE CONFIGURATION

AM PEAK HOUR

PM PEAK HOUR

Proposed Development

Road

To George

To Herolds Bay

To Quarry

To George Airport

Legend

<table>
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<tr>
<th>Control Legend</th>
<th>Traffic Signal</th>
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<tr>
<td>LOS = Intersection Level of Service (Signalised)</td>
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<tr>
<td>Del = Intersection Average Delay (Signalised)</td>
<td></td>
</tr>
<tr>
<td>V/C = Critical Volume-to-Capacity Ratio</td>
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</tbody>
</table>

Project:

ROAD MASTER PLAN:
GEORGE AIRPORT NORTH EASTERN PRECINT

Figure:

2038 AM & PM: TRAFFIC SIGNALS (TOTAL TRAFFIC)
Appendix D

Conceptual Layout of R404 between R102 and Airport Access Road
**ROAD MASTER PLAN:**
GEORGE NORTH EASTERN PRECINCT

**SCALE:** 1:1250

**Legend:**
- Proposed Widening

**DRAWING:**
R404 LONG TERM CONCEPTUAL LAYOUT
BETWEEN R102 AND AIRPORT ACCESS ROAD

**Intersection Details:**
- Proposed Long Term Double Lane Roundabout
- Access to Airport
- Existing Property Boundary
- Existing Property Fence/Wall
- Intersection Detail Layout to Be Resolved
R404 LONG TERM CONCEPTUAL LAYOUT BETWEEN R102 AND AIRPORT ACCESS ROAD

Legend:
- Proposed Widening

Existing Property Boundary
Access to Airport
Intersection Detail Layout to be Resolved
Proposed Long Term Double Lane Roundabout

Scale 1:1250