



THUSABATHO

CONSULTING ENGINEERS CC

Registration Number 2009/168229/23 | VAT Number 4210253763

PROPOSED TOWNSHIP ESTABLISHMENT ON AT PLOT 27 RAYTON

FOR

JENN TRAINING COLLEGE
P O BOX 4305
BLOEMFONTEIN 9300

JACOB SELESHO
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PROJECT No: 01286 / PLOT 27 / 2017

Issued: 10 March 2017

SERVICES REPORT

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SERVICES REPORT

1. Introduction

This report has been compiled for the establishment of a 4 125 m² institutional space development and a 150 room residential block to a total area of 8.536 ha at Plot 27. Refer to Annexure A the proposed breakdown of the development as compiled by Urban Dynamics.

The proposed development will consists of two primary buildings elaborated in table 1 below.

Table 1

Property	Academic Space Use Category	Quantity	Size (m ²)
PLOT 27	Lecture / Class Rooms	10	1 050
	Computer Labs	2	400
	Library	1	400
	Service Areas and Ablutions	1	200
	Students Centre	1	200
	Teaching Staff Offices	20	300
	Academic and Institutional Support	1	1 150
	Ablutions	1	50
	SUB-TOTAL		3 750
	10% Allowance for Foyers and Passages		375
TOTAL		37	4 125

Property	Residential Space Use Category	Quantity	Size (m ²)
PLOT 27	Single Rooms	100	1 000
	Double Rooms	50	800
	Common Rooms	1	250
	TV Rooms and Study Rooms	2	38
	Communal Bathrooms and Ablutions	25	1 every 8 beds
	Communal Kitchen Area	25	1 every 8 beds
TOTAL		203	2 088

Listed below are the details of all the firms responsible for the successful completion of the project as indicated in this report.

- 1.1 Developer: **JENN TRAINING COLLEGE**
 Address: P O BOX 4305
 BLOEMFONTEIN
 9300
- Contact Person: JACOB SELESHO
 Tel: 051 430 1924 / 051 447 1094
 E-Mail: jmselesho@gmail.com

- 1.2 Civil Engineers: **THUSABATHO CONSULTING ENGINEERS**
 Address: P O BOX 32289
 FICHARDTPARK
 BLOEMFONTEIN
 9317
- Contact Person: WOUTER KRUGER
 Tel: 051 444 5616
 Fax: 051 444 1742
 E-Mail: wouter@thusabatho.co.za
- 1.3 Town Planners: **URBAN DYNAMICS**
 Address: P O BOX 37522
 LANGENHOVENPARK
 9330
- Contact Person: LEON EHLERS
 Tel: 051 446 0532
 Fax: 051 446 0590
 E-Mail: leon@udi.co.za

The external and internal civil services required for the development at Plot 27 in Rayton are discussed in this report. The locality of the proposed development is shown on attached drawing from Urban Dynamics marked Annexure H and was used in this evaluation.

2. Water Services

The local municipal services was investigated and tested and the water system and several diameter water pipelines around the site cannot accommodate the future development. There are however future planning in the pipeline with the new Emoya development. There will be a bulk distribution pipeline constructed under the Emoya Development that will accommodate and include this proposed development on plot 27. Therefore when the proposed pipeline is completed under the Emoya Project no additional external infrastructure will be required for this development. Refer to Annexure B. The development will be providing adequate water by erecting 1 m³ storage capacity in the development for every residential unit and larger storage tanks to the other proposed facilities calculated according to the individual sizes. This will be done by means of a water tanks and pressure pump in the roof space of every unit and facility to be constructed. If this development is before the mentioned future development of Emoya they will have to upgrade the bulk water systems.

- 2.1 Design standards for the internal services will be according to the “*red book*” and as prescribed by the local municipality specifications.
- 2.2 The firefighting requirements of the development is classified as “*low and medium-risk-group 2*”. The Groenvlei area where the development is situated does not have any fire hydrants as it is formally zoned as a peri-urban area. This will have to be reviewed in accordance with the SANS 10090 (2003) to which the municipality has to comply with.

2.3 Water demand:

The estimated water consumption can be calculated with the following assumptions:

2.3.1 According to the plan, there will be several residential, educational and other facilities on the proposed development. This was determined using the breakdown as supplied by the town planners.

2.3.2 Unit flows assumptions that was made is the following:

- a. 100 Single Residential Rooms is 500 l/day for every residential single room, where the area per unit does not exceed 150 m².
- b. 50 Double Residential Rooms is 1 000 l/day for every residential single room, where the area per unit does not exceed 300 m².
- c. 1 000 Student Academic Space is 10 l/day per student.

2.3.3 A peak factor of 3.5 for residential sections and 1 for other facilities.

2.3.4 The water system has an average existing pressure reading of 349.5 kPA measured during the peak working hours from 07h00 to 18h00. Refer to Table 2 below.

2.3.5 All the above is according to the National Building Regulations.

TABLE 2: WATER PRESSURE

PEAK TIME AM	PRESSURE KPA	PEAK TIME PM	PRESSURE KPA
06H00	355	16H00	360
06H30	350	16H30	355
07H00	345	17H00	350
07H30	345	17H30	345
08H00	350	18H00	340

Based on the assumptions listed above the following figures in Table 3 below were derived for the water network of the proposed development:

TABLE 3: WATER DEMAND

DESCRIPTION	QUANTITY	DAILY CONSUMPTION L/UNIT/DAY	ANNUAL DAILY L/S	PEAK FLOW L/S
SINGLE ROOMS	100	500	0.579	2.025
DOUBLE ROOMS	50	1000	0.579	2.025
ACADEMIC SPACE	1000	10	0.116	0.116
			TOTAL:	4.166

2.4 Pipe work

The development lies within the Mangaung Local Municipality District in Groenvlei as indicated in Annexure H. Existing 110 mm diameter water pipe line serves the proposed development area in front of the site. This 110 mm pipeline are supplied from the western and the northern reservoirs and main water pipelines. There is sufficient water pressure in the area as indicated in point 2.3.4 above but insufficient water distribution supply and the system will have to be upgraded before it can be able to accommodate the new development and more development in the future. The new pipeline as discussed in point 2 above will have to be completed before this development can commence.

