WALVIS STREET EXTENSION, MOSSEL BAY

TRAFFIC IMPACT ASSESSMENT AND ARTERIAL MANAGEMENT PLAN

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ATTACHMENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Mossel Bay Municipality has identified the need to extend the existing Walvis Street to link up with Louis Fourie Road (Trunk Road 33/1).

The proposed extension is approximately 500 metres in length and situated on the southern side of Louis Fourie Road, Mossel Bay. The extension falls within the boundaries of Asazani/Izinyoka. The area surrounding the proposed extension is currently being developed. The existing Asazani/Izinyoka area south of the extension will obtain access to Louis Fourie Road via the extension.

This traffic impact assessment (TIA) will analyse the existing traffic to be redistributed along Walvis Street Extension, as well as evaluate the effect of the traffic that will be generated by the additional developments.

An arterial management plan (AMP) will be included in the TIA and will evaluate the safety and flow of traffic along Louis Fourie Road from Boland Park Intersection (Beach Boulevard West/Kiewiet Crescent intersection) up to and including George Road intersection as well as the proposed Walvis Street- and Louis Fourie Road Intersection.

2.0 ROAD NETWORK

The section of Louis Fourie Road that will be analysed in this report is a Class 2 road, approximately 2.0 kilometres in length with a posted speed limit of 80km/h and falls under the jurisdiction of the Western Cape Government. Along this section there are 7 intersections.

Future road upgrades of Louis Fourie Road are contained in the conceptual design of Louis Fourie Road and traffic studies prepared by HATCH (previously known as Goba). These upgrades include the dualling of Louis Fourie Road from the existing, one lane per direction, to two lanes per direction with a median island.

Other proposed upgrades contained in the updated conceptual design (2016) of Louis Fourie Road by HATCH also include, inter alia, the re-alignment of George Road to intersect Louis Fourie Road opposite Bakke Street, as well as the closure of the access in between the Hall- and Canty Street intersections.

The existing and proposed extension of Walvis Street is a municipal road and can be classified as a Class 5 road.

The existing section of Walvis Street from Bakke Street is approximately 860 metres long with one lane per direction. A surfaced sidewalk exists on the southern side of the road from just to the southeast of Hall Street. There are no shoulders.

The proposed extension of Walvis Street as per the Aurecon design is approximately 500 metres in length, 6.4 metres wide (black top) with a cross section of 2 x 3.2 metre lanes and 2 x 1.2 metre gravel sidewalks.

The proposed extension will intersect with Louis Fourie Road between the Park Crescent intersection and Hall Street intersection, providing a spacing of approximately ± 220 metres between Park Crescent and the proposed Walvis Street intersection, as well as approximately ± 890 metres between Hall Street and the proposed Walvis Street intersection.

Access to the housing development on the southern side of Walvis street will be provided along Walvis Street with intersection spacing at approximately 60 metres, according to the Traffic Impact Statement compiled by SMEC (previously known as VKE).

Access for the new housing development to the south west of Walvis Street as well as an alternative access to the Asazani/Izinyoka township have previously been proposed. It can be anticipated that people from the Asazani/Izinyoka township wishing to travel to/from the industrial area to the north would in future mostly make use of the Extension of Walvis Street.

3.0 ALTERNATIVE ALIGNMENTS

Three alternative alignments were considered. All the alternatives require expropriation of property. The preferred alternative was found to be the most cost-effective.

4.0 TRAFFIC

Available traffic flow data was obtained from the Western Cape Government's Road Network Information System (RNIS), as well as from the traffic studies prepared by HATCH in 2012.

Traffic counts were conducted on Tuesday, 5th June 2018 from 06h00 to 09h00 and again from 15h30 to 18h30 at the intersections agreed with the Mossel Bay Municipality. These intersections included Boland Park-, Park Crescent-, Hall Street-, Canty Street-, Bakke Street- and George Road intersections along Louis Fourie Road, as well as Bakke Street and Walvis Street intersection. Pedestrian counts were conducted at selected locations as agreed with the Mossel Bay Municipality.

The scenarios analysed are the existing 2018 AM/PM peak hours, the projected 2038 AM/PM peak hours (including the assumed 3 percentage annual traffic growth and the redistribution of traffic as a result of the extension of Walvis Street) as well as the projected 2038 AM/PM peak hour volumes (including the assumed traffic growth, the redistribution of traffic as a result of the extension of Walvis Street, the traffic generated by the proposed developments in the area and the planned road upgrades).

The peak hour link volumes for the same scenarios were analysed as a network.

The network analyses of the **existing 2018** AM/PM peak hour link volumes along the subject section of Louis Fourie Road show that Louis Fourie Road is currently operating at a service level D with an average speed of 30.3 km/h (AM peak) and 41.6 km/h (PM peak) along the subject section of Louis Fourie Road. Based on a 3% annual traffic growth it can be expected that the road would have to be dualled by 2020. Taking into consideration that the traffic counts were conducted in June during the "off peak" season, it can be expected that the seasonal traffic would be such that a dual carriageway would be required before 2020 in order to accommodate the peak hour traffic.

The analyses of the **existing 2018** AM/PM peak hour traffic volumes at the various intersections also show that the right turning movements at all the stop-controlled intersections, i.e. Hall Street-, Canty Street- and Bakke Street intersection are experiencing unacceptable service levels during the peak hours as a result of the high through traffic along Louis Fourie Road in both directions.

As previously described, the projected 2038 peak hour traffic volumes were obtained by applying a 3% growth rate per annum to the existing 2018 traffic volumes. The analyses of the **current road layout of Louis Fourie Road with the expected 2038 redistributed peak hour traffic volumes, without additional generated traffic** also indicate that traffic on the side streets are unable to access Louis Fourie Road without unacceptable delays.

The intersection of Walvis Street with Louis Fourie Road was also analysed testing four alternatives for types of intersection control. The four controls include full signalisation, partial signalisation, stop-controlled and a left in/left out control. The results showed that the intersection can be expected to operate at acceptable service levels with full signalisation, partial signalisation and as a left in/left out but not as stop control. Traffic flow at the intersection will not warrant traffic signals. The fact that the intersection will be on a horizontal curve results in a sight distance problem for eastbound right turning traffic (into Walvis Street). For the intersection to operate acceptably, the intersection should either be signalised with the correct phasing (no right turns on red arrow) or be a left in/left out only.

It is further the opinion that, for safety reasons, a dedicated right turn lane should be provided for eastbound right turning traffic. According to the Conceptual Design of Louis Fourie Road a 1,0 metre median island will be provided on the section of Louis Fourie Road at the location of the proposed Walvis Street intersection (this is considered insufficient width for road signs). In order to provide a dedicated right turn lane eastbound on Louis Fourie Road (into Walvis Street) the median island should be 5,0 metres. From the Conceptual Design it appears that the proximity of the railway line could be problematic. From the cross-section on the Conceptual Design of Louis Fourie Road it appears that a 2,80 metres shoulder will be provided along the eastbound carriageway (sea side). This could then assist in providing sufficient space for a dedicated right turn lane. If it is not possible to provide a dedicated right turn lane, it is the opinion that the intersection should be a left in/left out only.

The current road layout of Louis Fourie Road was also analysed as a network with the expected 2038 redistributed traffic volumes, without additional traffic generated. The LOS for the AM and PM peak period was found to be F with an average speed of 4.0 km/h (AM peak hour) and 5.4 km/h (PM peak hour) and an average delay of 302.1 seconds (AM peak hour) and 222.4 seconds (PM peak hour), respectively. This confirms the statement above that the dualling of Louis Fourie Road is required in the short-term future.

The westbound traffic along Louis Fourie Road was found to have higher levels of congestion in the AM peak and PM peak hour compared to the southbound traffic. The highest levels of congestion were found in the northbound traffic during the AM peak hour.

The expected 2038 redistributed traffic with proposed road upgrades at all the intersections and traffic generated by the housing developments were modelled. The intersection approaches operate at acceptable levels of service (between B and D), aside from the Canty Street intersection where a level of service F is experienced due to right-turning movements.

The dualled Louis Fourie Road was also analysed as a network, testing four alternatives for the intersection control at the proposed Walvis Street intersection. The four controls include; full signalisation, partial signalisation, stop-controlled and a left in/left out control.

Each upgraded network performed at a LOS D for the AM and PM peak hour with the network including the partially signalised intersection obtaining the highest average speed during the AM and PM peak hour, 33.1 km/h and 38.4 km/h, respectively. The stop-controlled intersection alternative received the lowest average speeds and was deemed to be an unsafe alternative due to sight distance and the posted speed of 80 km/h along Louis Fourie Road. From a traffic flow point of view the Walvis Street intersection could thus be signalised although the spacing of the intersection does not conform to the spacing requirements of the Road Access Guidelines.

5.0 ACCESS MANAGEMENT ON LOUIS FOURIE ROAD

The access spacing of the proposed Walvis Street Extension intersection with Louis Fourie Road conforms to the Western Cape Government's Road Access Guidelines (2002) on either side of the intersection for an unsignalised intersection with ±220 metres available on the west and ±880 metres on the east. For a signalised intersection, the required spacing is 540 metres and the proposed intersection, therefore, does not conform towards the west with ±400 metres available between the proposed access and Boland Park intersection.

The access spacing of the proposed Walvis Street Extension intersection with Louis Fourie Road does not conform to the Western Cape Government's; Access Management Guidelines (2016) and the South African Road Classification and Access Management Manual (RCAM 2012) towards the west for both signalised and unsignalised intersections.

The latest HATCH Conceptual Design for the subject section of Louis Fourie Road makes provision for the relocation of George Road to opposite Bakke Street (thus consolidating the two intersections to one signalised intersection), Canty Street as a full T-intersection, the closure of the existing access between Canty Street and Hall Street, Hall Street as a "Butterfly" type intersection and Boland Park intersection will remain signalised and Park Crescent will remain a left in / left out.

It should be noted that sight distance in a westerly direction from Hall Street is currently insufficient. With the upgrade of Louis Fourie Road to a dual carriageway and the implementation of the "butterfly" type intersection this problem will be addressed.

Five minor accesses exist between Park Crescent and Hall Street that are not specifically addressed by HATCH. It is the opinion that the accesses be closed and access be obtained along the proposed Walvis Street Extension. Alternatively, the access furthest east could be converted to a left-in / left out intersection, however, this is not desirable as the angle of intersection will be problematic.

6.0 NON-MOTORISED TRANSPORT

No formal sidewalks exist along the section of Louis Fourie Road between the Boland Park intersection and the George Road intersection. North of the Louis Fourie Road / Boland Park intersection, a formal sidewalk exists on the northern side of the road.

Based on existing pedestrian desire lines it can be assumed that pedestrians will make use of the Extension of Walvis Street. According to the cross-section of the Extension of Walvis Street as obtained from Aurecon, a 1,2-metre gravel sidewalk will be provided on either side. It is recommended that the sidewalk on one side be widened to 2,4 metres to accommodate pedestrians and cyclists. It is further the opinion that the sidewalks should be surfaced as damage to the sidewalks can be expected during rain storms.

Should the Louis Fourie Road/Walvis Street intersection be signalised provision should be made for pedestrians to cross at the intersection. Should a traffic signal not be provided at the intersection, a sidewalk would have to be provided along Louis Fourie Road on the southern side up to the signalised Boland Park intersection. According to the Conceptual Design of Louis Fourie Road by HATCH, no shoulder will be provided along Louis Fourie Road and should it thus be considered to provide a wider sidewalk (2,4 metres is suggested) than the 1,8 metre as per the Conceptual Design in order to also cater for cyclists (at least on one side of Louis Fourie Road).

7.0 PUBLIC TRANSPORT

Previous studies on Louis Fourie Road, such as the Public Transport Study, 2013, prepared by HATCH, recommended that Louis Fourie Road be upgraded to accommodate the high number of minibus taxis operating along the route and that public transport embayments (laybyes) as well as additional pedestrian facilities and public transport shelters be provided.

According to the Conceptual design of Louis Fourie Road, public transport embayments will be provided at the Boland Park intersection but it appears from the drawings that an embayment will only be provided on the westbound carriageway at the Bakke Street intersection. It is the opinion that an embayment should also be provided on the eastbound carriageway (outbound).

It is further the opinion that an embayment should be provided along the westbound carriageway (outbound) at the Walvis Street intersection. Should Walvis Street be signalised with accommodation for pedestrians, embayments should be provided outbound along both carriageways at the intersection. Space for road widening could be problematic on the northern side of Louis Fourie Road.

Currently, minibus taxis make use of Bakke Street to obtain access to Louis Fourie Road. With the implementation of the extension of Walvis Street, it can, however, be expected that minibus taxis will make use of Walvis Street as it will provide a shorter route from the townships to the industrial area.

8.0 TRAFFIC CALMING

There are currently no traffic calming measures along Walvis Street. It is suggested that it be considered to provide a speed hump at ± SV 120 just before the steep down grade starts as well as just before the relocated accesses at ± SV 450.

9.0 CONCLUSIONS

The conclusions made from the report are as indicated in ***Chapter 9.0*** in the report.

10.0 RECOMMENDATIONS

The recommendations made from the report are as indicated in ***Chapter 10.0*** in the report.

1.0 INTRODUCTION

1.1 Background

Mossel Bay Municipality identified the need to extend the existing Walvis Street to link up with Louis Fourie Road (TR 33/1) and appointed Aurecon SA (Pty) Ltd (further in the report referred to as Aurecon) to investigate and conduct a design of the proposed extension of Walvis Street.

iCE Group was then, through a tender process, appointed by Aurecon to conduct a Traffic Impact Assessment (TIA) for the proposed extension of Walvis Street to link up with Louis Fourie Road in Mossel Bay, as well as an Arterial Management Plan (AMP) for Louis Fourie Road, from the Boland Park intersection (Beach Boulevard West/Kiewiet Crescent intersection), up to and including the George Road intersection. See the ***Locality Plan*** in ***Attachment A***.

In 2012/2013, HATCH (previously Goba Consulting Engineers and further in the report referred to as HATCH) produced a conceptual design as well as multiple traffic studies along Louis Fourie Road, including a Transport Modelling Report (2012), a Traffic Surveys Report (2012), a Transportation Status Quo Report (2013) and a Public Transport Study (2013). These traffic studies have been consulted in the preparation of this TIA.

1.2 Locality

The proposed extension of Walvis Street is approximately 500 metres in length and situated on the southern side of Louis Fourie Road. The extension falls within the boundaries of the Asazani/Izinyoka township as shown on the ***Locality Plan*** in **Attachment A**.

New developments are currently in progress to the south of Walvis Street and its future extension whilst the area north of Walvis Street is also expected to be developed in future. Vehicular access to Walvis Street and its extension will in future also be possible from the Asazani/Izinyoka township.

1.3 Scope of Works

This TIA will analyse the existing traffic along Louis Fourie Road from the Boland Park intersection to the George Road intersection, the redistributed existing traffic as a result of the implementation of Walvis Street Extension and also evaluate the effect of the traffic that will be generated by the additional developments in the area on the mentioned road infrastructure.

The AMP will evaluate the existing spacing of intersections along Louis Fourie Road between the Boland Park intersection and the George Road intersection in terms of the Western Cape Government Department of Transport and Public Works; Road Access Guidelines (2002), the Western Cape Government's; Access Management Guidelines (2016) and the South African Road Classification and Access Management Manual (RCAM 2012).

It will also evaluate the spacing of intersections, with Walvis Street Extension implemented, as well as the type of intersection control.

1.4 Study Approach

Basic information with regard to the project was obtained from Aurecon whilst more specific information was obtained at a meeting at the Mossel Bay municipal offices on Tuesday, 15 May 2018. Representatives at the meeting were Mr. Pieter Myburgh (Mossel Bay Municipality), Mr. Ryno Schraader (Aurecon) and Mr. Piet van Blerk (iCE Group). The information obtained included the Conceptual Design of Louis Fourie Road conducted by HATCH, new developments in the area, etc.

