

**HIGH LEVEL REPORT**

ON

**PHASED CIVIL ENGINEERING SERVICES**

FOR

**TOWNSHIP ESTABLISHMENT**

ON

**FARM BULTFONTEIN 107 JR**

Compiled by:



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## **BULTFONTEIN DEVELOPMENT**

### **1 PURPOSE OF THE REPORT**

The purpose of this report is to evaluate services provision to a Phased Bultfontein Development from a civil engineering services perspective.

### **2 BACKGROUND**

The proposed Bultfontein Development is situated approximately 34 km north of Pretoria and east of existing Soshanguve - see locality plan **Annexure A**

The development comprises the provision of approximately 28 000 residential units, schools, business centres etc. The development falls on the boundary of the existing area destined for urban development, however, it was accepted that it would be included in the future SDP of City of Tshwane as urban area. The City of Tshwane has confirmed that the Bultfontein area is strategically located to address the housing and services backlog of the northern areas of Tshwane.

This report has taken cognisance of the Traffic Impact Assessment Report of Messrs. EDL Consulting Engineers as far as access to the development is concerned.

### **3 INVESTIGATION**

The City of Tshwane is the Water Services Authority for the area and hence the development's impact on water services provision was sent to Messrs. GLS, Consulting Engineers for the City of Tshwane, for evaluation. The report of Messrs GLS is attached as **Annexure B**. Cognisance must be taken of the fact that the water services impact of an area much larger than the Bultfontein Development was evaluated as planned future bulk infrastructure of the City of Tshwane needed to be taken into account. The cost estimates per the GLS report therefore allows for servicing a much larger area.

The GLS report's findings are summarized below.

#### Water Supply

- The development can be supplied with water from the current bulk supply system of the City of Tshwane – no upgrading of the existing infrastructure is required
- New bulk pipelines will have to be laid to the Bultfontein area
- New reservoirs will have to be constructed for the supply area.

- The costs of the works summarized is approximately R 137 864 000.00

#### Sanitation

- The current bulk infrastructure is not able to support the Bultfontein development
- Upgrading of the Rietgat WWTW is required
- Provision is made for the replacement of the entire Rietgat outfall sewer
- Main outfall sewers to the north (Stinkwater area) is required
- A Sewage Pump station to the north with rising main to the south (to deliver at the Rietgat WWTW) is required
- **The costs of the works summarized is approximately R 1 870 000 000**

**If one approaches at the Bultfontein Development as a phased stand alone development and provide bulk services to fit into the future services scenario as per the GLS report, it becomes a far more “developable “ undertaking.**

The development is divided into phases in order to provide access to residential erven as fast as possible whilst utilizing available services and available access as far as possible.

The Bultfontein development has therefore been divided in four phases as follows

- North Western Quadrant - with approximately 6500 dwelling units
- South Western Quadrant - with approximately 7000 dwelling units
- North Eastern Quadrant - with approximately 7500 dwelling units
- South Eastern Quadrant - with approximately 7000 dwelling units

The Development Phases are shown on plan **Annexure C**

The different phases were decided upon taking cognisance of a number of services aspects as follows

- Available bulk wet services that could be accessed/utilized
- Drainage areas and catchments
- Existing access routes
- Future access and road authorities
- Costs of bulk services as per the GLS Water & Sanitation Bulk Services Investigation.

The phased development approach required an in depth look at services provision to each phase and it was endeavoured to utilize and or upgrade existing infrastructure effectively before the authorities have to embark on the provision of expensive bulk infrastructure - not

that the latter can be completely avoided. Cognisance has also been taken of the available transport routes and the easier upgradable routes in identifying the phases.

The main difference in the proposed services provision compared to the GLS report is to provide a sewage pump station closer to the northern border of the Bultfontein Development and to lay a parallel sewer to the existing Rietgat Outfall Sewer thus eliminating the Stinkwater pump station, outfall sewer and rising main to return to the Rietgat MOS and WWTW.

In order to follow the sequence of development phases outlined above, the following bulk infrastructure is proposed – See **ANNEXURE E**.