The development will be provided with water by constructing and connecting a internal 110 mm water network with the new water distribution lines from the water reticulation system situated around the development as indicated in Annexure B. The water consumption of the development as analyzed above is possible to supply water from this proposed connection without a significant loss of pressure in the system.

The development will be supplied by 110 mm diameter internal water network with a water meter for the complete academic and residential facility. The water meter and its reading will be handed over to the local municipality after construction. The Owners of the facility will have to submit an application to the council for the connection of the internal network to the municipal network as per the normal procedures.

2.5 Water Network Capacity Analysis by Bigen Africa

Attached as annexure G is the Water Analysis by Bigen Africa

3. Sewerage Network

There is no existing sewer reticulation available near the development to accommodate the development. There are however a 6 061 km gravity sewer line running to the Western Sewer Treatment Works that are being planned and are already under construction. This line will have to be completed before the development and the internal sewer reticulation connection as indicated on the drawing attached as Annexure C can be connected

3.1 The estimated sewerage flow will be calculated by using the following assumption figures:

3.1.1 According to the plan, there will be several residential, academic and other facilities on the proposed development. This was determined using the breakdown as supplied by the town planners.

3.1.2 Unit flows assumptions that was made is the following:

- a. 100 Single Residential Rooms is 375 l/room/day.
- b. 50 Double Residential Rooms is 750 l/room/day.
- c. 1000 Student Academic Space is 7.5 l/day per student.

- 3.1.3 A peak factor of 3.0 residential sections and 1 for other facilities.
- 3.1.4 The system designed according to "Red Book" standards.
- 3.1.5 All the above is according to the National Building Regulations and SABS 1200 LD.

Based on the assumptions listed above the following figures were derived as indicated in Table 4 below:

TABLE 4: SEWER DEMAND

DESCRIPTION	QUANTITY	DAILY CONSUMPTION L/UNIT/DAY	ANNUAL DAILY L/S	PEAK FLOW L/S
SINGLE ROOMS	100	375	0.434	1.302
DOUBLE ROOMS	50	750	0.434	1.302
ACADEMIC SPACE	1000	7.5	0.087	0.087
			TOTAL:	2.691

The total average daily flow is estimated at 0.955 L/S and the peak flow as 2.691 L/S.

3.2 Pipe work

There is no existing sewerage reticulation system in the site that can be developed, this will however be replaced with a new internal 160 mm and connected to a new external 200 mm diameter sewer network connected with a 355 mm diameter sewer fallout line in the western direction of the site to the existing 355 mm diameter sewer line in the back of Langenhovenpark running to the Western Sewer Treatment Works. This line is already under construction under the Emoya Development.

The flow depths of the 355 mm diameter sewer pipes in the existing sewer network were monitored over a period of approximately 4 hours during peak flow time in the morning and in the afternoon. The result of the flow depths indicate that the pipework in the network is only at 40 % of full capacity during peak hours. The existing network therefore has been evaluated and will have sufficient capacity to accommodate the new development.

Connection to this line can however only be done when this fallout line is complete.

3.3 Sewerage purification works

The proposed 6 061 km gravity line under construction will be connected to the existing 355 mm sewer line and drains to an developed sewerage purification works. According to sewer services department, there is sufficient capacity within the purification works to handle the additional sewer for this development.

3.4 Adequacy of existing Municipal Network

The capacity of the existing sewer network that is required to service the proposed development was checked and was found to be adequate to accommodate the additional flow as described in the section 3 above.

3.5 Sewer Network Capacity Analysis by Bigen Africa

Attached as annexure G is the Sewer Analysis by Bigen Africa.

4. Roads

Annexure E indicating the proposed position of the new development with the entrance to the development in either the tarred Frans Kleynhans Road or tarred Floris Coetzee Road.

There are no new internal roads to be constructed under this development and all will be normal block paving layout as per the site development plan that will be done on a later stage.

4.1 Existing Roads

The existing roads layout and reserve widths are shown on the attached drawings in Annexure E.

All the roads, adjacent to the proposed development, are to be upgraded as per the municipal standards. The length of the bulk adjacent roads to be upgraded will be determined and calculated from the total area that is being developed. This will be calculated and included at services agreement stage.

The Traffic Impact Study is not part of this report and will be submitted separately by another consultant.

4.2 Municipal Policy

This development will construct no internal roads and cannot be added as bulk contribution for the development.

4.3 Roads Design Standards

The internal paving block roads will be designed according to the Standard Specifications for roads as required by the municipality.

The basic design of the roads will be as follows to accommodate the normal vehicles that will service the residential area:

- a) A 80 mm Paving Block Surfacing with the specification for normal traffic.
- b) 150 mm Gravel sub-base compacted to 95 % Modified AASHTO density consisting of a minimum G5 material classification.
- c) A 150 mm insitu roadbed compacted to 93 % Modified AASHTO density.
- d) All paving inside the development will be according to the site development plan to be done on a later stage..

The profile of the paving blocks will be an average of 3 % cross-fall to accommodate the storm water as designed by the engineer as far as possible. A complete design with all the levels and direction of flow will be designed and submitted after the approval of the report.

The vertical and horizontal alignment will be done to accommodate the storm water in the area and will not be less than 0,5 %.

5. Storm water

The area for development is an open land with several trees and bush with a gradient that falls from the north eastern side to the north western side of the site. Refer to Annexure F.

5.1 Existing Storm Water

It is possible to accommodate the storm water run-off from the proposed development in the existing storm water open drain system adjacent to the existing Frans Kleynhans Road and gravel Floris Coetzee Road.

The existing open drains will however have to be serviced by the developer to ensure the drains are open and in working condition. The new internal storm water system will be accommodated in the proposed new road network that can connect to the existing storm water network.

There is no underground storm water network in the area at the moment therefore all storm water will be handled above ground.

The capacity of the storm water network will be designed for a 1 / 5 year storm event. The runoff from all new developments or densification of existing developments may not exceed the pre-development runoff for the applicable minor or major frequency design flood and the necessary detention facilities must therefore be provided on the erf / development. There will therefore be retention of the storm water as per municipal request. This retention of the storm water will be done on site as per Annexure F. Retention of the storm water will be done with contour humps on the lower side of the site in open spaced provided in the site development plan before it exits the site.

