The developers of Portion 4 of Gwayang 208 will be responsible for the internal services. With respect to road, they will provide for the roads, sidewalks and signs and markings per approved design.

The development takes access from a provincial road. Provincial roads are not deemed municipal engineering services (for which engineering service contributions are charged).

No engineering services contributions from external roads are thus applicable.

12 Geometric design considerations

The proposed roundabout on R 404, connecting both the airport access and the access road to the development, is on a straight section of the R 404 with flat topography. There are no horizontal or vertical alignment constraints that will impede sight distances and cause safety issues. The roundabout is

Street lights should be provided from the R101 intersection to the emergency access to the airport, 300 m and 350 m north and south of the roundabout respectively.

13 Conclusion and Recommendations

A development is proposed on Portion 4 of Farm Gwayang No 208. The site is located to the east of the R404 at the George Airport main access road/R404 intersection. The township will include for a Filling Station and Warehousing.

The proposed development will comprise of eight erven. One erf will be zoned Business Zone V for the purpose of a Filling Station, while the other seven erven will be zoned Business Zone IV for the purpose of warehousing. The required land-use rights comply with the *Gwayang Local Spatial Development Framework*.

The properties to the immediate north and south of the proposed development will also receive access via the new township. The future land-use rights for these properties include for Airport Support Zone as stated in the *Gwayang Local Spatial Development Framework*.

There is currently no formal access to the property. Access to the property is proposed via a new single lane roundabout at the R404/ George Airport main access road intersection.

Warehousing and Distribution land-use rights were used to calculate trip generation for the proposed development and neighbouring properties. A filling station is not a primary trip generator since the majority of the total trips generated are passer-by trips that are intercepted from the adjacent road network.

The results of the capacity and operational analyses show that the proposed intersection can easily accommodate the expected additional vehicle trips, not only in terms of the design horizon year (2022), but also when the Airport Supprt Zone is fully developed for warehousing in the planning horizon year 2035. The upgrading of this intersection to a roundabout will ensure LOS A during the PM Peak Hour in the horizon year.

The planning horizon may include the construction of the George Western Bypass (TR89) that will take through traffic from the R404. The traffic roundabout will then function at an even better level of service.

Annexure A

April 2014 Traffic Survey



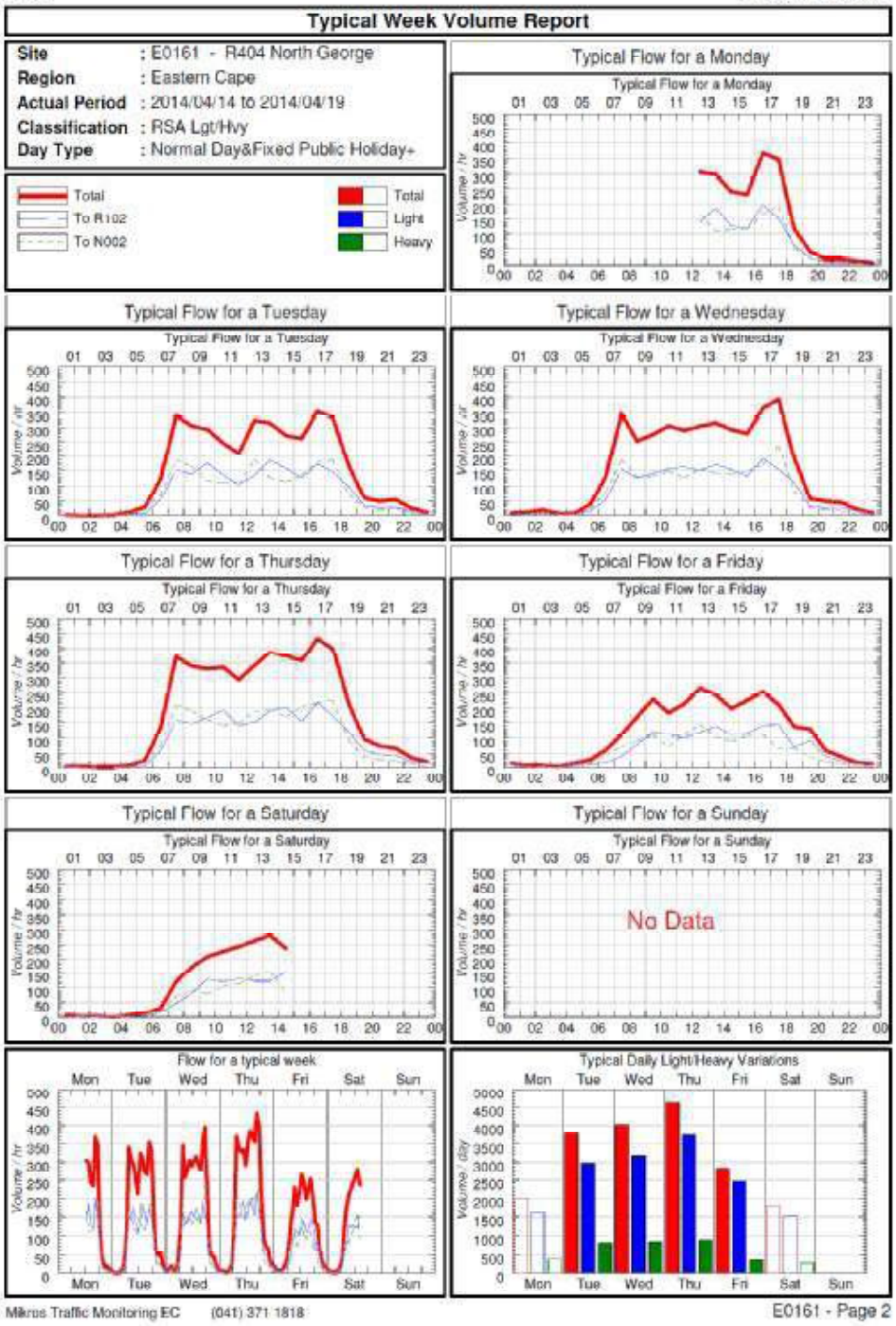
Annexure B

George Airport passenger volumes

E0161 **R404 North George**

TRAFFIC HIGHLIGHTS OF SITE E0161				
1.1	Site Identifier			E0161
1.2	Site Name			R404 North George
1.3	Site Description			R404 North George Airport
1.4	Road Description	Route : R404	Road : Section :	Distance : 0.0km
1.5	GPS Position			22.382200E -33.9981695
1.6	Number of Lanes			2
1.7	Station Type			Secondary (Temp)
1.8	Requested Period			2014/01/01 - 2014/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2014/04/14 - 2014/04/19
1.11	Actual available data (hours)			124
1.12	Percentage data available for requested period			1.4
		To R102	To N002	Total
2.1	Total number of vehicles	9810	9435	19245
2.2	Average daily traffic (ADT)	1903	1830	3732
2.3	Average daily truck traffic (ADTT)	338	361	694
2.4	Percentage of trucks	17.5	19.7	18.6
2.5	Truck split % (short:medium:long)	0 : 0 : 0	0 : 0 : 0	0 : 0 : 0
2.6	Percentage of night traffic (20:00 - 06:00)	5.3	4.3	4.8
3.1	Speed limit (km/hr)			80
3.2	Average speed (km/hr)			
3.3	Average speed - light vehicles (km/hr)			
3.4	Average speed - heavy vehicles (km/hr)			
3.5	Average night speed (km/hr)			
3.6	15th centile speed (km/hr)			
3.7	85th centile speed (km/hr)			
3.8	Percentage vehicles in excess of speed limit	0.0	0.0	0.0
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2014/04/17 17:00:00	434
4.3	Highest volume in the North (vehs/hr)		2014/04/17 17:00:00	217
4.4	Highest volume in the South (vehs/hr)		2014/04/16 18:00:00	239
4.5	Highest volume in a lane (vehicles/hr)		2014/04/16 18:00:00	239
4.6	15th highest volume on the road (vehicles/hr)		2014/04/17 09:00:00	338
4.7	15th highest volume in the North direction (vehs/hr)		2014/04/17 08:00:00	160
4.8	15th highest volume in the South direction (vehs/hr)		2014/04/17 15:00:00	171
4.9	30th highest volume on the road (vehicles/hr)		2014/04/16 12:00:00	291
4.10	30th highest volume in the North direction (vehs/hr)		2014/04/16 10:00:00	143
4.11	30th highest volume in the South direction (vehs/hr)		2014/04/16 15:00:00	139
5.1	Percentage of vehicles less than 2s behind vehicle ahead			
6.1	Total number of heavy vehicles	1717	1860	3577
6.2	Estimated average number of axles per truck			
6.3	Estimated truck mass (Ton/truck)			
6.4	Estimated average E80/truck			
6.5	Estimated daily E80 on the road			
6.6	Estimated daily E80 in the North direction			
6.7	Estimated daily E80 in the South direction			
6.8	Estimated daily E80 in the worst North lane			0
6.9	Estimated daily E80 in the worst South lane			0
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 3.1)

Mikros Traffic Monitoring EC (041) 371 1818 E0161 - Page 1


Typical Week Volume Report
Site : E0161 - R404 North George
Region : Eastern Cape
Actual Period : 2014/04/14 to 2014/04/19
Classification : RSA Lgt/Hvy
Day Type : Normal Day&Fixed Public Holiday+
Total
To R102
To N002
Total
Light
Heavy
Typical Flow for a Monday
Typical Flow for a Tuesday
Typical Flow for a Wednesday
Typical Flow for a Thursday
Typical Flow for a Friday
Typical Flow for a Saturday
Typical Flow for a Sunday
No Data
Flow for a typical week
Typical Daily Light/Heavy Variations
Volume / hr
Volume / day
Mon Tue Wed Thu Fri Sat Sun

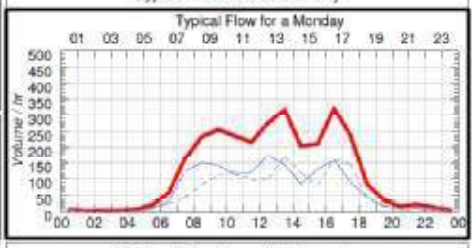
TRAFFIC HIGHLIGHTS OF SITE E0162				
1.1	Site Identifier			E0162
1.2	Site Name			R404 South George
1.3	Site Description			R404 South George Airport
1.4	Road Description	Route : R404	Road : Section :	Distance : 0.0km
1.5	GPS Position			22.384180E -34.0000005
1.6	Number of Lanes			2
1.7	Station Type			Secondary (Temp)
1.8	Requested Period			2014/01/01 - 2014/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2014/04/14 - 2014/04/23
1.11	Actual available data (hours)			216
1.12	Percentage data available for requested period			2.5
		To R102	To N002	Total
2.1	Total number of vehicles	14955	14160	29115
2.2	Average daily traffic (ADT)	1666	1577	3243
2.3	Average daily truck traffic (ADTT)	270	247	517
2.4	Percentage of trucks	16.2	15.7	15.9
2.5	Truck split % (short:medium:long)	0 : 0 : 0	0 : 0 : 0	0 : 0 : 0
2.6	Percentage of night traffic (20:00 - 06:00)	6.6	4.4	5.5
3.1	Speed limit (km/hr)			80
3.2	Average speed (km/hr)			
3.3	Average speed - light vehicles (km/hr)			
3.4	Average speed - heavy vehicles (km/hr)			
3.5	Average night speed (km/hr)			
3.6	15th centile speed (km/hr)			
3.7	85th centile speed (km/hr)			
3.8	Percentage vehicles in excess of speed limit	0.0	0.0	0.0
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2014/04/17 17:00:00	405
4.3	Highest volume in the North (vehs/hr)		2014/04/18 13:00:00	204
4.4	Highest volume in the South (vehs/hr)		2014/04/17 18:00:00	263
4.5	Highest volume in a lane (vehicles/hr)		2014/04/17 18:00:00	263
4.6	15th highest volume on the road (vehicles/hr)		2014/04/17 10:00:00	319
4.7	15th highest volume in the North direction (vehs/hr)		2014/04/14 17:00:00	172
4.8	15th highest volume in the South direction (vehs/hr)		2014/04/15 17:00:00	177
4.9	30th highest volume on the road (vehicles/hr)		2014/04/17 14:00:00	292
4.10	30th highest volume in the North direction (vehs/hr)		2014/04/15 09:00:00	151
4.11	30th highest volume in the South direction (vehs/hr)		2014/04/23 11:00:00	147
5.1	Percentage of vehicles less than 2s behind vehicle ahead			
6.1	Total number of heavy vehicles	2426	2217	4643
6.2	Estimated average number of axles per truck			
6.3	Estimated truck mass (Ton/truck)			
6.4	Estimated average E80/truck			
6.5	Estimated daily E80 on the road			
6.6	Estimated daily E80 in the North direction			
6.7	Estimated daily E80 in the South direction			
6.8	Estimated daily E80 in the worst North lane			0
6.9	Estimated daily E80 in the worst South lane			0
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

Typical Week Volume Report

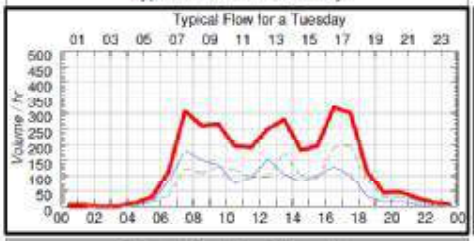
Site	: E0162 - R404 South George
Region	: Eastern Cape
Actual Period	: 2014/04/14 to 2014/04/23
Classification	: RSA Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+



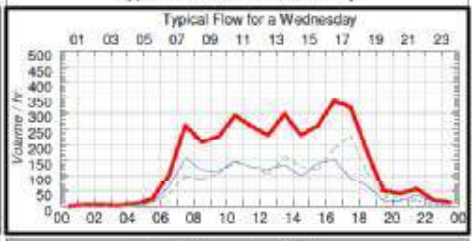
Typical Flow for a Monday



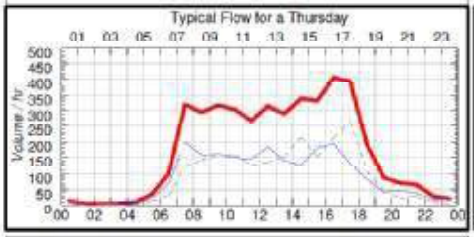
Typical Flow for a Tuesday



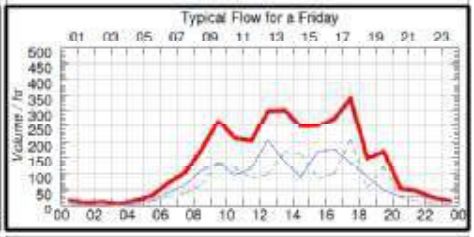
Typical Flow for a Wednesday



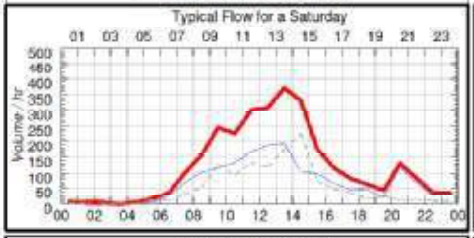
Typical Flow for a Thursday



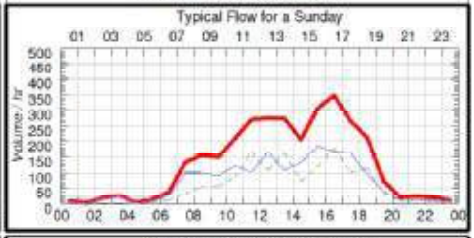
Typical Flow for a Friday

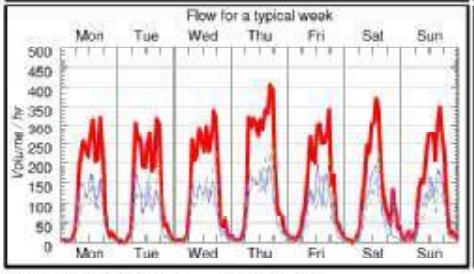


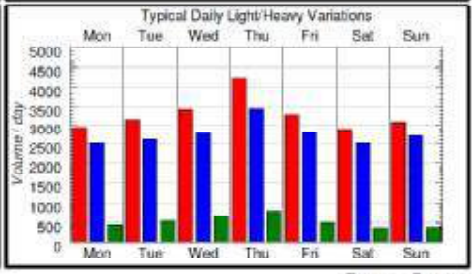
Typical Flow for a Saturday



Typical Flow for a Sunday







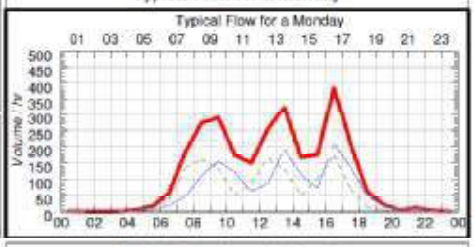
TRAFFIC HIGHLIGHTS OF SITE E0163				
1.1	Site Identifier			E0163
1.2	Site Name			George Airport 1
1.3	Site Description			George Airport Entrance
1.4	Road Description		Route : Road : Section :	Distance : 0.0km
1.5	GPS Position			22.382469E -33.999100S
1.6	Number of Lanes			2
1.7	Station Type			Secondary (Temp)
1.8	Requested Period			2014/01/01 - 2014/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2014/04/14 - 2014/04/23
1.11	Actual available data (hours)			215
1.12	Percentage data available for requested period			2.5
		To R404	To George Airport	Total
2.1	Total number of vehicles	13479	12776	26255
2.2	Average daily traffic (ADT)	1505	1426	2931
2.3	Average daily truck traffic (ADTT)	279	338	613
2.4	Percentage of trucks	18.3	23.7	20.9
2.5	Truck split % (short:medium:long)	0 : 0 : 0	0 : 0 : 0	0 : 0 : 0
2.6	Percentage of night traffic (20:00 - 06:00)	2.4	2.7	2.6
3.1	Speed limit (km/hr)			80
3.2	Average speed (km/hr)			
3.3	Average speed - light vehicles (km/hr)			
3.4	Average speed - heavy vehicles (km/hr)			
3.5	Average night speed (km/hr)			
3.6	15th centile speed (km/hr)			
3.7	85th centile speed (km/hr)			
3.8	Percentage vehicles in excess of speed limit	0.0	0.0	0.0
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2014/04/17 17:00:00	414
4.3	Highest volume in the East (vehs/hr)		2014/04/19 15:00:00	245
4.4	Highest volume in the West (vehs/hr)		2014/04/15 13:00:00	225
4.5	Highest volume in a lane (vehicles/hr)		2014/04/19 15:00:00	245
4.6	15th highest volume on the road (vehicles/hr)		2014/04/16 17:00:00	331
4.7	15th highest volume in the East direction (vehs/hr)		2014/04/23 11:00:00	189
4.8	15th highest volume in the West direction (vehs/hr)		2014/04/17 09:00:00	162
4.9	30th highest volume on the road (vehicles/hr)		2014/04/16 16:00:00	280
4.10	30th highest volume in the East direction (vehs/hr)		2014/04/17 11:00:00	151
4.11	30th highest volume in the West direction (vehs/hr)		2014/04/19 13:00:00	145
5.1	Percentage of vehicles less than 2s behind vehicle ahead			
6.1	Total number of heavy vehicles	2461	3029	5490
6.2	Estimated average number of axles per truck			
6.3	Estimated truck mass (Ton/truck)			
6.4	Estimated average E80/truck			
6.5	Estimated daily E80 on the road			
6.6	Estimated daily E80 in the East direction			
6.7	Estimated daily E80 in the West direction			
6.8	Estimated daily E80 in the worst East lane			0
6.9	Estimated daily E80 in the worst West lane			0
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

Typical Week Volume Report

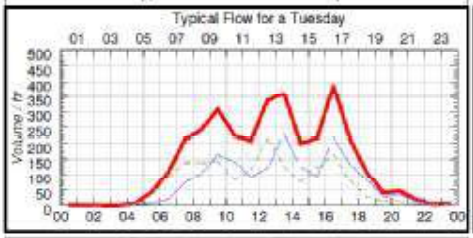
Site	: E0163 - George Airport 1
Region	: Eastern Cape
Actual Period	: 2014/04/14 to 2014/04/23
Classification	: RSA Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+

Total
To R404
To George Airport
Total
Light
Heavy

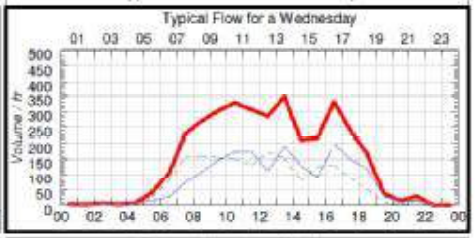
Typical Flow for a Monday



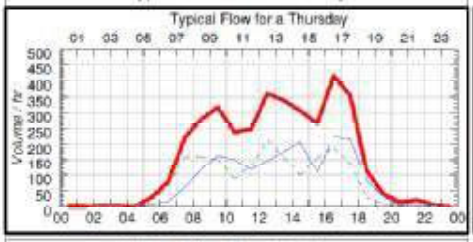
Typical Flow for a Tuesday



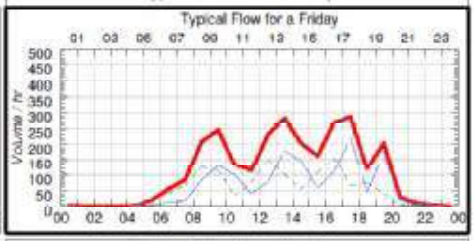
Typical Flow for a Wednesday



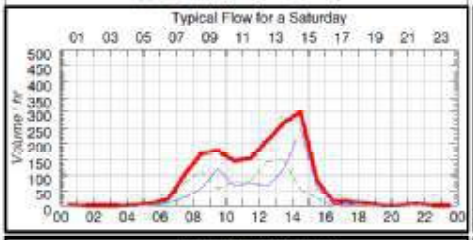
Typical Flow for a Thursday



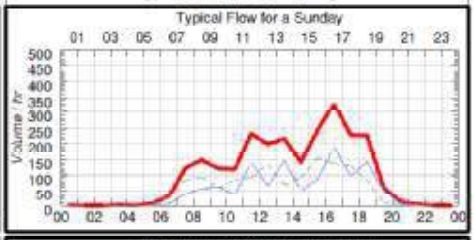
Typical Flow for a Friday

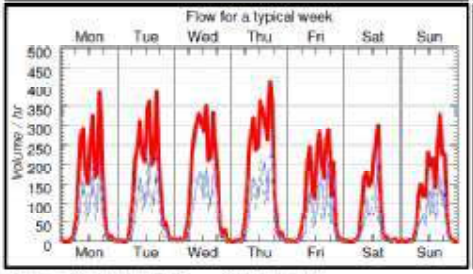


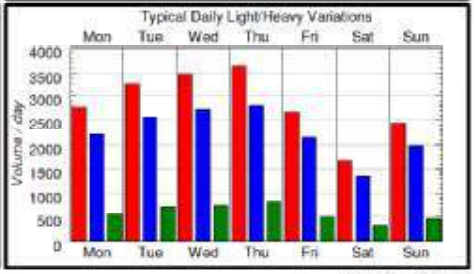
Typical Flow for a Saturday



Typical Flow for a Sunday







Annexure D

Comparison between alternative filling station locations

D1 Introduction

Eight Mile Investments 236 (Pty) Ltd is planning the development of Portion 4 of the Farm Gwayang No 208. The proposed development includes the development of a fuel service station.