## **4 DEVELOPMENT PHASES - SERVICES REQUIRED**

### **4.1 BULK SERVICES**

#### **PHASE 1 - BULTFONTEIN NORTH WEST**

##### **Water supply**

- Provide a main feeder inlet pipe 800 mm dia from the Soshanguve DD Reservoir to Bultfontein reservoir
- A new 8 MI reservoir (Bultfontein 1) as proposed
- Provide a main feeder outlet pipe 700mm dia/450mm dia to Phase 1, traversing Phase 2

##### **Sewerage**

- Provide a parallel sewer to the existing Rietgat outfall sewer - from the northern boundary of Phase 1 to the Rietgat WWTW. This sewer (approximately 12.3 km, 0.6 m dia @ average grade 1:400) to cater for the entire flow from the Bultfontein Development (this sewer to replace the proposed GLS sewer to the Stinkwater Pump Station, the future Stinkwater Pump Station and the rising main.)
- Provide a Sewage Pumpstation ( Bultfontein Sewage 1 with capacity of 100l/s, to be upgraded in future) north of Phase 4 with rising main (355mm dia) to the Rietgat Outfall sewer
- Provide an outfall sewer (350/400 mm dia) to the Bultfontein Sewage 1 pumping station.
- Upgrade existing Rietgat WWTW with a 7.5 MI ADWF unit.

##### **Stormwater**

- Provide a main stormwater discharge (for 1:20 Year flood) to the Stinkwater Spruit (underground pipe preferred)

## **Roads & Access**

- Provide an extension to the Bultfontein Road, northwards to meet Road K214 (7.4 m wide travelled way 700m length)
- Construct a single carriageway east/west on K214 alignment (7.4 m wide travelled way 2700m length)

## **PHASE 2 BULTFONTEIN SOUTH WEST**

### **Water supply**

- Connect to Bulk feeder pipe laid under Phase 1. Provide capacity in internal network for **Phase 3 and 4**

### **Sewerage**

- Provide approximately 1.3 km outfall sewer (355 mm dia to meet 400mm dia section laid under Phase 1) ) to Bultfontein Sewage 1 pumping station (Latter provided under Phase 1)

### **Stormwater**

- 1:20 Year flood drains directly to Stinkwater Spruit and its tributaries.

### **Access**

- Provide Eastern section of East/West Link Road (7.4 m travelled way 2000m long)

## **PHASE 3 - BULTFONTEIN NORTH EAST**

### **Water supply**

- Construct a second Bultfontein Reservoir (8MI, Bultfontein 2)

### **Sewerage**

- Provide outfall sewer (355 mm dia 0.5km ) to Bultfontein Sewage 1 pumping station
- Upgrade Bultfontein Sewage 1 pumping station to receive sewage from Phases 3 and 4
- Provide a second rising main (350mm dia ) to the Rietgat parallel sewer.
- Provide capacity in internal collection system for Phase 4.
- Additional upgrade 7.5 MI ADWF unit to Rietgat WWTW

### **Stormwater**

- 1:20 Year flood drains drains directly to Stinkwater Spruit and its tributaries.

### Roads & Access

- Nil - Off Road K214 provided under Phase 1

### PHASE 4 - BULTFONTEIN SOUTH EAST

#### Water supply

- Supplied from Phase 2. No new pipes required

#### Sewerage

- Connect to Phase 3 internal collection system

#### Stormwater

- 1:20 Year flood drains directly to Stinkwater Spruit and its tributaries.

#### Roads & Access

- Off Existing Bultfontein Road – possible access improvement required.

## 4.2 INTERNAL SERVICES

Phase 1 to 4 will require the following internal infrastructure. It is accepted that the services will be to Grade A (Housing Subsidy) services where the following amounts are allowed.