5.2 Design Standards

The external storm water drainage consists of overland storm water that are being accommodated in the road itself and is designed for a 1 / 5 year storm event using the parameters and storm water design model as prescribed by the local municipality.

All above ground storm water will be handled using the roads and the public open spaces as per the site development plan where the velocity will be below 0.8 m/s to accommodate retention of the storm water on the site.

5.3 Municipal Policy

The Municipal policy on storm water for new developments in this area, states that the developer will be responsible to provide full underground piped storm water facilities to cater for all storm water entering his development up to a point

where it exits the development. This is however not possible due to no underground storm water available in the area.

All the storm water in the area can be accommodated using overland flow, the road system and cleaning of existing channels according to the engineers design.

5.4 Flood Line

The site is not subject to any flood lines and been endorsed accordingly. The nearest storm water stream is south of the site. The area is estimated 20 meters higher than the nearest 1 : 50 meter flood line.

The area under discussion therefore falls outside the recurrence interval of the 1 in 50 Years flood-line.

6. Estimated Project Budget

It is the requirement from the council that the cost estimate for the civil construction be supplied in the services report. The cost estimate for the other engineers services for example the structure and the electricity will be covered in the addition reports submitted by the relevant engineers.

6.1 Development Budget

Refer to Annexure D for the complete development budget.

6.2 Municipal Contribution

The contribution from the local municipality will be determined after negotiations with the local municipality and as indicated in the above-mentioned services report. This will be shown in the Services Agreement to be compiled at a later stage.

7. Conclusion

The development cost is high due to Municipal requirements; it is therefore essential that the municipality contribution be negotiated during services agreement stage for the construction of external bulk Municipal services.

We trust that we have supplied sufficient information. However, should you require any additional information we are at your service.

Yours faithfully

 Wouter Kruger Pr. Tech. Eng.
THUSABATHO CONSULTING ENGINEERS

 Date

Annexure A

1. Institutional Space Requirements

The proposed development consists of two primary building elaborated in table 1.1 and 1.2, where 1.1 is the academic block and 1.2 is the residential block.

1.1. Academic Block

The academic block is proposed as 2 storey building and will consist of the below mentioned uses.

Space Use Category	Quantity	Total Size
Lecture/Class Rooms	10	1050m ²
Computer labs	2	400m ²
Library	1	400m ²
Service Areas and ablutions	-	200m ²
Students Centre	1	200m ²
Teaching Staff Offices	20	300m ²
Academic and Institutional Support, Student Services and Auxiliary Enterprises	-	1 150m ²
Ablutions	-	50m ²
SUB-TOTAL	-	3750m²
10% Allowance, for Foyers, and Passages	-	375m ²
TOTAL		4125m²

1.2. Residential Block

Proposed to be 3 Storeys high, will consist of the below mentioned uses.

Space Use Category	Quantity	Total Size
Single Rooms	100	1000m ²
Double Rooms	50	800m ²
Common Rooms	1	250m ²
TV Rooms and Study Rooms	2	38m ²
Communal Bathrooms and Ablutions	25	1 every 8 beds
Communal Kitchen Area	25	1 every 8 beds

Is not foreseen that there will be any Special equipment used by the institution.

Annexure B

Amendment	
No.	Date

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Project
PROPOSED CIVIL SERVICES FOR PLOT 27 RAYTON