There are two competing proposals for service stations in the immediate vicinity of the proposed service station. These facilities are located on Portion 131 and Portion 84 of the Farm Gwayang. The first mentioned site is located on the south-eastern quadrant of the intersection of provincial roads R102 and R404. The other site is located on the north-western quadrant of the R404 and the Airport access road intersection.

D2 Purpose

The purpose of this annexure is to evaluate the technical feasibility of the competing facilities as well as to compare the economic feasibility of alternative locations. The annexure therefore considers the potential of the three sites to serve the needs of road users and the local community including the Airport, other commercial land uses such as the quarry and various nurseries, residential areas such as Herolds Bay and Glentana as well as the farming community between George and Groot Brak.

D3 Methodology

In order to meet the mentioned purpose this document reports on the outcome of the following considerations:

- Impact of the alternatives on the local traffic and access to the Airport;
- Potential of alternatives to optimally serve the local market;
- Potential of the alternatives to serve the Airport Node.

The methodology used is to study all relevant planning documents for the area. These documents include the Spatial Development Framework for George as well as the Local Spatial Development Framework for the Gwayang area, local provincial road planning and development planning of the Airport Precinct. These documents provide detail on the planning framework within which Portion 4 should be integrated in order to ensure optimal benefits of future developments for the larger community as well as local stakeholders.

The Gwayang Local Spatial Development Framework refers to the Airport as Airport Zone and the land immediately to the east of the Airport as Airport Support Zone. This report makes use of this

terminology. The drawing attached in Figure A shows the Airport Zone marked in grey and the Airport Support Zone marked in dark blue.

The drawings used as figures were provided by Infrastructure Consulting Engineers (ICE), design engineers for the development.

D4 Traffic impacts

D4.1 Provincial road planning

Provincial road planning in the immediate vicinity of the Airport has a significant impact on the development of the Airport and Airport Support Zones. The drawing attached as Figure B shows detail of road planning in the Gwayang area. The proposed re-alignment of R404 as indicated on the drawing, has a major impact on the development planning of the mentioned zones. Access to land bordering the R404 and the R102 in the immediate area of the intersection of the two roads, is prohibited in terms of road planning. Lines of no access apply along the mentioned roads as shown on the development layout planning drawing attached in Figure C.

The road planning effectively limits access to the Airport Support Zone to the current intersection along the R404 where the Airport currently exclusively gains access to the major road network. At present this is a three legged at grade intersection. A fourth eastern leg to be added to the intersection will provide access to the Airport Support Zone.

D4.2 Impact on access to proposed service station or Portion 131

Resulting from the mentioned proclaimed provincial road planning, access to any possible service station at the south-eastern quadrant of the R102/R404 intersection is prohibited from both the R102 or the R404. Access to any development on this land will be via the internal road system of the proposed development on Portion 4. This indirect access to a potential service station renders the service station not feasible. Service stations are competing on the basis of convenience. This access arrangement results in a detour of approximately 300 m to gain access. This renders the site not financially feasible.

D4.3 Access to proposed service station on Portion 84

The proposed service station on ACSA land at the intersection of the main airport access road and provincial road R404 is proposed to take access from the main airport access and distribution road. The drawing attached in Figure D shows the proposed facility layout. The proposed access to the service station is via a mini-circle at a distance of approximately 60m from the main access intersection on the R404.

TRH 26: South African Classification and Access Management Manual, was compiled under the auspices of the Road Coordinating Body of the Committee of Transport Officials. This document provides guidance to national, provincial and municipal spheres of government on the functional classification of roads as well as how roads must be managed in order to function effectively.

In terms of TRH 26 provincial road R404 can be classified as a Class R2 rural road. Similarly, the main access road to the Airport is classified as a Class 4 road. In order to function effectively TRH 26 advises that intersections along Class 4 roads should be spaced at minimum distance of 150 m. (*Road Access Guidelines of the Provincial Administration Western Cape* advises a minimum spacing of 120 m.) This spacing requirement is proposed with specific reference to mobility and road safety considerations.

In contrast with the mentioned spacing requirements, the distance between the existing main access intersection to the Airport and the proposed intersection giving solely access to the proposed service station, is merely 60 m. See layout drawing in Figure E for spacing. The existing spacing between the main access intersection and the first intersection inside the Airport (to unscheduled flights) is 120 m. This existing condition does not meet the spacing requirements of TRH 26 of 150 m. It is therefore not in the interest of sound road management, mobility and road safety to add a further intersection on this road link at a spacing of merely 60 m to the main intersection on the R404 where the airport gains access.

Drawings in Figure F show the consequences of the turning manoeuvres of a large truck moving to and from the proposed service station onto the Airport main access road. The truck has to ignore the traffic circle as proposed by ACSA. This movement results in unsafe conflicts between the vehicle attempting to gain access to the service station and vehicles entering or leaving the Airport. This impact is merely one of several unacceptable impacts if spacing requirements proposed by TRH 26 are ignored.

Access from the road leading to unscheduled flights to the proposed service station on Portion 84 may however be possible. The drawing attached in Figure G shows the schematic layout to the proposed service station with access from the road to unscheduled flights. This possible solution will be subject to a detailed traffic engineering analysis and will have to be integrated into the road master plan for the Airport.

D5 Current problems experienced at the Airport access intersection

Access to the Airport is currently already problematic. The queue formation at the intersection is significant. The photo below was taken on 18 February 2017. It shows traffic queuing along the Airport approach. The queue stretches beyond the proposed traffic circle giving access to the service station on ACSA land.



Congestion at the Airport access and the resulting queue length will increase as the Airport passenger throughput increases. The limited frontage length of the proposed ACSA service station therefore warrants the development of a site at that location undesirable.

A further significant safety risk results from the lack of pedestrian facilities along the main Airport access and circulation road. This results in pedestrians walking in the basic lanes of the main Airport access and circulation road. The photo below shows a pedestrian walking along the Airport main access and circulation road in the vicinity of the proposed mini-circle to give access to the ACSA service station on Portion 84.



The congestion at the R404 intersection with queue formation and pedestrian movements combined with the limited access spacing proposed by ACSA contributes to road safety risks and mobility constraints.

D6 Public transport facilities

The Gwayang Local Spatial Development Framework specifically addresses the lack of public transport facilities at the Airport. The photo below shows an airport traveller approaching the Airport main building on foot after being dropped off at the main access intersection at the R404. It confirms the need for public transport not only for workers at the Airport but also airport passengers.

The road edge of the airport main access and circulation road (approaching the R404 from the Airport) provides an opportunity to provide a public transport layby. A layby in this position will be ideal for workers at the Airport Precinct.



The proposed mini-circle to give access to the proposed ACSA service station will make this option impossible.

D7 Access to proposed service station on Portion 4

Access to the proposed facility on Portion 4 is in accordance with the requirements of TRH 26 and the Road Access Guidelines of the Provincial Administration Western Cape. It will consequently have no adverse impacts on the road network. The proposed service station will have no impact on accessibility of the Airport. Refer to the drawing in Figure C for more detail.

D8 Serving the needs of road users

Background

A service station at the Airport or Airport Support Zone will serve transient traffic along R102 and R404. It will also serve local traffic generated by the Airport, future Airport Support Zone, commercial land uses such as nurseries and the quarry, residential areas such as Glentana, Herolds Bay, Oubaai and Fancourt as well as the local farming community between Groot Brak and George. The current east to west spacing of service stations between the service station in Groot Brak and the service stations in George is approximately 21 km. The residential, commercial and farming communities in this area is therefore poorly serviced.

Travellers returning hired vehicles to car hire operators at the Airport, will also make use of this facility. Some of the car hire companies will also utilise the facility.

The accessibility of the three alterative positions proposed for a service station must be evaluated with the potential market to be served in mind.

D8.1 Access to Portion 131

Access to the proposed facility on Portion 131 is indirect and inconvenient. It will be via the internal road system to be developed on Portion 4. This is inappropriate for the mentioned market segments. It is also inappropriate to route external traffic to a service station at that location via the internal road system of the proposed development on Portion 4. A service station in this location will therefore poorly serve the larger community.

D8.2 Access to Portion 84

A service station on Portion 84 is ideally located to serve traffic leaving the Airport. It will merely require a left-in and left-out manoeuvre. All other patrons will have to make right turn manoeuvres to enter the service station. This includes all vehicles entering the Airport as well as vehicles attracted from the R404 or R102. These right turn manoeuvres will be inconvenient and dangerous due to the limited spacing to adjacent intersections and congestion along this road link.

Accessing this site will be inconvenient for heavy vehicles. The large vehicle movement tracking as indicted on the attached drawing clearly points to the inconvenient access arrangement at this location. It is clear that the access will be ideal for a small section of the market, but inconvenient and dangerous for all other potential patrons.

The Gwayang Spatial Development Framework advocates facilities to be developed on ACSA land to relate to the basic functions of the Airport. A service station serving the larger community between Groot Brak and George is clearly not a basic function of the Airport.

The mandate of ACSA is to develop gateway precincts with associated commercial activities. It goes beyond the mandate of ACSA to compete with other service providers to provide for the non-airport related needs of the larger community between Groot Brak and George.

For reasons of road safety, mobility and proper planning the service station to be developed on Portion 84 can only gain access from the road leading to unscheduled roads. With an access in that location the service station will primarily serve airport related activities. It is ideally located to serve car hire companies and their patrons. A service station developed in this manner will also comply with the mandate of ACSA.

D8.3 Access to Portion 4

Access to the proposed facility on Portion 4 meets all road design guidelines and will be convenient for all road users attracted from the R404, R102 and the Airport.

D9 Airport – importance and future development potential

The Gwayang Local Spatial Development Framework dated November 2015 forms part of the George SDF. The document states: *"George Airport plays a significant role in the Southern Cape's tourism* industry *and whether directly or indirectly, creates and supports jobs and economic growth for the George area "* and *"Efficient airports are an essential part of the transport networks that all successful modern economies rely on. The George Airport is a crucial transport hub for the Southern Cape. As demand for travel increases, modern economies expect and demand a range of services and facilities at these transport hubs to improve their travel experience and to support their businesses. The George Airport is continuously improving on the service they render, which will also contribute to the development of the Southern Cape economy."*

It is further relevant to consider the rapid growth rate of George Airport. According to data published by Airports Company South Africa (ACSA) an average annual growth rate of 8.1% for passengers was noticed from 2013 to 2017. This rapid growth rate is adding substantial pressure on the exiting airport facilities. Passengers making use of the Airport is currently approximately 750 000 per annum.

In his State of the Nation Address of 16 February 2018 President Ramaphosa specifically mentioned the critical role to be played by tourism and the potential doubling of tourism in South Africa. In the interest of the future development of the Southern Cape's tourism industry it is important to plan the Airport with due allowance for future expansions. This Airport will continue to play an important role in the economy of the region.

It is unthinkable to jeopardise the long-term convenience, capacity and safety of the Airport road access system in lieu of the development of a petrol service station. The service station can be provided without any impact on the future development of the Airport within the proposed development of Portion 4.

D10 Conclusion and recommendations

Based on the current road and spatial planning of the Gwayang area that includes the Airport, the Airport Support Zone and the local residential, commercial and farming areas, it is clear that a service station must be developed on Portion 4. A service station serving the Airport with safe access from the road leading to unscheduled flights is also technically feasible and within the mandate of ACSA.

The following table summarises the conclusions as discussed above.

Consideration	Location	Notes	Score
Accessibility	Portion 131	Access indirect via development on Portion 4. Detour of 300 m to gain access	Poor
	Portion 84	Access from main Airport access road does not meet sound road planning guidelines. It will be unsafe and will impact on mobility. Access from the road to unscheduled flights may be technically feasible if properly integrated into the road master-plan for the Airport.	Poor
	Portion 4	Access convenient for all road users. Access via traffic circle at location of proposed service station.	Good
Road safety	Portion 131	Access via Portion 4 meets all road safety requirements.	Good
	Portion 84	Access does not meet requirements of TRH 26: South African Classification and Access Management Manual or Road Access Guidelines of the Provincial Administration Western Cape. Impacts negatively on road safety and mobility. Access via road to unscheduled flights may meet requirements of TRH 26 if properly integrated into the road master-plan of the Airport Zone.	Unacceptable
	Portion 4	Access meets provincial, national and international design guidelines.	Good
Long term development considerations	Portion 131	No impact on long term development of Airport and Airport Support Zone.	Good
	Portion 84	Negative impact on future development of Airport road access system. Negative impact on future public transport facilities.	Unacceptable
	Portion 4	No impact on future development of Airport or Airport Support Zone.	Good
Ability to serve	Portion 131	The facility will not be able to serve the market due to indirect access.	Poor
	Portion 84	Ability to serve heavy vehicles poor due to constrained access via mini-circle. Ability to serve vehicles exiting Airport is good through left-in-left-out movement.	Unacceptable

		Ability to serve all other road users is poor due to substandard access along congested road link. Ability to serve all Airport related patrons via access from road leading to unscheduled flights is good.	
	Portion 4	Facility will serve the market well due to properly designed access system in accordance with National and Provincial road design guidelines.	Good
Impact on long term development of Airport	Portion 131	No impact.	Good
	Portion 84	Significant impact on development potential of the Airport due to limited spacing along main access to Airport. Impacts on mobility and road safety along main Airport access and circulation road.	Unacceptable
	Portion 4	No impact.	Good

The proposed location for the development of a service station on Portion 131 is not acceptable due to poor and inconvenient access via the proposed internal road system of Portion 4.

The proposed ACSA facility on Portion 84 is flawed due to the non-compliance of the proposed access mini-circle with national and provincial road design guidelines. Access via the road to unscheduled flights is however acceptable and will serve Airport related land uses.

The proposed facility on Portion 4 will meet all the road access requirements and will optimally serve the local market, including the residential, farming and commercial land uses.