In order to obtain information with regard to current traffic flow in the area, traffic counts were conducted on Tuesday, 5 June 2018 (from 06h00 to 09h00 and from 15h30 to 18h30), along Louis Fourie Road from the Boland Park intersection up to the George Road intersection. These counts were used to determine the peak hour traffic volumes. The peak hour traffic flows at the various intersections along Louis Fourie Road were then analysed using SIDRA 8.0 Intersection Analysis Software in order to provide an indication of the service levels and the degree of saturation at the various intersections. In order to obtain an

indication of how the existing Louis Fourie Road along the subject section thereof operates, the network-function of SIDRA was used to determine current service levels, travel speed, etc. The network along Louis Fourie Road, from Boland Park intersection up to and including George Road Intersection was then also analysed with the proposed Walvis Street intersection in place taking into consideration the redistribution of traffic as a result of the new intersection.

A 2038 traffic model was then developed in order to determine the 20-year future traffic impact.

From the analyses and the traffic studies performed along Louis Fourie Road by HATCH in 2013, adequate intersection spacing, the type of intersection control and layout of the intersections were determined taking into consideration the effect of the additional Walvis Street intersection, the redistribution of traffic as a result of the new intersection and the additional traffic generated by future developments in the area.

In order to obtain an indication of pedestrian movement the traffic counts conducted also included pedestrian counts. The impact of the new Walvis Street intersection on pedestrian and bicycle movement was also investigated and recommendations made in this regard

The impact of the extension of Walvis Street on public transport routes as well as possible traffic calming required as a result of the road was also considered and recommendations made.

2.0 ROAD NETWORK

2.1 Existing and Future Road Network

Trunk Road 33 Section 1 (TR 33/1 – Louis Fourie Road) is a section of the Regional Route R328, between the N2/6 Interchange to the west of Mossel Bay, the Main Road 344 intersection to the north and the Main Road 339 intersection at George Road.

The section of Louis Fourie Road (from Boland Park- to George Road intersection) that will be analysed in this report is approximately 2.0 kilometres in length. Along this section there are 7 intersections (see ***Counting Stations*** in **Attachment B**). Between Hall Street and Canty Street, a parallel road to Louis Fourie Road exists (no name) with an access (no name and labelled A1 on ***Intersections Counted*** in **Attachment B**) in very close proximity of the intersections with Louis Fourie Road.

The intersections along the subject section of Louis Fourie Road are (See **Attachment B**):

1. **Louis Fourie Road / Beach Boulevard West / Kiewiet Crescent intersection (referred to in this report as the Boland Park intersection)**

   This intersection is a full signalised intersection at the start (north-western end) of the section being analysed. This intersection provides access to Boland Park, a number of free-standing residential units, apartment blocks as well as tourist and recreational attractions, such as hotels, beach front and Diaz Water Park.

2. **Louis Fourie Road / Park Crescent intersection**

   This intersection is a left-in / left-out intersection enforced by an existing median along Louis Fourie Road. The intersection provides access to a number of residential units, a hotel and self-catering holiday apartments.

3. **Louis Fourie Road / Hall Street intersection**

   This intersection is a T-junction which is stop-controlled along Hall Street, providing access to the service road running parallel to Louis Fourie Road, which in turn, provides access to a number of retailers and petrol stations. It also provides access to residential units, as well as the existing Walvis Street.

4. **Louis Fourie Road / Canty Street intersection**

   This intersection is a T-junction, which is stop-controlled along Canty Street, providing access to a small number of residential units as well as the service road mentioned above. It should also be noted that between Hall Street and Canty Street, an access to the service road currently exists.

5. **Louis Fourie Road / Bakke Street intersection**

   This intersection is a T-junction which is stop-controlled along Bakke Street, providing access to the existing Walvis Street, as well as a large number of residential units in Fairview and D'Almeida.

6. **Louis Fourie Road / George Road intersection**

   This intersection is a signalised T-junction at the end (south-eastern end) of the section being analysed. The intersection provides access to George Road, which is classified as a Main Road (MR00339), leading to Mossel Bay CBD.

Future upgrades of Louis Fourie Road are contained in the conceptual design of Louis Fourie Road and traffic studies prepared by HATCH in 2012/2013. An updated conceptual design was received by HATCH on 11 July 2018, dated August 2016. These upgrades include the dualling of Louis Fourie Road from the existing, one lane per direction, to two lanes per direction with a median island.

Other proposed upgrades contained in the updated conceptual design (2016) of Louis Fourie Road by HATCH also include, inter alia, the re-alignment of George Road to intersect Louis Fourie Road

opposite Bakke Street, as well as the closure of the access between the Hall Street- and Canty Street intersections as described above.

2.2 Road Authorities

Louis Fourie Road is a trunk route that falls under the jurisdiction of the Western Cape Government whilst Walvis Street is a municipal road.

2.3 Road Classification

Louis Fourie Road is, according to the Western Cape Government's Road Network Information System, a Class 2 road with a posted speed limit of 80 km/h along the subject section of the road.

The existing and proposed extension of Walvis Street can be classified as a Class 5 road.

2.4 Existing and Future Walvis Street Cross-Sections and Accesses/Intersections

The existing section of Walvis Street from Bakke Street is approximately 860 metres long with one lane per direction. A surfaced sidewalk exists on the southern side of the road from just to the southeast of Hall Street. There are no shoulders. The section of Walvis Street to about 115 metres west of Hall Street is an interlocking paved road whilst further north it is an asphalt surfaced road. See ***Photo 1*** below.

Photo 1: *The existing Walvis Street*

The proposed extension of Walvis Street as per the Aurecon design is approximately 500 metres in length, 6.4 metres wide (black top) with a cross section of 2 x 3.2 metre lanes and 2 x 1.2 metre gravel sidewalks.

The proposed extension of Walvis Street extends through a hilly environment and traverses three watercourses before reaching Louis Fourie Road. The horizontal layout as well as the longitudinal section, as prepared by Aurecon, is attached in ***Attachment C***: ***Road and Stormwater Layout*** and ***Road Longitudinal Section*****.**

The proposed extension will intersect with Louis Fourie Road between the Park Crescent intersection and Hall Street intersection, providing a spacing of approximately ± 220 metres between Park Crescent and the proposed Walvis Street intersection, as well as approximately ± 890 metres between Hall Street and the proposed Walvis Street intersection.

Access to the housing development on the southern side of Walvis street will be provided along Walvis Street with intersection spacing at approximately 60 metres, according to the Traffic Impact Statement compiled by SMEC (previously known as VKE).

Access to the properties along the northern side of the extension of Walvis Street would have to be provided directly from the street due to the level difference between Louis Fourie Road and Walvis Street and the fact that no direct erf access will be allowed off Louis Fourie Road. See ***Diagram 1*** below.

***Diagram 1*:** Proposed access road alternatives linking Asazani/Izinyoka to Louis Fourie Road[1]

In order to provide access for the new housing development to the south west of Walvis Street as well as an alternative access to the Asazani/Izinyoka township, three alternative accesses, labelled 1, 2 and 3 in ***Diagram 1*,** have previously been proposed. It can be anticipated that people from the Asazani/Izinyoka township wishing to travel to/from the industrial area to the north would in future mostly make use of the Extension of Walvis Street. The proposed access labelled 1 is such that the travelling distance to Louis Fourie Road via the Extension of Walvis Street or Bakke Street is approximately the same. A further benefit is that this route runs past the school making the dropping off of learners convenient. It is also a much shorter route than the route labelled 3 and approximately the same length as the route labelled 2. Based on the above it is the opinion that the route labelled 1 be the preferred route.

[1] *Please note that the erven and accesses are drawn schematically and not to scale*

3.0 ALTERNATIVE ALIGNMENTS

Aurecon considered three alternative alignments shown below in ***Diagram 2 (a)***, ***Diagram 2 (b)*** and ***Diagram 2 (c)*** below.

According to Aurecon, Alternative 3 (***Diagram 2 (c)***) is the preferred route based, mainly on the area of private land required for road purposes. The volume of cut/fill for all three alternatives was similar and thus did not affect the choice. The preferred route, i.e. Alternative 3, was thus taken into consideration in this report.

Diagram 2 (a): Alternative Alignment 1

Diagram 2 (b): Alternative Alignment 2

Diagram 2 (c): Alternative Alignment 3 (preferred route)

4.0 TRAFFIC

4.1 Existing Traffic Data

Available traffic flow data was obtained from the Western Cape Government's Road Network Information System (RNIS), as well as from the traffic studies prepared by HATCH in 2012.

In order to obtain current traffic volumes in the area, traffic counts were, as mentioned earlier, conducted on Tuesday, 5th June 2018 from 06h00 to 09h00 and again from 15h30 to 18h30 at the intersections indicated below under paragraph 4.2 as agreed with the Mossel Bay Municipality (See ***Counting Stations*** in ***Attachment B*** for the location of the various intersections).

Pedestrian counts were conducted at selected locations also as agreed with the Mossel Bay Municipality (See ***Intersections Counted*** in ***Attachment B*** for the locations indicated as P1 and P2).

The Existing 2018 AM/PM peak hour traffic volumes and pedestrian volumes derived from these counts are as indicated in ***Figure 1*** in ***Attachment D*****.**

4.2 Intersections and Road Network Analysed

The intersections analysed along the subject section of Louis Fourie Road are as follows:

- Louis Fourie Road / Beach Boulevard West / Kiewiet Crescent (Boland Park intersection)
- Louis Fourie Road / Park Crescent
- Louis Fourie Road / Hall Street
- Louis Fourie Road / Canty Street
- Louis Fourie Road / Bakke Street
- Louis Fourie Road / George Road
- Bakke Street / Walvis Street
- Alhof Drive / Fortuin Street
- Alhof Drive / Van Zyl Street
- P 1 and P 2: Pedestrian counting locations to the east and west of the future Walvis Street intersection with Louis Fourie Road)

The intersections listed above were each analysed independently using the SIDRA 8.0 software. The scenarios analysed are the existing 2018 AM/PM peak hours, the projected 2038 AM/PM peak hours (including the assumed percentage annual traffic growth and the redistribution of traffic as a result of the extension of Walvis Street) as well as the projected 2038 AM/PM peak hour volumes (including the assumed traffic growth, the redistribution of traffic as a result of the extension of Walvis Street, the traffic generated by the proposed developments in the area and the planned road upgrades).

The peak hour link volumes for the same scenarios were analysed using the network option of the SIDRA 8.0 software. The effect of the proposed upgrades along Louis Fourie Road as per the HATCH Conceptual Design and the Extension of Walvis Street was also evaluated for these scenarios.

4.3 Traffic Growth and Estimated 2038 Peak Hour Traffic Volumes

According to RNIS, the annual growth rate along Louis Fourie Road before 2013 was between 5% and 6% whilst thereafter a negative growth rate was recorded. The average growth rate over the period from 2001 to 2016 is, however ± 2.4%. For the purpose of this report a 3% annual growth rate was used. The existing 2018 peak hour volumes were increased by 3% per annum for 20 years to obtain the 2038 estimated peak hour traffic volumes as indicated in ***Figure 2*** in **Attachment D**.

4.4 Traffic Redistribution and Traffic Generated

The Extension of Walvis Street will not generate additional traffic as such but it will lead to the redistribution of the existing traffic flows. Currently, the existing Asazani/Izinyoka township area indicated below, in ***Diagram 3***, obtain access to the road network towards the south, via the Alhof Drive / Fortuin Street intersection and Alhof Drive / Van Zyl Street intersection. Following the extension of Walvis Street, as well as the implementation of one of the link roads between the development and the extension of Walvis Street (as mentioned in *Paragraph 2.4*), a percentage of the traffic from/to the Asazani/Izinyoka township and the traffic generated by the new housing developments will opt to use the proposed Walvis Street /Louis Fourie Road intersection.

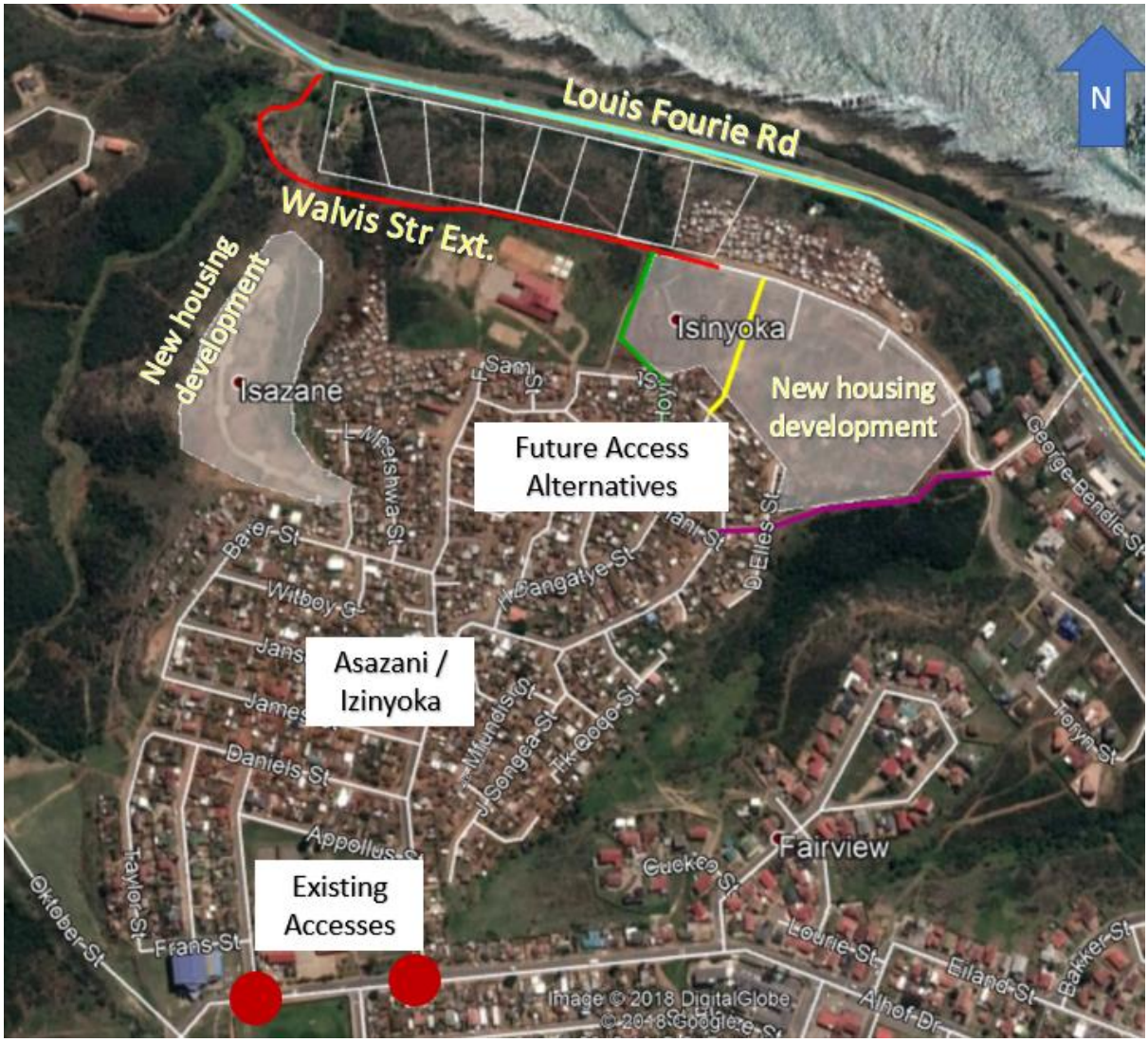

***Diagram 3*:** Alternative access proposals for surrounding areas and housing developments along Walvis Street

Additional traffic will be generated by the housing developments currently being developed to the south of Walvis Street as well as to the southwest of Walvis Street. The Traffic Impact Statement (TIS) dated June 2006 prepared by SMEC (previously known as Vela VKE) was used in order to estimate the number of trips generated by the developments.