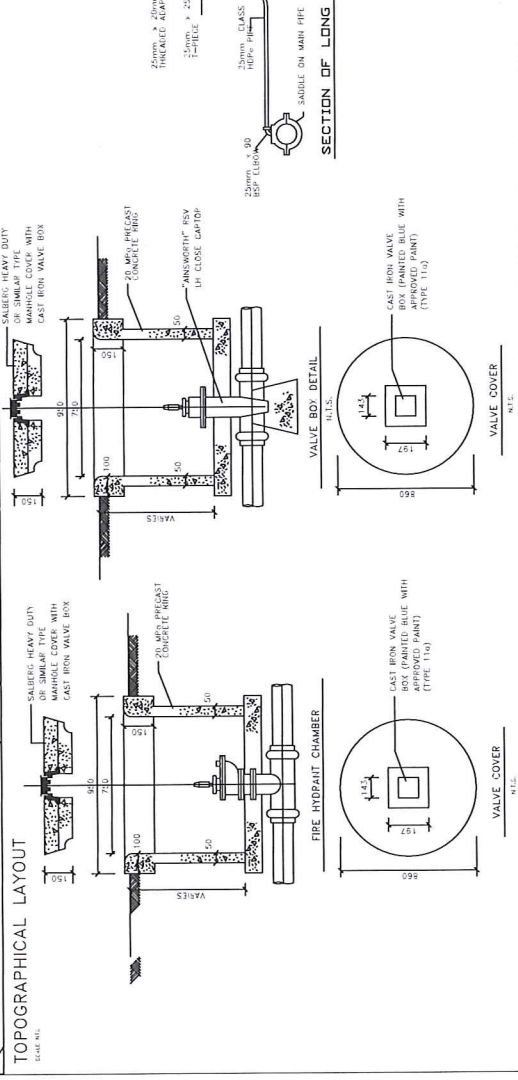
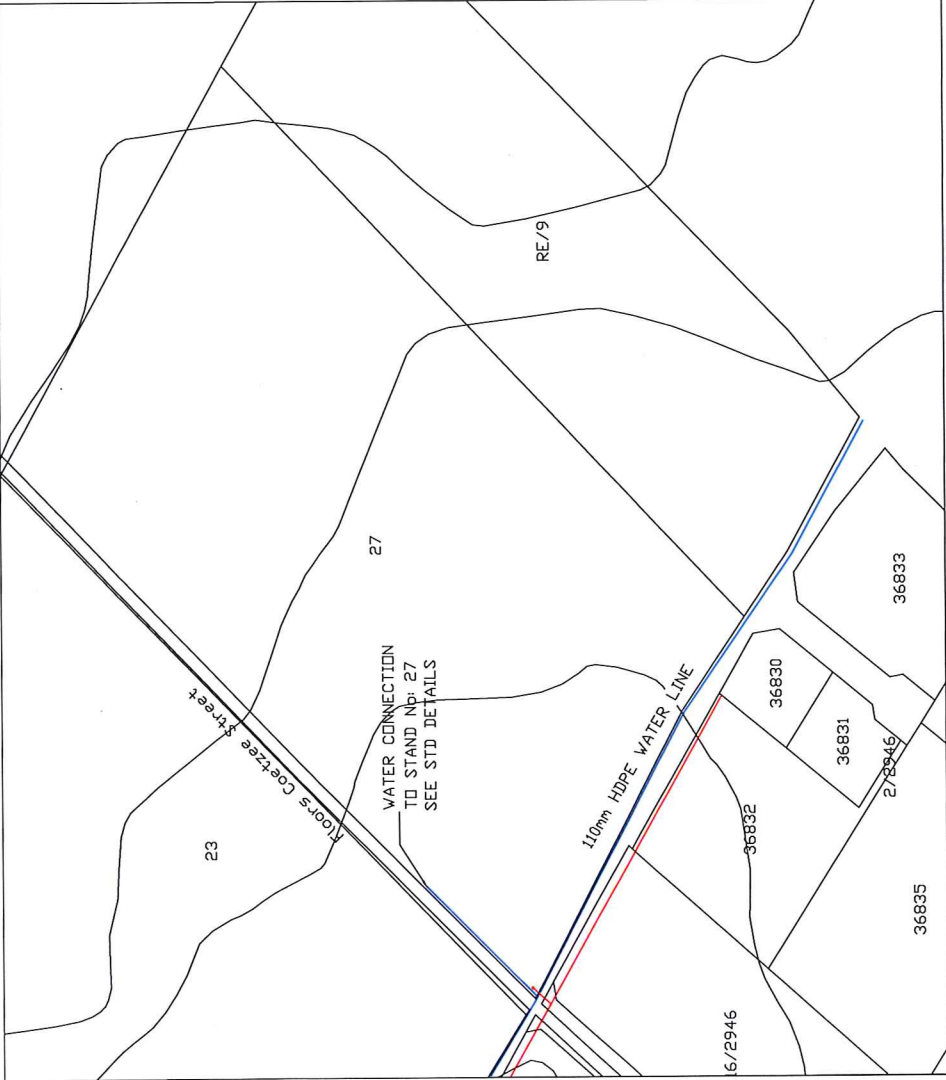
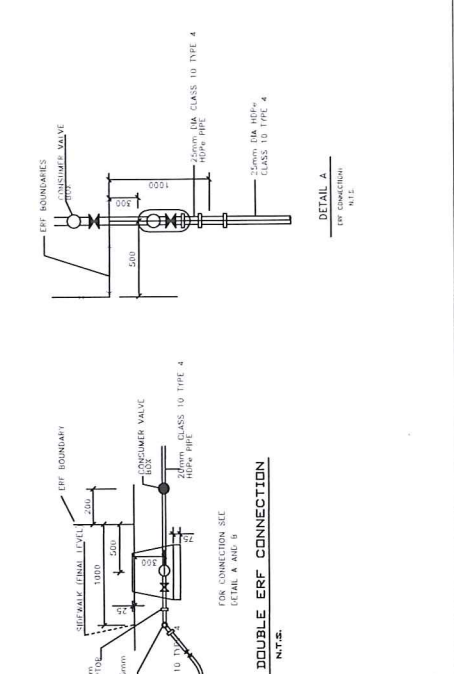
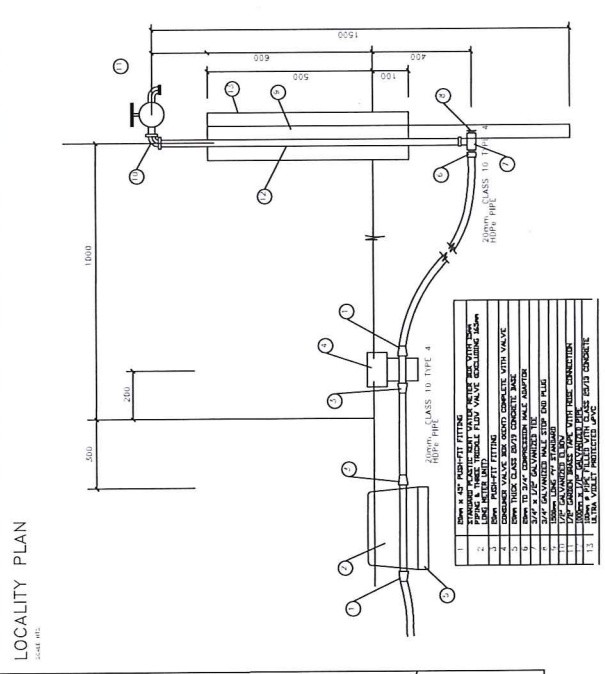
Plan Description
PROPOSED WATER CONNECTION