Figure A

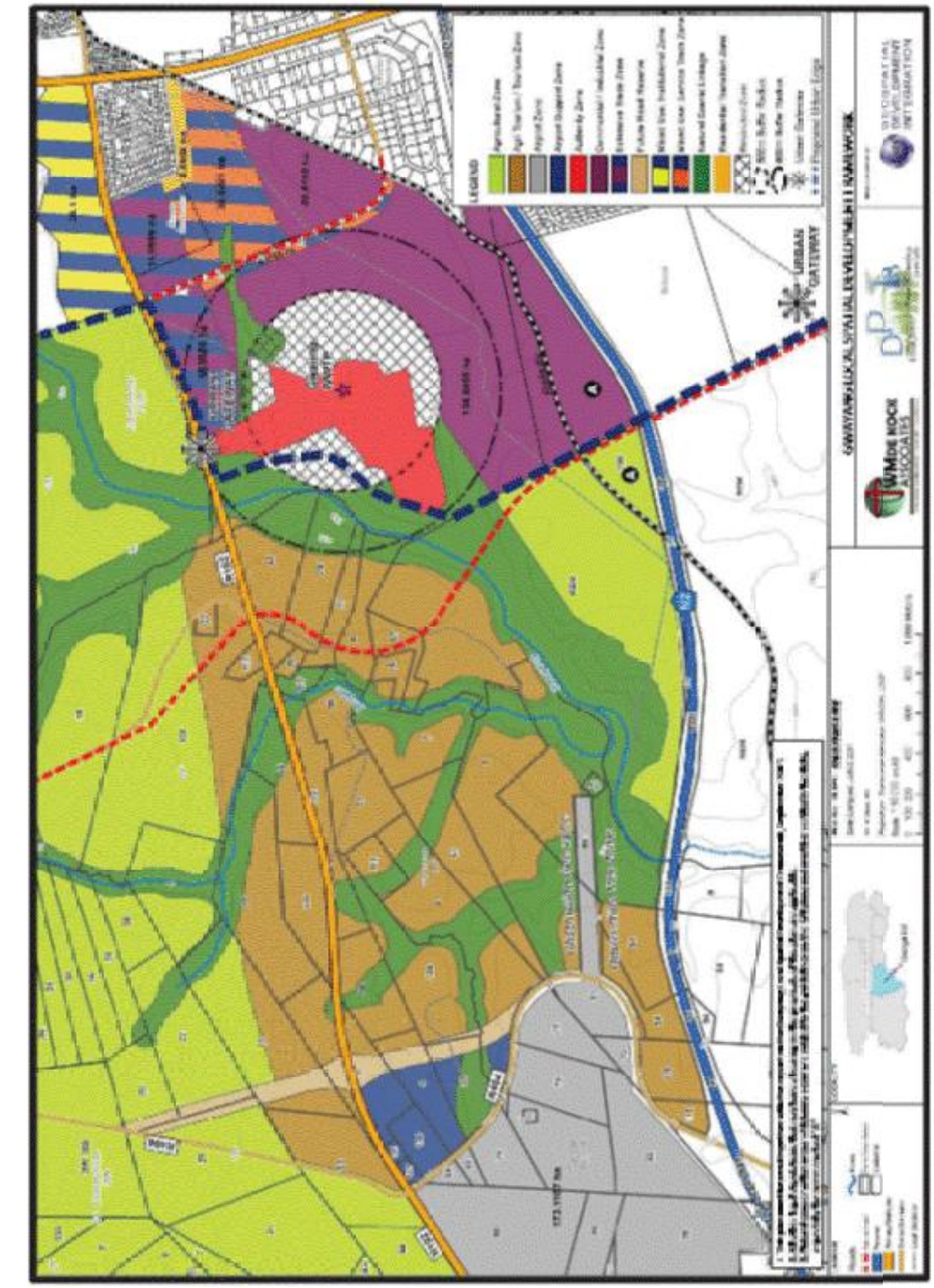


Figure B

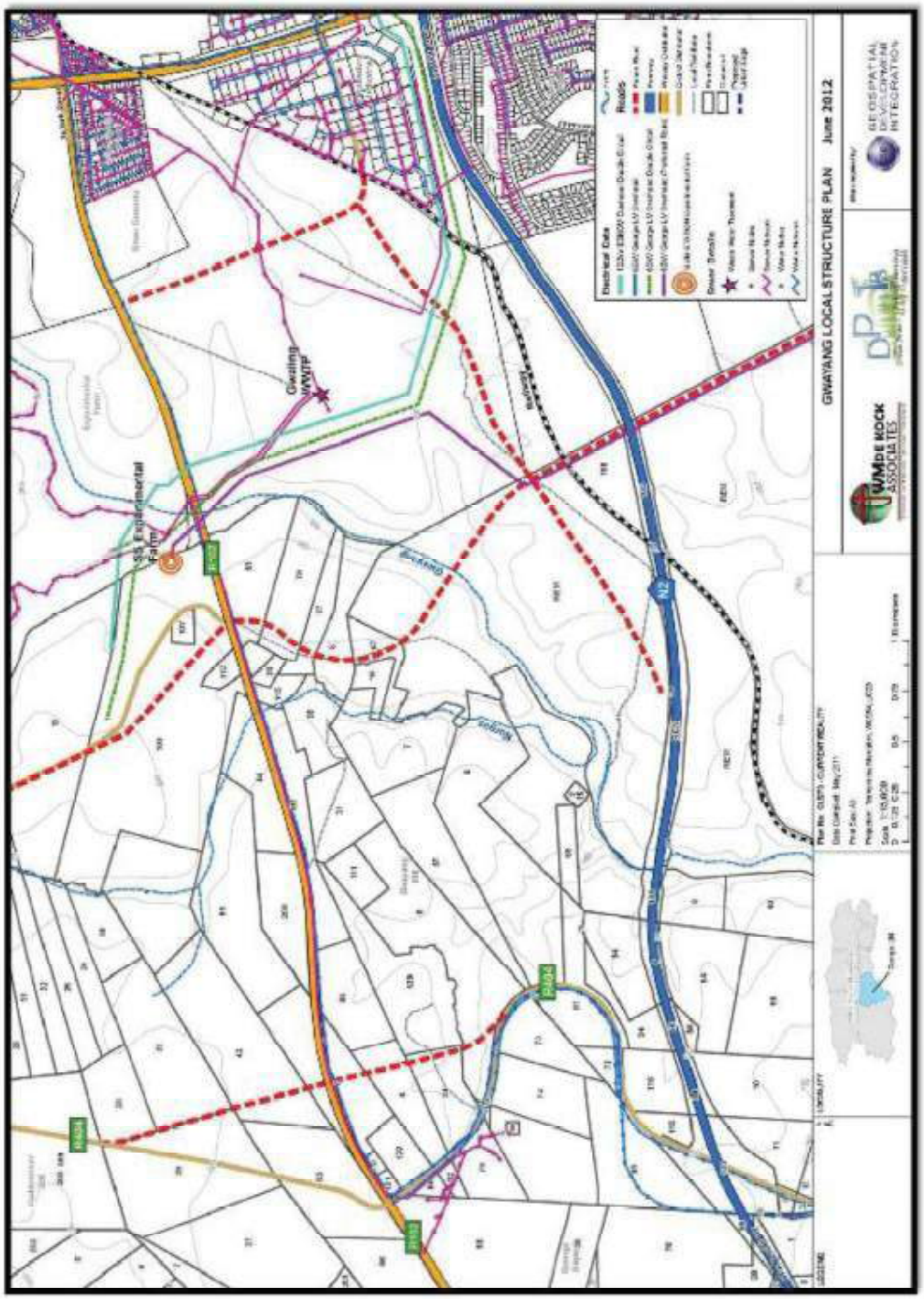


Figure C

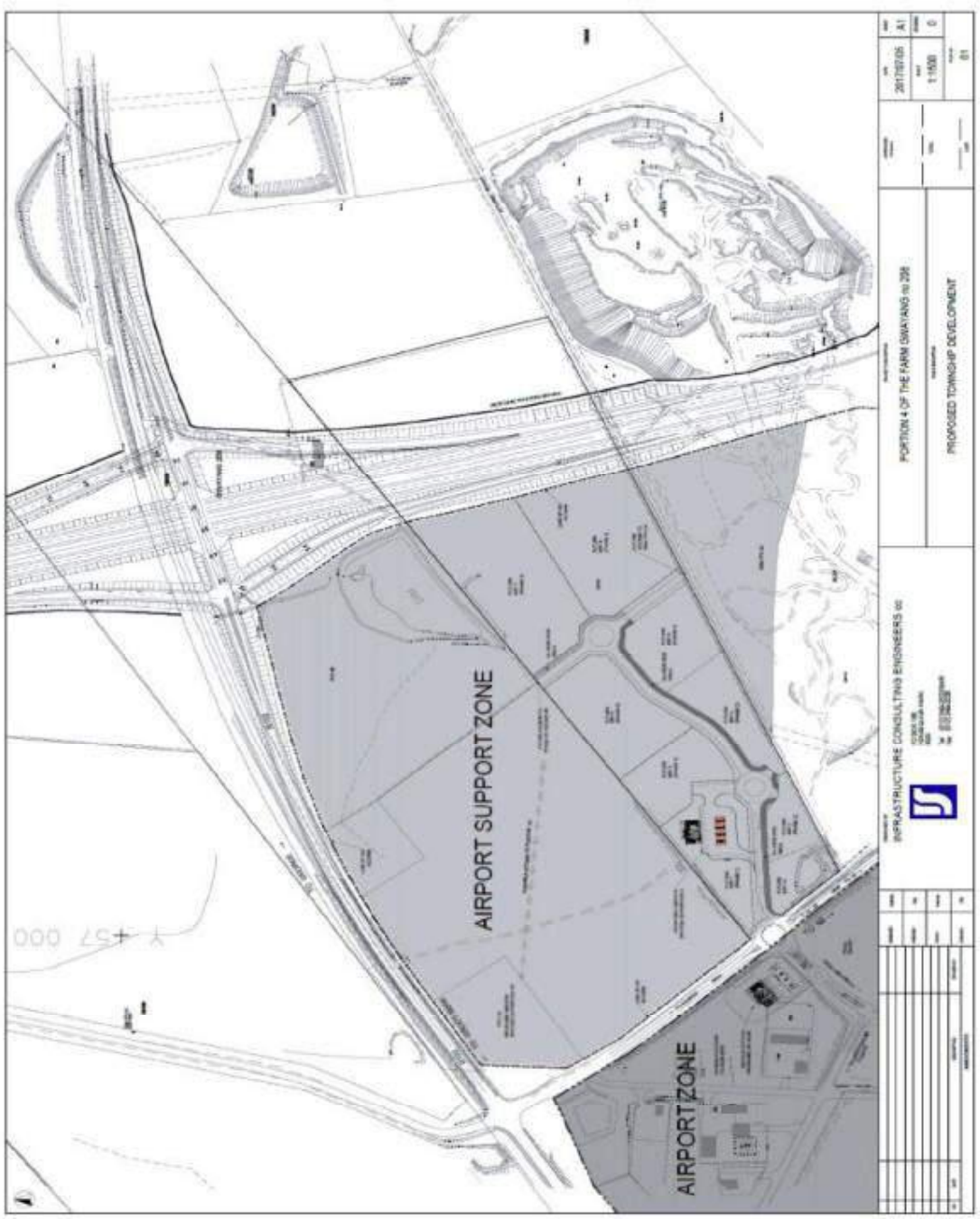

AIRPORT SUPPORT ZONE
AIRPORT ZONE
PROPOSED TOWNSHIP DEVELOPMENT

Figure D

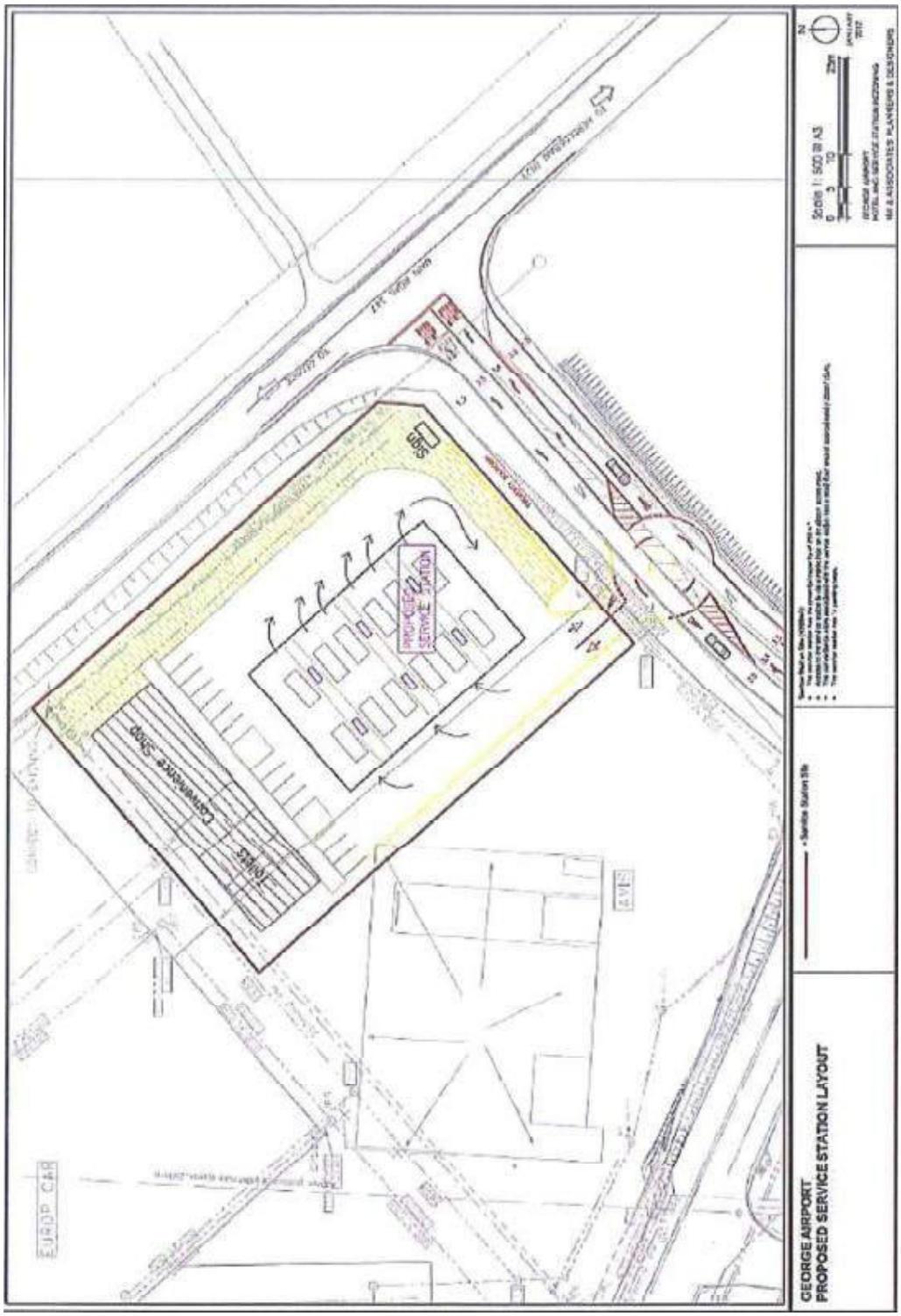

GEORGE AIRPORT
PROPOSED SERVICE STATION LAYOUT
PROPOSED SERVICE STATION
CONVENIENCE SHOP
EUROP CAR

Figure E

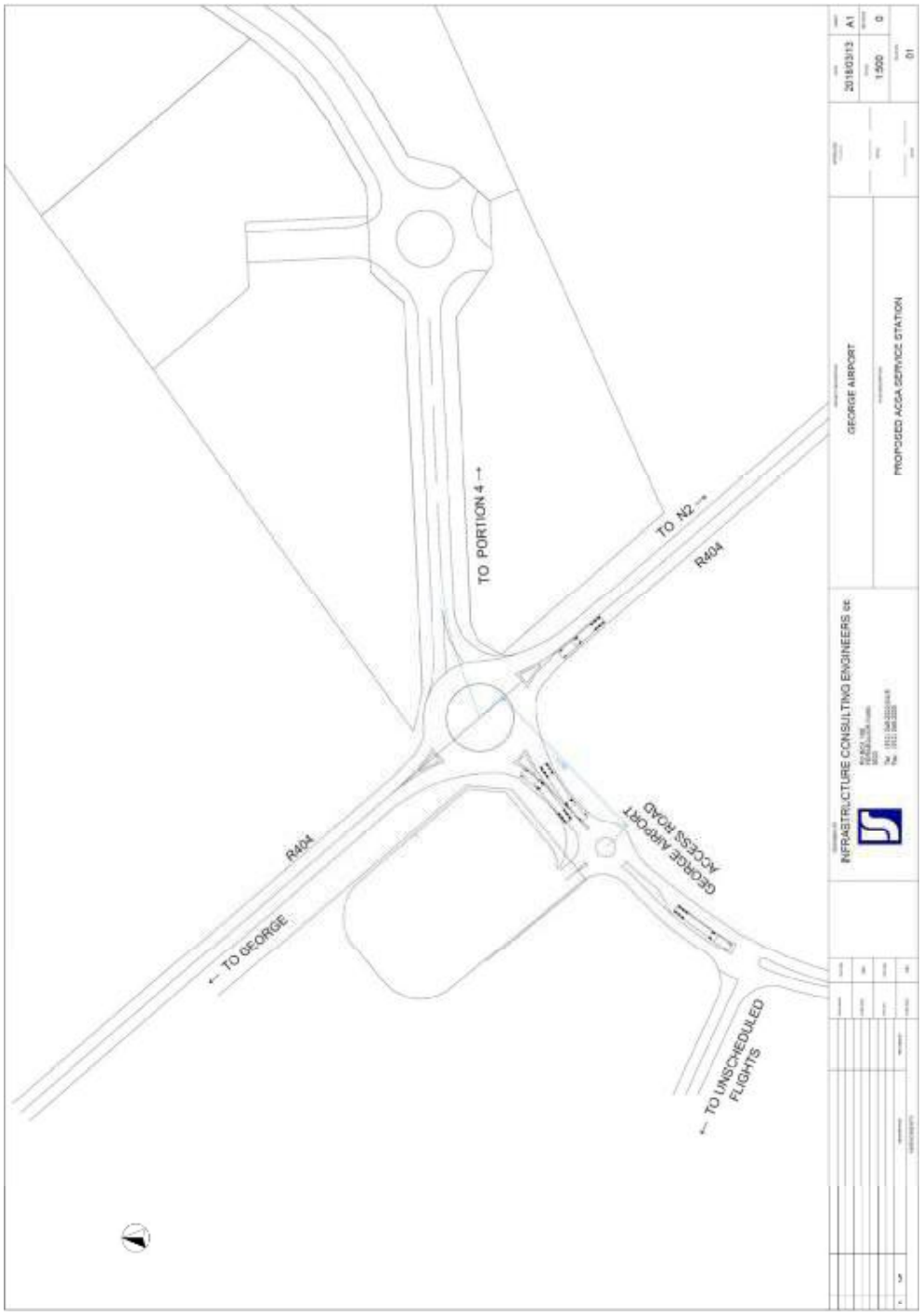

TO PORTION 4 →
TO N2 →
R404
R404
← TO GEORGE
GEORGE AIRPORT ACCESS ROAD
← TO UNSCHEDULED FLIGHTS
INFRASTRUCTURE CONSULTING ENGINEERS cc
GEORGE AIRPORT
PROPOSED ACSA SERVICE STATION

Figure F


LEGEND:
EXISTING BIG TREES
INFRASTRUCTURE CONSULTING ENGINEERS cc
GEORGE AIRPORT
NM & ASSOCIATES LAYOUT PLAN TRACKING WITH INTERLINK
2017/03/23
A1
1:250
0
01

Figure G


INFRASTRUCTURE CONSULTING ENGINEERS cc
GEORGE AIRPORT
PROPOSED ACCESS TO SERVICE STATION ON PORTION 84
FROM ROAD TO UNSCHEDULED FLIGHTS
2017/03/23
A1
1:250
0
01

Annexure E

TMH 16 Requirements Check List

Stated requirements per TMH16 Volume 1 with paragraph numbers	Comments / information
A2.2 Traffic Impact Assessment cover	
2.2.1 The Traffic Impact Assessment must be provided with a cover page that provides information identifying the traffic assessment.	Done:
2.2.2 The following information must be shown on the cover page:	
a) Municipality name	George Municipality
b) Type of assessment	Traffic Impact Assessment
c) Particulars of the town planning application, township name	Subdivision and rezoning
d) Erf numbers and farm names	Portion 4 Gwayang 208
e) Date of report.	March 2018
f) Name and address of the Assessor and/or firm.	L Roodt Pr Eng
A2.3 Cover letter	
2.3.1 A cover letter shall be bound into the assessment (first page following the cover) that includes the following certification: It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.	See page following cover page
2.3.2 The letter shall be signed by a person qualified to undertake traffic assessments. The following information must be provided for this person:	
a) Name, address and telephone numbers.	
b) ECSA Registration and registration number.	Louis Roodt Pr Eng
c) Academic qualifications	820425
A2.4 Development particulars	PhD Civil Engineering
2.4.1 The following information must be provided for the development:	
a) Trade name of the development (where available).	
b) Erf numbers and farm names.	
c) Street address of development, including suburb.	Not Available
d) Reference to the land-use application (where available).	Portion 4 Gwayang 208
2.4.2 A location plan must be provided showing the location of the development.	NA
2.4.3 Where applicable, references to any previously submitted and approved traffic assessments for the property must be provided.	See page 2
2.4.4 The following information must be provided for the existing land-use rights (exercised and not exercised) as well as the land-use rights applied for:	No previous assessment or studies for this property
a) Total site area in m2.	
b) Floor Space Ratio (FSR), Floor Area Ratio (FAR) and Gross Leasable Area (GLA).	Page 4 to 7
c) Size of development per land use type and in the units specified in the Trip Data Manual.	Page 4 to 7
2.4.5 Information must also be provided on the expected date and phasing of development. For each phase, the following information must be provided:	Page 4 to 7
a) Envisaged date of implementation.	Page 7
b) Size of development per land use type per phase of development.	2018 see page 7
	Page 7 and 8

2.4.6 The report shall refer to the master plan on which it relies and must include a statement on whether the total land-use rights applied for comply with the spatial development framework for the area.	George Spatial Development Framework 2013 Gwayang Local Spatial Development Framework (November 2015)
A2.5 Primary study area	
A2.6 Secondary study area	Page 9 to 12
A2.7 Background information	Page 13
a) Spatial development framework.	Page 13
b) Road network master plan.	George and Gwayang SDF
c) Functional road hierarchy plan.	George Roads Master Plan, 2006
d) Traffic management plan.	Ditto
e) Public transport plan.	George Sector Plans and IDP
f) Modelled traffic demand.	Not Applicable
g) Other traffic impact and site traffic assessments in the area.	Sturgeon Consulting 2012 for ACSA
A2.8 Site investigations	Page 15
A2.9 Traffic demand estimation	Page 19 and 20
A2.10 Demand-side mitigation	Page 19
.	
A2.11 Proposed improvements	Page 20
A2.12 Traffic Impact Assessment	Page 23
2.12.1 The Traffic Impact Assessments must be undertaken for the following scenarios:	
a) Design horizon year assessments, undertaken with the purpose of establishing the mitigating measures that are required to accommodate the development.	2022
i) "Without" proposed mitigating measures, undertaken to show the need for mitigating measures.	Existing situation
ii) "With" proposed mitigating measures, undertaken to show whether the proposed measures will be effective in addressing the impacts of the development.	Page 25
b) Planning horizon year assessments, undertaken with the purpose of establishing whether it will be physically possible to accommodate the proposed as well as future developments provided for in the spatial development frameworks of the Municipality.	2035
A2.13 Improvement costs (external services)	Page 33
A2.14 Engineering Service Contributions	Page 33
A2.15 Conclusions and recommendations	Page 34

Floor Factor means a factor (expressed as a numerical factor) which is prescribed for the calculation of the maximum floor space of a building or buildings permissible on a land unit, and if the floor factor is known, the maximum permissible floor space can be calculated by multiplying the floor factor by the area of the land unit;

Floor space in relation to any building means the area of the floor which is covered by a slab, roof or projections; provided that:
(i) Any area, including a basement, which is reserved solely for the parking or loading of vehicles shall be excluded;
(ii) External entrance steps and landings, any stoep and any area required for external fire escapes shall be excluded;
(iii) A projection of eaves, and a projection which acts as a sunscreen or an architectural feature, which projection does not exceed 1,0 m beyond the exterior wall or similar support shall be excluded;
(iv) Any common pedestrian thoroughfare which is not covered by a roof, which provides access through a building concerned from parking, public street or open space, to some other parking, public street or open space, and which is accessible to the general public during normal business hours, shall be excluded;
(v) Any covered area outside and immediately adjoining a building at or below the ground floor level, where such paved area is part of a forecourt, yard, external courtyard, pedestrian walkway, parking area or vehicular access, and which is permanently open to the elements on at least the front or the side(s), shall be excluded;
(vi) Subject to clause (vii), any stairs, stairwells and atriums that are covered by a roof, shall be included;
(vii) In the case of multi-level buildings, any stairwells, lift wells, light wells or other wells, and any atrium, shall only be counted once;
and provided further that floor space shall be measured from the outer face of the exterior walls or similar supports of such building, and where the building consists of more than one level, the total floor space shall be the sum of the floor space of all levels, including that of basements;

Gross leasable area means the area of a building designed for, or capable of, occupancy and control by owners or tenants, measured from the centre line of the joint partitions to the inside finished surface of the outside walls, and shall exclude the following:
(i) All exclusions from the definition of floor space;
(ii) Toilets;
(iii) Lift shafts, service ducts, vertical penetrations of floors;
(iv) Lift motor rooms and rooms for other mechanical equipment required for the proper functioning of the building; and
(v) Interior parking and loading bays;

ANNEXURE G:

Civil Services Report

CIVIL ENGINEERING SERVICES REPORT FOR THE REZONING / SUBDIVISION APPLICATION I.T.O. THE GEORGE BY-LAW ON MUNICIPAL LAND USE PLANNING

- Revision 6 -

Farm Gwayang 208 Portion 4 George

July 2018

Prepared for:

8 Mile Investments (Pty) Ltd
PO Box 1163
Rynfield
Benoni

Prepared by:

F van Zyl (Pr Eng Civil)
ECSA 96

S19
planning · design · engineering

Content

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2. Site description
3. Civil engineering services
    - 3.1 Water supply
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    - 3.3 Access & Storm water control
    - 3.4 Electrical supply
    - 3.5 Solid waste management
4. Conclusion
5. Limitations
6. Annexure
    - Annexure I: Locality plan / Aerial photograph (Studio19, April 2017)
    - Annexure II: Site photographs (Studio19, April 2017)
    - Annexure III: Site development / Subdivision Plan (Vreken, 24 March 2017)
    - Annexure IV: Civil engineering schematic services layout (Studio19, June 2018)
    - Annexure V: Sewer pump station / Protection of pipe lines at water course crossings - Schematic layout (Studio19, June 2018)
    - Annexure VI: Preliminary operational / maintenance plan for sewer system (Studio19, June 2018)

1. Scope of works

The owner of Portion 4 of the farm Gwayang 208 has appointed Fritz van Zyl (Pr. Eng [Civil] - ECSA 960570) to investigate and evaluated the provision for essential civil engineering services for the proposed filling station / retail facility / industrial zone development on the above property in the George municipal district. The primary objective of the investigation was to ensure that the proposed development will be sustainable in terms of service provision and to evaluate the impact on the existing municipal services network.

The following documents are attached for consideration / information:

- Locality plan (Studio19, November 2017)
- Aerial photograph (Studio19, April 2017)
- Site development / Subdivision Plan (Vreken, November 2017)
- Engineering services plan – Revision 5 (Studio19, July 2018)
- Schematic layout of proposed Sewer pump station / Protection of pipe lines at water course crossings - (Studio19, June 2018)
- Preliminary operational / maintenance plan for sewer system (Studio19, June 2018)
- Site photographs (Studio19, April 2017)

This memorandum outlines the required information of the selected engineering services for the proposed development and supports the necessity and desirability of the application in order to obtain the approval from the relevant authorities in terms of Spatial Planning Land Use Management Act (SPLUMA 16/2013) and the Land Use Planning Act (LUPA 3/2014).

2. Site description

The attached Locality / Site development plans (Annexure I & III) illustrate the existing site and the proposed preferred development of the proposed filling station / retail facility / Industrial Zone on Portion 4 of the farm Gwayang 208

A recent aerial photograph (March 2017) and on-site photographs are also attached.

3. Engineering services

The provision for essential engineering services for the proposed development has been investigated and evaluated according to the provisions of the current national and municipal standards and regulations (i.e. 'Guidelines for the provision of Engineering Services for residential townships, 1983' & 'The Human Settlement Planning and Design Handbook, 2000'). The investigation centred around the utilization / upgrading of the existing services along the R404 adjacent to the development site i.e. municipal water supply, municipal sewer line / pump station and solid waste disposal for the proposed preferred alternative. The proposed road access, storm water control and the electrical services are dealt with in separate reports (see Roodt - March 2018, Infrastructure Consulting Engineers - June2018, Clinkscales Maughan Brown - March 2017)

It is proposed that all connections to the existing municipal services (as indicated on the Proposed Services Schematic Layout Plan attached as Annexure IV) be provided according to the relevant engineering standards and to the satisfaction of the Municipality of George. The existing services and the applicable upgrades are briefly discussed below:

3.1. Water supply

Potable water will be supplied (via a new 160mm uPVC pipe) from the existing reticulation system feeding from the existing municipal water supply line along the R404 near the entrance to the George airport. Way leave approval from the relevant Provincial departments will be required in order to traverse (i.e. horizontal directional drilling) under the existing R404 provincial road.

The following estimations of the basic potable water requirements (i.e. average demand) for Phase 1 i.e. business zone (kitchen / toilets / wash up / car wash) and Phase 2 i.e. industrial zone (warehouse toilets & wash up areas) were calculated:

- *<u>Phase 1:</u> Business Erf x1 (i.e. Filling station / Retail facility): AADD =* ***20 kl/day*** *@* ***1.5 l/s*** *peak flow and storage requirement [2x Average daily demand + Fire Storage (High Risk – 6 hours @ 1500l/min)] =* ***760m^3***
- *<u>Phase 2:</u> Industrial Plots x7 (i.e. Warehousing / Airport services): AADD =* ***160 kl/day*** *@* ***1.5 l/s*** *peak flow and storage requirement [2x Average daily demand + Fire Storage (Moderate Risk – 4 hours @ 1500l/min)] =* ***600m^3***

All water supply pipes will be installed within the proposed access road reserve and all shallow pipe depths at water course crossings (i.e.<1m) will necessitate additional hard layer protection in the road design in order to protect pipes against storm water and heavy vehicle damage. The required construction method statements, rehabilitation and maintenance plan will be finalised after the design of the water supply network has been completed and approved by the Municipality of George. The rehabilitation plan for the road construction will include the installation of the water supply network.