According to the TIS prepared by SMEC, the housing development of 323 units (subsidised housing), will generate 162 peak hour trips. The trip generation rate used in the report is 0.5 trips per low-income dwelling (South African Trip Generation Manual) which is still considered applicable.

The traffic counted (5 June 2018), as well as the traffic generated by the housing developments, was then redistributed onto the proposed road network. It was assumed that approximately 30% of the

trips travelling through the existing Alhof Drive / Fortuin Street intersection and Alhof Drive / Van Zyl Street intersection, via Bakke Street, will choose to travel along Walvis Street Extension to access Louis Fourie Road via Asazani/Izinyoka (see ***Counting Locations*** in ***Attachment* B**). The distribution of traffic is shown in ***Figure 2*** in ***Attachment D*.**

4.5 Traffic Analyses

The subject section of Louis Fourie Road and the intersections along this section of road were analysed by means of the SIDRA Intersection 8.0 software. Service levels A to D are considered acceptable, where a level of service (LOS) below D and a degree of saturation above 0.85 is considered unacceptable.

4.5.1 Existing Traffic

The analyses of the 2018 AM and PM peak hour link volumes along the subject section of Louis Fourie Road show that Louis Fourie Road is currently operating at a service level D. Based on a 3% annual traffic growth it can be expected that the road would have to be dualled by 2020. Taking into consideration that the traffic counts were conducted in June during the "off peak" season, it can be expected that the seasonal traffic would be such that a dual carriageway would be required before 2020 in order to accommodate the peak hour traffic.

The analyses of the existing 2018 AM/PM peak hour traffic volumes at the various intersections show that the right turning movements at all the stop-controlled intersections, i.e. the Hall Street intersection, the Canty Street intersection and the Bakke Street-intersection, are experiencing unacceptable service levels during the peak hours as a result of the high through traffic along Louis Fourie Road in both directions. The results are shown below in ***Table 1*** showing the service levels of the approaches only. The service levels of each movement are as indicated in ***Figure 1*** in ***Attachment* D**.

It should be noted that in the case of the Hall Street and Canty Street intersection, the degree of saturation is low although the service levels are unacceptable (right turn movements from these streets). This can be attributed to the low volume of vehicles making use of these intersections to enter Louis Fourie Road. The traffic at these intersections also has alternative routes via signalised intersections where the necessary movements can be performed. With the road upgrades as per the Conceptual Design by HATCH (including the relocation of George Road to opposite Bakke Street), the intersections are expected to operate at acceptable service levels except at the Canty Street intersection where the service level of the right turn movement would still be an F. The right turning traffic volume on Canty Street is, however, low and alternative routes are available to obtain access to Louis Fourie Road. It can also be expected that the traffic signals at Bakke Street/George Road intersection will create gaps for traffic at Canty Street.

Table 1*:** Existing 2018 AM and PM peak hour SIDRA Intersection Results[2] (numbers of intersections are as per the ***Counting Stations attached in ***Attachment B)***

INTERSECTION	APPROACH	AM PEAK HOUR			PM PEAK HOUR		
		v/c	DELAY (sec)	LOS	v/c	DELAY (sec)	LOS
1. Louis Fourie Rd / Beach Blvd West	South: Louis Fourie	0.963	36.8	D	0.896	23.4	C
	East: Beach Blvd	0.092	33.1	C	0.11	33.2	C
	North: Louis Fourie	0.816	19.9	B	0.732	18.2	B
	West: Kiewiet Cres	0.211	38.8	D	0.184	38.4	D
	Overall	**0.963**	**29.3**	**C**	**0.896**	**22.3**	**C**
2. Louis Fourie Rd / Park Crescent	South: Louis Fourie	0.485	0.1	A	0.447	0.1	A
	North: Louis Fourie	0.471	0.0	A	0.412	0.0	A
	West: Park Cres	0.021	1.5	B	0.005	10.3	B
	Overall	**0.485**	**0.1**	**N/A**	**0.447**	**0.1**	**N/A**
3. Louis Fourie Rd / Hall St	South: Louis Fourie	0.462	0.1	A	0.426	0	A
	North: Louis Fourie	0.463	0.5	A to B	0.406	0.4	A to B
	West: Hall St	**0.204**	**17.4**	**C to F**	0.115	16	C
	Overall	**0.463**	**1.0**	**N/A**	**0.426**	**0.7**	**N/A**
4. Louis Fourie Rd / Canty Street	South: Louis Fourie	0.483	0.3	A	0.438	0.2	A
	North: Louis Fourie	0.458	0.1	A to B	0.4	0.1	A
	West: Canty St	**0.479**	**140**	**F**	**0.669**	**105.4**	**F**
	Overall	**0.483**	**1.6**	**N/A**	**0.669**	**2.9**	**N/A**
5. Louis Fourie Rd / Bakke St	South: Louis Fourie	0.399	0.2	A	0.409	0.4	A
	North: Louis Fourie	0.41	1.3	A	0.329	2.4	A to B
	West: Bakke St	**1.237**	**274.2**	**F**	**0.733**	**46.4**	**E**
	Overall	**1.237**	**35.5**	**N/A**	**0.733**	**5.2**	**N/A**
6. Louis Fourie Rd / George Rd	South: Louis Fourie	0.439	9.6	A	0.372	9.2	A
	East: George Rd	0.585	32.4	C	0.773	36.6	D

[2] *N/A: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movement.*
LOS displayed as a range, i.e. A to B, C to F, etc., are described as such to accommodate the difference in LOS for different movements along the same leg.

INTERSECTION	APPROACH	AM PEAK HOUR			PM PEAK HOUR		
		v/c	DELAY (sec)	LOS	v/c	DELAY (sec)	LOS
	North: Louis Fourie	0.78	14.7	B	0.686	12.2	B
	Overall	**0.78**	**16.2**	**B**	**0.773**	**17.4**	**B**
7. Bakke St / Walvis St	East: Bakke St	0.075	0.2	A	0.112	0.4	A
	North: Walvis St	0.065	9.8	A to B	0.07	11.2	B
	West: Bakke St	0.129	0.3	A	0.093	0.3	A
	Overall	**0.129**	**1.4**	**N/A**	**0.112**	**1.5**	**N/A**
8. Alhof Dr / Fortuin St	East: Alhof Dr	0.027	4.1	A	0.025	2.6	A
	North: Fortuin St	0.028	8.3	A	0.018	8.2	A
	West: Alhof Dr	0.014	0.6	A	0.014	0.2	A
	Overall	**0.028**	**4.7**	**N/A**	**0.025**	**3.4**	**N/A**
9. Alhof Dr / Van Zyl St	East: Alhof Dr	0.066	3.0	A	0.128	3.6	A
	North: Van Zyl St	0.111	8.5	A	0.156	8.7	A
	West: Alhof Dr	0.066	1.8	A	0.063	3.3	A
	Overall	**0.111**	**4.6**	**N/A**	**0.156**	**5.2**	**N/A**

The current road layout of the subject section of Louis Fourie Road (excluding the Walvis Street intersection) was also analysed as a network by means of the SIDRA network option in order to determine the service levels and delays along the length of the road as well as any areas where congestion may occur between intersections. The LOS for the 2018 AM and PM peak hour was found to be D with an average speed of 30.3 km/h (AM peak) and 41.6 km/h (PM peak) along the subject section of Louis Fourie Road.

4.5.2 Projected and Redistributed 2038 Traffic without Proposed Upgrades of Louis Fourie Road and without developments

As previously described, the projected 2038 peak hour traffic volumes were obtained by applying a 3% growth rate per annum to the existing 2018 traffic volumes. The results indicated that the dualling of Louis Fourie Road would be required in order to accommodate the 2038 projected peak hour traffic volumes. Based on the Highway Capacity Manual 2000, the capacity for Louis Fourie Road is approximately 1800 vehicles two-way. Further analyses showed that the dualling of Louis Fourie Road is required within two years. The results also indicate that traffic on the side streets is unable to access Louis Fourie Road without unacceptable delays as can be seen in ***Figure 2*** in ***Attachment D***.

The intersection of Walvis Street with Louis Fourie Road was also analysed testing four alternative types of intersection control. The four types of control include full signalisation, partial signalisation, stop-controlled and a left in/left out. The results showed that the intersection can be expected to operate at acceptable service levels with full signalisation, partial signalisation and as a left in/left out but **not** as stop control. Traffic flow at the intersection will not warrant traffic signals. The fact that the intersection will be on a horizontal curve results in a sight distance problem for eastbound right turning traffic (into Walvis Street). For the intersection to operate acceptably, the intersection should thus either be signalised with the correct phasing (no right turns on red arrow) or be a left in/left out only access.

It is further the opinion that, for safety reasons, a dedicated right turn lane should be provided for eastbound right turning traffic. According to the Conceptual Design of Louis Fourie Road a 1,0 metre median island will be provided on the section of Louis Fourie Road at the location of the proposed Walvis Street intersection (this is considered insufficient width for road signs). In order to provide a dedicated right turn lane eastbound on Louis Fourie Road (into Walvis Street) the median island should be 5,0 metres. From the Conceptual Design it appears that the proximity of the railway line could be problematic. From the cross-section on the Conceptual Design of Louis Fourie Road it appears that a 2,80 metre shoulder will be provided along the eastbound carriageway (sea side). This could then assist in providing sufficient space for a dedicated right turn lane. If it is not possible to provide a dedicated right turn lane, it is the opinion that the intersection should be a left in/left out only.

The current road layout of Louis Fourie Road was also analysed as a network with the 2038 future traffic volumes. The LOS for the AM and PM peak period was found to be F with an average speed of 4.0 km/h (AM peak hour) and 5.4 km/h (PM peak hour) and an average delay of 302.1 seconds (AM peak hour) and 222.4 seconds (PM peak hour), respectively. This confirms the statement above that the dualling of Louis Fourie Road is required in the short term future.

The westbound traffic along Louis Fourie Road was found to have higher levels of congestion in the AM peak and PM peak hour compared to the eastbound traffic. The highest levels of congestion were found in the westbound traffic during the AM peak hour.

4.5.3 Expected 2038 Redistributed Traffic with Proposed Road Upgrades and Traffic Generated by Housing Developments

The expected 2038 redistributed AM and PM peak hour traffic with the proposed road upgrades as per the Conceptual Design of Louis Fourie Road by HATCH and traffic generated by the housing developments were modelled. The analyses show that the intersections are expected to operate at acceptable levels of service ranging from B to D, aside from the Canty Street intersection where a level of service F is expected due to right-turning movements. See ***Figure 3*** in ***Attachment D***.

The upgraded Louis Fourie Road was also analysed as a network, testing four alternatives for the intersection control at the proposed Walvis Street intersection. The four controls include; full signalisation, partial signalisation, stop-controlled and a left in/left out.

Each network performed at a LOS D for the AM and PM peak hour with the network including the partially signalised intersection obtaining the highest average speed during the AM and PM peak hour of 33.1 km/h and 38.4 km/h, respectively. The stop-controlled intersection alternative received the lowest average speeds and as mentioned in *paragraph 4.5.2* was deemed to be an unsafe alternative due to sight distance and the posted speed of 80 km/h along Louis Fourie Road. From a traffic flow point of view the Walvis Street intersection could thus be signalised although the spacing of the intersection does not conform to the spacing requirements of the Road Access Guidelines.

5.0 ACCESS MANAGEMENT ON LOUIS FOURIE ROAD

According to the Western Cape Government's Road Access Guidelines (2002), the minimum spacing along a Class 2 road between unsignalised intersections in an intermediate environment, is 180 metres. The recommended spacing between signalised intersections is 540 metres.

According to the Western Cape Government's Access Management Guidelines (2016), the minimum spacing along a Class 2 road between unsignalized intersections, in an intermediate environment is 270 metres. The recommended spacing between signalised intersections is 780 metres.

According to the South African Road Classification and Access Management Manual (RCAM 2012), the minimum spacing between priority / signalised intersections along a Class 2 road is 800 metres ±15% variance. This distance can be halved for T-junction intersections and one-way streets, thereby equating to 400 metres ±15% variance.

The existing spacing between intersections along Louis Fourie Road is as shown below in ***Diagram 4*** below.

***Diagram 4*:** Intersection spacing along Louis Fourie Road

The access spacing of the proposed Walvis Street Extension intersection with Louis Fourie Road conforms to the Western Cape Government's Road Access Guidelines (2002) on either side of the intersection for an unsignalised intersection with ± 220 metres available on the west and ± 880 metres on the east. For a signalised intersection, the required spacing is 540 metres and the proposed intersection, therefore, does not conform towards the west with ± 400 metres available between the proposed access and Boland Park intersection.

The access spacing of the proposed Walvis Street Extension intersection with Louis Fourie Road does not conform to the Western Cape Government's; Access Management Guidelines (2016) and the South African Road Classification and Access Management Manual (RCAM 2012) towards the west for both signalised and unsignalised intersections.

The latest HATCH Conceptual Design for the subject section of Louis Fourie Road is as per the attached plans received from HATCH on 11 July 2018 (See Sheet 10, 11 and 12 in **Attachment E –** please note that the north arrow points down on these drawings) and makes provision for the relocation of George Road to opposite Bakke Street (thus consolidating the two intersections and making one signalised intersection possible), Canty Street as a full T-intersection, the closure of the existing access between Canty Street and Hall Street, Hall Street as a so-called "Butterfly"-intersection (providing for all turning movements but with acceleration and deceleration lanes on Louis Fourie Road for the right turning movements), Park Crescent as a left in/left out access and the Boland Park intersection as a signalised intersection with turning lanes. The future spacing of intersections, existing- and future type of intersection control along the subject section of Louis Fourie Road are as indicated in ***Table 2*** below.

Table 2: Intersection spacing and existing- and proposed type of intersection control

Intersection (Existing and New)	Spacing (metres)	Existing Type of Intersection Control	Proposed Type of Intersection Control
Boland Park [1]	180	Signalised	Retain as signalised
Park Crescent	220	Left in/left out	Retain as left in/left out
Walvis Street **(New)**	880	-	Left in/left out or signalised [2]
Hall Street	180	Stop	Convert to "Butterfly" - type intersection with no northbound left turn movement
Access	100	Stop	Access to be closed
Canty Street	170	Stop	Retain as stop control
Bakke Street	170	Stop	George Street to be relocated to opposite Bakke Street and intersection signalised
George Street		Signalised	

[1] *Beach Boulevard West/Kiewiet Crescent intersection referred to as Boland Park intersection*

[2] *Refer to Paragraph 4 - Should the decision be made that the intersection be signalised, a "no right turn on red arrow" phase should be provided eastbound along Louis Fourie Road*

With regard to the intersection layout proposals in the HATCH Conceptual Design the following (see *Sheet 10, 11 and 12 of the* ***Conceptual Design Ultimate Scheme*** in **Attachment E**):

Boland Park intersection (signalised)

Taking into consideration the intersection analyses with the expected 2038 peak hour traffic volumes, the lane layout appears to be acceptable.

Park Crescent intersection (left in/left out)

Taking into consideration the intersection analyses with the expected 2038 peak hour traffic volumes, the lane layout appears to be acceptable.

The possible weaving problem for vehicles performing the left out movement and wishing to turn right at the Boland Park intersection is not considered critical as only 18 vehicles is expected to perform the left out movement during the AM peak hour and only a small percentage, if any, is expected to weave across to the dedicated right turn lane at the Boland Park intersection. The vehicles from the area to the south of Louis Fourie Road can also make use of the signalised intersection at the Boland Park intersection as an alternative.

Access to individual properties

Five (5) accesses exist between Park Crescent and Hall Street that are not specifically addressed in the Conceptual Design by HATCH. The first two accesses provide access to three properties just to the east of Park Crescent, i.e. ± 65 metres and ± 190 metres from Park Crescent respectively whilst an access exists at approximately the position of the proposed Walvis Street intersection. The last-mentioned access appears to be an access to an informal rest area. A further access exists ± 460 metres to the west of Hall Street. See the photos below.