Scale
1 : 20

Date
09/03/2017

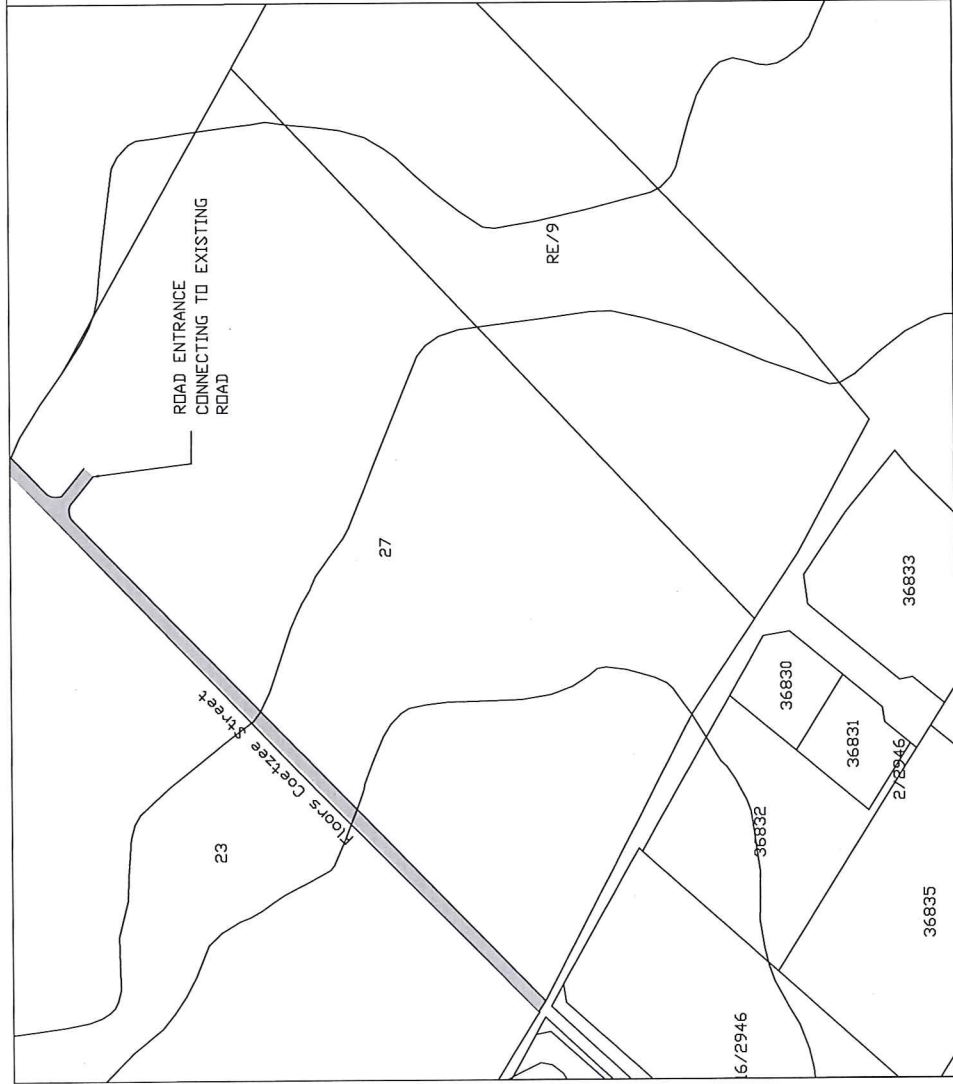
PRELIMINARY DRAWINGS

Plan No.
1286-02

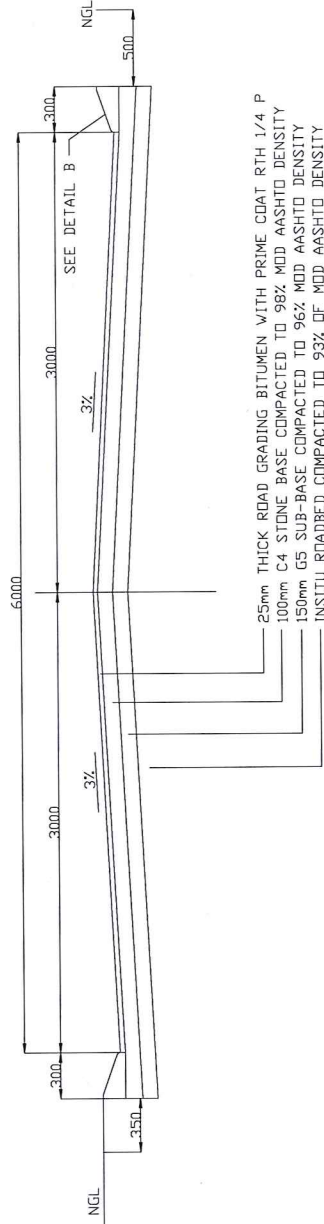


Annexure D

ESTIMATED DEVELOPMENT BUDGET			
INTERNAL CONNECTION SERVICES CONSTRUCTION COST			
DESCRIPTION	SERVISED SITES	COST PER UNIT	AMOUNT
WATER NETWORK	1	R 30 000.00	R 30 000.00
SEWER NETWORK	1	R 35 000.00	R 35 000.00
STORM WATER NETWORK	1	R 25 000.00	R 25 000.00
PAVED ROADS NETWORK	1	R 60 000.00	R 60 000.00
Subtotal A			R 150 000.00
EXTERNAL SERVICES CONSTRUCTION COST			
DESCRIPTION	METER	COST PER METER	AMOUNT
WATER NETWORK	0	R -	R -
SEWER OUTFALL LINE	0	R -	R -
STORM WATER NETWORK	500	R 200.00	R 100 000.00
PAVED ROADS NETWORK	500	R 1 000.00	R 500 000.00
Subtotal B			R 600 000.00
Subtotal A + B			R 750 000.00
Contingency of 10 %			R 75 000.00
Construction Subtotal			R 825 000.00
Construction Value Added Tax			R 115 500.00
Total Construction Value			R 940 500.00
PROFESSIONAL FEES			
Civil Engineer Services (5 %)			R 41 250.00
Disbursements			R 4 125.00
Professional Services Subtotal			R 45 375.00
Professional Services Value Added Tax			R 6 352.50
Total Professional Services Value			R 51 727.50
TOTAL PROJECT BUDGET			R 992 227.50



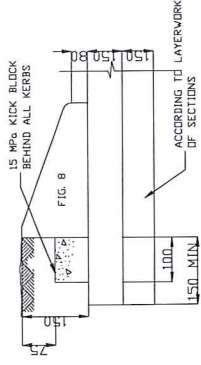
TOPOGRAPHICAL LAYOUT
SCALE: 1:200



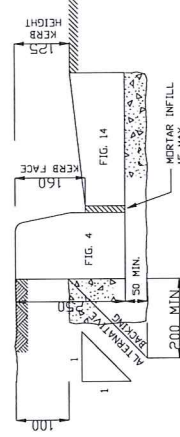
LAYERWORK DETAIL
SCALE: 1:25



LOCALITY PLAN
SCALE: 1:200



MOUNTABLE KERB



DETAIL OF KERB
AT ENTRANCE
SCALE: 1:25

Amendment	
No.	Date

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Project
PROPOSED
CIVIL SERVICES
FOR PLOT 27 RAYTON