Initial discussions with George Municipality indicated that the existing network should have the capacity to accommodate the proposed development of the proposed filling station / retail facility and no upgrade of the existing main water supply line will be required.

In order to minimize the impact on the municipal supply it is proposed that mandatory rainwater storage be implemented and furthermore to ensure sufficient capacity in the storage tanks (i.e. 10kl / site minimum) to accommodate all the on-site flushing toilet and garden irrigation requirements. Water saving measures including aerated taps and dual flush toilets will also be implemented.

Fire flow requirements will be supplied as per NBR / SANS minimum requirements and will include fire extinguishers and hose reels @ 300kPa water pressure and a minimum flow rate of 1500 l/min. It is recommended that a flow test be conducted over a 24 hour period in order to determine if the existing municipal supply line can accommodate this additional water requirement.

The alignment of the existing water supply line and the proposed new connection is indicated on the attached Engineering Services Plan (Studio19, June 2018). Potential future developments to the north and south of Portion 4 of the farm Gwayang 208 will be able to feed from the proposed water supply network

assuming that similar type developments / quantities are envisaged. Further discussion with adjacent landowners will be required to formalise an agreement regarding future water supply connections and cost.

3.2. Sewage

Preliminary calculations indicate that the proposed preferred development for Phase 1 i.e. business zone (kitchen / toilets / wash up areas) and Phase 2: i.e. Industrial zone (warehouse toilets & wash up areas) will generate the following average daily wastewater quantities:

- *Phase 1: Business Erf x1 (i.e. Filling station / Retail facility):* ***15 kl/day*** *@* ***0.15 l/s*** *peak flow*
- *Phase 2: Industrial Plots x7 (i.e. Warehousing / Airport services):* ***120 kl/day*** *@* ***1.2 l/s*** *peak flow*

The wastewater generated for phase 1 will be conveyed via a gravity sewer collector system (110mm uPVC @ min 1:60 gradient) into a 160mm uPVC gravity line (@min 1:60 gradient) which in turn will traverse the R404 Provincial Road towards the existing municipal sewer pump station located near the entrance of the George airport. Initial discussions with George Municipality indicated that the existing municipal network should have the capacity to accommodate the proposed development and no upgrade of the existing pump station or sewer line will be required.

Phase 2 of the proposed development (i.e. Industrial zone) will include a 63/110mm uPVC pump line that will spoil into the gravity sewer collector system. The pump station will include a back-up pump / power supply and telemetric system that will automatically activate and sound an alarm in case of a pump and/or power failure. The operational plan for the pump station will incorporate a 24hr response team that will monitor and attend to all maintenance issues. All emergency or accidental spills form the pump station will be discharged into an underground conservancy tank with a 48 hour storage capacity. The schematic layout of proposed sewer pump station is attached as Annexure V.

All sewer pipes will be installed within the proposed access road reserve and all shallow pipe depths (i.e.<1m) at water course crossings will necessitate additional hard layer protection in the road design to protect pipes against storm water and heavy vehicle damage (see attached concept drawings attached under Annexure V). Way leave approval from the relevant Provincial departments will be required in order to install (i.e. horizontal directional drilling) the proposed sewer under the existing R404 provincial road. The total length of the new proposed sewer network will be approximately 700m. The required construction method statements, rehabilitation, operational and maintenance plans will be finalised after the design of the sewer system has been completed and approved by the Municipality of George. The rehabilitation plan for the road construction will include the installation of the sewer system. A preliminary operational / maintenance plan for the proposed sewer system is included as Annexure VI.

All surface water / rain water from the forecourt / car wash areas of the proposed filling station will be intercepted via pavement kerbing into storm water traps that will discharge into a pollutant treatment and natural filter system. The proposed pavement design, storm water control requirements, spill management and the proposed natural filter system for the filling station area are discussed in a separate report from Infrastructure Consulting Engineers (ICE, June 2018).

As with the water supply network it is also envisaged that potential future developments to the north and south will be able to feed into the proposed sewer system (assuming similar type developments / quantities). Further discussion with adjacent landowners will be required to formalise an agreement regarding future sewer connections and maintenance.

The position of the new sewer line / pump line and possible future connection points are indicated on the attached Engineering services plan (Annexure IV).

3.3. Access & parking / Storm water control

The proposed development has on entrance point from the adjacent Provincial / Activity road (R404) and the Traffic Impact Statement, the proposed road / parking requirements and associated storm water control measures are described in separate reports (Roodt, March 2018 / ICE, June 2018).

The locations of the existing roads and the proposed road upgrade and parking areas are illustrated on the attached Site Development plan (Annexure III).

3.4. Electrical supply

The Electrical Services for the proposed preferred alternative is dealt with in a separate report (see Clinkscales Maughan-Brown, REF 11689, March 2017)

3.5. Solid waste management

The National Environmental Management legislation i.e. Waste Act (Act No. 59 of 2008) covers all aspects relating to waste management and will be adhered to in conjunction with the regulations / guidelines of the new Eden Municipality Integrated Waste Master Plan that will manage the delivery of all solid waste (via the George transfer station) to the proposed new district landfill site near Mossel Bay.

The removal of all solid general waste by Municipal contractors will take place from the mandatory enclosed waste service yards at each of the service station / light industrial erven and will be accessible from the access road. Solid waste quantities for commercial / light industrial purposes are based on an estimated solid general waste generation of 0.1kg/m2/day and it is expected that Phase 1 (i.e. service station) will generate approximately 100 kg/day and Phase 2 (i.e. light industries) in the order of 3500 kg/day. The removal of domestic / general waste and management thereof will be handled by the George Municipality as per the Services Agreement between with the developer / owner of property.

Waste reduction, re-use & recycling in terms of Eden Municipality Integrated Waste Master Plan will be strongly encourage and mandatory separate recycle bins for the various type of recyclable materials will be provided in waste collection yards on all the commercial / industrial properties. These bins will be emptied by approved recycling service providers.

All hazardous and industrial waste will be disposed of by registered service providers in terms of the regulations of the Waste Act (Act No. 59 of 2008) and the Hazardous Substances Act (Act 5 of 1973). No burning, on-site burying or dumping of any type of waste will be allowed.

All solid waste generated during the construction process will be separated and placed in appropriate containers in the bulk waste collection area in the Contractors camp and will be cleared weekly by a recognised service provider. Litter collection bins will be provided within the Contractors camp and at temporary locations on the construction site and will be regularly cleared. All unutilised construction materials will be removed once construction has ended. All removed topsoil should be stockpiled on-site and as far as possible be reused for rehabilitation and landscaping purposes in and around the development.

4. Conclusion

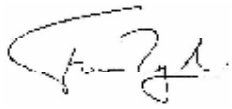
It is the intend of this memorandum to provide essential background information regarding selected civil engineering services for the proposed filling station / retail facility and industrial zone development on Portion 4 of the farm Gwayang 208 and present the proposed activity as a well needed and sustainable in terms of the provision of the required civil engineering services.

In conclusion the proponents want to emphasize their willingness to include in their project planning and design all necessary consultation and alternatives to ensure all raised concerns are addressed and mitigated.

5. Limitations

This report has been prepared for the sole benefit of the current owners of the property as described above. It is not to be relied upon or used out of context by any other person without reference to the undersigned. The recommendations and opinions given in this report are based on limited site data and variations in the conditions could exist across the site.

Signed on behalf of the proponent:



Fritz van Zyl

Pr.Eng (ECSA 960570)

.....



Annexure I:

Locality plan / Aerial photograph

Annexure II:

Site photographs

Annexure III:

Site development / Subdivision Plan

Annexure IV:

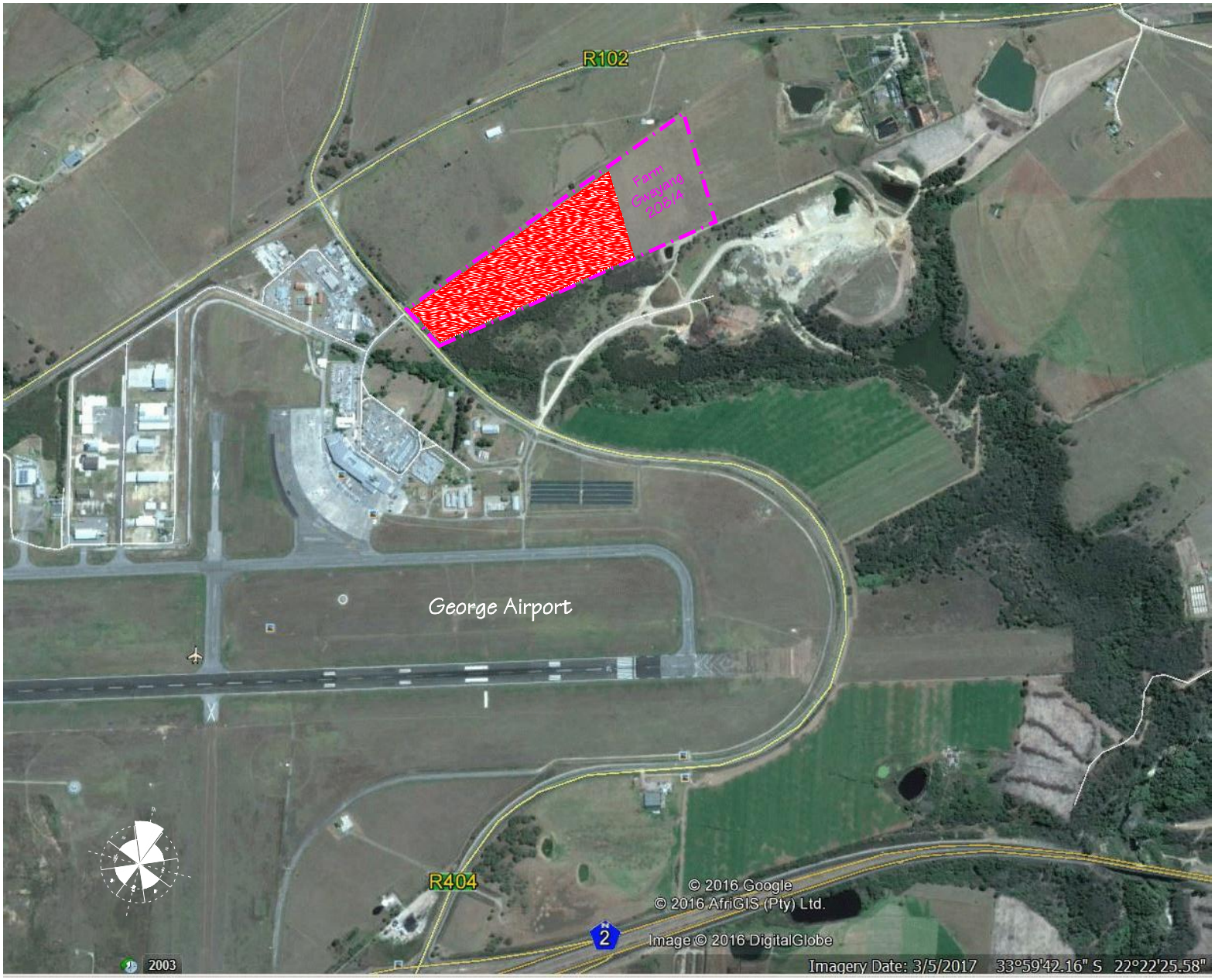
Engineering services schematic layout plan

Annexure V:

Sewer pump station / Pipe line detail - Schematic layout (Studio19, June 2018)

Annexure VI:

Preliminary operational / maintenance plan for sewer system (Studio19, June 2018)



Notes:

Farm 208/portion 4 boundary

Proposed development area

Project: Gwayang 208 / Portion 4 George

Drawing: Locality Plan

S19

Scale: (as shown)

Date: Oct '17

Dwg no: GRG208/E1





Notes:

Project: Gwayang 208 / Portion 4 George

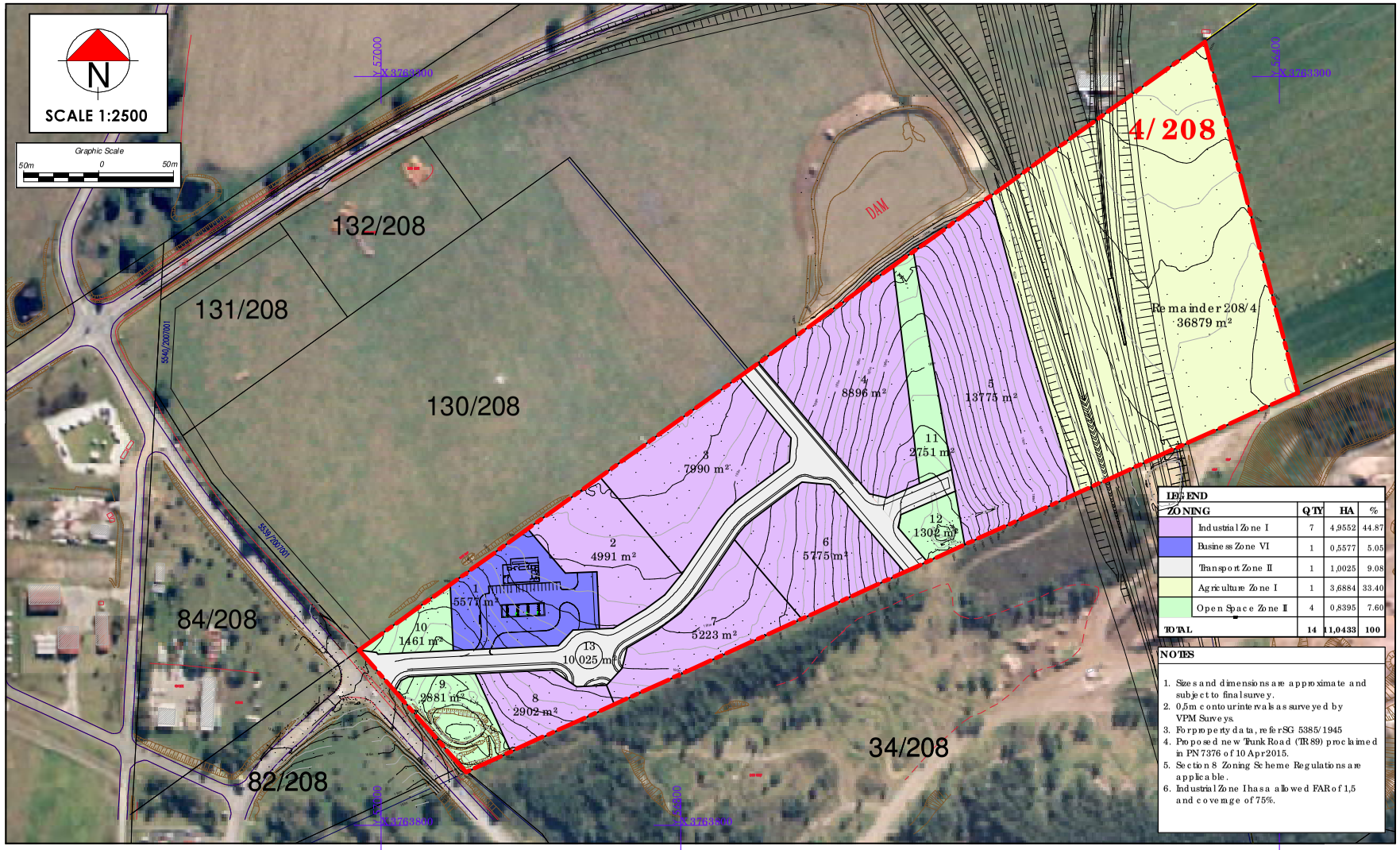
Drawing: Site photographs

S19

Scale: (as shown)

Date: Apr '17

Dwg no: GRG208/E2



LEGEND				
ZONING		QTY	HA	%
	Industrial Zone I	7	4,9552	44.87
	Business Zone VI	1	0,5577	5.05
	Transport Zone II	1	1,0025	9.08
	Agriculture Zone I	1	3,6884	33.40
	Open Space Zone II	4	0,8395	7.60
TOTAL		14	11,0433	100

NOTES

1. Sizes and dimensions are approximate and subject to final survey.
2. 0,5m contour intervals as surveyed by VPM Surveys.
3. For property data, refer SG 5385/1945
4. Proposed new Trunk Road (TR 89) proclaimed in PN 7376 of 10 Apr 2015.
5. Section 8 Zoning Scheme Regulations are applicable.
6. Industrial Zone I has a allowed FAR of 1,5 and coverage of 75%.

PLAN 4

SUBDIVISION PLAN

Portion 4 of the Farm Gwayang No 208, Division George

APPROVED IN TERMS OF SECTION 23(1) OF THE GEORGE MUNICIPALITY'S BY-LAW ON MUNICIPAL PLANNING AS PUBLISHED IN P.N. 7481/2015 ON 1 SEPTEMBER 2015

MUNICIPAL MANAGER

DATE: _____

DRAWN:	MV	CHECKED:	MV
PLAN NO:	Pr16/48P208Ptn4Sub 05		
PLAN DATE:	27 Nov 2017		
STORED:	z:\drawings\App\Pr16 48P208Ptn4Sub05.drg		

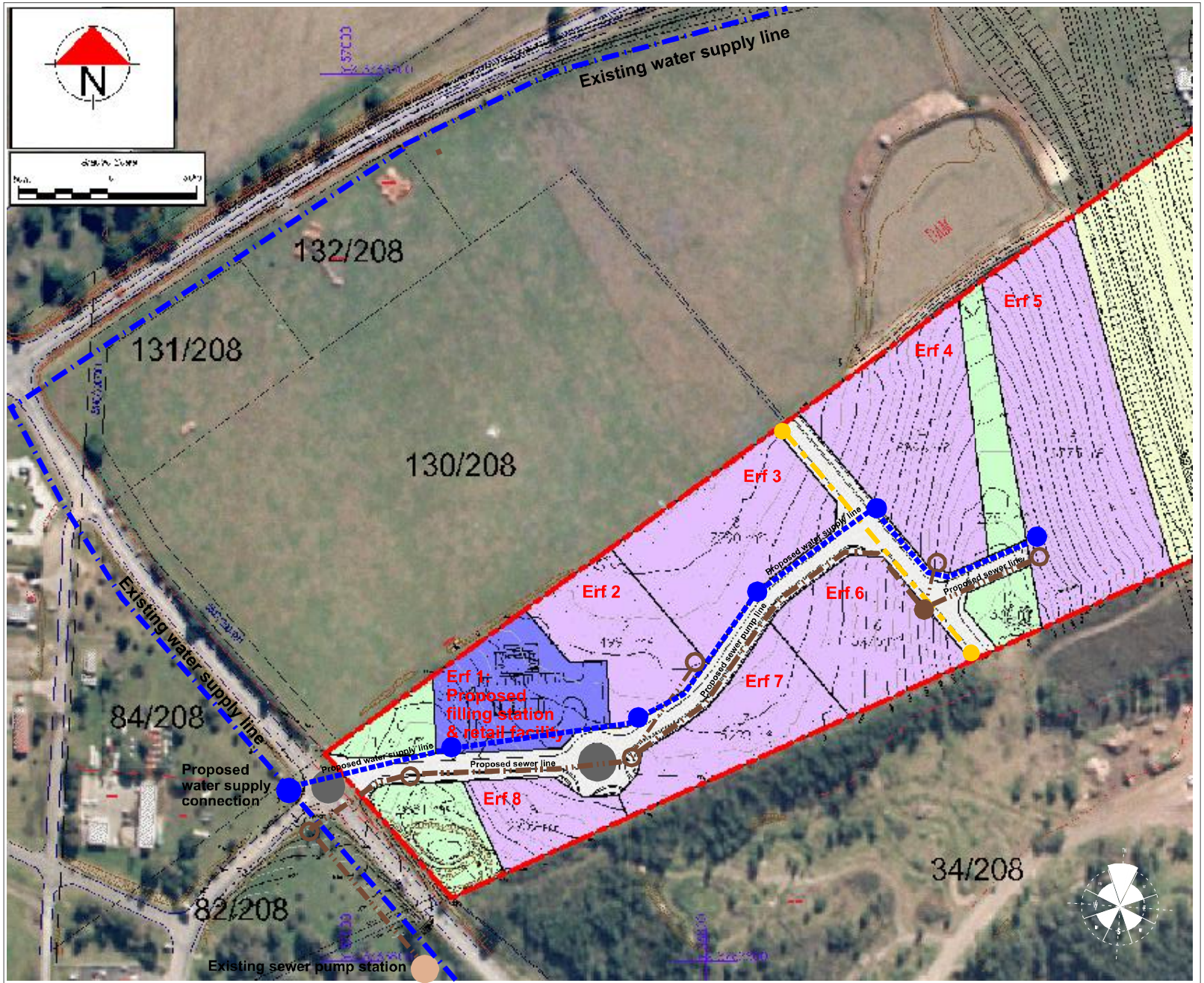
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URBAN & ENVIRONMENTAL PLANNERS

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www.vreken.co.za



Notes:

- Farm 202/79 boundary (11.043ha) & Proposed development area (7.3549ha)
- Proposed entrance & traffic circles
- Existing municipal water supply line
- Proposed 160mm uPVC water supply pipe and connection points / fire hydrants
- Existing municipal sewer pump station
- Proposed 110/160mm uPVC gravity sewer line and manholes connection points
- Proposed 110mm uPVC sewer pump line and pump connection points (incl. Back-up pump / emergency power supply / 48hr emergency storage)
- Future water supply / sewer connections to potential adjoining developments