Photo 2: *Louis Fourie Road looking east. Intersection on right is Park Crescent (behind keep left sign) with access to the properties ± 65 metres from Park Crescent in the background*

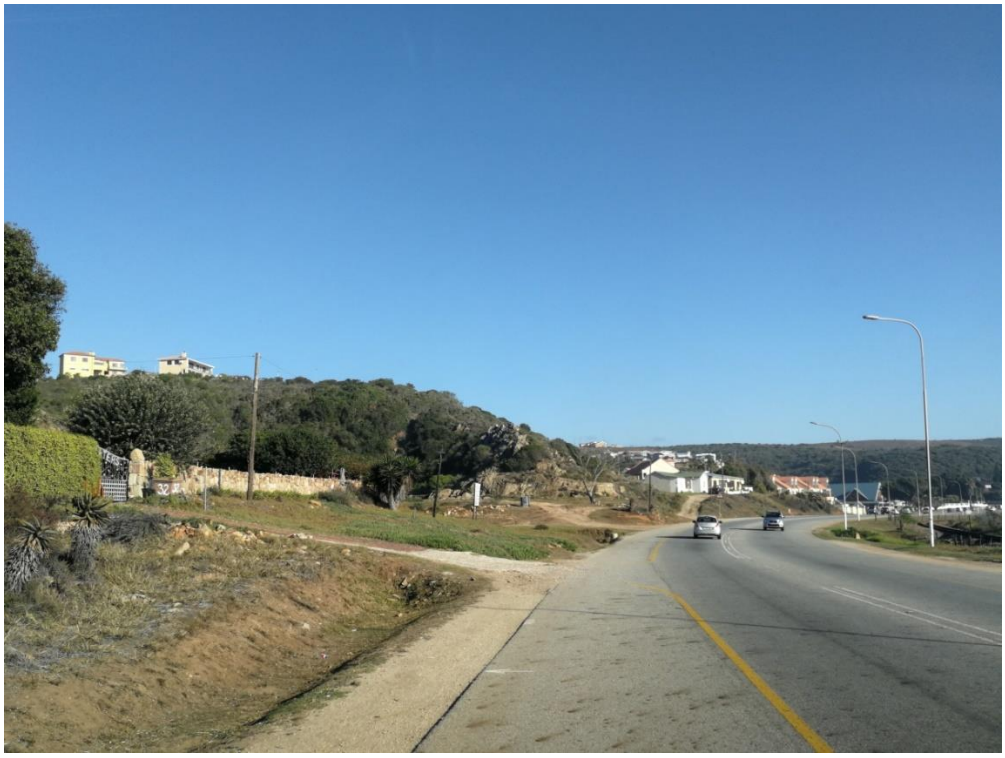

Photo 3: *Louis Fourie Road looking west towards Hartenbos. First access on left is ± 280 metres from Park Crescent, second access is to informal rest area (Walvis Street intersection), third access is ± 190 metres from Park Crescent*

Photo 4: *Access ± 460 metres west of Hall Street*

It is the opinion that the accesses ± 65 metres from Park Crescent (***Photo 2*** and ± 190 metres from Park Crescent (***Photo 3***) as well as the access ± 280 metres from Park Crescent (***Photo 4***) be closed and that access be provided off Walvis Street. See ***Attachment F*** for a schematic layout.

It is further the opinion that the access ± 460 metres from Hall Street (***Photo 4***) be closed and that access to the property be from Walvis Street as the property extends from Walvis Street to Louis Fourie Road (see ***Diagram 4*** above). Alternatively, the access should be a left in/left out in future. This is, however, not desirable as the angle of intersection will be problematic.

Hall Street intersection

The proposal to provide a "butterfly"-type intersection is considered acceptable taking into consideration the expected 2038 peak hour traffic volumes as very few vehicles are expected to turn right from Hall Street (currently also the case). The merging of the right turning traffic from Hall Street with the through traffic along Louis Fourie Road and the right turning vehicles directly thereafter at Canty Street (also low volume) is not considered problematic. If traffic does experience problems with the right turning movement during peak times, the alternative to travel via the proposed signalised Bakke Street intersection will be available.

It should be noted that sight distance in a westerly direction from Hall Street is currently insufficient. See ***Photo 5*** below. With the upgrade of Louis Fourie Road to a dual carriageway and the implementation of the "butterfly" type intersection this problem will be addressed.

Photo 5: *Louis Fourie Road looking west with Hall Street on the left – note sight distance*

Access Street intersection (between Hall Street and Canty Street)

The proposed closure of the intersection is supported in view of the spacing with the nearby intersections. See the photo below.

Photo 6: *Parallel road to Louis Fourie Road (on right) with intersection proposed to be closed*

Canty Street intersection

The proposal to retain the intersection as a full T-intersection, taking into consideration the 2038 peak hour traffic volumes, is considered acceptable as it could be expected that the proposed traffic signals at Bakke Street would provide sufficient gaps for the low volume of right turning traffic to/from Canty Street. Alternatively, the traffic can also make use of the Walvis Street/Bakke Street route.

Bakke Street/George Street intersection

The relocation of George Road to opposite Bakke Street and the signalisation of the "new" intersection is supported. The removal of the left slip on the **Bakke Street approach** would ensure more gaps for right turning traffic at the Canty Street intersection. It is, however, the opinion that a dedicated left turn lane should be provided in order to accommodate the relatively high expected left turn volume on this approach. The through/left turn lane as indicated on the HATCH proposal could then be changed to a through lane and the through/right turn lane to a dedicated right turn lane.

It is further the opinion that it be considered to provide a free-flow left slip lane on the **north-western approach on Louis Fourie Road** in order to accommodate the high left turn volume. This will then result in two through lanes on the north-western approach along Louis Fourie Road providing more through capacity.

In view of the very high expected 2038 peak hour right turn movement from **George Road** it is suggested that provision be made for the future to provide a second dedicated right turn lane on the George Road approach.

See **Diagram 5** below for the suggested lane layout of the proposed George Road/Bakke Street intersection.

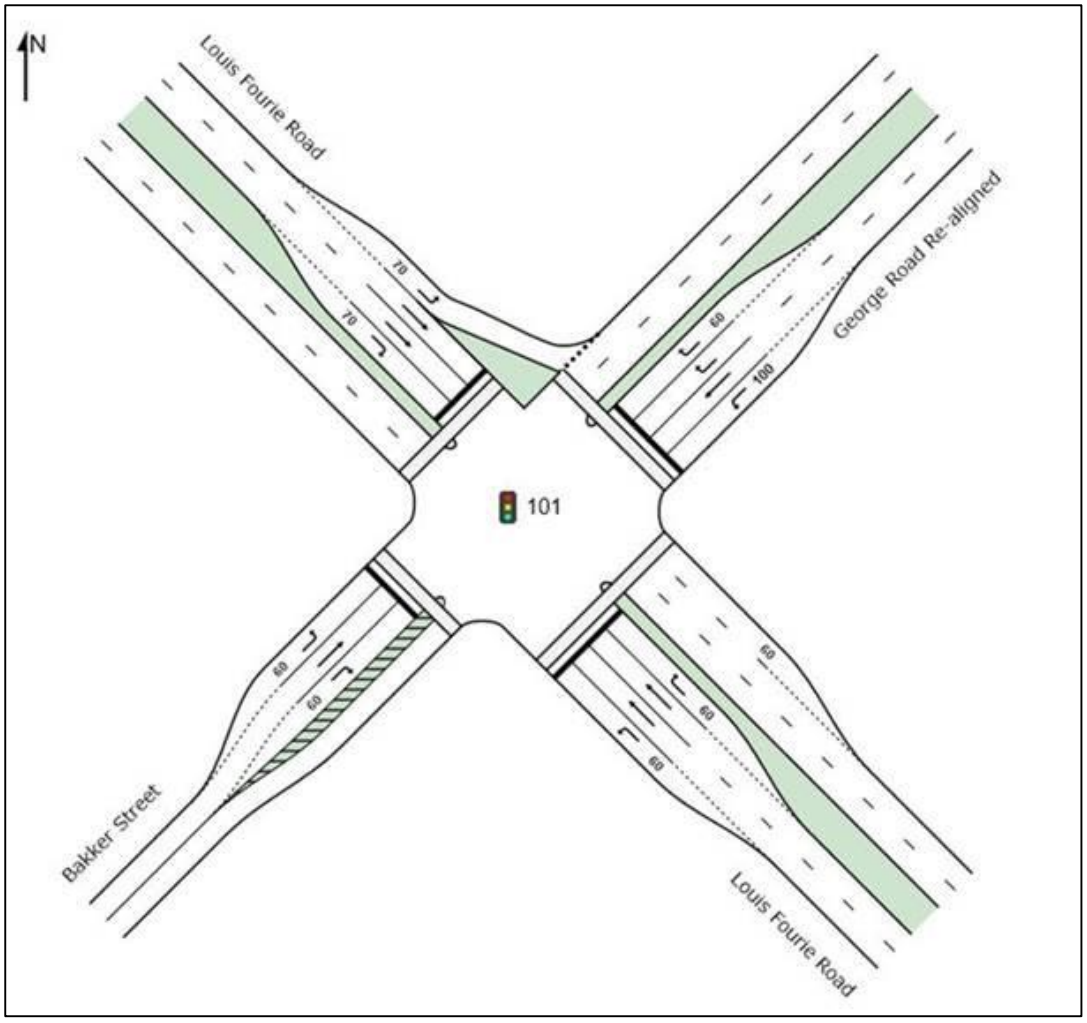

Diagram 5: *Proposed Louis Fourie Road/George Road/Bakke Street intersection*

With regard to the proposed Walvis Street intersection the following (also refer to *paragraph 4.5.2*):

As the intersection will be on the outside of a horizontal curve, sight distance from Walvis Street should be acceptable but it can be expected that eastbound right turning vehicles on Louis Fourie Road would experience difficulty during the peak hours to turn right partly due to very few gaps that will be available but more so due to the fact that oncoming vehicles in the fast lane could be obscured by the vehicle in the fast lane creating an unsafe situation. The right turning traffic from Walvis Street will also experience difficulty to perform the movement during the peak hours as a result of the high volume of through traffic along Louis Fourie Road.

The proposed ***Access Management Plan*** for the section of Louis Fourie Road from the Boland Park intersection (Beach Boulevard West/Kiewiet Crescent intersection) to George Road intersection based on the above is as indicated in in ***Attachment F*****.**

6.0 NON-MOTORISED TRANSPORT

In previous studies on Louis Fourie Road, such as the Public Transport Study, 2013, prepared by HATCH, it was recommended that Louis Fourie Road be upgraded to accommodate the high number of minibus taxis operating along the route and that public transport embayments (laybyes) as well as additional pedestrian facilities and public transport shelters be provided.

From aerial photos, pedestrian desire lines from the existing Walvis Street in a northerly direction are visible. The pedestrian counts conducted were done in the vicinity where the Extension of Walvis Street will intersect Louis Fourie Road. The pedestrians crossing Louis Fourie Road and the pedestrians along Louis Fourie Road were counted. See ***Figure 1*** in ***Attachment D*** for the pedestrian counts. It can thus be expected that these pedestrians will make use of the Extension of Walvis Street when the road is implemented. According to the cross-section of the Extension of Walvis Street as obtained from Aurecon, a 1,2 metre gravel sidewalk will be provided as can be seen in ***General Details*** found in ***Attachment C*** prepared by Aurecon.

No formal sidewalks exist along the section of Louis Fourie Road between the Boland Park intersection and the George Road intersection. North of the Louis Fourie Road / Boland Park intersection, a formal sidewalk exists on the eastern side of the road.

It should be noted that in previous studies on Louis Fourie Road, such as the Transportation Status Quo, 2012, prepared by HATCH, it was recommended that Louis Fourie Road be upgraded to accommodate pedestrians and cyclists. This includes the section of Louis Fourie Road as contained in this report.

The number of pedestrians crossing Louis Fourie Road at the informal pedestrian desire lines, P1 and P2 (see ***Figure 1*** in ***Attachment D***) during the peak hours was found to be 61 and 63 during the AM peak hour and 38 and 23 during the PM peak hour respectively. The number of pedestrians walking alongside Louis Fourie Road at the informal crossings P1 and P2 was found to be 115 (76 southern side and 39 northern side) and 74 (17 southern side and 57 northern side) during the AM peak hour and 66 (38 southern side and 28 northern side) and 56 (39 southern side and 17 northern side) during the PM peak hour respectively. Should the Louis Fourie Road/Walvis Street intersection be signalised provision should be made for pedestrians to cross at the intersection. Should a traffic signal not be provided at the intersection, a sidewalk would have to be provided along Louis Fourie Road on the southern side up to the signalised Boland Park intersection. According to the Conceptual Design of Louis Fourie Road by HATCH, no shoulder will be provided along Louis Fourie Road and should it thus be considered to provide a wider sidewalk (2,4 metres is suggested) than the 1,8 metre as per the Conceptual Design in order to also cater for cyclists (at least on one side of Louis Fourie Road).

It should also be noted, that the vertical gradient along the Extension of Walvis Street is approximately 14% for a length of around 280 metres. This is considered very steep for pedestrians and cyclists. It can thus be expected that cyclists will most probably cycle down the proposed road but on the return trip home push their bicycles on the sidewalk. Taking this into consideration the width of the sidewalk should be able to accommodate a pedestrian plus a cyclist pushing a bicycle. The proposed width of the sidewalk as per the Aurecon cross-section of 1,2 metres is not considered acceptable and it is suggested that it be a minimum of 2,4 metres on at least one side of the street. It is further the opinion that a wider sidewalk on one side would be more effective than a too narrow sidewalk on both sides of the road. It is further the opinion that the sidewalks should be surfaced as damage to the sidewalks can be expected as a result of scouring on rainy days especially because of the steep gradient.

7.0 PUBLIC TRANSPORT

As mentioned in *Chapter 6.0* previous studies on Louis Fourie Road, such as the Public Transport Study, 2013, prepared by HATCH, recommended that Louis Fourie Road be upgraded to accommodate the high number of minibus taxis operating along the route and that public transport embayments (laybyes) as well as additional pedestrian facilities and public transport shelters be provided.

According to the Conceptual design of Louis Fourie Road public transport embayments will be provided at the Boland Park intersection but it appears from the drawings (see ***Sheet 10*** in ***Attachment E***) that an embayment will only be provided on the westbound carriageway at the Bakke Street intersection. It is the opinion that an embayment should also be provided on the eastbound carriageway (outbound).

It is further the opinion that an embayment should be provided along the westbound carriageway (outbound) at the Walvis Street intersection. Should Walvis Street be signalised with accommodation for pedestrians, embayments should be provided outbound along both carriageways at the intersection. Space for road widening could be problematic on the northern side of Louis Fourie Road.

Currently taxis make use of Bakke Street to obtain access to Louis Fourie Road. It can, however, be expected that taxis will make use of Walvis Street as it will provide a shorter route from the townships to the industrial area.

8.0 TRAFFIC CALMING

There are currently no traffic calming measures along Walvis Street.

Taking into consideration the steep downgrade of the extension of Walvis Street, the accesses unavoidably close to the intersection with Louis Fourie Road and the stop- controlled intersection with Louis Fourie Road, it is suggested that it be considered to provide a speed hump at ± SV 120 just before the down grade starts as well as just before the relocated accesses at ± SV 450.