Table

Phase	Km Roads	Km sewers	Km Stormwater pipes	Km water pipes
1	36	47	47	34
2	55	71	71	51
3	18	39	36	17
4	27	37	39	24

## 5 COSTS

The costs below are considered first order estimates. Amounts allow for Professional Fees of ± 12%. **VAT not included**

## 5.1 BULK SERVICES COSTS

### PHASE 1

Table

Item	R/c
Main Feeder pipe (For Full Development)	49 209 000
Reservoir 8 MI (First of Two)	20 198 000
Main Outlet feeder to Phase 1 &2	5 575 000
Parallel sewer to Rietgat WWTW (12.3 km 600mm dia)	61 040 000
Main Bultfontein pump station Phase 1 (100l/s)	12 000 000
Rising main to Parallel sewer	4 500 000
Outfall sewer to Bultfontein pump station	4 200 000
Rietgat WWTW Upgrade Phase 1 (&.5 ML ADWF)	109 000 000
Stormwater (structures to accommodate 1:20 Year flood)	15 000 000
Access Roads Extension to Bultfontein Road (5180m <sup>2</sup> ) , One carriageway of K214 & structures (19 980m <sup>2</sup> )	36 000 000
<b>TOTAL</b>	<b>316 722 000</b>

### PHASE 2

Table

Item	R/c
Outfall sewer to Bultfontein pump station	4 200 000
Construct Western half of East/West Link Road	24 000 000
<b>TOTAL</b>	<b>28 200 000</b>

### PHASE 3

Table

Item	R/c
Second Bultfontein Reservoir	20 198 000
Outlet feeder pipe (to Phase 3 and 4)	10 935 000
Outfall sewer to Main Bultfontein pump station	300 000
Main Bultfontein pump station extension (Phase2)	12 000 000
Rising main to Rietgat Parallel sewer	1 900 000
Rietgat WWTW Upgrade Phase 2 (7.5 ML ADWF)	109 000 000
Access ex Bultfontein Road & K241	3 000 000
Stormwater to Stinkwater Spruit	2 000 000
<b>TOTAL</b>	<b>159 333 000</b>

### PHASE 4

Table

Item	R/c
Stormwater to Stinkwater Spruit	2 000 000
Construct Eastern half of East /West Link Road	24 000 000
<b>TOTAL</b>	<b>26 000 000</b>

The costs of bulk services per dwelling unit is approximately R 18 000 per dwelling unit.

## 5.2 INTERNAL SERVICES COST

It is accepted that the provision of services to the residential erven would be via the Governments Subsidy system. The following costs scenario would be valid. Provision has not been made in the calculations for Res 2, 3 and 4 erven where multiple dwelling units would exist. The table below has been compiled using the Housing Subsidy Grant figures.



**Table**

<b>Phase</b>	<b>Dwelling Units</b>	<b>Subsidy @ R 45 985/ DU (A Grade Services) Direct Costs R/c</b>	<b>Indirect Costs R 6 910.32/erf</b>	<b>Total</b>
1	6500	298 902 500	44 917 080	343 819 580
2	7000	321 895 000	48 372 240	370 267 240
3	7500	344 887 500	51 827400	396 714 900
4	7000	321 895 000	48 372 240	370 267 240

## **6 FOODLINES**

The development is affected by floodlines of 1:100 Year Intervals. The extent of the floodlines (indicative at this stage) are shown on plan **Annexure F**.

## **7 CONCLUSION**

Provided that the City of Tshwane can make funds available and provided that the Housing Subsidy Scheme can be accessed, it appears that the Bultfontein Development can proceed as a residential development.

The development can be accommodated as a Mega City Development with the norms and standards as provided for in the Department of Human Settlements Guidelines .

The development needs to be phased over a number of years ( 5-10 years) to accommodate the capital expenditure required for bulk services however the allocation of erven could be done sooner and then followed by the service upgrading approach.



O J Gerber Pr Tech Eng

For Encotech Consulting Engineers.