Project: Gwayang 208 / Portion 4 George

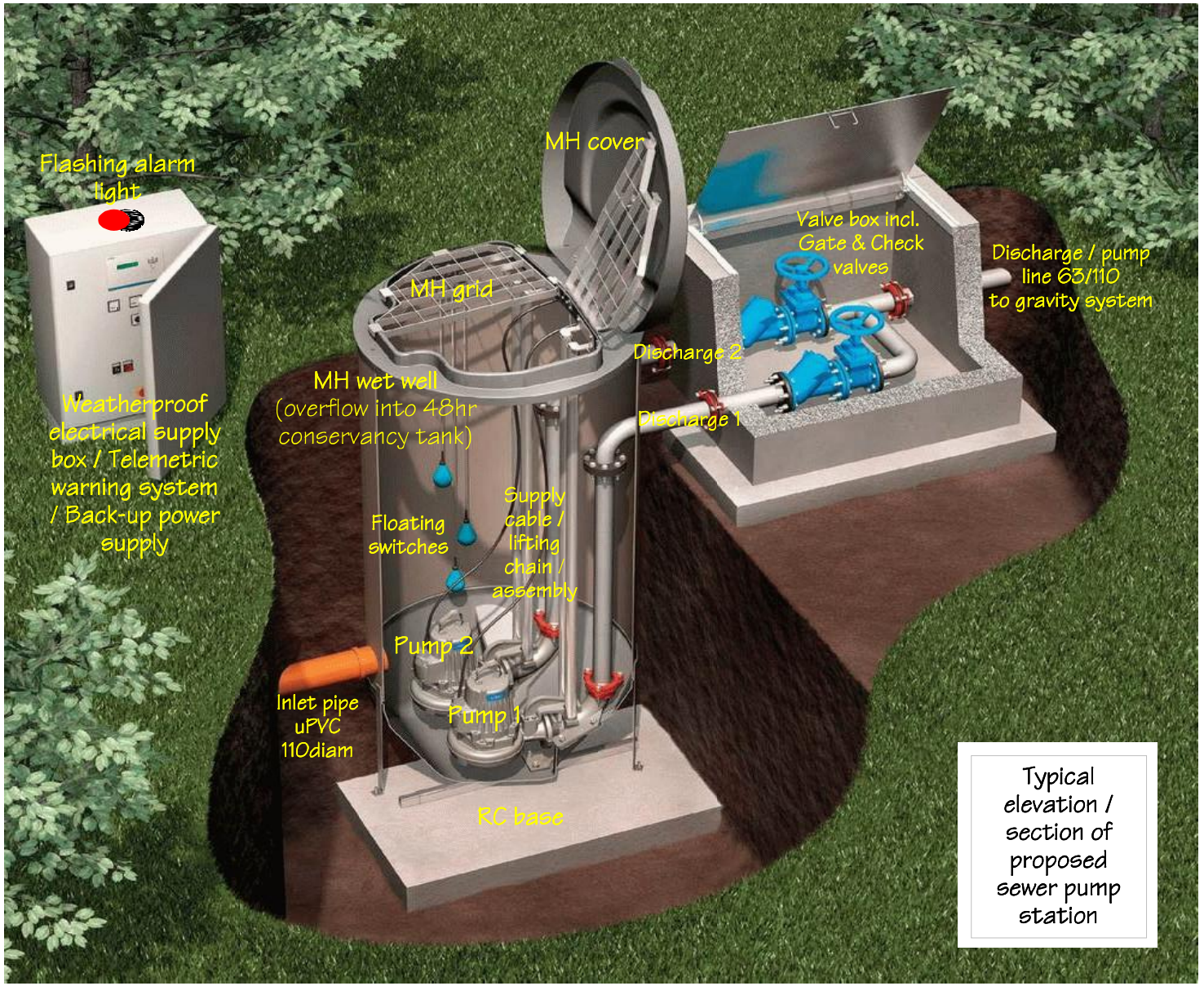
Drawing: Civil Engineering Services Plan

S19

Scale: (as shown)

Date: June '18

Dwg no: GRG208/E3 (rev05)



Typical elevation / section of proposed sewer pump station

Notes:

Project: Gwayang 208 / Portion 4 George

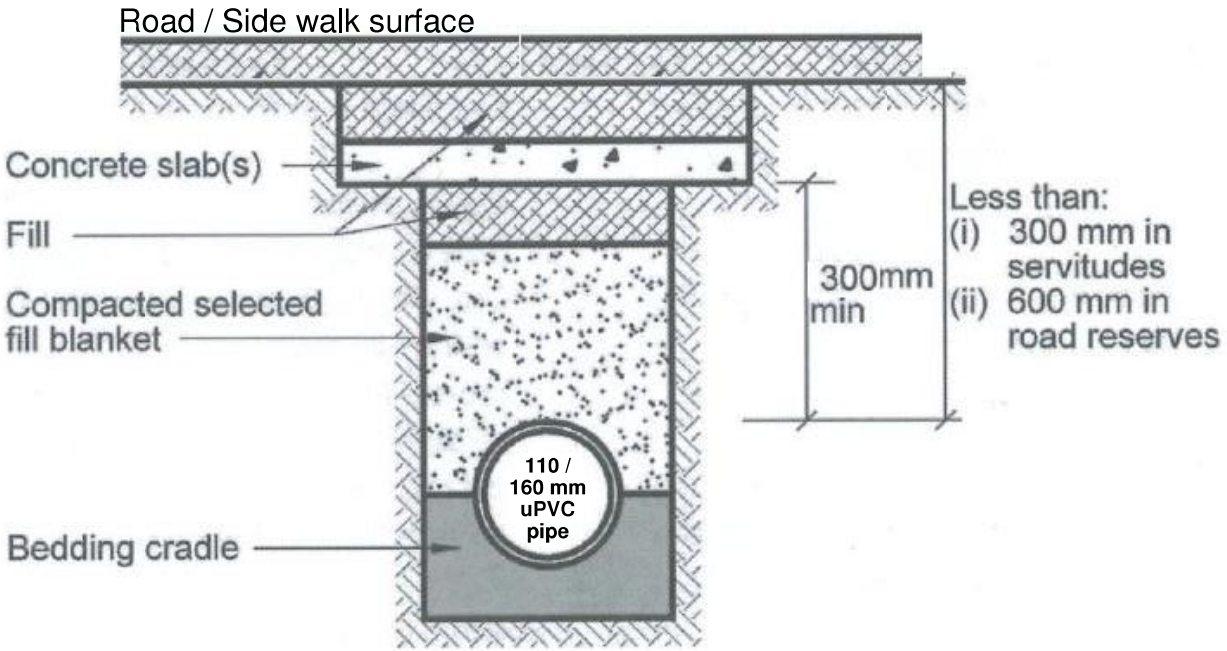
Drawing: Pump station Schematic Plan

S19

Scale: (Not to scale)

Date: Apr '18

Dwg no: GRG208/E3 (rev05)



Typical elevation / section of pipe line construction @ shallow depths / watercourse crossings

Notes:

Project: Gwayang 208 / Portion 4 George

Drawing: Typical pipe line construction detail

S19

Scale: (Not to scale)

Date: Jun '18

Dwg no: GRG208/E3 (rev05)

Preliminary Operating / Maintenance plan for the proposed sewer system filling station / retail facility / industrial zone development on the Farm Gwayang 208 Portion 4, George

- Revision 1 -

June 2018

Prepared for:

8 Mile Investments (Pty) Ltd
PO Box 1163
Rynfield
Benoni

Prepared by:

F van Zyl (Pr Eng Civil)
ECSA 96

S19
planning · design · engineering

Content

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2. Risk Assessment
    - 2.1 Pump Station
    - 2.2 Pipe network
3. Infrastructure failure
    - 2.1 Pump Station
    - 2.2 Pipe network
4. Limitations
5. Annexures

1. Maintenance & Servicing

Maintenance and Servicing of the pump station, equipment and ancillaries as well as the pipeline and it´s components for the proposed filling station / retail facility / industrial zone development will be undertaken by the Municipality of George, in accordance to the requirements of the approved Operating and Maintenance manual.

The detailed Operating and Maintenance manual will be compiled for the Municipality of George by the appointed consulting engineers and would detail the specifications, functioning, required operation and the maintenance and servicing requirements for all equipment and for the system as a whole. The manual will also specify procedures to be followed in event of plant and equipment failures.

The Operating and Maintenance manual will be based on the requirements of the equipment suppliers and good general practice to ensure maximum reliability and availability of equipment.

2. Risk Assessment

Risk Assessment Failure of the pump station equipment and pipeline could lead to sewage overflow at the pump station and spillages along the route of the pipeline respectively.

2.1. Pump station

In order to mitigate against pump station failures, the following measures will be incorporated into the design of the pump station:

- The pump station is fitted with two pumps (1 duty, 1 standby). Thus there will be a pump available to perform the full pumping load should one pump be out of service. Furthermore a thorough maintenance and operating specification will require routine and corrective maintenance on the pump station equipment that will ensure both pumps are always available for operation.

- A 24hr response team will have available a portable pump to be used in event of both installed pumps not being available.

- Pumps will be automatically controlled via the telemetric system that would be fitted with a remote monitoring function. In the event of abnormal conditions the alarm system will notify the operators / 24hr response team at the Municipality of George.

- Pumps controls enable manual override of automation electronics, to allow start-up of pumps independently electronics.

- Both pumps and the control systems will be connected to a back-up power supply (i.e. generator or battery system) to allow operation of the system in the event of the power failures, and routine and corrective maintenance of the generator will ensure the generator is available at all times.

2.2. Pipe network

In order to mitigate against pipeline failures, the following measures will be incorporated into the design of the pipeline:

- The sewer system will be designed to ensure ideal velocity to prevent settlement of solids while reducing unnecessary high pressures associated with flow frictional losses.

- All components and material will be selected to ensure that repairs can be performed speedily and components to be readily available.

- Air release and scour valves have been ideally placed to facilitate emptying of the pipeline whilst containing spills during maintenance.

3. Infrastructure failure

The normal and routine maintenance of the pump station equipment and pipeline should prevent the occurrences of spillages, blockages and leaks. The following response plan will however apply in case of an emergency:

3.1. Pump station

- The pump station will be equipped with a Telemetric system (i.e. SCADA) to monitor pumps stations continuously. Set points for low and high water thresholds are set to alert the Municipality / 24hr Response team of pump station failure.

- Municipal / Response team staff will check the status of the alarm and will determine if the problem can be corrected remotely via the remote interface.

- If a site visit is required, upon arrival at site a determination must be made as to the cause and extent of the problem.

- The necessary actions must then be taken to return the pumps to service.

3.2. Pipe network

In the event of pipe leakage the pumps must be isolated in order to undertake the repairs. Isolating the pumps will result in filling of the pump station sump and the 48 hr conservancy tank (the rate of filling which will be dependent on the time of day of isolation). The duration of pipeline repairs and the timing thereof must ensure that isolation of the pumps for the required does not result in overflows at the pump station.

The following process must be employed in planning and execution of pipeline repairs:

- Assess cause and rate of leakage, and repairs required. Repair to pipe work must be undertaken in accordance with the recommendations of the pipe supplier.

- In the event where permanent repairs cannot be undertaken during times of low sewage flow (into the pump station) or the time required for the repair poses a risk of overflow at the pump station sump, a temporary bypass connection shall be made over the area of damage of the pipe work and permanent repair should there be undertaken as soon as possible.

4. Limitations

This preliminary operational and maintenance plan has been prepared for the sole benefit of the current owners of the property as described above. It is not to be relied upon or used out of context by any other person without reference to the undersigned. The recommendations and proposals given in this plan are based on limited data and will be finalised after the design of the sewer system has been completed and approved by the Municipality of George.

ANNEXURE H:

Electrical Services Report

8 MILE INVESTMENTS 236 (PTY) LTD

ELECTRICAL SERVICES REPORT

FOR

PROPOSED FILLING STATION AND AIRPORT SUPPORT DEVELOPMENT

ON

PORTION 4 OF THE FARM GWAYANG NO 208, DIVISION GEORGE

REPORT NO G/11689/R1

December 2017

cmb
CLINKSCALES MAUGHAN-BROWN
CONSULTING MECHANICAL
& ELECTRICAL ENGINEERS

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Annexures

A Drawing No's:

11689/E/SK01 – Locality Plan

11689/E/SK02 – Phase 1: Filling Station: Plan Layout Showing Proposed Electrical Connection to George Municipality's Network

11689/E/SK03 – Master Plan: Plan Layout Showing Proposed MV & LV Reticulation Networks for Entire Development, i.e. Phase 1 and Phase 2

B Photographs No's 1 to 3

C Letter from George Municipality dated 17 March 2017, providing confirmation that their nearby MV network has sufficient spare capacity to supply Phase 1 of this development.

D Letter from CMB to George Municipality dated 9 November 2017 confirming their advice that the nearby MV network also has sufficient spare capacity to supply both Phase 1 and 2.

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ELECTRICAL SERVICES REPORT FOR PROPOSED FILLING STATION AND AIRPORT SUPPORT DEVELOPMENT ON PORTION 4 OF THE FARM GWAYANG NO 208, DIVISION GEORGE REPORT NO G/11689/R1

1.0 INTRODUCTION

This report has been compiled by Clinkscales Maughan-Brown (CMB) at their George Office, who are the Electrical Consultants for this project and responsible for making the necessary bulk electrical supply arrangements with the Supply Authority and compiling this electrical services report.

This report supersedes CMB's Report No G/11689/R, which only covered the filling station, incorporating a convenience shop. This will now be considered to be Phase 1 of the Development.

The Development for which application is now made is for said filling station, but with the addition of seven (7) industrial zoned erven. The filling station being Erf 1 and the industrial zoned erven designated Erven 2 to 8. The industrial zoned erven are to be developed for warehousing and other airport support services. The erf on the Eastern side of Erf 5 is allocated for a new Trunck Road (TR 89) and Erven 9 to 12 are allocated as open spaces, all as indicated on Drawing No. 11689/E/SK03, included under Annexure A hereof.

The area will be developed in two (2) phases, namely Phase 1 for the filling station and Phase 2 for the industrial zoned erven.

The report is for inclusion in the Environmental Impact Assessment (EIA) report and to obtain rezoning approval, and to be incorporated in the electrical section of the Services Agreement with the Supply Authority.

This work is done on behalf of the Developer, Messrs 8 Mile Investments 236 (Pty) Ltd. There is a possibility that at a later stage it might be a different company handling this Development.

The other consultants on this project are:

(i) Environmental impact assessment – Cape EAPRAC
(ii) Town planners – Marike Vreken Urban & Environmental Planners
(iii) Civil engineering – Infrastructure Consulting Engineers
(iv) Water and sanitation – Studio 19

2.0 MASTER PLAN AND PHASES

For long term planning purposes an electrical master plan has been compiled that includes all phases, i.e. Phase 1 and 2 of the Development.

For economic reasons it has been considered necessary that the main supply to the Development also be undertaken in two (2) phases, i.e. a supply of lower capacity and simplified construction for Phase 1, which is temporary, and of higher capacity and that is permanent to serve Phase 1 and 2 in terms of the master plan.

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3.0 DRAWINGS

Drawing No's 11689/E/SK01, SK02 and SK03 are annexed to this report, and contain the following information:

(i) Location of the entire Development (Phase 1 & 2), and the site plan for the filling station and convenience shop. Please note that the latter plan is still provisional and is for indicative purposes only.
(ii) Plan layout of the Supply Authority's existing MV (Medium Voltage – 11 000 volt – 11kV) network in the vicinity of the Development.
(iii) The proposed Point of Connection to the Supply Authority's network to firstly supply Phase 1, and secondly Phase 1 and 2 combined, to be taken from different connection points at the network.
(iv) The proposed Point of Supply for firstly Phase 1 of the Development, and secondly the Points of Supply for Phase 1 and 2 combined. Part of this is the extension required to the Supply Authority's MV and LV network in order to make the necessary LV (Low Voltage – 400/230 volt) Bulk Supply and Meter Points available to the respective erven.

4.0 PHOTOGRAPHS

Also annexed to this report are the following photographs related to Phase 1:

(i) No 1 – View of municipal 11kV overhead line strain pole and 16kVA pole mounted transformer substation. This is the proposed location for a new 200kVA pole mounted transformer substation to supply Phase 1 of the Development at LV – refer Drawing No 11689/E/SK02. Note that the 11kV drop-out fuses for the 16kVA transformer are in the "open" position.

(ii) No 2 – View of 11kV overhead line towards supply point, i.e. in the direction of George.

(iii) No 3 – View of municipal Pole No's US 89 and 90 and 11kV overhead line towards 16kVA pole mounted transformer substation.

5.0 LOCATION AND EXTENT OF DEVELOPMENT

The location of the Development is depicted on Drawing No. 11689/E/SK01 and the extent thereof on Drawing No. 11689/E/SK03. The proposed development is situated immediately opposite the George airport.

As stated above, the Development consists of the filling station erf and seven (7) industrial erven ranging from 2 902m² to 13 775m².

6.0 SUPPLY AUTHORITY

The Supply Authority will be George Municipality in which the boundaries of the Development fall.

7.0 BASIS OF REPORT

The report is based on the following:

(i) Site survey.

(ii) Meetings and correspondence with Messrs. Steyn van der Merwe (Senior Manager: Electrotechnical Services) and Deon Esterhuysen (assistant to Mr. van der Merwe) of the George Municipality's electrical department. A drawing was obtained from said department of their existing MV network in the immediate vicinity of the Development.

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(iii) A revised plan (27 Nov 2017) of the proposed Development received from the Town Planners, Marike Verken Urban and Environmental Planners.

(iv) CMB's database of the electrical loadings of similar developments.

8.0 ENERGY SAVINGS MEASURES

The following objectives will be set to reduce electricity consumption:

(i) Comply with SANS 10400.

(ii) Energy efficient light fittings, air conditioning, mechanical ventilation, refrigeration and water heating installations, electric motors, etc.

(iii) Use of LPG gas instead of electrical appliances for cooking where economically feasible.

(iv) Use of energy efficient appliances.

(v) Building and plant load management systems to reduce power consumption in the case of the industrial erven.

(vi) Installation of Photo Voltaic (PV) and other Small Scale Embedded Generators (SSEG) where it can be economically justified.

It is expected that with the implementation of these measures, consumption will reduce by approximately 20%.

9.0 ELECTRICAL PEAK kVA DEMAND

The estimated Peak kVA Demand that will be imposed on the municipal network has been calculated as follows:

9.1 Phase 1

Item	Description	kVA
(i)	Filling station and convenience shop - ±350m² @ 200VA/m²	70
(ii)	Petrol pumps	20
(iii)	Area lighting	8
(iv)	Sundry loads	5
	TOTAL	**103**

Applying an overall network diversity factor of 0,9, reduces the peak demand to 0,9 x 103 = 93kVA.

For the purpose of determining whether the Municipality has sufficient spare capacity in their network to supply this phase of the Development, allowance needs to be made for a possible high of 120kVA and low of 80kVA.

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9.2 Phase 1 and 2 (master plan)

Item	Description	kVA
(i)	Phase 1 – Filling station and convenience shop	103
(ii)	Phase 2:	
	• Erf 2 - 175 Amps 3 phase	69
	• Erf 3 - 300 Amps 3 phase	120
	• Erf 4 - 400 Amps 3 phase	138
	• Erf 5 - 400 Amps 3 phase	207
	• Erf 6 - 200 Amps 3 phase	138
	• Erf 7 - 200 Amps 3 phase	276
	• Erf 8 - 100 Amps 3 phase	276
	• Sundry load (street lighting, etc)	10
	TOTAL	**1 337**

Applying an overall network diversity of 0,7 reduces the peak demand to 0,7 x 1 337 = 936kVA.

This could result in a possible high of 1 000kVA and a low of 800kVA.

The abovementioned peak demand figures will also be used to determine the municipal Capital Contribution, i.e. the Development's contribution towards the upgrading or usage of the municipal primary MV network.

Annexure C contains a letter, dated 17 March 2017, from the Municipality confirming that their MV network has sufficient spare capacity to supply Phase 1.

Annexure D contains CMB's letter of 9 November 2017 to the Municipality to confirm that their MV network also has sufficient spare capacity to supply the combined load of Phase 1 and 2.

10.0 POINT OF CONNECTION / SUPPLY

For economic reasons, mainly to reduce the initial capital layout to the Developer for Phase 1, it is proposed that a different and lower cost Point of Connection / Supply be made available from the Municipality's MV network for Phase 1 compared with Phase 1 and Phase 2 combined, as per the master plan.

This means that the initial supply capacity required (Phase 1) will be much lower (±93kVA) compared with Phase 1 and 2 combined (±936kVA).

The supply network to Phase 1 will also be temporary and later be replaced with a permanent supply network that will supply both Phase 1 and 2.

The supply network can therefore also be considered to have two (2) phases.

10.1 Phase 1

Drawing No. 11689/E/SK02 depicts the proposed Point of Connection as well as the Point of Supply to the consumer. This drawing also depicts the existing municipal MV network in the vicinity of the Development.

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10.1.1 Point of Connection

It is proposed that the Point of Connection be at the location of the existing municipal 16kVA pole mounted transformer substation on the Airport Line, i.e. a vertical construction, 32mm², copper, 3 phase, bare conductor overhead line.

At this location it is proposed that a 200kVA (minimum municipal standard size) pole mounted transformer substation be erected for connection via 11kV drop-out fuses and lightning arrestors to the 11kV conductors of the Airport Line. The 11kV fuses and lightning arrestors are to be of the Transformer Combi-unit type.

The transformer (11kV to 400/230 volt) is to be a hermetically sealed unit (welded cover) with open bushings, zinc metal sprayed and painted to coastal finish.

All equipment described hereafter is to meet the technical specification of the Municipality.

10.1.2 Point of Supply

It is proposed that from the LV bushings of the pole mounted transformer (mounted on galvanized steel channels fixed to a wooden pole structure) a ±70mm² copper (or aluminium equivalent) x 4 core PVCAS cable be taken to a ground mounted Meter Kiosk (coastal painted 306 stainless steel or fibre glass), which will house the mains circuit breaker (±175 Amps), multi-function kWh meter and modem (remote meter reading) together with its associated current transformers and voltage reference circuit. The meter will be the Municipality's standard meter for this application to make a Bulk LV Supply available to the Development at either Tariff 3.A or 3.C (Time of Use). This means that the total consumption of Phase 1 (the filling station) will be metered at this point.

The LV terminals of said meter will become the Point of Supply to the filling station.

10.2 <u>Phase 1 and 2 combined</u>

Drawing No 11689/E/SK03 depicts the proposed master plan for the Development, indicating the Point of Connection to the municipal MV network as well as the Points of Supply for the individual erven.

10.2.1 Point of Connection

It is proposed that a temporary 11kV Ring Main Unit (RMU) be cut into the underground 11kV cable between the Fancourt Substation and the Airport Substation, in the position shown on the Drawing, as the initial Point of Connection. The T-off circuit breaker of the RMU will serve as the initial radial (spur) feeder for the substations within the Development.

Once more development takes place in the area (for example North West of this Development), it is proposed that the internal substations and future substations in the adjacent area (approximate positions shown on Drawing) be placed on a ring feed by diverting the 11kV cable (cut and through-joint) from Point A via the substations to Point B (remove RMU – cut and through joint cable to Airport Substation). This will also require upgrading of the existing 70mm² aluminium x 3 core MV cable between the Municipality's Fancourt and Airport Substations and removing the section of existing MV cable between Points A and B. It is to be noted that the latter work is only indicated as a Master Plan so that the Municipality can view the MV network to be included in this Development in relation to possible future developments in the adjacent areas. This means that this Development's Internal Network needs to be approved on its own and is not subject to conditions that can be imposed by adjacent land owners or developers.