Plan Description
**PROPOSED ROADS ENTRANCE
LAYOUT**

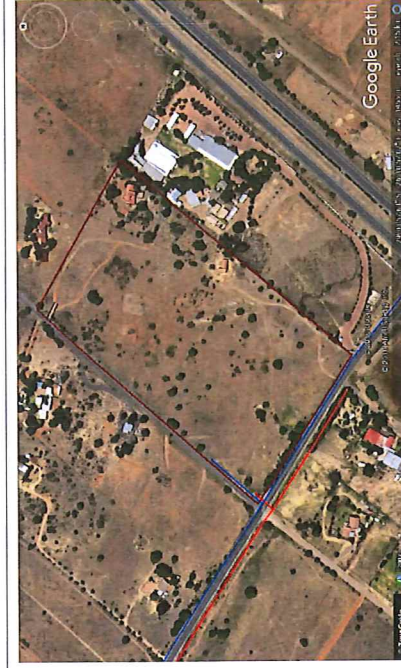
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Date
09/03/2017

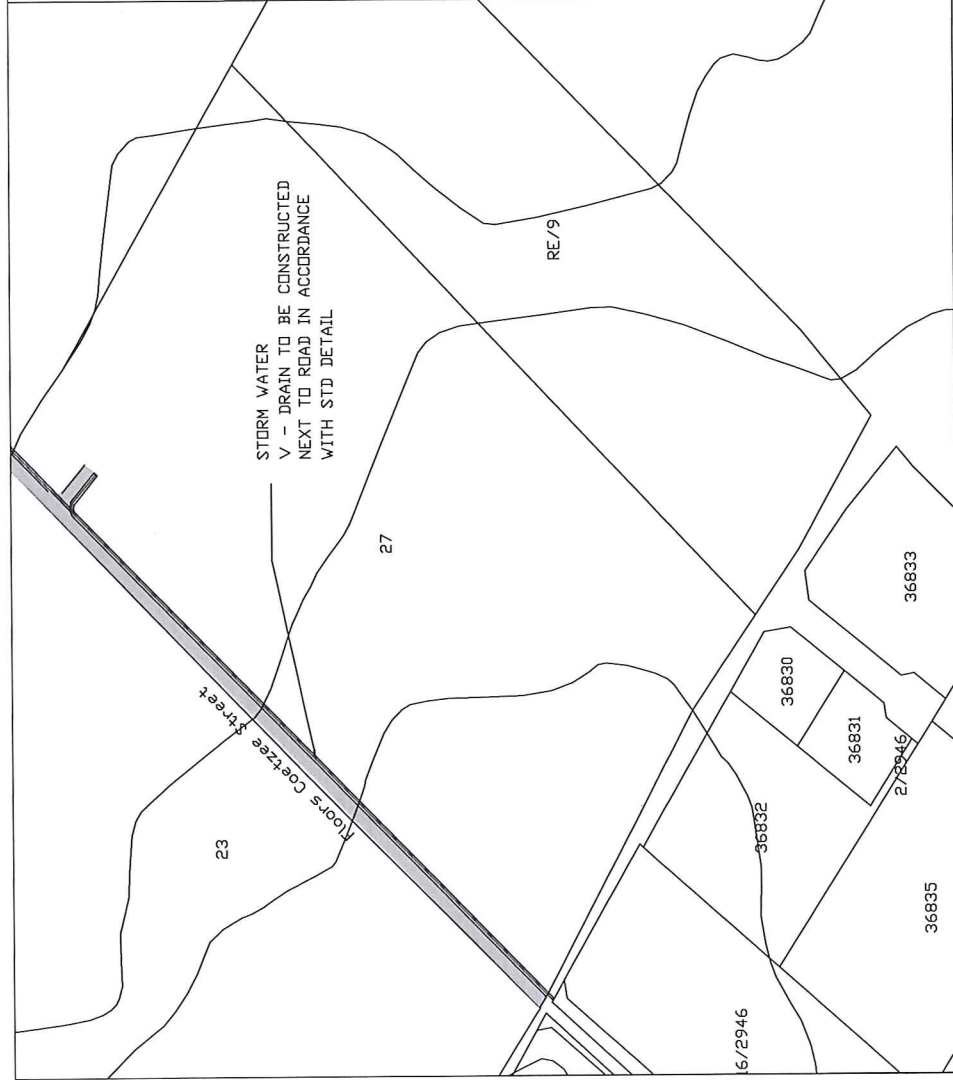
PRELIMINARY
DRAWINGS

Plan No.
1286-03

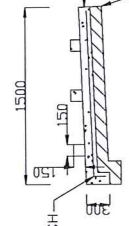
Angela



LOCALITY PLAN
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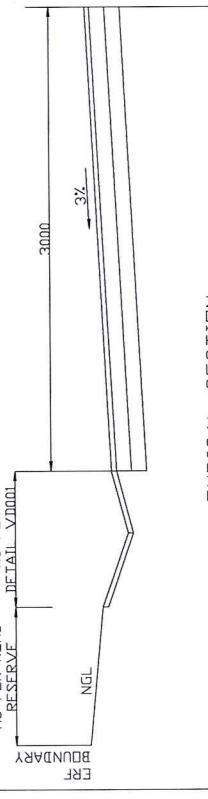


TOPOGRAPHICAL LAYOUT
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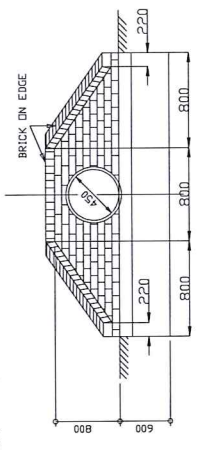


SECTION A - A

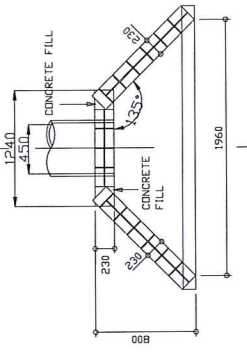
STORM WATER BREAK



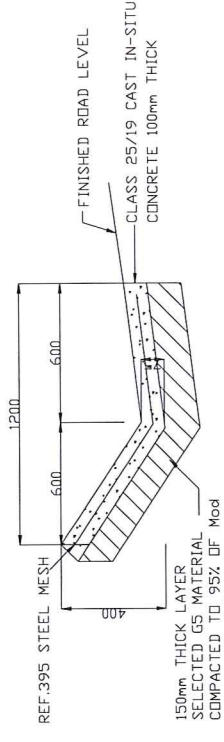
TYPICAL SECTION



FRONT ELEVATION - SINGLE PIPE
SCALE: 1:50



BOX CULVERT DETAIL



TYPICAL V - DRAIN

Amendment	
No.	Date



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Project

PROPOSED
CIVIL SERVICES
FOR PLOT 27 RAYTON

Plan Description

PROPOSED STORM WATER
LAYOUT

Scale	Date
1 : 20	09/03/2017

PRELIMINARY
DRAWINGS

Plan No.
1286-04

Original

Annexure G

MANGAUNG METROPOLITAN MUNICIPALITY
WATER INFRASTRUCTURE CAPACITY ANALYSIS



Application By:
Development Name:
Date:
Street Address of Development:

JENN TRAINING COL.
JACOB SELESHO
03 FEBRUARY 2017
PLOT 27 RAYTON FRANS KLEYNHANS ROAD

Type of Development (please tick):
Planned construction commencement date:
Date of development's connection to municipal water network:

<input checked="" type="checkbox"/> Residential	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Industrial
MAY 2018		
DEC 2018		

Is the development in accordance with the Mangaung Metropolitan Municipality's latest Spatial Development Framework (SDF)?

Yes <input checked="" type="checkbox"/>
No <input type="checkbox"/>

Water Demand Information:

Description	Value	Unit
Annual Average Daily Demand ⁽¹⁾	110000	l/day
Peak Demand ⁽¹⁾	4,166	l/s
Fire Flow ⁽²⁾	4,781	l/s

63,3 l/s. Houses 3-10m apart assumed.

Planned on-site water storage:
If Yes, indicate volume:

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
150	

kl

Notes on water demand information:

- 1) Water demands calculated should be based recommended demand information as per the Guidelines for Human Settlement, Planning and Design (2005).
- 2) Fire flow demand should be based on SANS 10090: Community Protection against Fire (2003)

Development Location:

Please insert a Google Earth image which clearly indicates the location of the development.

REFER TO ATTACHED LOCALITY DRAWING
0277/1/1

Requested by:
On behalf of:
Signed:
Date:

W. KRUGER
THUSABATHO

03/02/17

Approved by:
On behalf of:
Signed:
Date:

MMM

Request No. (office use):

W015/2017

Response on Request No.

W015/2017

1) Bulk reservoir supply zone:

Current:

Rayton Tower

Future:

Groenvlei Reservoir

2) Storage Capacity:

Existing Storage Capacity:

Sufficient	Insufficient	✓
------------	--------------	---

Does planned infrastructure accommodate this development?

Yes	✓	No
-----	---	----

Comment: The development is situated in the Rayton Tower's zone which does not have sufficient storage capacity. As discussed in the latest Bloemfontein Internal Water Masterplan, this issue will be addressed by the construction of a new Groenvlei Reservoir.

2) Operating Pressures

Distribution Network Capacity:

Sufficient	✓	Insufficient
------------	---	--------------

Status Quo Theoretical Operating Pressures at ground elevation level:

Static	50	m
Minimum	45	m

Future Predicted Operating Pressures at ground elevation level:

Static	50	m
Minimum	40	m

Comment: The distribution network has sufficient capacity for the development.

3) Fire Flow Pressures

Current Fire Flow Pressure:

Minimum 0 m

Does planned infrastructure accommodate this development?

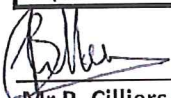
Yes	No	✓
-----	----	---

Comment: This area was previously zoned as peri-urban area and does not have any municipal fire hydrants. The distribution network doesn't have sufficient capacity to supply the minimum fire flow for the type of development.

4) Conclusion

5) Recommendation

In terms of storage capacity, the existing Rayton Tower doesn't have sufficient capacity for the development. The new proposed Groenvlei Reservoir will, however, have sufficient capacity for the development's demand. The existing distribution network has sufficient capacity for the development's demand. There are no municipal fire hydrants in the development's area and the distribution network doesn't have sufficient capacity for the development's fire flow requirements.	Additional storage capacity for future developments in this area needs to be addressed. Furthermore, the minimum fire flow requirements and municipal fire hydrants required for the type of development needs to be addressed before the development can be supplied from the municipal water network.
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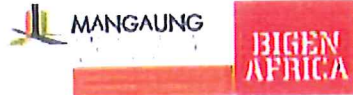


Mr P. Cilliers (PrEng)

on behalf of

Bigen Africa Services (Pty) Ltd

MANGAUNG METROPOLITAN MUNICIPALITY
SEWER INFRASTRUCTURE CAPACITY ANALYSIS



Application By:
Development Name:
Date:
Street Address of Development:

JENN TRAINING COL.
JACOB SELESHO
03 FEBRUARY 2017
PLOT 27
RAYTON
FRANS KLEYNHANS
ROAD

Type of Development (please tick):

<input checked="" type="checkbox"/> Residential	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Industrial
---	--	-------------------------------------

Planned construction commencement date:

MAY 2018

Date of development's connection to municipal sewer network:

DEC 2018

Is the development in accordance with the Mangaung Metropolitan Municipality's latest Spatial Development Framework (SDF)?

Yes
<input checked="" type="checkbox"/> No

Sewer Effluent Information:

Description	Value	Unit
Average Dry Weather Flow (ADWF)	82,500	l/day
Average Dry Weather Flow (ADWF)	0,955	l/s
Peak Wet Weather Flow (PWWF)	2,691	l/s

Notes on water demand information:

Sewerage effluent flows calculated should be based recommended effluent information as per the Guidelines for Human Settlement, Planning and Design (2005).

Development Location:

Please insert a Google Earth image which clearly indicates the location of the development.

REFER TO ATTACHED LOCALITY DRAWING
0277/1/1

Requested by:

W. KRUGER
THUSABATHO

On behalf of:

Signed:

Date:

[Signature]
03/02/17

Approved by:

On behalf of:

Signed:

Date:

[Signature]

MMM

[Signature]

Request No. (office use):

5015/2017

Response on Request No. S015/2017

1) Waste Water Treatment Works (WWTW) Catchment Area: Bainsvlei WWTW

2) Waste Water Treatment Works (WWTW) Capacity:

Theoretical Status Quo Capacity:	Sufficient	✓	Insufficient
Future Predicted Capacity:	Sufficient	✓	Insufficient

The Bainsvlei WWTW has sufficient capacity for the proposed development's effluent.