June 2019

## Annexures

Locality plan





Development Phases

Phased bulk engineering services

Floodlines





LEGEND:	PHASES:	APPROXIMATE TOTAL OF ERVEN
	1	6500
	2	7000
	3	7500
	4	7000

## BULTFONTEIN DEVELOPMENT

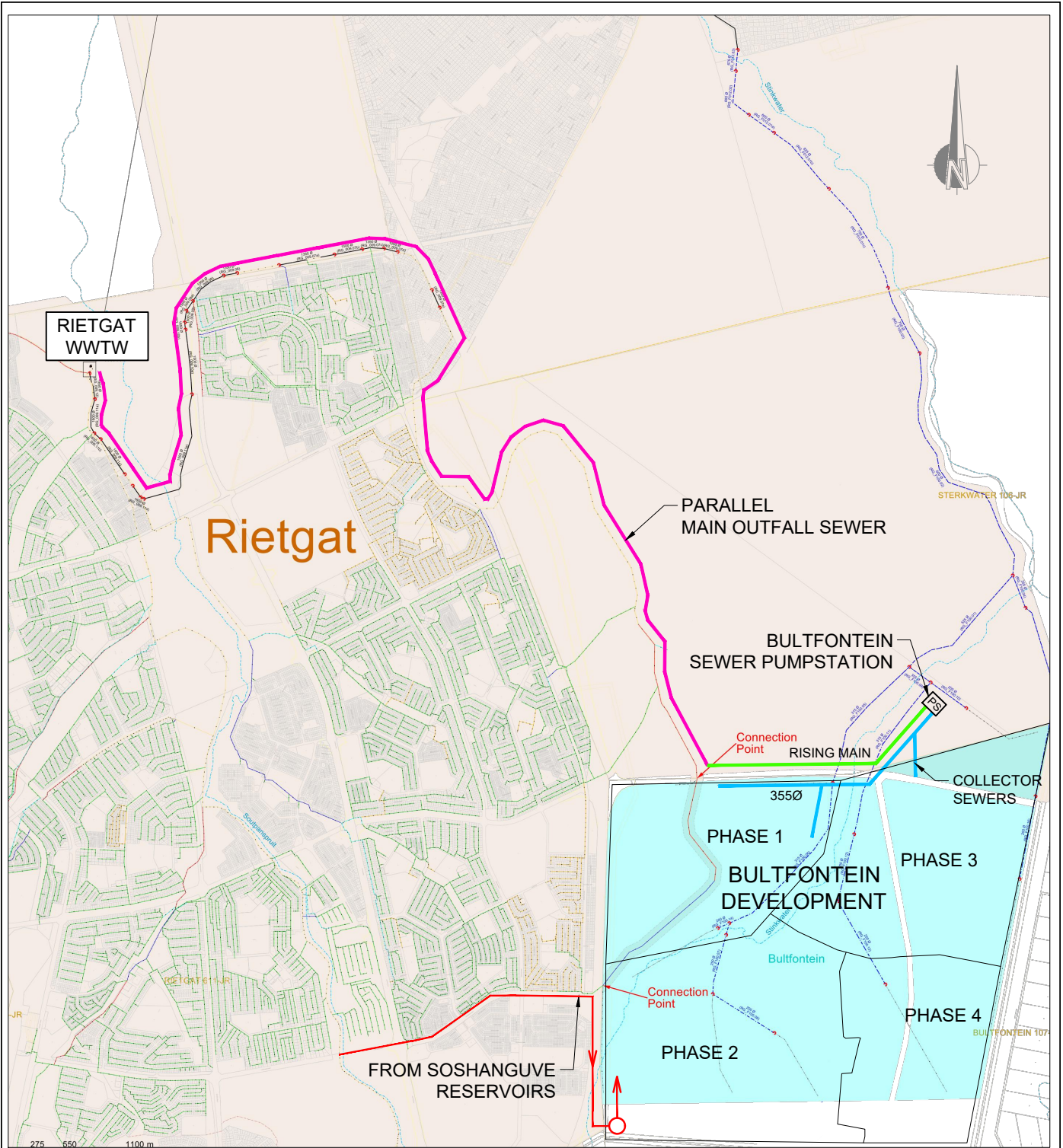


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ANNEXURE C  