It is recommended that the cable between Points A and B be at least 120 mm² Aluminium x 3 core of the PILCA type.

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The RMU is to be of the SF6 outdoor type enclosed in a 304 stainless steel cubicle with doors, coastal painted and mounted on a concrete plinth.

In the case of both Phase 1 on its own and Phase 1 and 2 combined, the extensions required to the existing municipal MV network outside the boundaries of the development phase is considered to be the External Network.

10.2.2 Points of Supply

It is proposed that the new Point of Supply for the filling station as well as the Point of Supply for the industrial erven be the LV meter kiosks forming part of the Internal Network and detailed hereafter.

The mains circuit breaker and multi-function kWh meter and modem, together with its associated current transformers and voltage reference circuit, for the filling station and the industrial erven respectively, will be housed in the kiosks in the positions shown on the Drawing, from where underground service connection cables will be taken to the Main LV Boards of the buildings on the erven.

The kiosks and relevant tariffs will be the same as described for Phase 1.

This Development is to be an "Open Development", meaning that there will be no access control and all roads and the entire electrical network including the Internal Network will be taken over by the Municipality on completion. This would therefore also mean that the LV terminals of said meters will become the Point of Supply for all the erven, or the consumers' supply points.

11.0 INTERNAL NETWORK

11.1 Phase 1

The Internal Network or Service Connection will consist of a ±70mm² copper x 4 Core PVCAS cable plus a ±35mm² bare copper conductor (earth wire) laid underground between the LV meter kiosk and the Main LV Board at the filling station / convenience shop building.

11.2 Phase 1 and 2 combined

The Internal Network will consist of the following:

(i) 11kV RMU at the Point of Connection.

(ii) Underground 11kV cable (minimum 120 mm² Aluminium x 3 core PILCA) feeding internal substations, following the route as shown on the Drawing. This cable will be extended to the North West boundary for future connection to a cable to Point A via other substations to form a ring feed.

(iii) Two (2) miniature substations (both 800kVA rating) for transforming from 11kV to LV to supply the meter kiosks, in the positions shown on the Drawing.

Each substation will contain an 11kV RMU of the SF6 type, transformer and LV board, all within in galvanized steel or 304 stainless steel cubicles, coastal painted and mounted on a concrete plinth.

(iv) Underground LV PVCAS cables plus earth wires (sizes to be given during detailed design stage) interconnecting the substations with the meter kiosks.

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(v) Meter kiosks as detailed above, with the front compartment for the meters and the rear compartment for main distribution. Each compartment will have its own door to be fitted with padlocks.

(vi) Streetlights are not shown on the Drawing, but will be provided meeting the Municipality's requirements.

The service connection cables (with the exception of the filling station as previously described) will be installed as and when required by the industrial erven, at the Consumer's cost.

All items mentioned above will meet the requirements of the Municipality and once a service connection has been completed, the Contractor undertaking the work will provide the Municipality with a copy of the Certificate of Compliance (COC) for the internal installation downstream from the meter kiosk (service connection plus electrical installation at building/s).

12.0 PROGRAMME

It is expected that permanent power to Phase 1 will only be required towards the end of 2018.

It cannot be determined at this stage when power will be required for Phase 2.

13.0 TAKING OVER OF NETWORK

The Municipality will be required to take over the extended External Network and the Internal Network on completion, and be responsible for the operation and maintenance thereof. The property owners will be responsible for the service connections and the electrical installation within the buildings.

Drawings and a specification for said networks will be submitted to the Municipality, and be approved by them before construction commences. On completion a full set of as-built drawings (electronic and hard copy) together with test certificates and manuals for the equipment will be handed to the Municipality. The electrical Consulting Engineer for the project will also certify that all work has been completed in accordance with the approved drawings and specification. Regular meetings will be held with the Contractor responsible for the work, where a representative from the Municipality's electrical department will also be present.

The necessary permits will be obtained from the Municipality where any work is to be carried out on the municipal network, and safety will be of prime importance.

14.0 COSTS

It is assumed that the total construction cost of the extension to the External Network and the Internal Network will be for the account of the Developer, which will be done by an Electrical Contractor approved by the Municipality and appointed by the Developer. This work will be done under the supervision of the Developer's Consultants, i.e. CMB, who will have a registered professional engineer or technologist in charge of the project.

The Developer will also be responsible for paying the Municipally a Capital Contribution charge, of which a preliminary calculation is as follows:

Phase 1

(i) Number of Equivalent Erven = 93/kVA ÷ 10 kVA/Equivalent Erf = 9,3.
(ii) Total charge = 9,3 x R 15 978-00/erf = R 148 595-40 plus VAT.

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Phase 2

(i) Number of Equivalent Erven = 936kVA (total Phase 1 & 2) – 93kVA (Phase 1) = 843kVA ÷ 10 kVA/Equivalent Erf = 84,3 x R 15 978/erf = R1 346 945-40 plus VAT.

Total Phase 1 and 2 = R148 595-40 + R1 346 945-60 = R 1 495 540-80 plus VAT.

This is based on the 2017/18 municipal financial year charge, and it is assumed that same will be adjusted in terms of the municipal financial year in which the payment is made.

The Municipality could elect for the Developer to spend this amount or part of it to upgrade the municipal MV network supplying the Development. In such a case the work will be undertaken by the Developer's Contractor under the supervision of CMB and meeting the requirements of the Municipality.

15.0 SERVICES AGREEMENT

This agreement is the services agreement between the Municipality and the Developer and will include a section on the electrical services.

This Services Report can form the basis for said electrical section of the Services Agreement.

16.0 ENVIRONMENTAL MANAGEMENT PLAN

All electrical work undertaken will comply in all respects with the Environmental Management Plan, which will form part of the Electrical Specification for this project.

17.0 CONCLUSION

It is trusted that this report provides the required information for inclusion in the EIA report and rezoning application, and can also serve as a basis for the Services Agreement.



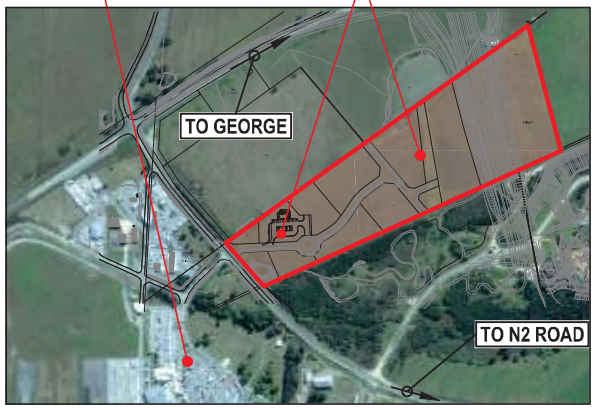
Pierre Conradie Pr Eng Pr CPM
CLINKSCALES MAUGHAN-BROWN (SOUTH) (PTY) LTD

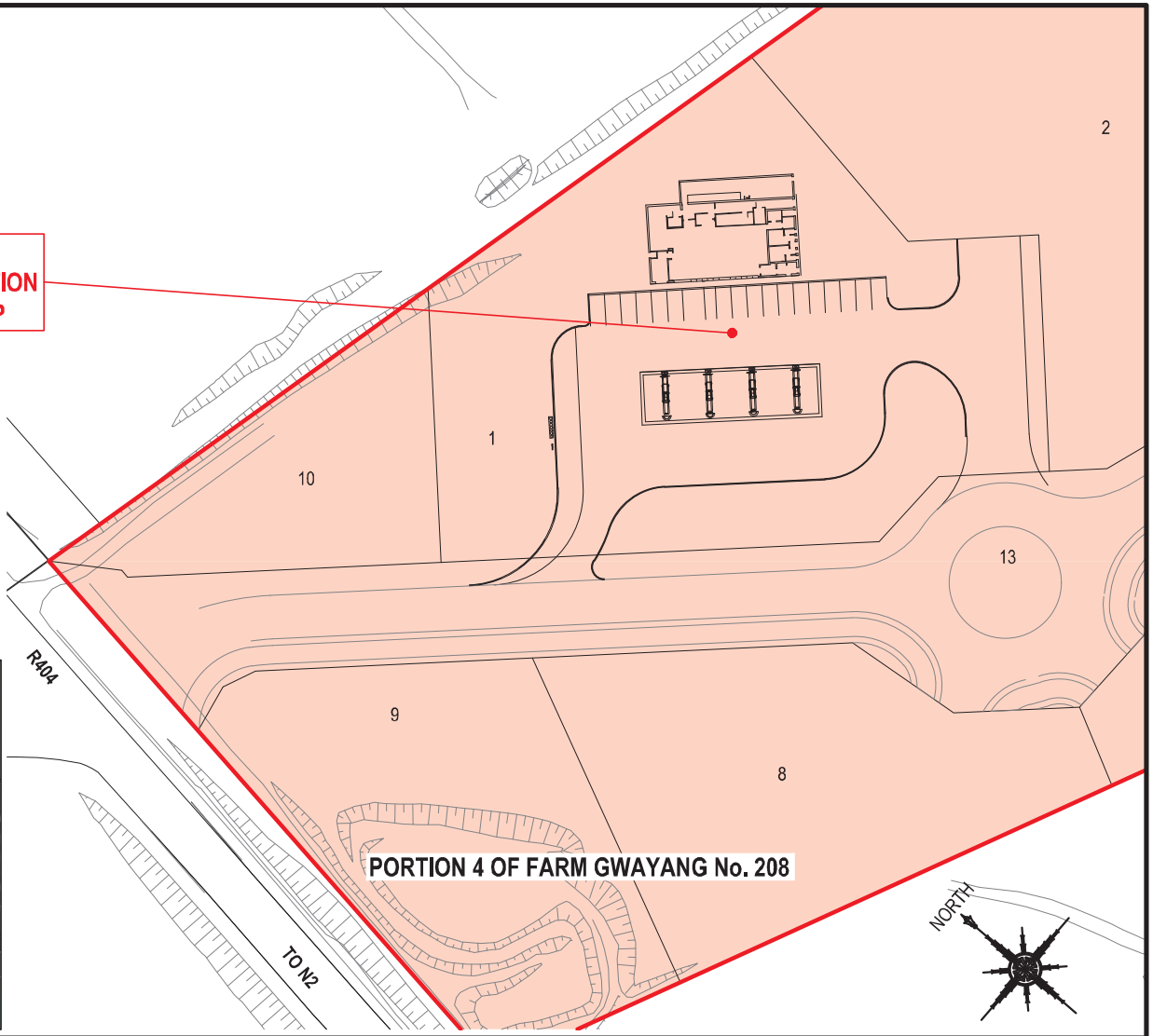
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LOCATION OF PROPOSED DEVELOPMENT

PHASE 1: LOCATION OF PROPOSED FILLING STATION AND CONVENIENCE SHOP

AIRPORT





cmb
CLINKSCALES MAUGHAN-BROWN
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
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CLIENT: 8 MILE INVESTMENTS 236 (PTY) LTD

PROJECT: PROPOSED FILLING STATION AND AIRPORT SUPPORT DEVELOPMENT ON PORTION 4 OF THE FARM GWAYANG NO. 208, DIVISION GEORGE

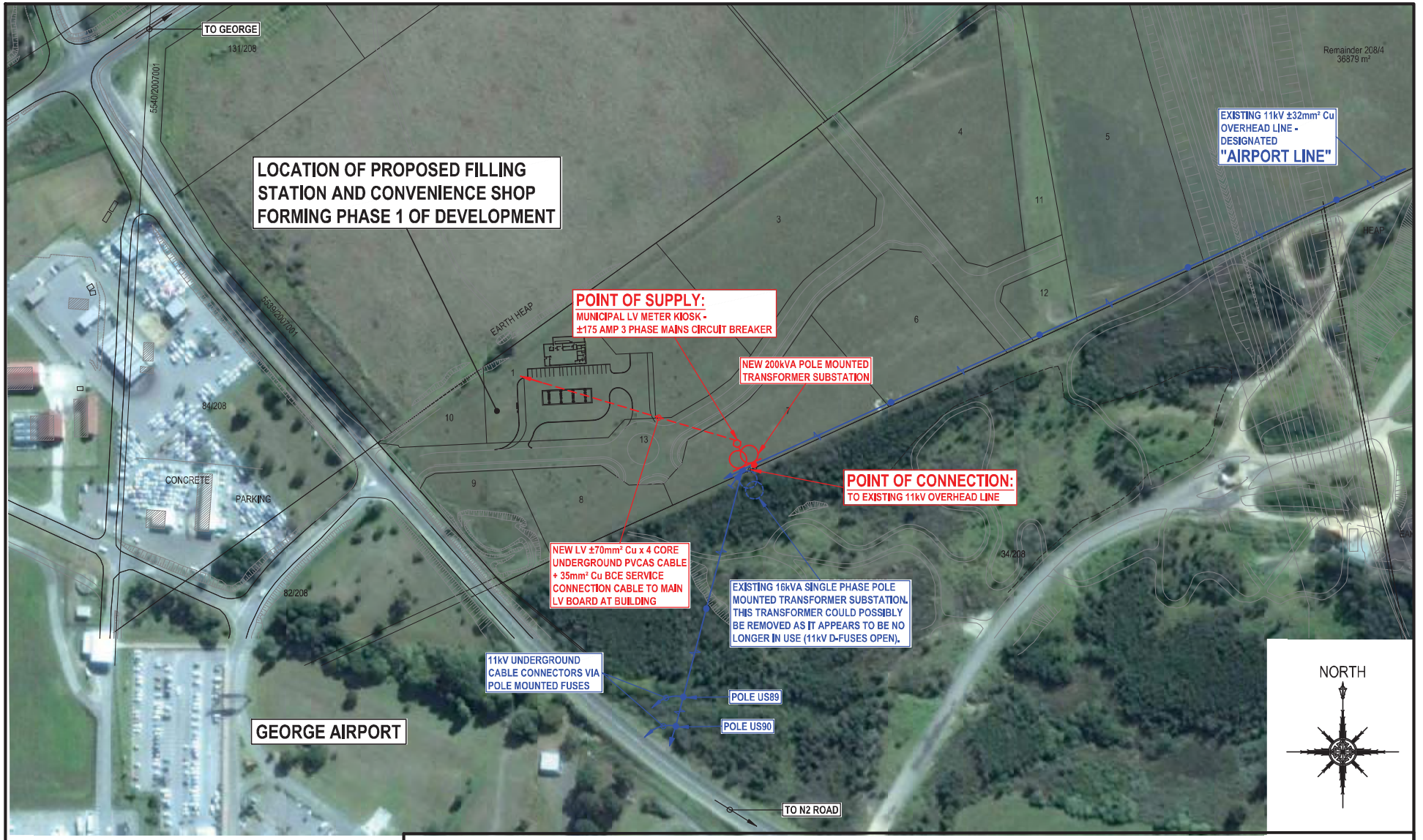
DRAWING TITLE: LOCALITY PLAN

DRAWN	DESIGNED	CHECKED	APPROVED
FB	FPC	GSA	

SCALE	DATE	CAD REF No.	DWG-SIZE
N.T.S.	09-03-2017	11689-E-SK01	A4

DRAWING NO: 11689/E/SK01

REVISION: C 12-12-2017



LEGEND

BLUE: EXISTING MUNICIPAL 11kV NETWORK

RED: PROPOSED EXTENSION TO MUNICIPAL 11kV & LV NETWORK

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PROJECT
PROPOSED FILLING STATION AND AIRPORT SUPPORT DEVELOPMENT ON PORTION 4 OF THE FARM GWAYANG NO. 208, DIVISION GEORGE

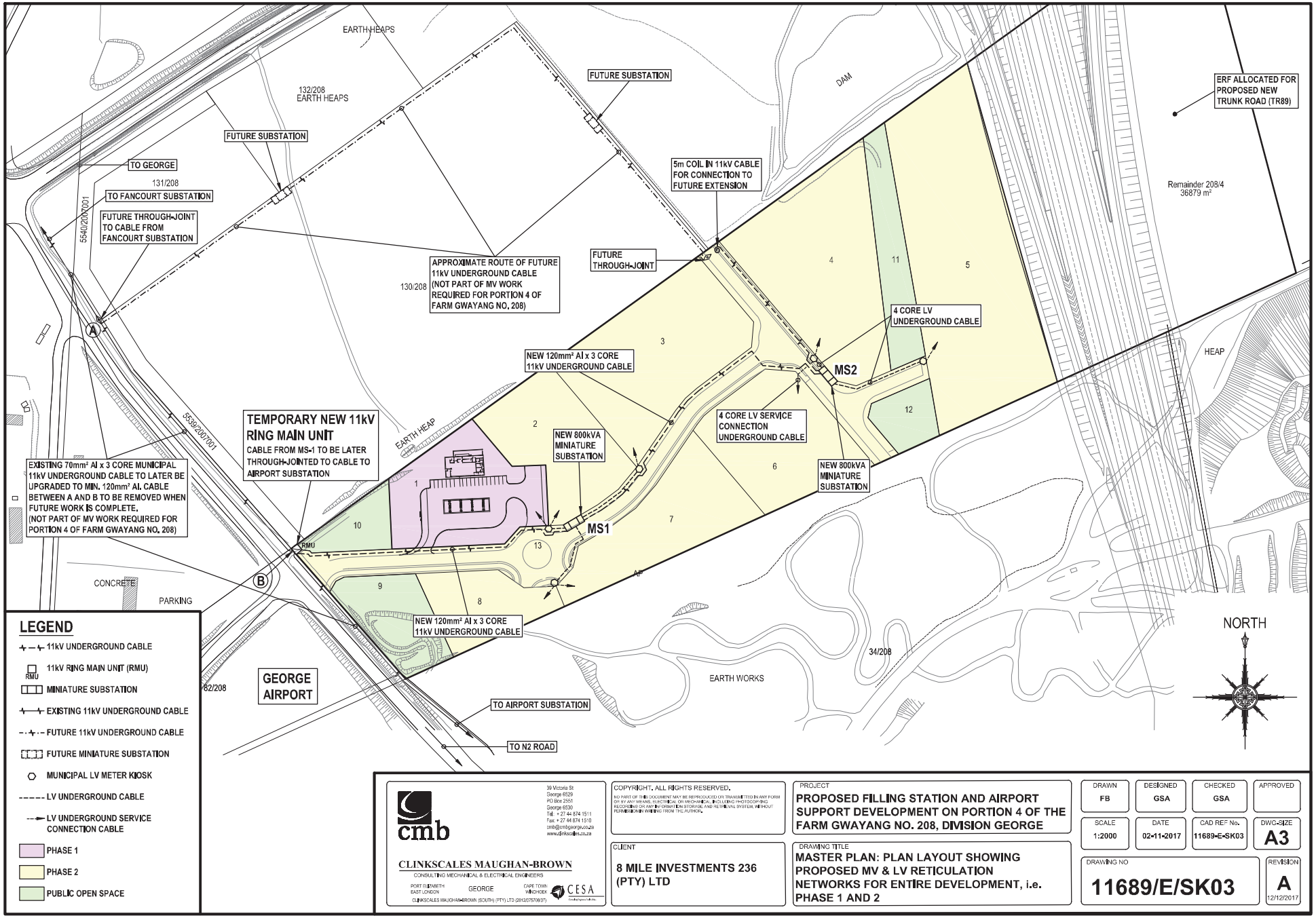
DRAWING TITLE
PHASE 1: FILLING STATION:
PLAN LAYOUT SHOWING PROPOSED ELECTRICAL CONNECTION TO GEORGE MUNICIPALITY'S NETWORK

DRAWN	DESIGNED	CHECKED	APPROVED
FB	FPC	GSA	

SCALE	DATE	CAD REF No.	DWG-SIZE
1:2000	29-03-2017	11689-E-SK02	A3

DRAWING NO
11689/E/SK02

REVISION
B
12-12-2017



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PROJECT
PROPOSED FILLING STATION AND AIRPORT SUPPORT DEVELOPMENT ON PORTION 4 OF THE FARM GWAYANG NO. 208, DIVISION GEORGE

DRAWING TITLE
MASTER PLAN: PLAN LAYOUT SHOWING PROPOSED MV & LV RETICULATION NETWORKS FOR ENTIRE DEVELOPMENT, i.e. PHASE 1 AND 2

DRAWN	DESIGNED	CHECKED	APPROVED
FB	GSA	GSA	

SCALE	DATE	CAD REF No.	DWG-SIZE
1:2000	02-11-2017	11689-E-SK03	A3

DRAWING NO
11689/E/SK03

REVISION
A
12/12/2017

PHOTOGRAPHS



Photograph No 1



Photograph No 2



Photograph No 3

G E O R G E

MUNISIPALITEIT Wes Kaap | UMASIPALA WASE Intshona - Koloni | MUNICIPALITY Western Cape

Posbus/ PO, Box 19 George 6530 Tel: 0448019111 Fax: 0448733776

NAVRAE/ ENQUIRIES: **S. van der Merwe**

TEL: **044 – 801 9111**

VERWYSING: Filling Station – Portion 4 of Farm Gwayang 208, Division George

17 March 2017

By E-mail: pconradie@cmbgeorge.co.za

Clinkscales Maughan-Brown
PO Box 2551
George
6530

Attention: Mr Pierre Conradie

Dear Sir

PROPOSED FILLING STATION AND CONVENIENCE SHOP ON ERF 1 OF PORTION 4 OF THE FARM GWAYANG NO 208, DIVISION GEORGE: CONFIRMATION ON AVAILABILITY OF ELECTRICAL SUPPLY FROM GEORGE MUNICIPALITY'S ELECTRICAL DISTRIBUTION NETWORK

With reference to the recent meetings between yourselves and officials from the Municipality's electrical department, and your e-mail of 9th instant and attached Drawing No 11689/E/SK01, we wish to confirm the following:

1) Based on your calculation of the estimated peak kVA demand of 103 kVA, with a possible high of 120 kVA and a low of 80 kVA, it can be confirmed that there is sufficient spare capacity in the nearby municipal 11 kV network to supply this development.

2) An LV bulk metered 11 kV supply can be made available on the Southern boundary of the development by upgrading an existing pole mounted transformer substation to 200 kVA or extending an existing 11 kV overhead line to a new 200 kVA pole mounted transformer substation closer to the main building of the development.

3) This connection will be further considered and final comments provided once yourselves have submitted a Services Report to this department.

We trust this information is sufficient for yourselves to proceed with the Services Report.

Yours faithfully



Steyn van der Merwe
Senior Manager: Electrotechnical Services

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Our ref: GSA/gsa/11689

9 November 2017

Senior Manager: Electro Technical Services
Electrical Department
George Municipality

By E-mail
(Svdmerwe@george.gov.za)

Attention: Mr. Steyn van der Merwe

Dear Sir,

PROPOSED FILLING STATION AND INDUSTRIAL DEVELOPMENT ON PORTION 4 OF FARM GWAYANG NO. 208, DIVISION OF GEORGE

With reference to your letter of 17 March 2017 and a meeting of 30 October 2017 at your offices between ourselves and officials from the Municipality's electrical department, we wish to confirm the following:

1) The development will consist of a Phase 1 and a Phase 2. Phase 1 will be for the proposed filling station and convenience shop. Phase 2 will be for seven (7) industrial erven.