3) Sewer Network Capacity

Theoretical Status Quo Capacity:	Sufficient	Insufficient	✓
Future Predicted Capacity:	Sufficient	Insufficient	✓

Comment: There is currently no water borne sanitation available however, the bulk services report by Emoya Estate development indicate that provision will be made to drain this property to Bainsvlei WWTW.

Figure: ■ Applicable Sewer Network ■ Sufficient Capacity ■ Insufficient Capacity




4) Conclusion

Conclusion summary: The Bainsvlei WWTW has sufficient capacity for the proposed new development. The main sewer network South of Nelson Mandela Road has sufficient capacity for this development's future effluent however, this is subject to the upstream network development.

5) Recommendation

The connection for the development to the Bainsvlei WWTW has to be investigated and formalised in a master plan.


Mr P. Cilliers (PrEng)
on behalf of
Bigen Africa Services (Pty) Ltd

Plan No.
1

Orientation Locality Map

Subject Property
Plot Royton 27,
Bloemfontein

LEGEND

- Subject Property
- National_Roads
- Roads_(ordinary)
- Secondary

SCALE

1:30 000



DATA FRAME

Coordinate System: WGS77
Projection: Transverse Mercator
Datum: Horibesthoek 1994

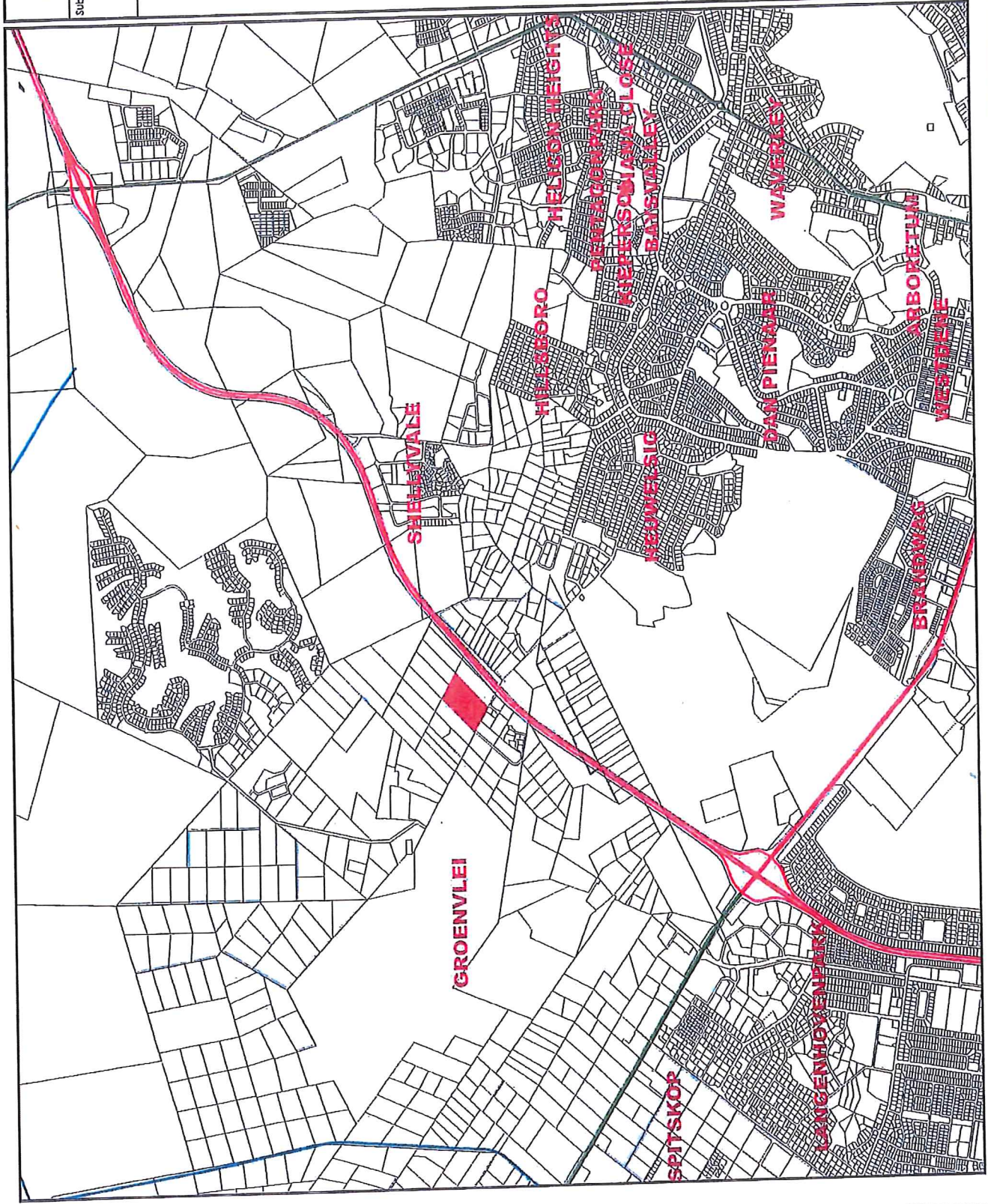
DRAWING No: 0277/1/1

DATE: November 2016



URBAN DYNAMICS

PO BOX 31233
LINDSAY PARK
Ermak, 00101
TEL: 001 442 5232
FAX: 001 442 5716



Annexure II

Orientation Locality Map	Plan No. 1
	Subject Property Plot Rayton 27, Bloemfontein
LEGEND	<ul style="list-style-type: none">Subject PropertyNational_RoadsRoads_(ordinary)Secondary
SCALE 1:30 000	0 0.375 0.75 1.5 km
DATA FRAME Coordinate System: WGS27 Projection: Transverse Mercator Datum: Hartbeesthoek 1994	DRAWING No: 0277/1/1 DATE: November 2016
URBAN DYNAMICS P.O. BOX 19205 LANGENHOVENPARK BLOEMFONTEIN 9300 Email: urban@urbandyn.co.za TEL: (051) 446 0052 Fax: (051) 246 7745	