LAYOUT PHASES



**BULTFONTEIN  
DEVELOPMENT**

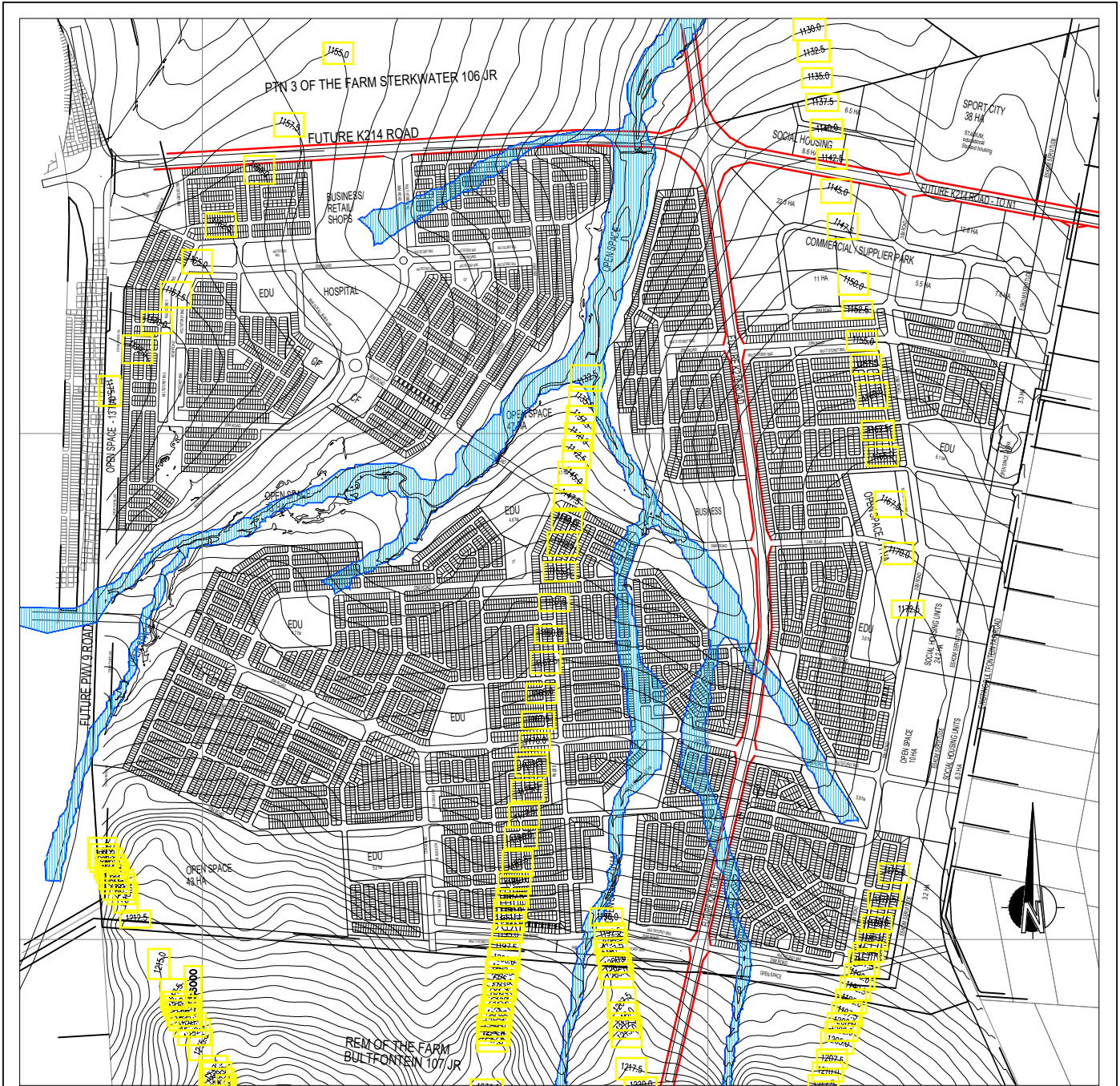
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**PROPOSED  
PHASED BULK CIVIL  
ENGINEERING SERVICES**



# BULTFONTEIN DEVELOPMENT



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ANNEXURE F  
INDICATIVE FLOODLINES