2) Based on our calculations, the estimated peak kVA demand for Phase 1 will be 93kVA, with a possible high of 110kVA and a low of 80kVA.

3) For Phase 1 together with Phase 2 it will be 936kVA, with a possible high of 1000kVA and a low of 800kVA.

Your advice is confirmed that the existing municipal Medium Voltage (MV) network in the area of the development should have adequate supply capacity to supply Phase 1 and Phase 2.

This office is currently busy finalising the revised Services Agreement, of which a copy will be forwarded to your department for official comments and approval before this matter is taken further.

We trust that you will find the above in order.

Yours faithfully



Stiaan Adams Pr Tech Eng
CLINKSCALES MAUGHAN-BROWN

cc. George Municipality Electrical Department: Mr. Deon Esterhuysen
(Rgesterhuysen@george.gov.za)
CMB: Mr. Pierre Conradie (pconradie@cmbgeorge.co.za)

DIRECTORS: • JL RAUCH PrTechEng PrCPM (Managing Director) • BJ ANSELL PrEng • JS DE VILLIERS PrTechEng • R LAMPRECHT PrEng • RC PALMER PrEng • RL STEENEKAMP PrEng PrCPM • A ZEELIE PrTechEng

ASSOCIATES: • GS ADAMS PrTechEng • M GATYENI PrTechEng • SG MEGGERSEE PrEng • MG TSOSANE PrTechEng • SR WEBB PrTechEng
CONSULTANT: FP CONRADIE PrEng PrCPM

CLINKSCALES MAUGHAN-BROWN (SOUTH) (PTY) LTD (2012/075708/07)

ANNEXURE I:

Storm Water Management Plan

Stormwater Management Plan

Portion 4 of the Farm Gwayang No 208

Submission date: 16 March 2018

Prepared by:

Infrastructure Consulting Engineers (ICE)

Contact person:

De Bruyn Joubert

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1.2. Location of Development 1

1.3. Objective of Report 2

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2.2. Proposed stormwater control measures 3

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1. Introduction

1.1. Background to Report

8 Mile Investments is in the process of rezoning and subdividing Portion 4 of the Farm Gwayang no 208, situated opposite the main entrance road to George Airport in the Western Cape. The current zoning of the property is deemed to be "Agriculture Zone I". The property is approximately 11ha in extent.

The land use application to be lodged to George Municipality will be for:

i The subdivision of Portion 4 of the Farm Gwayang No 208 into 14 Portions (7 x Industrial Zone I portions; 1 x Business Zone VI portion; 1 x Transport Zone II portion; 4 x Open Space Zone II portions & 1 x Agriculture Zone I portion (the Remainder)) in terms of Section 15(2)(d) from the Land-Use Planning By-Law for George Municipality, 2015;

ii The rezoning of Portion 4 of the Farm Gwayang No 208 from "Agriculture Zone I" to "Subdivisional Area" in terms of Section 15(2)(a) from the Land-Use Planning By-Law for George Municipality, 2015.

ICE was appointed to design roads and services for the proposed township, which includes the necessary infrastructure to collect and control stormwater runoff.

1.2. Location of Development

The property is situated to the east of the R404 at the intersection with the George Airport main access road. The site locality plan is shown in **Figure 1** below.



Figure 1: Site Locality Plan

1.3. Objective of Report

The objective of this report is to propose methods for the management of stormwater runoff using attenuation structures.

2. Future development scenario

2.1. Future Development

The property is currently undeveloped and is used for agricultural activities. The property is 11.0433ha in size and the intention of the owner is to rezone and subdivide the property. The proposed economical land-uses within the township will consist of Industrial Zone 1 and Business Zone VI.

The Floor Space Ratio will be limited to 50% to allow for adequate space for landscaping and retention or detention ponds.

The proposed Stormwater Management Plan drawing is attached in **Annexure A**.

2.2. Proposed stormwater control measures

The objective is to limit the amount of post-development runoff which is discharged to not exceed the pre-development discharge in a major storm. It is therefore proposed that excess discharge be managed on site by temporarily storing the runoff until it can be discharged once the storm peak has passed. This can be achieved by supplying stormwater attenuation facilities on each stand.

A typical stormwater runoff hydrograph is presented in Figure 3 below. The hydrograph indicates the management of the post-development peak flow with the use of attenuation facilities.

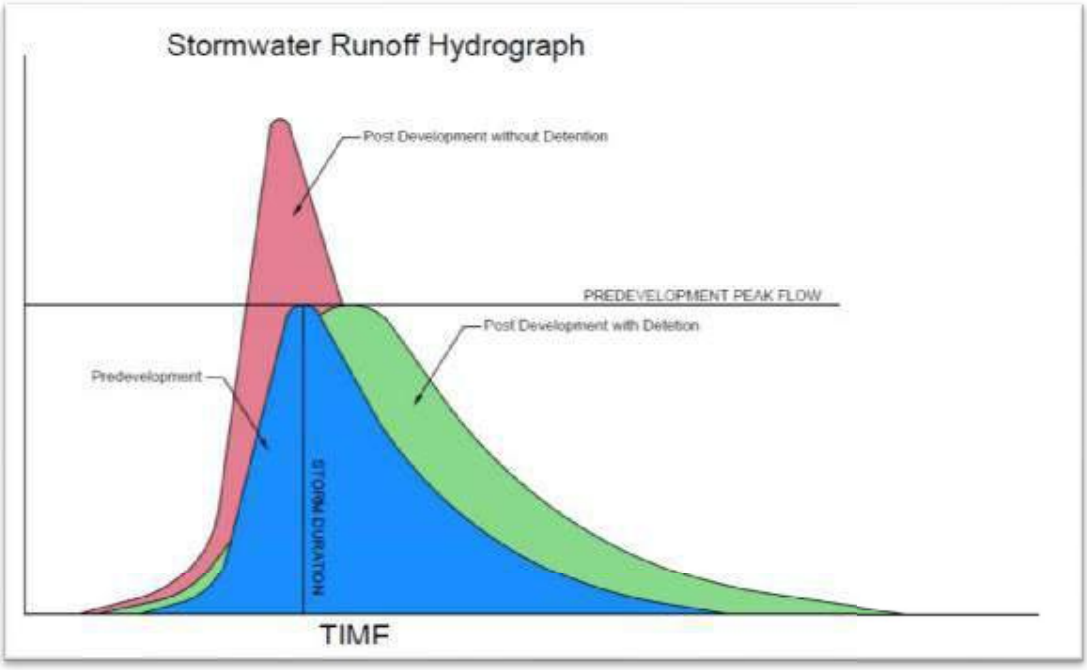


Figure 2: Stormwater Runoff Hydrograph

Attenuation facilities can also improve the quality of runoff water as sedimentation can take place within the ponds. Sand filters must be installed at the inlets to the ponds to further improve the quality of the water.

Runoff from the internal road network will be channelled into stormwater inlets. From the inlets the water will run in a pipe network to the various attenuation ponds.

3. Design, Operation and maintenance

The detail design of the stormwater drainage on each stand must be done by a professional engineer. After completion the system must be approved by a professional engineer.

Once the stormwater facilities have been constructed, the maintenance and monitoring thereof will remain the responsibility of the owners of the erven.

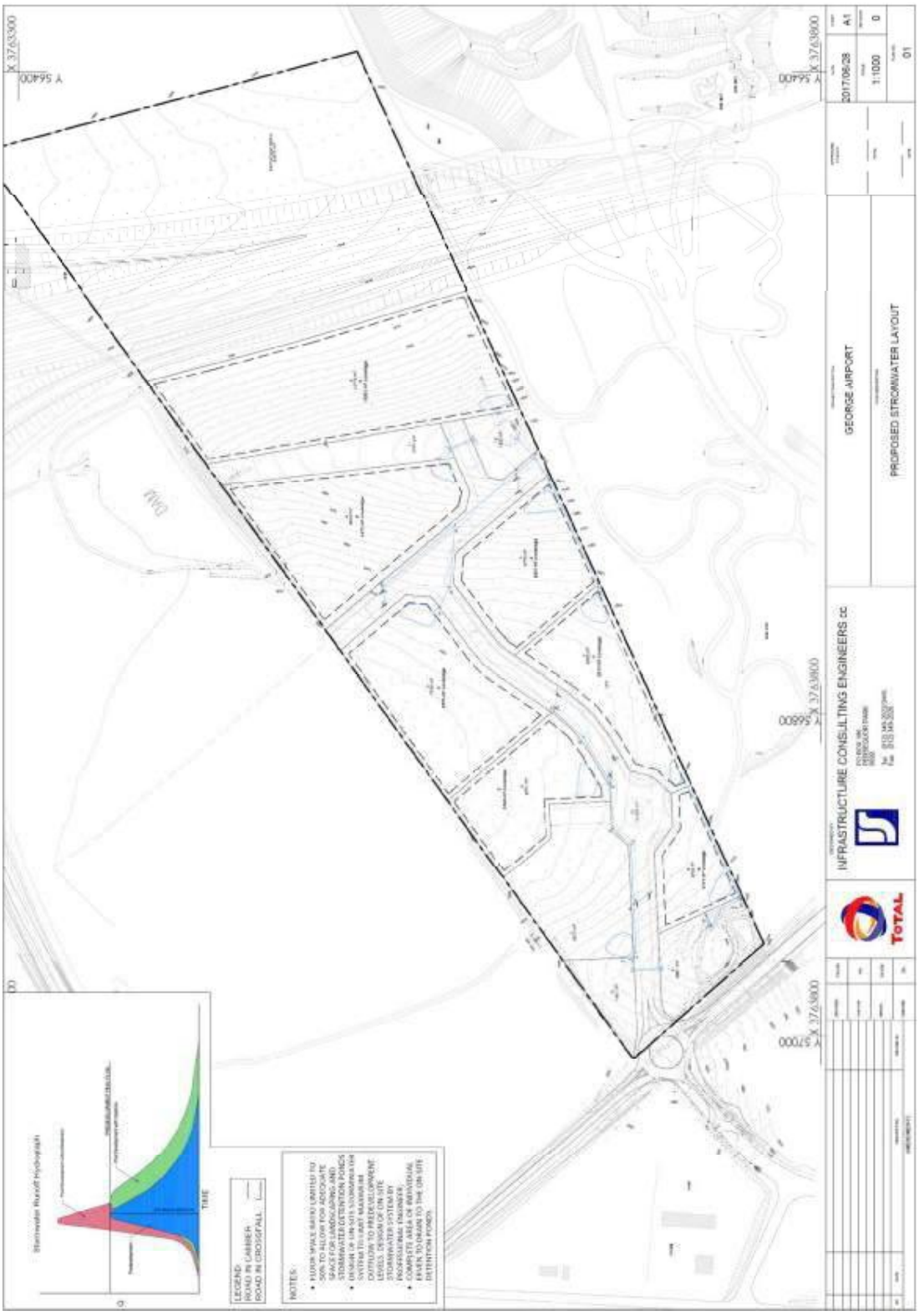
The landscaping of the attenuation facilities and other stormwater structures, such as open drains, must be done by a landscaping architect.

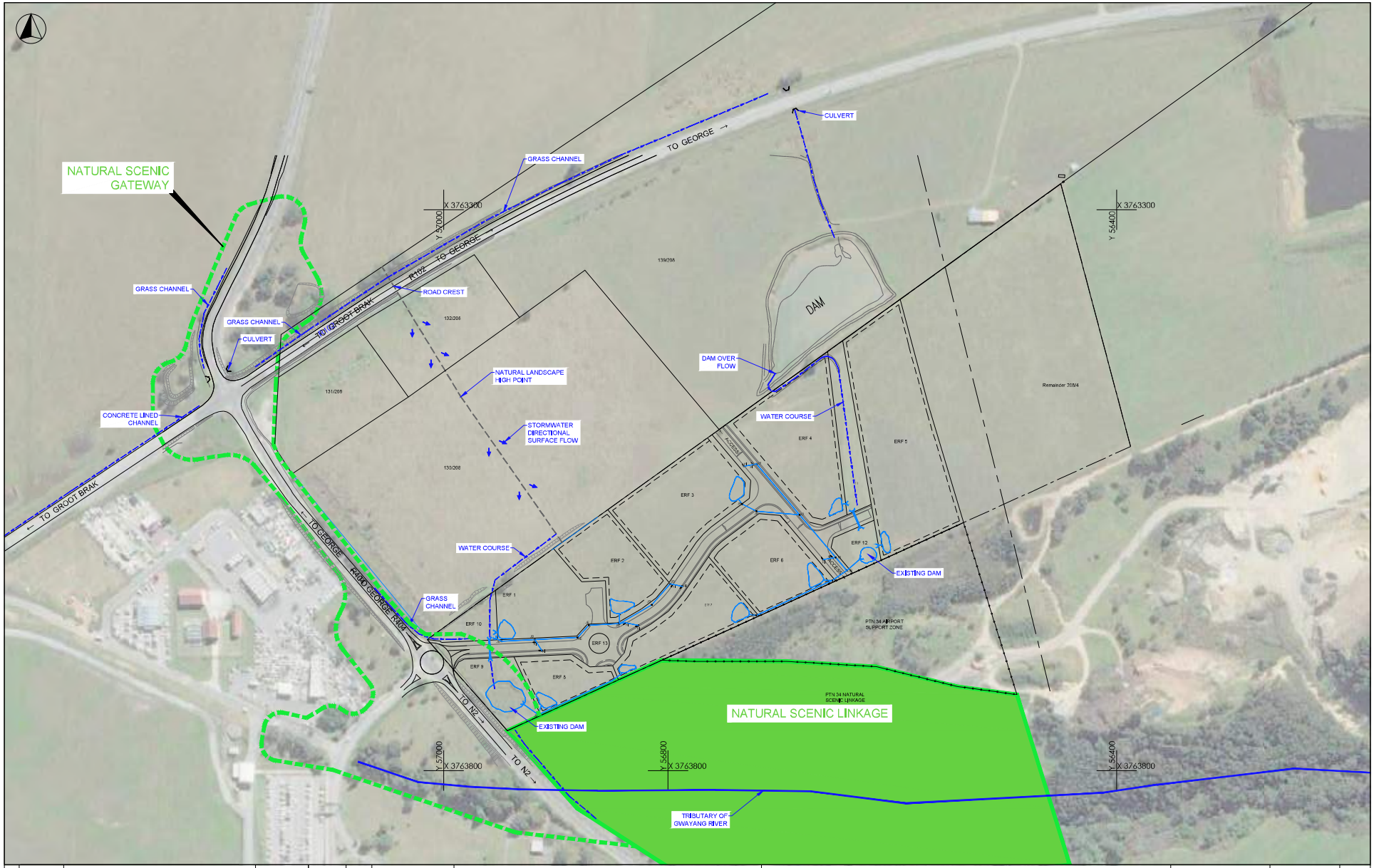
4. Conclusion

The proposed township development on Portion 4 of the Farm Gwayang no 208 is subject to the responsible management of stormwater runoff. On-site attenuation facilities have been proposed to ensure that post-development runoff which is discharged do not exceed the pre-development discharge in a major storm event.

ICE trusts that these proposals will enable the necessary approvals to be granted for the development.

Annexure A – Stormwater Management Plan





NO	DATE	DESCRIPTION	REVISED BY
AMENDMENTS			

DESIGNED PWVDB
CHECKED DBJ
DRAWN PWVDB
CHECKED DBJ

DESIGNED BY
INFRASTRUCTURE CONSULTING ENGINEERS cc

PO BOX 186
PERSEQUOR PARK
0020

Tel (012) 349-2022/3/4/5
Fax (012) 349-2026

PROJECT DESCRIPTION
PORTION 4 OF THE FARM GWAYANG NO 208

PLAN DESCRIPTION
STROMWATER LAYOUT PLAN

APPROVED
DATE

DATE 2018/07/11
SHEET A1
SCALE 1:1500
REVISION 01
PLAN NO. 01

ANNEXURE J:

Freshwater Impact Study

FRESHWATER ASSESSMENT FOR THE PROPOSED GEORGE AIRPORT SUPPORT ZONE - PORTION 4 OF FARM 208 GWAYANG, GEORGE

MAY 2018



Prepared By:

Ms Toni Belcher and Dana Grobler

PO Box 455, Somerset Mall, 7137

Tel: (021) 851 0555

Email: toni@bluescience.co.za

EXECUTIVE SUMMARY

The landowner (8 Mile Investments 236 (Pty) Ltd) of Portion 4 of Farm 208 Gwayang, George proposes to develop the site by constructing a filling station and associated services. The filling station is located near the George Airport and is intended to provide a support service to the expanded airport related land uses. This freshwater assessment report is intended to inform the environmental and water use authorisation processes for the proposed project.

The study area is located in the K30B quaternary catchment, within the catchment of the Gwaing River. The tributary of the Gwaing River at the site flows through the George Airport before flowing south of the site and into the Gwaing River. The stream is joined by two smaller tributaries that cross the site. A small valley-bottom wetland is associated with the larger watercourse.

The watercourses in the area are mapped Ecological Support Areas and the lower sections of the larger tributary of the Gwaing River (that is south of the site) is mapped as aquatic Critical Biodiversity Areas (CBA) where the two stream confluence and the valley bottom wetland areas occur. The wider river corridor is mapped as riparian forest CBAs. The valley bottom wetland area associated with the Gwaing River is also mapped as a Freshwater Ecological Priority Area (FEPA) wetland. No FEPA wetland features are mapped within the site.

Both the watercourses and the valley bottom wetland area within the site are considered to be in a seriously modified ecological condition with extensive loss of ecological functionality as a result of cultivation of the area as well as the instream dams. The larger tributary of the Gwaing River to the south of the site is in a better ecological condition and is moderately to largely modified as a result of the construction of the airport and the associated activities and the invasion of the riparian zone with alien invasive plants.

The smaller watercourses within the site are considered to be of a low ecological importance and sensitivity while the larger tributary and valley bottom wetland are of a moderate ecological importance and sensitivity due to the habitat that provides as well as the link that it helps to provide between the coast area and the hillslope.

Due to the fact that the watercourses within the site are highly modified and of a relatively low ecological importance and sensitivity they do not pose a significant constraint to the proposed development of the site. They do however act as conduits for the movement of water through the landscape with the larger watercourse to the east occurring within a relatively wide and deep valley. This functionality of the watercourses is recognised within the biodiversity conservation mapping of the area where the watercourses are mapped as ecological support areas. These corridors and the associated functionality should thus preferably be maintained within the development proposal as far as possible.

A corridor of approximately 20m for the larger watercourse and 10m for the smaller watercourse is recommended to accommodate stormwater flow within the site. These areas would need to be sized to accommodate the potential flow through the site. The watercourses and their instream dams near the southern boundary of the site can be incorporated into the stormwater management system for the site. The watercourses could possibly be shaped as open swales that are planted with wetland vegetation such as Juncus effusus, Carex gloerabilis, C. clavata, Isolepis prolifera, Pycreus polystachyos, Zantedeschia aethiopica within the wetter bed together with buffalo grass Stenotaphrum secundatum along the banks.

The incorporation should as far as possible lead to the longer term improvement of the aquatic habitat within the watercourses on site and more importantly adequate mitigate any potential downstream impacts on the valley bottom wetland and watercourse south of the site. The dams in particular should assist with mitigation of the increased intensity of the runoff from the site that the final flow from the site is allowed to overflow from the ponds into the downstream watercourse and wetland area in a dispersed manner.

The number of crossings of the watercourses for infrastructure (roads, water and sewer pipelines) should be minimised and as far as possible limited to one position (i.e. at the road crossing or dam/pond wall). It is also recommended that the pump station be located further away from the larger watercourse corridor, preferably to the west of the internal road, that the road could provide a buffer and management area in which any possible spills from the pump station could be prevented from discharging into the downstream wetland area. Additional mitigation may be required at this pump station to ensure that any spills that may occur are adequately maintained on site and do not spill into the downstream wetland area.

The introduction of exotic and alien invasive plants (an in particular kikuyu grass Pennisetum clandestinum) for landscaped areas should be avoided. It is recommended that alien vegetation control measures take place throughout the undeveloped open areas of the site such as within the corridors and stormwater management areas. Control of nuisance growth of bulrush Typha capensis is likely to also be required on an ongoing basis to encourage growth of indigenous vegetation.

Also of significance are the more ecologically important tributary of the Gwaing River and the valley bottom wetland area that are downstream of the site. Any potential impacts of the proposed development should be mitigated on site to prevent any further degradation of these aquatic ecosystems it is recommended that the two existing dams within the site located on the downstream edge of the two watercourses before they leave the property should be utilised to mitigate any stormwater impacts from the developed site. The incorporation should as far as possible lead to the longer term improvement of the aquatic habitat within the watercourses on site and more importantly adequate mitigate any potential downstream impacts on the valley bottom wetland and watercourse south of the site.

Alternative 1 is likely to have the greater potential impact on the watercourses and valley bottom wetland area within the site as well as the watercourse and wetland area directly downstream (south) of the site due to the fact that it will entail development of most of the site. With mitigation however the potential impact of the development of the site would still be low. Alternative 2 will largely only impact on the smaller western tributary while the No-go Alternative will entail the status quo within the site being maintained, i.e. the watercourses within the site will remain in their existing degraded ecological condition and there would be no potential risk of further impacts to the downstream aquatic ecosystems.

In terms of the proposed layout, the risk of altering the ecological status of the aquatic features within the site as a result of the proposed development of the site is considered to be low for the construction phase and operational phase. The need for sewerage pipelines to cross the two watercourses within the site, as well as the proposed pump station near the larger watercourse and wetland area will however imply that the proposed works will be excluded from the General Authorisations and that a water use licence will need to be applied for, for Section 21c and i water uses.

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1. BACKGROUND

The landowner (8 Mile Investments 236 (Pty) Ltd) of Portion 4 of Farm 208 Gwayang, George proposes to develop the site by constructing a filling station and associated services. The filling station is located near the George Airport and is intended to provide a support service to the expanded airport related land uses. A tributary of the Gwaing River passes to the south of the property, with two smaller watercourses crossing the site (Figure 1). The focus of this report is to assess the freshwater features that may be impacted by the proposed development activities as well as to describe potential impacts of the proposed development and provide recommended mitigation measures.