9.0 CONCLUSIONS

From the above, the following can be concluded:

1) Using a 3% annual growth rate, Louis Fourie Road will need to be dualled by 2020.
2) Approximately 30% of the traffic from Asazani/Izinyoka currently using Alhof Drive to access Louis Fourie Road, will use the proposed Walvis Street Extension.
3) In 2018 AM/PM peak hour:
    a. The network performs at a level of service D.
    b. Levels of service F are experienced along Hall, Canty Street and Bakke Street.
4) In 2038 AM/PM peak hour:
    a. The existing network performs at a level of service F.
    b. Levels of service F are experienced at all intersections.
5) Four intersection controls at the proposed Walvis Street Extension intersection were tested, namely; partially signalised, fully signalised, stop-controlled and a left-in/left-out.
6) In 2038 AM/PM peak hour (with redistributed traffic, traffic generated and recommended road upgrades):
    a. The network performs at a level of service D for all Walvis Street intersection control alternatives.
    b. Level of service F is experienced at Canty Street for right-turning vehicles.
7) Stop-controlled intersection control at the proposed Walvis Street Extension was deemed to be unsafe due to sight distance and the posted speed of 80 km/h along Louis Fourie Road.
8) The proposed Walvis Street Extension intersection does not meet the requirements for the spacing of signalised intersections towards the west.
9) There are currently no sidewalks along the subject section of Louis Fourie Road.
10) The are currently no traffic calming measures along Walvis Street or the proposed Walvis Street Extension.

10.0 RECOMMENDATIONS

From the above, the following are recommended:

1) That the proposed Walvis Street intersection should ultimately be signalised subject to a dedicated right turn lane being possible eastbound along Louis Fourie Road (into Walvis Street), alternatively the intersection should be a left in/left out only. If the intersection will be a left in/left out ultimately it should also be a left in/left out for the interim (Louis Fourie Road as a two lane road) and a median island be provided.
2) That Louis Fourie Road should be dualled by 2020.
3) That intersection upgrades at Boland Park, Hall Street and Canty Street intersections are implemented as per the Ultimate Conceptual Design (2016) by HATCH as well as the relocation of George Road to opposite Bakke Street.
4) That the layout provided in ***Diagram 5*** be considered as an alternative layout for the George Road/Bakke Street intersection.
5) That the access between Hall Street and Canty Street should be closed as per the Ultimate Conceptual Design (2016) by HATCH.
6) That the minor accesses between Park Crescent and Hall Street should be closed and access obtained via the Walvis Street Extension.
7) That the sidewalk along the proposed Walvis Street Extension be 2,4 metres on at least one side and surfaced.
8) That the sidewalk proposed along Louis Fourie Road be 2,4 metres on at least one side, preferably the southern side in order to also cater for pedestrians/cyclists between Walvis Street and the Boland Park intersection.
9) That, in addition to the public transport embayments recommended by HATCH, it is recommended that:
    a) An embayment should also be provided along Louis Fourie Road on the eastbound carriageway (outbound) at the Bakke Street / George Road intersection.
    b) An embayment is provided along Louis Fourie Road on the westbound carriageway (outbound) at the Walvis Street intersection.
    c) If Walvis Street intersection is signalised, embayments should be provided outbound along Louis Fourie Road on both carriageways at the intersection and provision be made at the intersection for pedestrians.
10) Provision of a speed hump along the proposed Walvis Street Extension just before the down grade starts as well as just before the relocated accesses.

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LOCALITY PLAN

JULY 2018

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Faks / Fax : 021 - 880 0390
e-pos / e-mail : piet@icegroup.co.za

GROUP (Pty) Ltd.

COUNTING STATIONS

JULY 2018

ATTACHMENT C

RESPONSIBLE PERSONS		
	SIGNATURE	DATE
DRAWN		
DESIGNED		
CHECKED		

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CLIENT

MOSSEL BAY MUNICIPALITY

REV	DATE	REVISION DETAILS	APPROVED
A	14/2/2018	FOR DISCUSSION PURPOSES ONLY	AC KEYSER

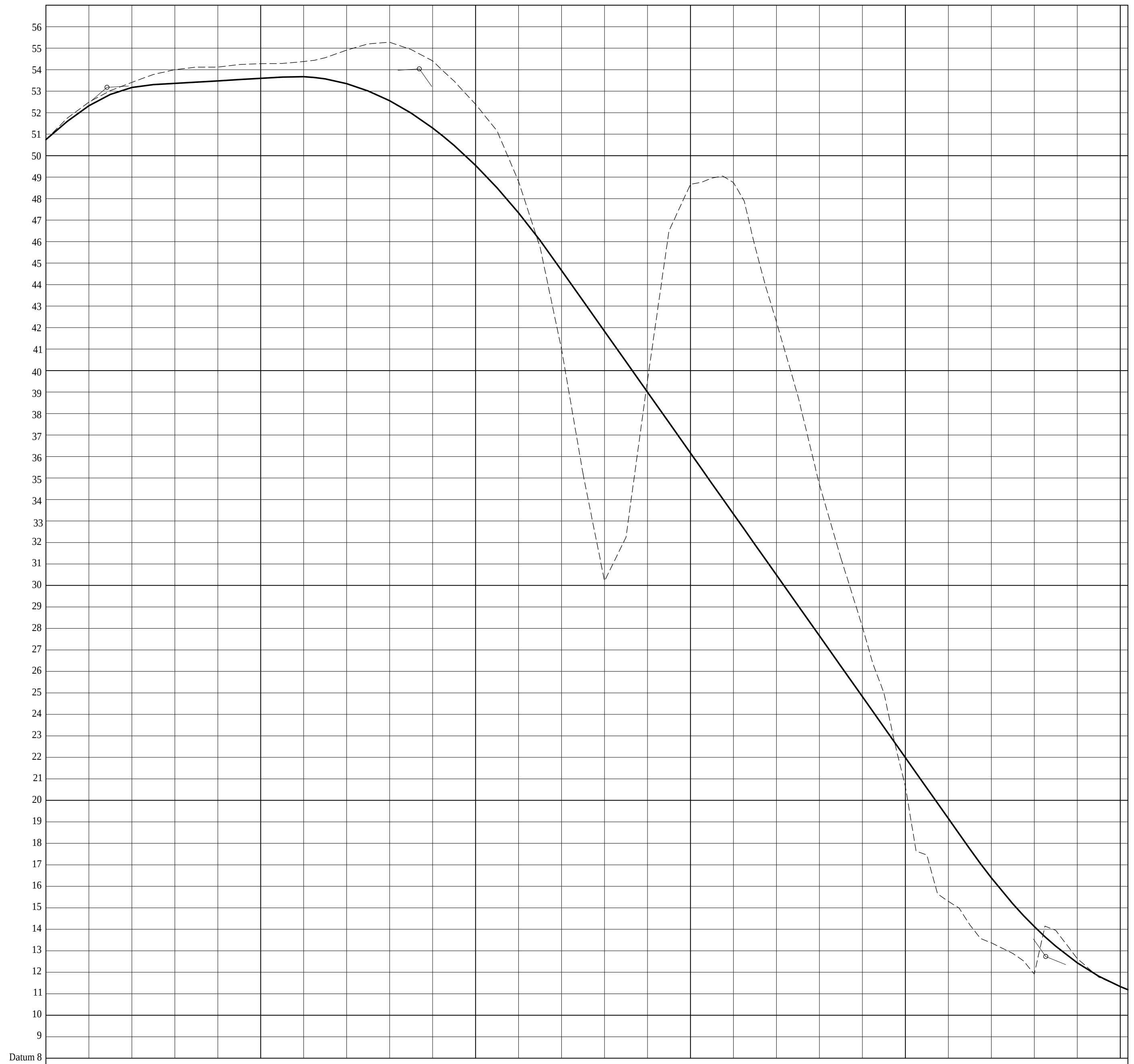
PROJECT

ASAZANI / IZINYOKA MAIN ACCESS ROADS : EXTENSION OF WALVIS STREET, PHASE 3B & PHASE 4, MOSSEL BAY

TITLE

ROAD AND STORMWATER LAYOUT

DRAWN	DESIGNED	FOR DISCUSSION PURPOSES ONLY
A VAN WYK	R SCHRAADER	
CHECKED		PROJECT No. 501550
APPROVED		SCALE 1 : 500 / SIZE A0
AC KEYSER (CSA 20867/5108)	DATE	DRAWING No. 501550 GE 3 / REV A



STAKE VALUE	GROUND LEVEL	DESIGN ROAD LEVELS – LEFT EDGE	DESIGN ROAD LEVELS – CENTRE LINE	DESIGN ROAD LEVELS – RIGHT EDGE
0	50.75	50.689	50.747	50.811
10	51.75	51.541	51.599	51.663
20	52.49	52.265	52.323	52.387
30	53.03	52.790	52.848	52.912
40	53.41	53.117	53.175	53.239
50	53.78	53.248	53.306	53.370
60	54.00	53.307	53.365	53.429
70	54.12	53.366	53.424	53.488
80	54.12	53.424	53.482	53.546
90	54.24	53.483	53.541	53.605
100	54.28	53.542	53.600	53.664
110	54.29	53.601	53.659	53.723
120	54.38	53.616	53.674	53.738
125	54.44	53.579	53.637	53.701
130	54.56	53.513	53.571	53.635
140	54.91	53.293	53.351	53.415
150	55.20	52.954	53.012	53.076
160	55.28	52.497	52.555	52.619
170	54.94	51.923	51.981	52.045
180	54.41	51.230	51.288	51.352
185	53.93	50.839	50.897	50.961
190	53.47	50.419	50.477	50.541
200	52.39	49.490	49.548	49.612
210	51.15	48.443	48.501	48.565
220	48.80	47.278	47.336	47.400
230	45.74	45.995	46.053	46.117
240	40.99	44.602	44.660	44.724
250	35.19	43.185	43.243	43.307
260	30.21	41.769	41.827	41.891
270	32.25	40.352	40.410	40.474
280	39.55	38.935	38.993	39.057
290	46.50	37.518	37.576	37.640
300	48.67	36.102	36.160	36.224
305	48.76	35.393	35.451	35.515
310	48.96	34.685	34.743	34.807
315	49.05	33.976	34.034	34.098
320	48.75	33.268	33.326	33.390
325	47.89	32.560	32.618	32.682
330	45.78	31.851	31.909	31.973
335	43.91	31.143	31.201	31.265
340	42.27	30.435	30.493	30.557
350	38.82	29.018	29.076	29.140
360	34.70	27.601	27.659	27.723
370	31.28	26.184	26.242	26.306
380	28.08	24.767	24.825	24.889
385	26.33	24.059	24.117	24.181
390	25.01	23.351	23.409	23.473
395	22.70	22.642	22.700	22.764
400	20.65	21.934	21.992	22.056
405	17.64	21.226	21.284	21.348
410	17.46	20.517	20.575	20.639
415	15.65	19.809	19.867	19.931
420	15.30	19.100	19.158	19.222
425	14.99	18.392	18.450	18.514
430	14.21	17.684	17.742	17.806
435	13.57	16.991	17.049	17.113
440	13.37	16.334	16.392	16.456
450	12.88	15.129	15.187	15.251
455	12.53	14.581	14.639	14.703
460	11.92	14.069	14.127	14.191
465	14.15	13.593	13.651	13.715
470	13.95	13.153	13.211	13.275
480	12.64	12.382	12.440	12.504
490	11.77	11.756	11.814	11.878
500	11.34	11.275	11.333	11.397
503.61	11.19	11.129	11.187	11.251

VERTICAL CURVES

GRADES: 8.538 % | 28.485 53.179 | 0.589 % | 173.829 54.035 | -14.168 % | 465.367 12.731 | -4.037 %

VERTICAL CURVES: BVC 8.485 – 40.000m VC, K = 5.032 – 48.485 EVC | BVC 111.329 – 125.000m VC, K = 8.471 – 236.329 EVC | BVC 430.367 – 70.000m VC, K = 6.910 – 500.367 EVC

SUPERELEVATION: 2.0 / -2.0

HORIZONTAL CURVES: Direction 102.28.52 | 117.941 BCC – Curve 1 Left, R=120, I= 7.15.13 – ECC 133.133 | Direction 95.13.38 | 182.743 BCC – Curve 2 Right, R=150, I=4.16.04 – ECC 193.916 | Direction 99.29.43 | 302.104 BCC – Curve 3 Right, Radius=50.000, I= 42.26.28 – ECC 339.141 | Direction 141.56.11 | 382.918 BCC – Curve 5 Right, Radius=25.000, I=120.16.05 – ECC 435.395 | Direction 262.12.16 | 454.933 BCC – Curve 6 Left, R=20, I= 56.46.34 – ECC 474.752 | Direction 205.25.42

SV 0.00 to 503.61

Horizontal Scale 1:1000
Vertical Scale 1:100

RESPONSIBLE PERSONS		
	SIGNATURE	DATE
DRAWN		
DESIGNED		
CHECKED		

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REV	DATE	REVISION DETAILS	APPROVED
A	6/2/2018	FOR DISCUSSION PURPOSES ONLY	AC KEYSER

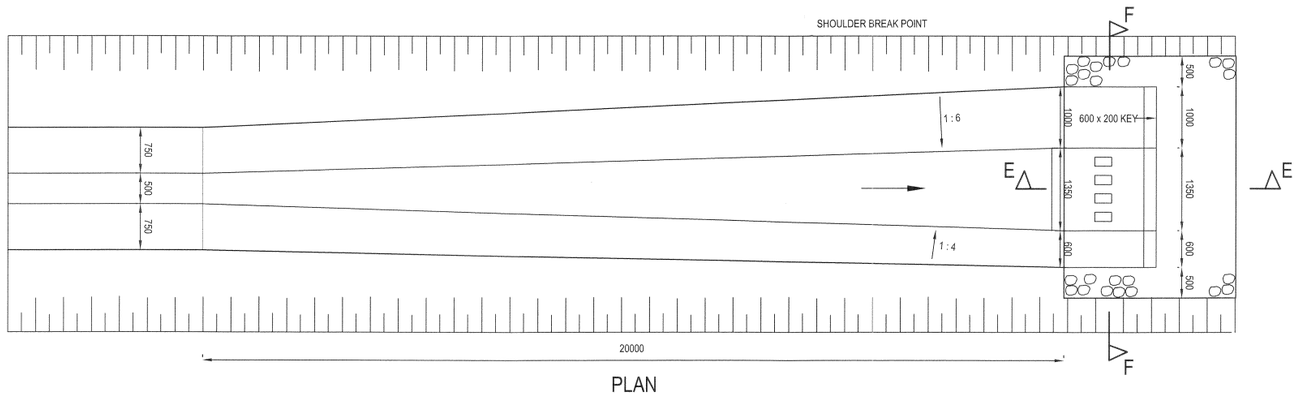
PROJECT

ASAZANI / IZINYOKA MAIN ACCESS ROADS : EXTENSION OF WALVIS STREET, PHASE 4, MOSSEL BAY

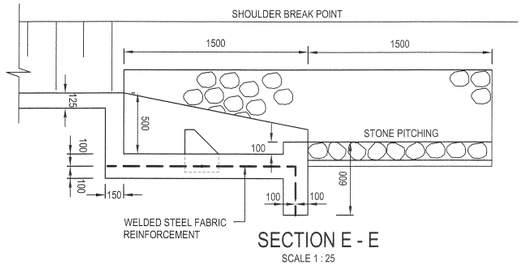
TITLE

ROAD LONGITUDINAL SECTION

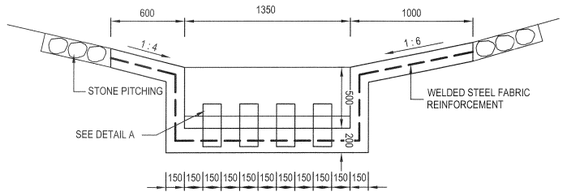
DRAWN	DESIGNED	FOR DISCUSSION PURPOSES ONLY	
A VAN WYK	R SCHRAADER		
CHECKED		PROJECT No.	
		501550	
APPROVED		SCALE	SIZE
		AS SHOWN	A0
AC KEYSER ECSA -200670188	DATE	DRAWING No.	REV
		501550 GE 2	A



PLAN
NTS

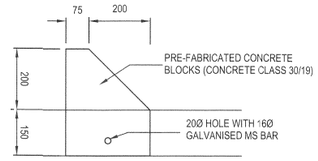


SECTION E - E
SCALE 1 : 25



SECTION F - F
SCALE 1 : 25

TYPICAL SIDE DRAIN OUTLET



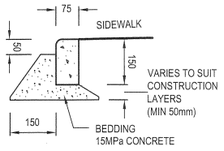
DETAIL A
SCALE 1 : 10

BARRIER KERB AND CHANNEL
SCALE 1:10

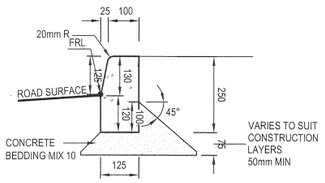
NOTE:

1. THE SETTING-OUT POINT AS SHOWN ON THE LAYOUT PLAN, INDICATES THE POINT (FRL) ON THE EDGE OF THE KERB/EDGE RESTRAINT/CHANNEL.