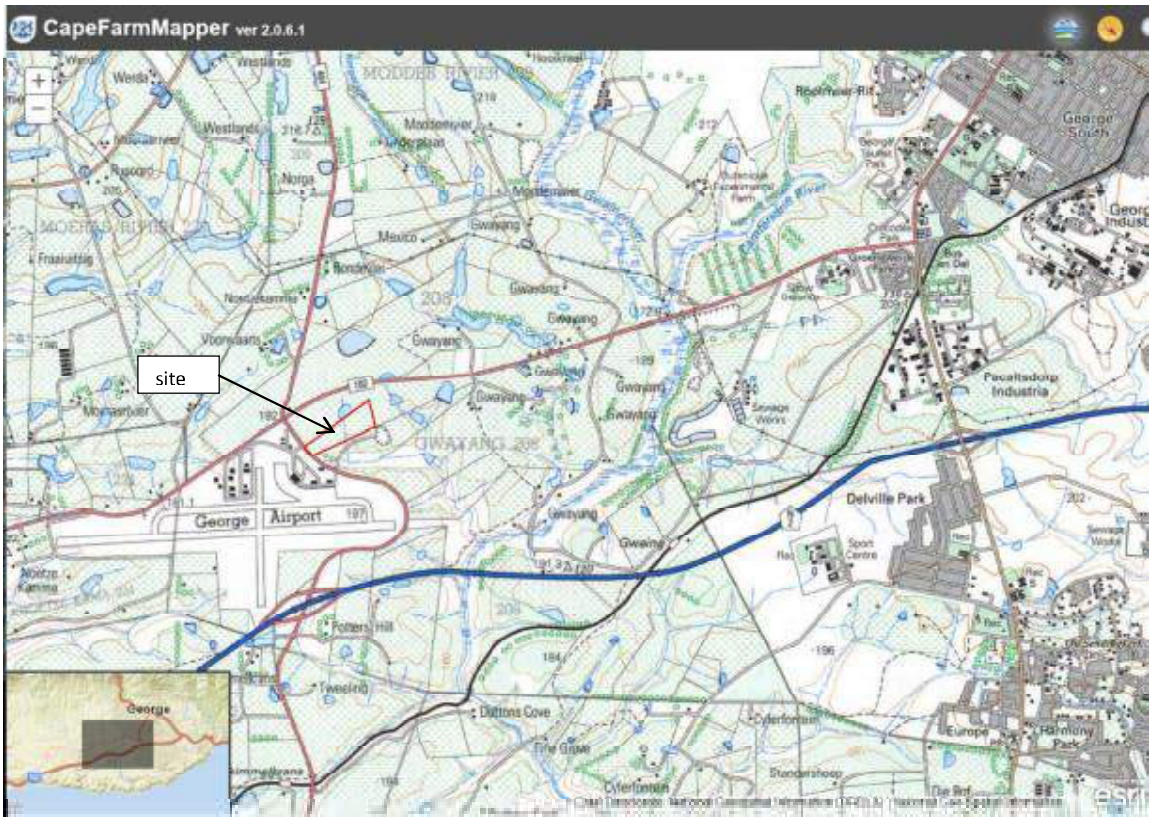


Figure 1. Locality map of the study area (CapeFarmMapper, 2017)

Table 1: Key water resources information

Descriptor	Name / details	Notes
Water Management Area	Breede-Gourits WMA	
Catchment Area	Gwaing River	
Quaternary Catchment	K30B	
Present Ecological state	D – Largely Modified	Department of Water Affairs, 2012, for Gwaing River (Appendix C)
Ecological Importance and Sensitivity	Ecological Importance – Moderate Ecological Sensitivity – High	
Water resource component potentially impacted	Tributary of the Gwaing River and its tributary and associated wetlands	
Latitude	33°59'53"S	Centre of site
Longitude	22°23'08"E	

2. TERMS OF REFERENCE

The agreed upon scope of works for this ***freshwater assessment*** is as follows:

TASK 1: FRESHWATER ECOSYSTEM OPINION ASSESSMENT AND RISK ASSESSMENT

1.1 Initialisation

1.2 Site assessment

1.3 Freshwater assessment and assessment report

1.4 DWS risk assessment for water use authorisation consideration

1.5 Review and liaison

TASK 2: WATER USE AUTHORISATION APPLICATION FOR SECTION 21 C AND I

2.1 Collate relevant information

2.2 Pre-application consultation meeting with BGCMA

2.3 Section 21 c and i water use authorisation application

2.4 Submission of application

2.5 Liaison and review

3. ASSUMPTIONS AND LIMITATIONS OF THE STUDY

Input into this report was informed by a combination of desktop assessments of existing freshwater ecosystem information for the study area and catchment, as well as by a more detailed field assessment of the freshwater features at the site. The site was visited in winter (June 2017) as well as in the spring (October 2017) as the preferred seasons to undertake the assessment although it should be noted that the Western Cape is experiencing a particularly dry period. During the field visit, aquatic features within the site were mapped using a handheld GPS. The characterisation and integrity assessments of the freshwater features were also undertaken.

The SANBI Biodiversity GIS and CapeFarmMapper websites were consulted to identify any constraints in terms of fine-scale biodiversity conservation mapping as well as possible freshwater features mapped in the Freshwater Ecosystem Priority Areas maps. This information/data was used to inform the freshwater related recommendations.

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following techniques and methodologies were utilized to undertake this study:

- Analysis of the freshwater ecosystems was undertaken according to nationally developed methodologies for water resource protection and aquatic ecosystem assessments; and
- Recommendations are based on professional opinion and best practise guidelines.

The level of assessment was deemed to be adequate for the proposed project.

4. USE OF THE REPORT

This report reflects the professional judgment of its authors. The full and unedited content of this should be presented to the client. Any summary of these findings should only be produced in consultation with the authors.

5. OVERVIEW OF THE STUDY AREA AND PROJECT PROPOSAL

5.1. OVERVIEW OF STUDY AREA

The site is located opposite the entrance to the George Airport on Main Road 347 between the Old National Road to George and the N2 National Road. The proposed and authorised new western bypass road is aligned along the eastern boundary of the site. The property is currently vacant, with no improvements, and is used as grazing for cattle. Apart from the George Airport, the immediate area surrounding the property is characterised by agricultural activities. A small tributary of the Gwaing River drains to the south of the property with two smaller tributaries crossing the site. An existing dam is located in the south-west corner of the site.



Figure 2. View of the site as seen from the south-western corner of the site with the small dam in the foreground

5.2. ACTIVITY DESCRIPTION

The Proponent wishes to develop Portion 4 of Farm 208, Gwayang in the George Area. Two development alternatives are being considered:

Alternative 1 (Preferred Alternative): Subdivision of Portion 4 of the Farm Gwayang No 208 into fourteen portions (Figure 3): Seven Industrial Zone I erven; a Business Zone VI erf; a Transport Zone II erf; four Open Space Zone II erf and an Agricultural Zone I (the Remainder). The Industrial Zone I erven will be used for warehousing and airport support services while the Agriculture Zone I erf (the Remainder) will

allow for the proposed by-pass road through the site. A proposed traffic circle will be constructed at the existing entrance to the George Airport. Access to the proposed development will be via the proposed new traffic circle. The new proposed filling station will include four filling pumps, nineteen parking bays and a service station shop. The proposed filling station will include a quick service restaurant / take-away with limited seating, toilets and an information centre. The Open Space Zone II erven will allow for the natural watercourses to be accommodated undisturbed within the site.



Figure 3. Spatial Development Plan for the Preferred Alternative (Alternative 1)

Alternative 2: This alternative entails the subdivision into three portions and to Rezone Portion A to Business Zone VI for a service station and to rezone Portion B to Business Zone II with a consent use for a supermarket to allow for business and small convenience store on this portion (Figure 4). The remainder will remain Agriculture Zone I. The proposed filling station on Portion A will include four fuel pumps, ten parking bays and a service station shop. Portion B will comprise a retail store and sixty parking bays.

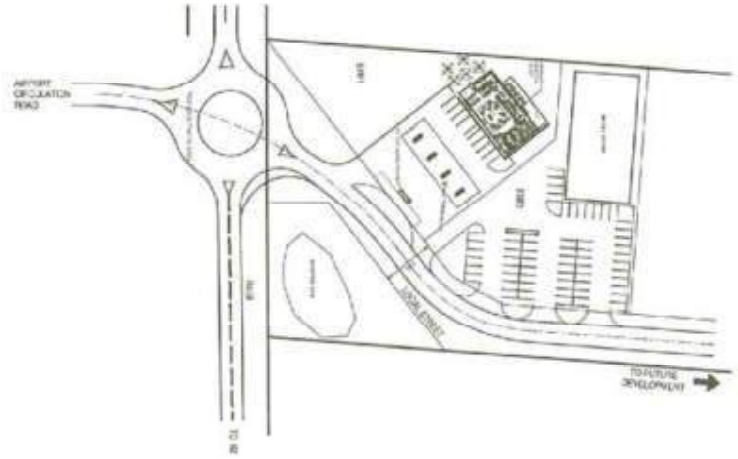


Figure 4. Spatial Development Plan for Alternative 2

Alternative 3: No go Alternative: The current status (Vacant) will be maintained and therefore much needed industrial service infrastructure (airport services) cannot be introduced within close proximity of the George Airport.

6. PHYSICAL CHARACTERISTICS OF THE STUDY SITE

6.1. TOPOGRAPHY

The property is located on low hills within the coastal plain at an altitude of between 180m and 198m above mean sea level. The gradient slopes gently towards the coastline in the south. A small watercourse crosses the site from north to south with a small dam occurring immediately north of the site within the watercourse channel. The watercourse drains into a small tributary of the Gwaing River that flows from west to east, south of the property. A quarry has been excavated within the property to the south of the site.



Figure 5. Orphophotograph of the site (yellow polygon) with the 5m contours, watercourses and dams shown

6.2 CLIMATE

The area normally receives about 599mm of rain per year, throughout the year. It generally receives the lowest rainfall (27mm) in May and the highest (72mm) in October (Figure 6). The monthly distribution of

average daily maximum temperatures shows that the average midday temperatures range from 13°C in July to 20°C in February. The region is the coldest during July when the mercury drops below 7°C on average during the night.

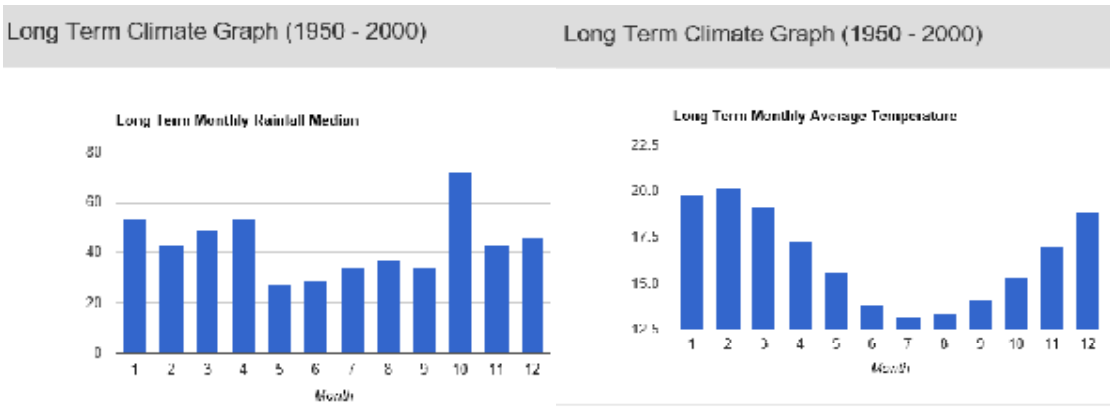


Figure 6. Average monthly rainfall (in mm) and temperatures (°C) (CapeFarmMapper, 2017)

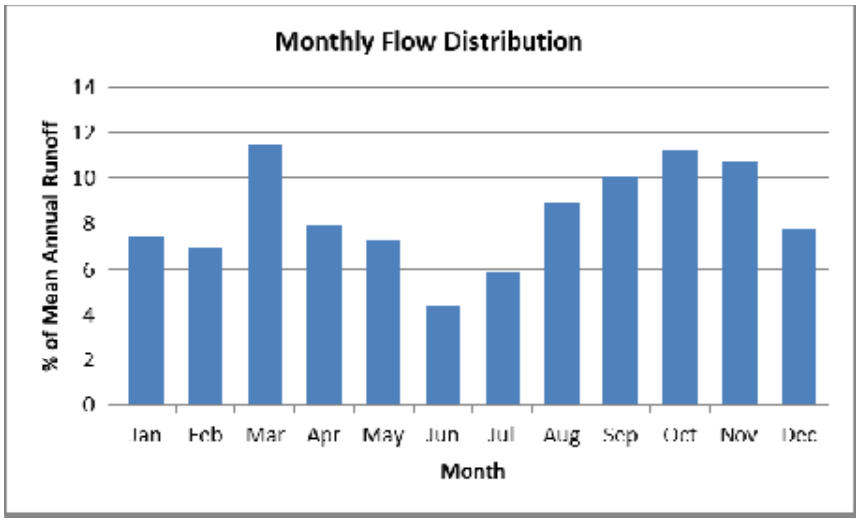


Figure 7. Graph indicating the monthly flow distribution of the watercourses in the area

The runoff for the rivers reflects the rainfall patterns of the area with the highest runoff usually occurring in March and then in the months of September to November (Figure 7).

6.3 GEOLOGY AND SOIL

The site is underlain by gneissic granite and granodiorite with phyllite, schist, grit, hornfels and quartzite of the Kaaimans Group and quartzitic sandstone of the Table Mountain Group, Cape Supergroup. The soils are strongly structured and a non-reddish colour with a marked clay accumulation which is usually conducive to the formation of wetland areas. One or more of vertic, melanic and plinthic soils may be present. The soils have a very high erosion potential. The broad soil classification for the area indicates the soils as being miscellaneous (Figure 8).

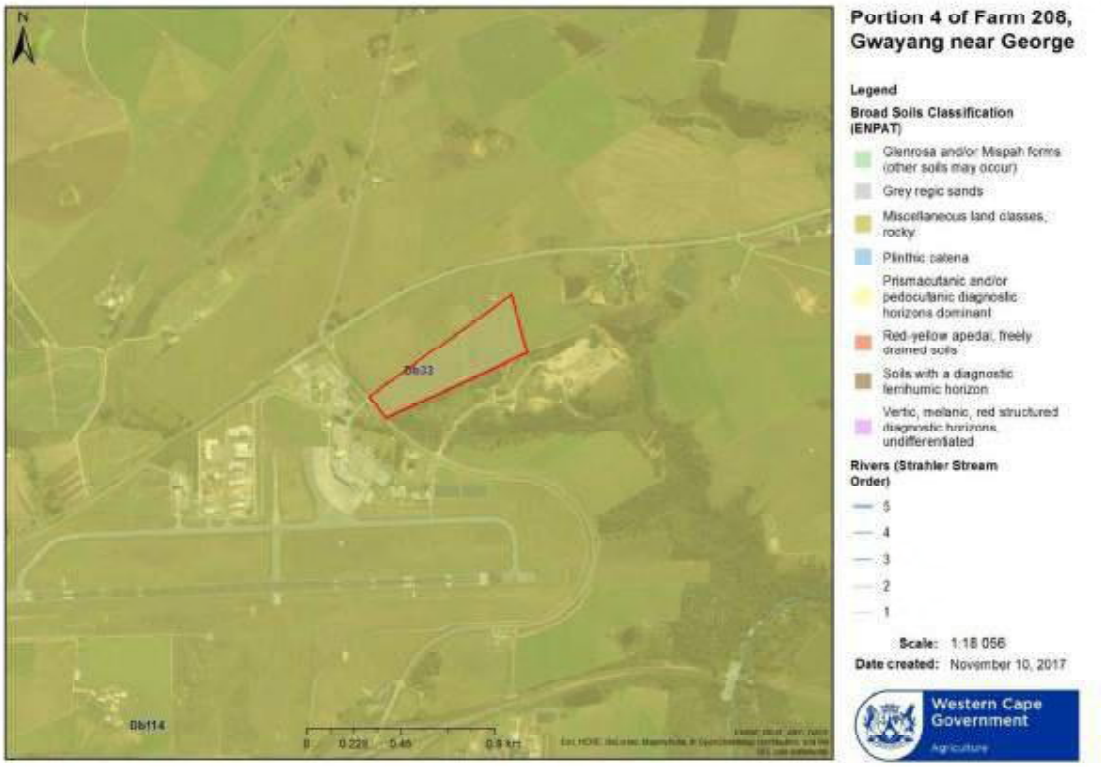


Figure 8. Soil map for the wider area (CapeFarmMapper, 2017)

6.4. FLORA

Mucina and Rutherford (2006) mapped natural vegetation cover in South Africa on a national scale. Due to removal of indigenous vegetation, the mapping was guided by habitat determinants such as geology and soil type. The mapping has been undertaken at a large scale thus the finer scale boundaries of mapped units are often not always very accurate. The mapping has subsequently been updated by the South African National Biodiversity Institute (SANBI) in 2009 and 2012. Figure 9 shows the 2009 update of the mapping of Mucina and Rutherford (2006). There are no differences between the 2009 and 2012 versions of the vegetation map for the study area. Within the garden route area more detailed vegetation mapping was also undertaken by Vlok for the Garden Route Biodiversity Sector Plan and is shown in Figure 10.

The natural vegetation within the site and surrounding area is mapped as being Garden Route Granite Fynbos which is considered to be an Endangered vegetation type (Figure 9). Finer scale vegetation mapping that has been mapped for the Garden Route Biodiversity Sector Plan indicates the natural vegetation within the site to be Wolwedans Grassy Fynbos with Moordkuils Perennial Stream vegetation along the river corridor (Figure 10). The vegetation type is supposed to comprise of dense proteoid and ericoid shrubby grassland however very little of the natural vegetation cover remains and has mostly been replaced by fields cultivated with grasses for grazing.

The riparian vegetation comprises largely of alien plants such as grey poplars *Populus × canescens,* blackwood *Acacia melanoxylon*, black wattle *Acacia mearnsii*, bugweed *Solanum mauritianum,* pampas grass *Cortaderia selloana* and bramble *Rubus* sp. with patches of indigenous plants such as *Senecio halimifolius Passerina corymbosa* and *Ficinia nodosa* as well as the translocated *Cyperus papyrus*.

Riverbed grass *Pennisetum macrourum* dominates the valley bottom wetland areas while rushes such as *Juncus effusus* and occur within the dam. Wetland vegetation such as *Wachendorfia thyrsiflora* also occurs within the stormwater drain along the main road.



Figure 9. Vegetation types for the study area (red polygon represents the boundary of the site) (CapeFarmMapper, 2017).

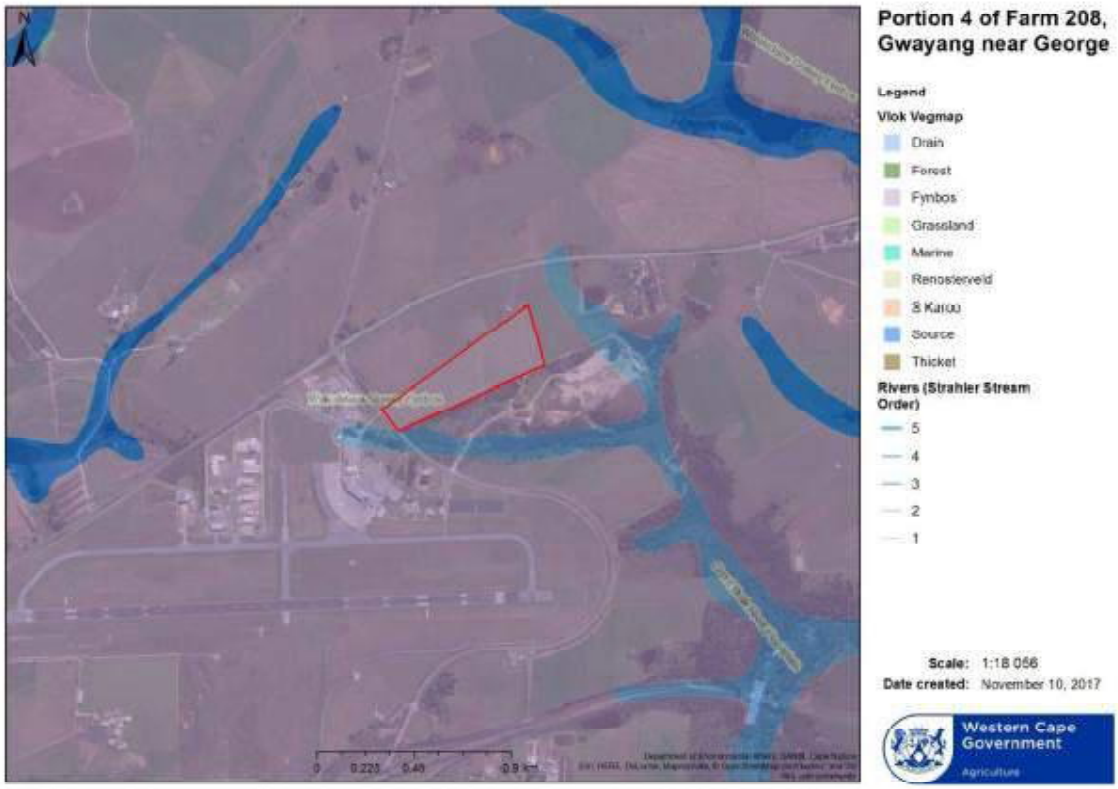


Figure 10. Vlok vegetation mapping for the area (CapeFarmMapper, 2017)

6.5. AQUATIC FEATURES

The study area is located in the K30B quaternary catchment, within the catchment of the Gwaing River. The larger Gwaing River originates as a number of streams flowing off the Outeniekwa Mountains that join to form the Modder River which joins the Malgas River to form the Gwaing River. The Camfersdrift / Rooi River is a tributary of the Gwaing River that rises in George and joins the Gwaing River downstream of the Modder River confluence.

The tributary of the Gwaing River at the site flows through the George Airport before flowing south of the site and into the Gwaing River. Upstream of the site as well as the section of stream flowing adjacent to the site is overgrown with alien trees (primarily black wattle *Acacia mearnsii)* and invasive alien kikuyu grass *Pennisetum clandestinum.* The stream flows within a largely natural channel at the site, passing under the R404/MR347 in a 1.2m pipe culvert. Downstream, the watercourse is joined by two smaller tributaries that flow onto the site from the north. A small valley-bottom wetland dominated by riverbed grass *Pennisetum macrourum* is associated with the larger tributary. Downstream of the site the stream passes to the south of a quarry and is joined by another small tributary of the Gwaing River.

The National Freshwater Ecosystem Priority Areas mapping initiative has only mapped the dam upstream of the site in the smaller tributary as an artificial wetland area (Figure 11).