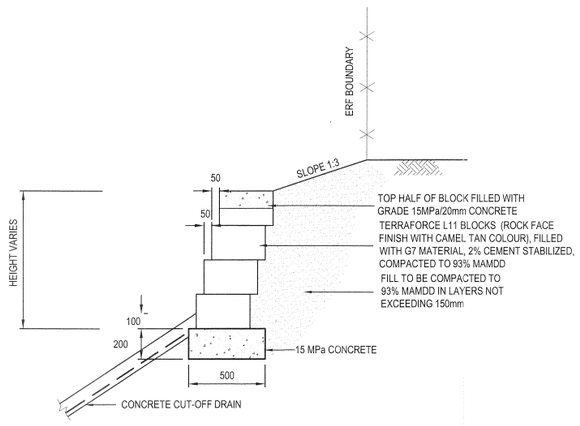
2. EXPANSION JOINTS OF WIDTH AT LEAST 12mm TO BE CONSTRUCTED AT INTERVALS NOT EXCEEDING 10m ON RADII 20m - STRAIGHT. AT BELLMOUTHS EXPANSION JOINTS TO BE CONSTRUCTED AT 5m INTERVALS. JOINTS TO BE FILLED WITH AN APPROVED POLYSULPHIDE SEALAND OR SIMILAR APPROVED PRODUCT.



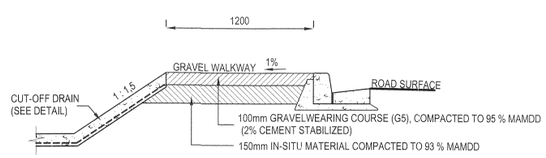
EDGING
SCALE 1 : 10



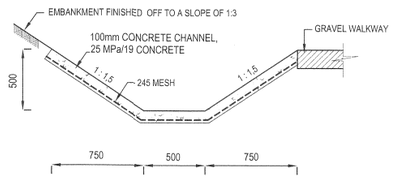
BARRIER KERB : TYPE BK1
SCALE 1:10



TYPICAL DETAIL OF TERRAFORCE L11 CONCRETE RETAINING WALL
SCALE 1:20



TYPICAL DETAIL OF GRAVEL WALKWAY
SCALE 1:25



TYPICAL DETAIL OF CUT-OFF DRAIN
SCALE 1 : 25

TYPICAL SECTION THROUGH ASPHALT ROADWAY (SV 120 - SV 322.59)
SCALE 1 : 50

NOTES :

1. ALL CONSTRUCTION NEED TO BE IN ACCORDANCE WITH SANS 1200.
2. FOR GENERAL LAYOUT OF THE WORKS SEE DRG. 112674 GE 1.
3. FOR LAYOUT AND LONGITUDINAL SECTION OF THE EXTENSION OF WALVIS STREET, SEE DRG. 112674 GE 2.
4. FOR THE LAYOUT AND SETTING OUT DETAIL OF THE ROAD WIDENING OF WALVIS STREET, SEE DRG 112674 GE 3.
5. ALL ROAD SIGNS AND MARKINGS TO COMPLY WITH THE SADC ROAD TRAFFIC SIGNS MANUAL LATEST EDITION AND THE NATIONAL ROAD TRAFFIC REGULATIONS, 2000.
6. ALL ROAD MARKING SHALL COMPLY WITH SABS 731-1 FOR TYPE 1 OR 2 PAINT WITH CLASS 1 DRYING TIME CLASSIFICATION. THE MARKINGS SHALL BE REFLECTORISED BY APPLYING GLASS BEADS AT A RATE NOT LESS THAN 0,34kg/m2
7. THE FINAL POSITION OF ALL ROAD SIGNS TO BE CONFIRMED BY THE ENGINEER
8. THE SETTING OUT AND PRE-MARKING OF THE LINES AND SYMBOLS SHALL BE APPROVED PRIOR TO ANY FINAL MARKINGS BE APPLIED.
9. NO ROAD SIGNS MAY BE ORDERED WITHOUT WRITTEN CONSENT FROM THE ENGINEER.
10. THE STOP AND YIELD SIGNS SHALL BE ERECTED WITH THE NEAREST EDGE NOT LESS THAN 500mm FROM THE KERB FACE OR ROAD EDGE.
11. ALL ROAD SIGNS AND MARKINGS TO BE IN ACCORDANCE WITH THE REGULATIONS AND STANDARDS AS SET ASIDE IN THE LATEST VERSION OF SARTSM FOR 60km/h OPERATING SPEED. ALL NEW ROAD MARKING TO TIE IN WITH EXISTING ROAD MARKING.
12. ERECTION OF SMALL SIGNS (AREA < 0,5m2): PRIOR TO ERECTION OF SUPPORTS FOR ROAD SIGNS THE ENGINEER WILL CONSIDER ATTACHING SMALLER SIGNS TO OTHER FEATURES SUCH AS STREETLIGHTING POLES AND CONFIRM THE NEED TO ERECT SEPARATE SUPPORTS FOR SMALL SIGNS.
13. SIGN SIZES :

13.1 REGULATORY SIGNS : CIRCULAR = 600mm
RECTANGULAR = 600X450mm
13.2 WARNING SIGNS : TRIANGULAR = 900mm SIDE LENGTH
DANGER PLATES = 150X600mm

14. EXISTING ROAD SIGNS TO BE RELOCATED AS DIRECTED BY THE ENGINEER AS MAY BE REQUIRED

RESPONSIBLE PERSONS		
	SIGNATURE	DATE
DRAWN		
DESIGNED		10/10/16
CHECKED		10/10/16

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REV	DATE	REVISION DETAILS	APPROVED
0	11/10/2016	FOR CONSTRUCTION	AC KEYSER
T0	12/07/2016	TENDER DRAWING	AC KEYSER
A	15/6/2016	PRELIMINARY DRAWING	AC KEYSER

PROJECT

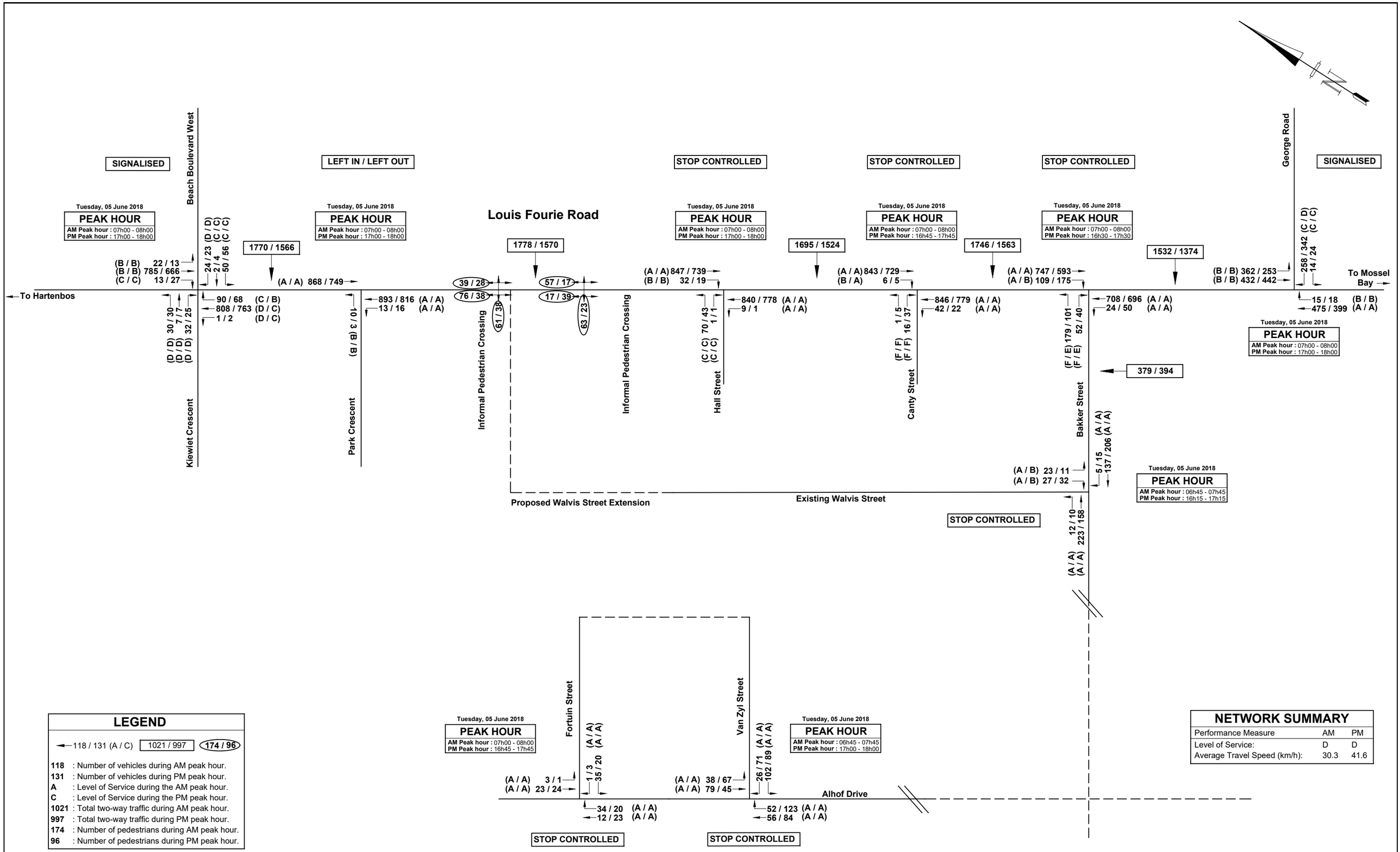
ASAZANI / IZINYOKA MAIN ACCESS ROADS : EXTENSION/UPGRADING OF WALVIS STREET PHASE 3A, MOSSEL BAY

TITLE

GENERAL DETAILS

DRAWN	DESIGNED	
AS VAN WYK	R SCHRAADER	FOR CONSTRUCTION
CHECKED		PROJECT No.
M BOTHA		112674
APPROVED		SCALE / SIZE
AC KEYSER ECSA -200670188	10/10/16 DATE	AS SHOWN / A1
		DRAWING No. / REV
		112674 GE 4 / 0

ATTACHMENT D



LEGEND

118 / 131 (A / C) | 1021 / 997 | 174 / 96

118	: Number of vehicles during AM peak hour.
131	: Number of vehicles during PM peak hour.
A	: Level of Service during the AM peak hour.
C	: Level of Service during the PM peak hour.
1021	: Total two-way traffic during AM peak hour.
997	: Total two-way traffic during PM peak hour.
174	: Number of pedestrians during AM peak hour.
96	: Number of pedestrians during PM peak hour.

NETWORK SUMMARY

Performance Measure	AM	PM
Level of Service:	D	D
Average Travel Speed (km/h):	30.3	41.6

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Stellenbosch 7599

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Stellenbosch 7600

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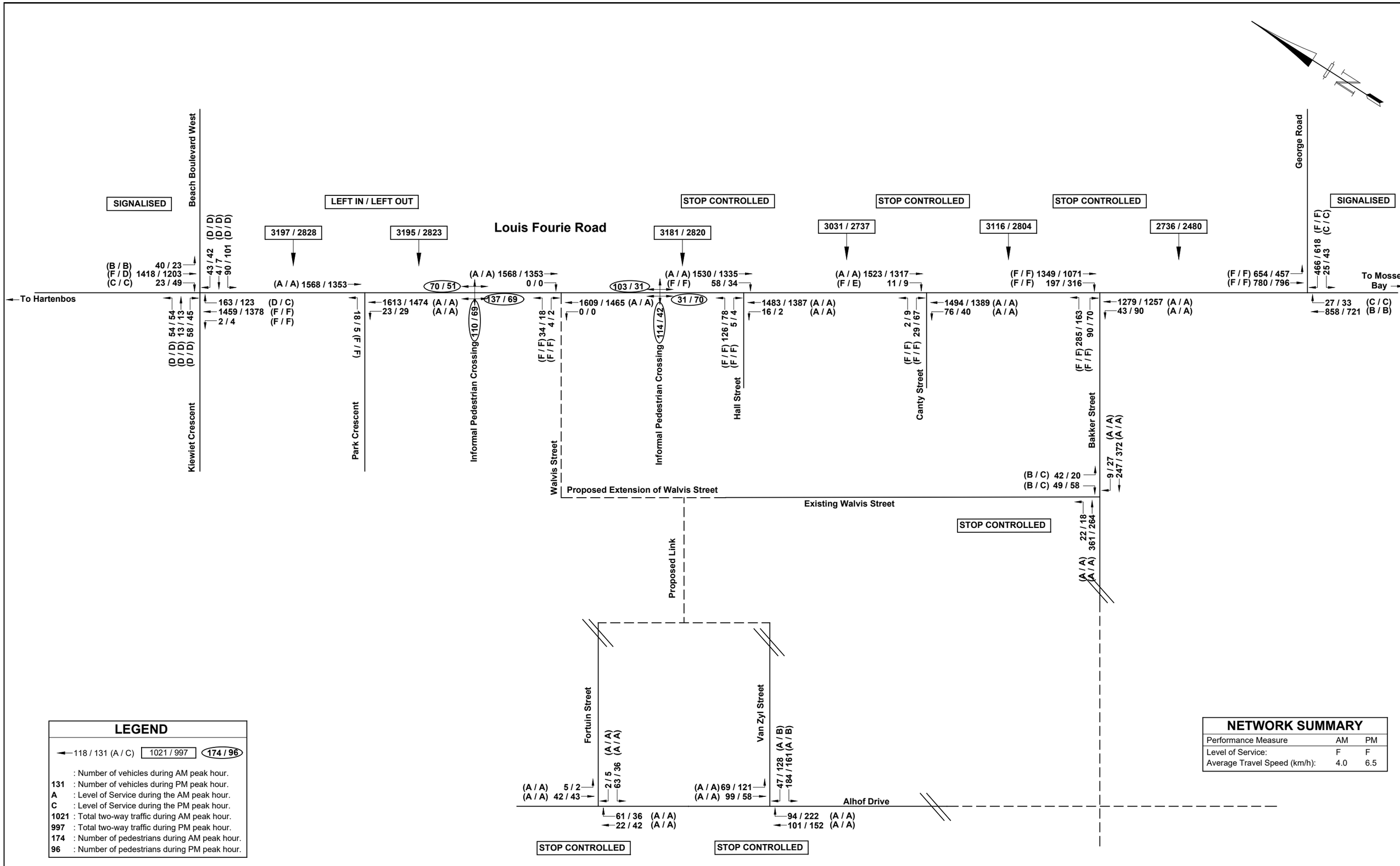
e-pos / e-mail : piet@icegroup.co.za

GROUP (Pty) Ltd.

Existing AM and PM Peak Hour Traffic Volumes (Tuesday, 05 June 2018)

Figure 1



LEGEND

118 / 131 (A / C) | 1021 / 997 | 174 / 96

: Number of vehicles during AM peak hour.
131 : Number of vehicles during PM peak hour.
A : Level of Service during the AM peak hour.
C : Level of Service during the PM peak hour.
1021 : Total two-way traffic during AM peak hour.
997 : Total two-way traffic during PM peak hour.
174 : Number of pedestrians during AM peak hour.
96 : Number of pedestrians during PM peak hour.

NETWORK SUMMARY

Performance Measure	AM	PM
Level of Service:	F	F
Average Travel Speed (km/h):	4.0	6.5

Posbus / PO Box 131
Stellenbosch 7599

Time Square Unit 8
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Stellenbosch 7600

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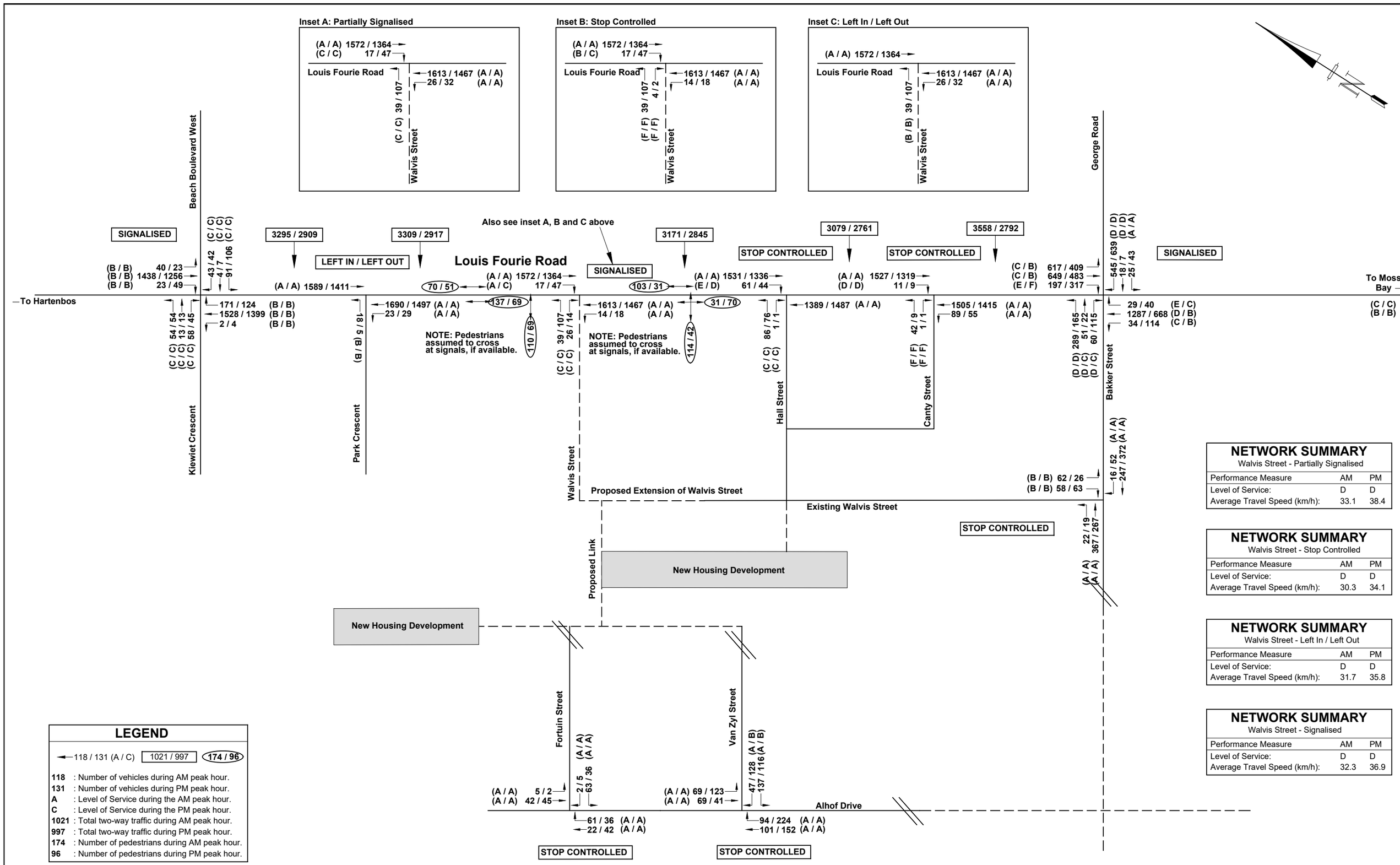
e-pos / e-mail : piet@icegroup.co.za

ICE GROUP (Pty) Ltd.

Projected 2038 Redistributed AM and PM Peak Hour Traffic Volumes (Using a 3% p.a. growth rate)

Figure 2



LEGEND

118 / 131 (A / C) | 1021 / 997 | 174 / 96

118	: Number of vehicles during AM peak hour.
131	: Number of vehicles during PM peak hour.
A	: Level of Service during the AM peak hour.
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1021	: Total two-way traffic during AM peak hour.
997	: Total two-way traffic during PM peak hour.
174	: Number of pedestrians during AM peak hour.
96	: Number of pedestrians during PM peak hour.

NETWORK SUMMARY
Walvis Street - Partially Signalised

Performance Measure	AM	PM
Level of Service:	D	D
Average Travel Speed (km/h):	33.1	38.4

NETWORK SUMMARY
Walvis Street - Stop Controlled

Performance Measure	AM	PM
Level of Service:	D	D
Average Travel Speed (km/h):	30.3	34.1

NETWORK SUMMARY
Walvis Street - Left In / Left Out

Performance Measure	AM	PM
Level of Service:	D	D
Average Travel Speed (km/h):	31.7	35.8

NETWORK SUMMARY
Walvis Street - Signalised

Performance Measure	AM	PM
Level of Service:	D	D
Average Travel Speed (km/h):	32.3	36.9

Posbus / PO Box 131
Stellenbosch 7599

Time Square Unit 8
9 Electron Street
Techno Park
Stellenbosch 7600

Tel. : 021 - 880 0443
Faks / Fax : 021 - 880 0390
e-pos / e-mail : piet@icegroup.co.za

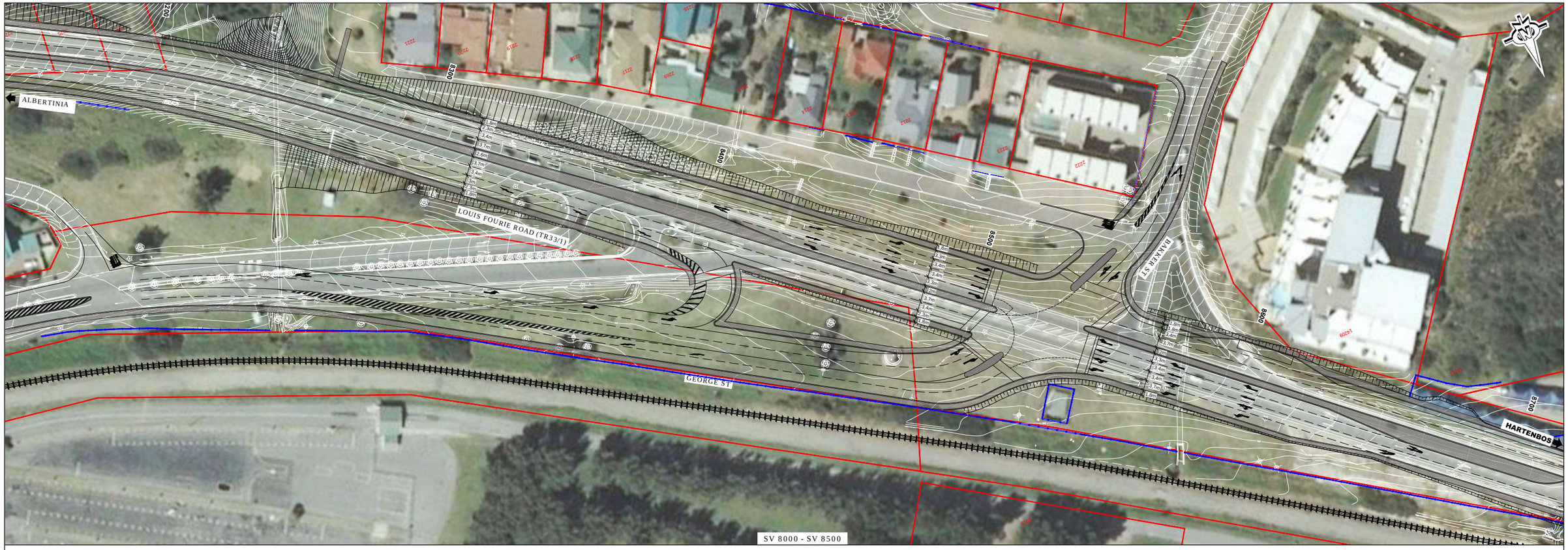
GROUP (Pty) Ltd.

Total 2038 AM and PM Peak Hour Traffic Volumes
(Redistributed Traffic and Including Traffic Generated and Proposed Upgrades)

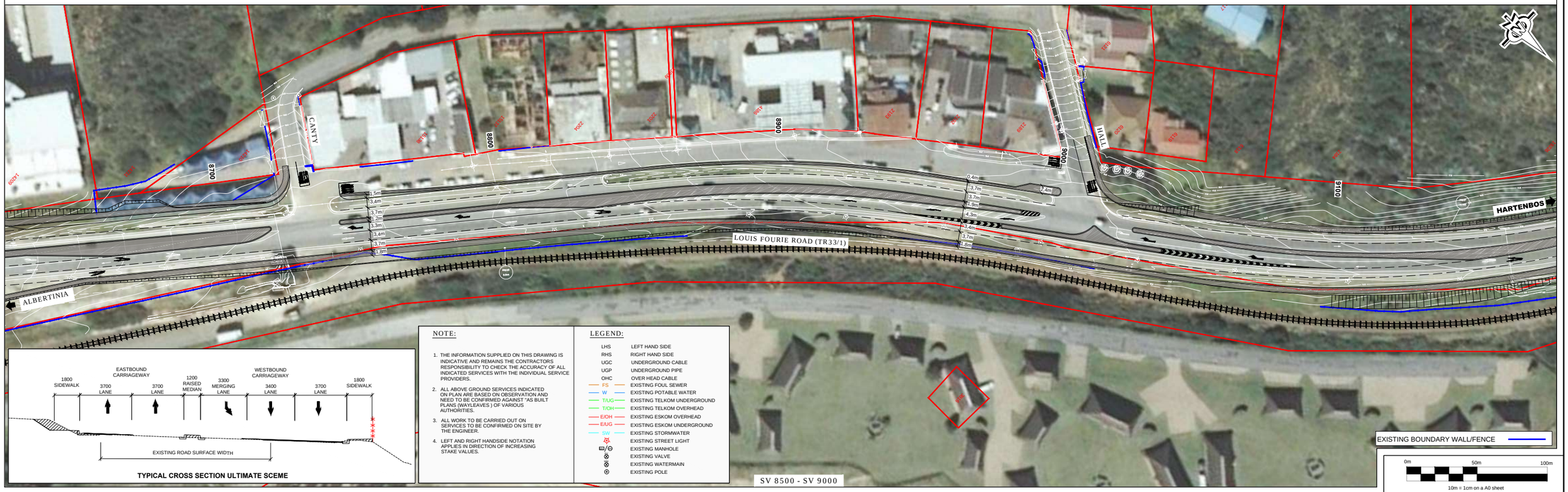
Figure 3

ATTACHMENT E

GD46/



SV 8000 - SV 8500



SV 8500 - SV 9000

TYPICAL CROSS SECTION ULTIMATE SCEME

NOTE:

1. THE INFORMATION SUPPLIED ON THIS DRAWING IS INDICATIVE AND REMAINS THE CONTRACTORS RESPONSIBILITY TO CHECK THE ACCURACY OF ALL INDICATED SERVICES WITH THE INDIVIDUAL SERVICE PROVIDERS.
2. ALL ABOVE GROUND SERVICES INDICATED ON PLAN ARE BASED ON OBSERVATION AND NEED TO BE CONFIRMED AGAINST "AS BUILT PLANS (WAYLEAVES) OF VARIOUS AUTHORITIES.
3. ALL WORK TO BE CARRIED OUT ON SERVICES TO BE CONFIRMED ON SITE BY THE ENGINEER.
4. LEFT AND RIGHT HANDSIDE NOTATION APPLIES IN DIRECTION OF INCREASING STAKE VALUES.

LEGEND:

LHS	LEFT HAND SIDE
RHS	RIGHT HAND SIDE
UGC	UNDERGROUND CABLE
UGP	UNDERGROUND PIPE
OHC	OVER HEAD CABLE
FS	EXISTING FOUL SEWER
W	EXISTING POTABLE WATER
T/UG	EXISTING TELKOM UNDERGROUND
T/OH	EXISTING TELKOM OVERHEAD
E/OH	EXISTING ESKOM OVERHEAD
E/UG	EXISTING ESKOM UNDERGROUND
SW	EXISTING STORMWATER
	EXISTING STREET LIGHT
	EXISTING MANHOLE
	EXISTING VALVE
	EXISTING WATERMAIN
	EXISTING POLE

EXISTING BOUNDARY WALL/FENCE

0m 50m 100m

10m = 1cm on a A0 sheet

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	APPROVED PRE

DESIGNED BY: P.GERMISHUYS
CHECKED BY: C.MANCHIP
DRAWN BY: K.RICKETTS
CHECKED BY:

HATCH GOBA
Member of the Hatch Group
2nd floor False Bay Building
Tygerberg Park
163 Uys Krige Drive
Plattekloof, 7500
+27 21 9115823
www.hatch.co.za

CONSULTING ENGINEERS

DATE: _ _ _ _ _ _ _

WESTERN CAPE GOVERNMENT

DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

APPROVED

THIS APPROVAL IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OF ANY KIND FROM WHATSOEVER OR HOWEVER ARISING

PROVINCIAL ROADS ENGINEER

DATE: _ _ _ _ _ _ _

C964 : UPGRADING OF TRUNK ROAD 33/1 (LOUIS FOURIE)

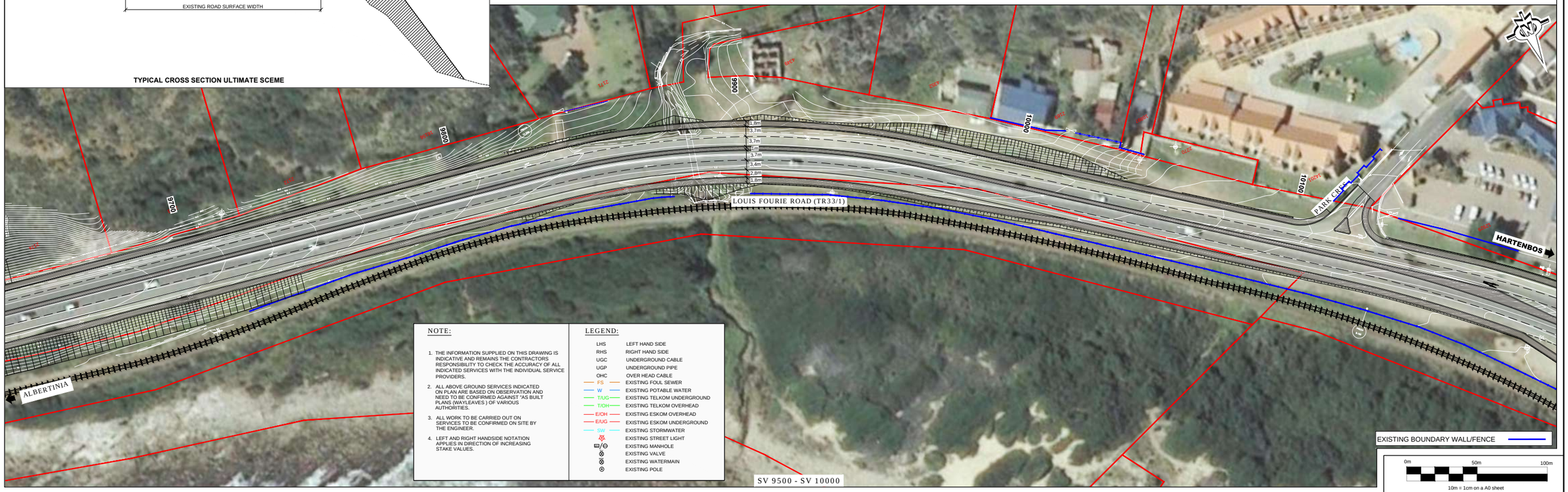
CONCEPTUAL DESIGN ULTIMATE SCHEME : SHEET 10 OF 18

P.R.E.'s FILE No. TPW16/6/4/1/5-TR03301-C964	SCALE 1:500
CONTRACT No. C964	WCPA STRUCTURES PLAN No.
CONSULTANT'S PLAN No.	WCPA INDEX No.

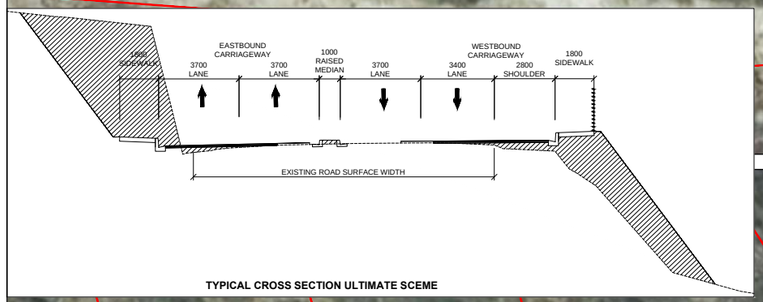
G:\20554 - Upgrading Trunk Road 33-1\Drawings\00_Area\00_Unit\400_Roads and Earthworks\2. Prelimlit. ULTIMATE\ULTIMATE CONCEPTUAL DESIGN\GENERAL ARRANGEMENTS\General Arrangement ULTIMATE1.dwg 2-Aug-16

GD46/

SV 9000 - SV 9500



SV 9500 - SV 10000



TYPICAL CROSS SECTION ULTIMATE SCEME

NOTE:

1. THE INFORMATION SUPPLIED ON THIS DRAWING IS INDICATIVE AND REMAINS THE CONTRACTORS RESPONSIBILITY TO CHECK THE ACCURACY OF ALL INDICATED SERVICES WITH THE INDIVIDUAL SERVICE PROVIDERS.
2. ALL ABOVE GROUND SERVICES INDICATED ON PLAN ARE BASED ON OBSERVATION AND NEED TO BE CONFIRMED AGAINST "AS BUILT PLANS (WAYLEAVES) OF VARIOUS AUTHORITIES.
3. ALL WORK TO BE CARRIED OUT ON SERVICES TO BE CONFIRMED ON SITE BY THE ENGINEER.
4. LEFT AND RIGHT HANDSIDE NOTATION APPLIES IN DIRECTION OF INCREASING STAKE VALUES.

LEGEND:

LHS	LEFT HAND SIDE
RHS	RIGHT HAND SIDE
UGC	UNDERGROUND CABLE
UGP	UNDERGROUND PIPE
OHC	OVER HEAD CABLE
FS	EXISTING FOUL SEWER
W	EXISTING POTABLE WATER
T/UG	EXISTING TELKOM UNDERGROUND
T/OH	EXISTING TELKOM OVERHEAD
E/OH	EXISTING ESKOM OVERHEAD
E/UG	EXISTING ESKOM UNDERGROUND
SW	EXISTING STORMWATER
	EXISTING STREET LIGHT
	EXISTING MANHOLE
	EXISTING VALVE
	EXISTING WATERMAIN
	EXISTING POLE

EXISTING BOUNDARY WALL/FENCE

0m 50m 100m

10m = 1cm on a A0 sheet

NO.	DATE	ADDITIONS AND AMENDMENTS	APPROVED CONS.	APPROVED PRE

DESIGNED BY: P.GERMISHUYS
CHECKED BY: C.MANCHIP
DRAWN BY: K.RICKETTS
CHECKED BY:

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Tygerberg Park
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Plattekloof, 7500
+27 21 9115823
www.hatch.co.za

CONSULTING ENGINEERS

DATE: _ _ _ _ _ _ _

WESTERN CAPE GOVERNMENT

DEPARTMENT OF TRANSPORT AND PUBLIC WORKS

APPROVED

THIS APPROVAL IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OF ANY KIND FROM WHATSOEVER OR HOWEVER ARISING

PROVINCIAL ROADS ENGINEER

DATE: _ _ _ _ _ _ _

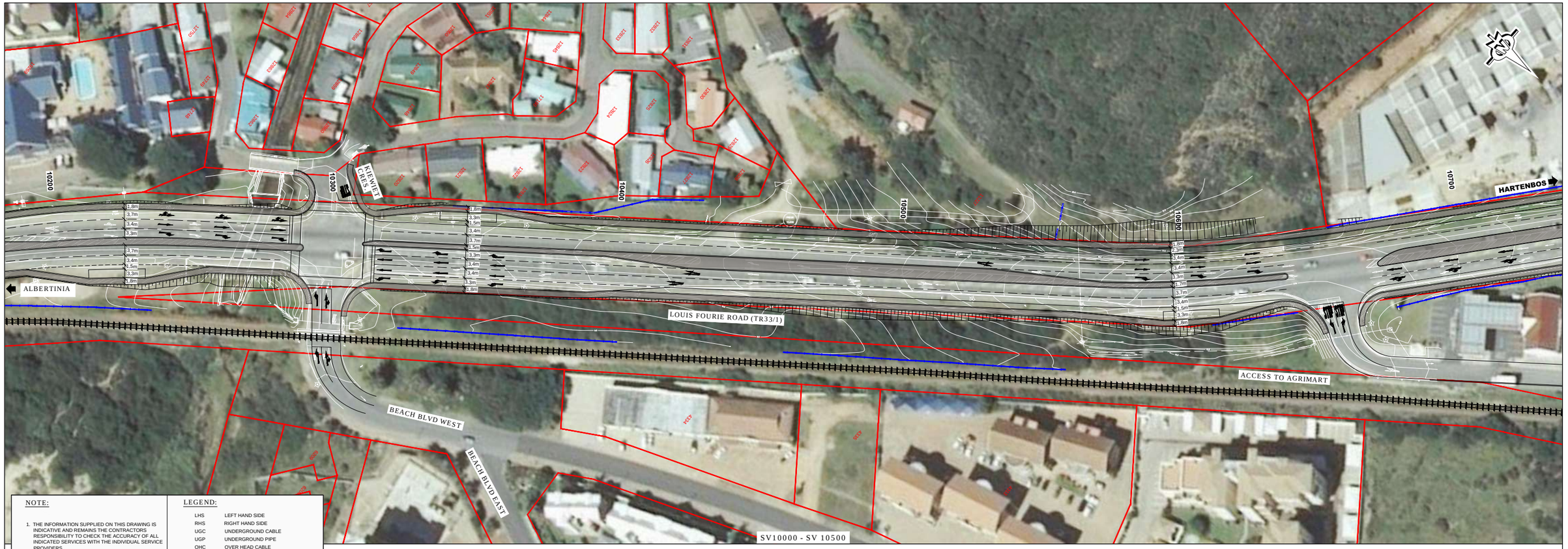
C964 : UPGRADING OF TRUNK ROAD 33/1 (LOUIS FOURIE)

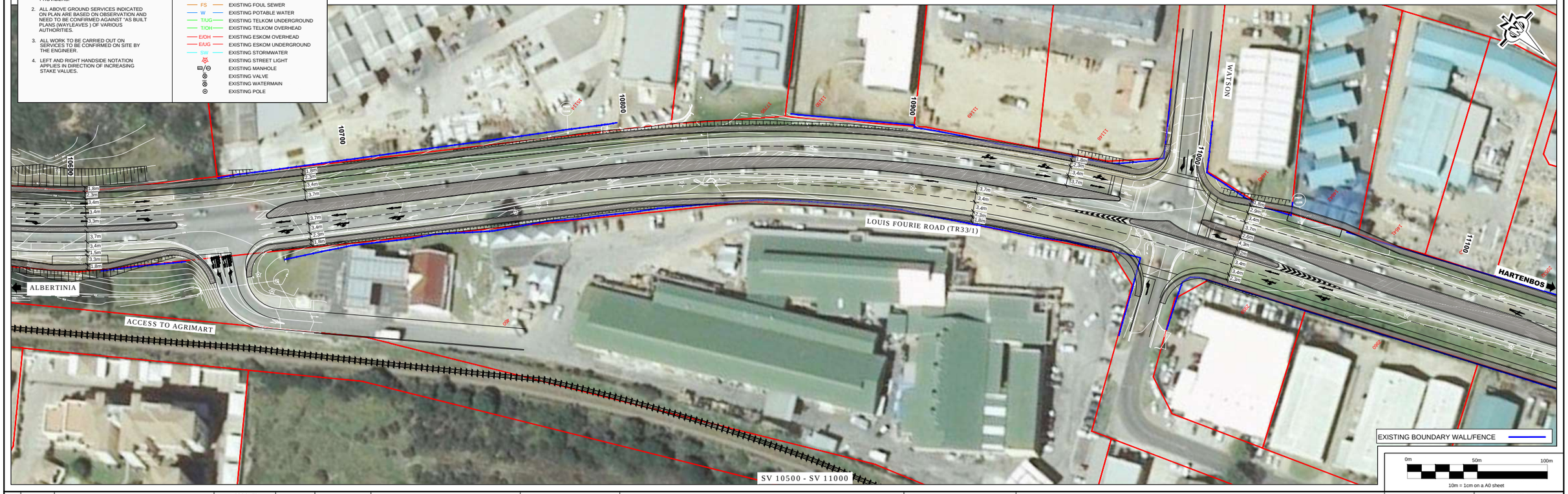
CONCEPTUAL DESIGN ULTIMATE SCHEME : SHEET 11 OF 18

P.R.E.'s FILE No. TPW16/6/4/1/5-TR03301-C964	SCALE 1:500
CONTRACT No. C964	WCPA STRUCTURES PLAN No.
CONSULTANT'S PLAN No.	WCPA INDEX No.

G:\20554 - Upgrading Trunk Road 33-1\Drawings\00_Area\00_Unit\400_Roads and Earthworks\2. Prelimlit. ULTIMATE\ULTIMATE CONCEPTUAL DESIGN\GENERAL ARRANGEMENTS\General Arrangement ULTIMATE1.dwg 2-Aug-16

GD46/





NOTE:

1. THE INFORMATION SUPPLIED ON THIS DRAWING IS INDICATIVE AND REMAINS THE CONTRACTORS RESPONSIBILITY TO CHECK THE ACCURACY OF ALL INDICATED SERVICES WITH THE INDIVIDUAL SERVICE PROVIDERS.
2. ALL ABOVE GROUND SERVICES INDICATED ON PLAN ARE BASED ON OBSERVATION AND NEED TO BE CONFIRMED AGAINST "AS BUILT PLANS (WAYLEAVES) OF VARIOUS AUTHORITIES.
3. ALL WORK TO BE CARRIED OUT ON SERVICES TO BE CONFIRMED ON SITE BY THE ENGINEER.
4. LEFT AND RIGHT HANDSIDE NOTATION APPLIES IN DIRECTION OF INCREASING STAKE VALUES.

LEGEND:

LHS	LEFT HAND SIDE
RHS	RIGHT HAND SIDE
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PROVINCIAL ROADS ENGINEER

DATE: _ _ _ _ _ _ _

C964 : UPGRADING OF TRUNK ROAD 33/1 (LOUIS FOURIE)

CONCEPTUAL DESIGN ULTIMATE SCHEME : SHEET 12 OF 18

P.R.E.'s FILE No. TPW16/64/1/5-TR03301-C964	SCALE 1:500
CONTRACT No. C964	WCPA STRUCTURES PLAN No.
CONSULTANT'S PLAN No.	WCPA INDEX No.

G:\20564 - Upgrading Trunk Road 33-1\Drawings\00_Area\00_Unit\400_Roads and Earthworks\2. Prelim\8. ULTIMATE\ULTIMATE CONCEPTUAL DESIGN\GENERAL ARRANGEMENTS\General Arrangement ULTIMATE1.dwg 2-Aug-16

ATTACHMENT F

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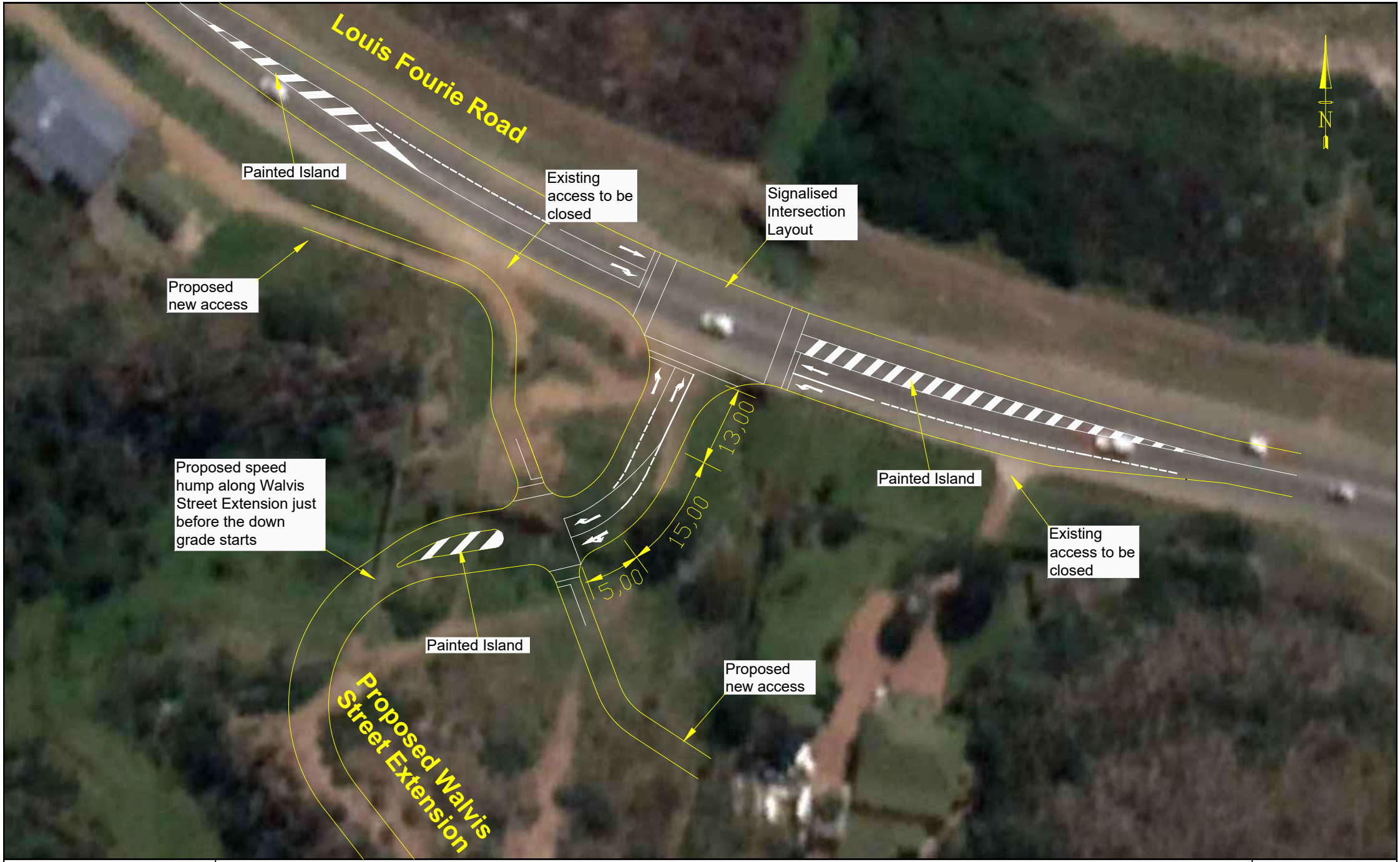
GROUP (Pty) Ltd.

Access Management Plan

JULY 2018



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GROUP (Pty) Ltd.

PROPOSED LOUIS FOURIE ROAD / WALVIS STREET INTERSECTION LAYOUT SIGNALISED (SCHEMATIC)

JULY 2018