



**PROPOSED TOWNSHIP ESTABLISHMENT ON
PORTION 3 OF THE FARM DOORNPAN
NUMBER 193 IP**

**ENGINEERING BULK SERVICES
REPORT**

NOVEMBER 2021

Prepared for:



Nkanivo Development Consultants

Unit 79, Block 5
Lombardy Business Park
66 Graham Road
Pretoria
0084

Prepared by:



Ukhozikazi Projects (Pty) Ltd

322 Whisken Avenue
Midrand
1684

ENGINEERING BULK SERVICES REPORT:

PROPOSED TOWNSHIP ESTABLISHMENT ON PORTION 3 OF THE FARM DOORNPAN NUMBER 193 IP: PROVISION OF CIVIL ENGINEERING BULK SERVICES

1. CLIENT INFORMATION:

Company	Nkanivo Development Consultants
Contact Person	Mr S. Chauke
Address	Unit 79, Block 5 Lombardy Business Park 66 Graham Road Pretoria 0084
Telephone No.	012 807 7445
E-mail	info@nkanivo.co.za

2. COMPILED BY:

Company	Ukhozikazi Projects (Pty) Ltd
Contact Person	Ms G. Mthethwa, Pr Tech Eng
Address	322 Whisken Avenue Midrand 1684
Telephone No.	010 206 9054
E-mail	gugu@ukhozikazi.co.za

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	PURPOSE OF THE REPORT	1
3.	PROJECT LOCATION	1
4.	SITE VISIT	2
5.	FLOODLINE	2
6.	WETLANDS	2
7.	LAND USE	2
8.	WATER	4
8.1	Findings and Status Quo	4
8.2	Fire Water Status Quo.....	5
8.3	Summarized Findings of the Current Water and Fire Water System.....	5
8.4	Water Supply for the Proposed Development.....	5
8.4.1	General Design Criteria.....	5
8.4.2	New Development Water Demand Calculation	6
8.4.3	Proposed Bulk Water Supply.....	6
9.	SANITATION	8
9.1	Findings and Status Quo	8
9.2	Summarized Findings.....	9
9.3	Sewer Demand for the Proposed Development.....	10
9.3.1	General Design Criteria.....	10
9.3.2	New Development Sewer Flow Calculation	10
9.3.3	Proposed Bulk Sewer	10
10.	ROADS	12
10.1	Existing Roads Infrastructure.....	12
10.2	Proposed Roads Infrastructure.....	14
10.2.1	Typical Roads Geometry.....	15
10.2.2	Typical Roads Pavement Design.....	15
11.	STORMWATER DRAINAGE	16
11.1	Existing Stormwater Infrastructure.....	16
11.2	Proposed Infrastructure	16
11.2.1	Standards and Specifications	17
11.2.2	Design Criteria.....	17
11.3	Planned Stormwater Drainage.....	18
12.	RECOMMENDATIONS	19
12.1	Water Use	19
12.2	Sanitation	19
12.3	Roads.....	19
12.4	Stormwater.....	19

LIST OF TABLES

Table 1: Land usage from Nkanivo Development Draft Township Layout	3
Table 2: Water Supply General Criteria.....	6
Table 3: Calculated Average Water Daily Demand	6
Table 4: Sewer Flow General Criteria	10
Table 5: Calculated Sewer Flows.....	10
Table 6: Geometric Design Standards	15
Table 7: Typical Road Layerworks for Internal Access Roads.....	15

LIST OF FIGURES

Figure 1: Project Location	1
Figure 2: Locality Map (Study Area).....	2
Figure 3: Draft Township Layout	3
Figure 4 : Ventersdorp Reservoirs	4
Figure 5: Proposed Development site	4
Figure 6: Proposed Development site in relation to the reservoir site.....	5
Figure 7: Metered water supply in Tshing Ext. 5	5
Figure 11: Proposed Development site	9
Figure 12: Existing Waste Water Treatment.....	9
Figure 13: Proposed Development area in relation to the WWTW.	9
Figure 14: Outfall sewer manhole in Tshing Ext. 5	9
Figure 15: 500m Waste Water Treatment Works Buffer Zone in relation to the site.	11
Figure 16: Existing Roads Network	12
Figure 17: End of surface: Dock Street furnished with an edge beam	13
Figure 18: Internal access road from Dock Street to the proposed Development	13
Figure 19: Proposed Route to the Development	14
Figure 20: Typical Section through road.....	14
Figure 21: A wetland that was 100m away from site	16
Figure 22: Internal access road from Dock Street to the proposed Development	17

LIST OF APPENDICES**APPENDIX A – DRAFT TOWNSHIP LAYOUT****APPENDIX B – BULK WATER SUPPLY AND SANITATION LAYOUT FUTURE 15 YEARS**

1. INTRODUCTION

Nkanivo Developments on behalf King Associates appointed Ukhozikazi Projects (Pty) Ltd to carry out an assessment for bulk engineering services for the Township Establishment on Portion 3 of the Farm Doornpan number 193 IP, in Ventersdorp, North West Province.

2. PURPOSE OF THE REPORT

The purpose of the civil engineering services assessment is to report on the availability and capacity of existing engineering bulk services that can be used to connect the proposed development. This report presents findings of a preliminary site investigation relating to bulk services and further sets out the criteria and standards for engineering services. The report will further illustrate the procedures and literature that can be utilized to design the necessary services.

The civil engineering services addressed in this report are as follows:

- Potable Water
- Sewerage / Sanitation
- Roads and Stormwater

3. PROJECT LOCATION

The site is located on Portion 3 of the Farm Doornpan number 193 IP North West Province, approximately 3.5 km North West from Ventersdorp CBD. The proposed development is bordered by Tshing Townships which is located within the 2.5km radius of the proposed site. The site co-ordinates are Latitude: 26°18'15.96"S; Longitude: 26°47'23.51"E

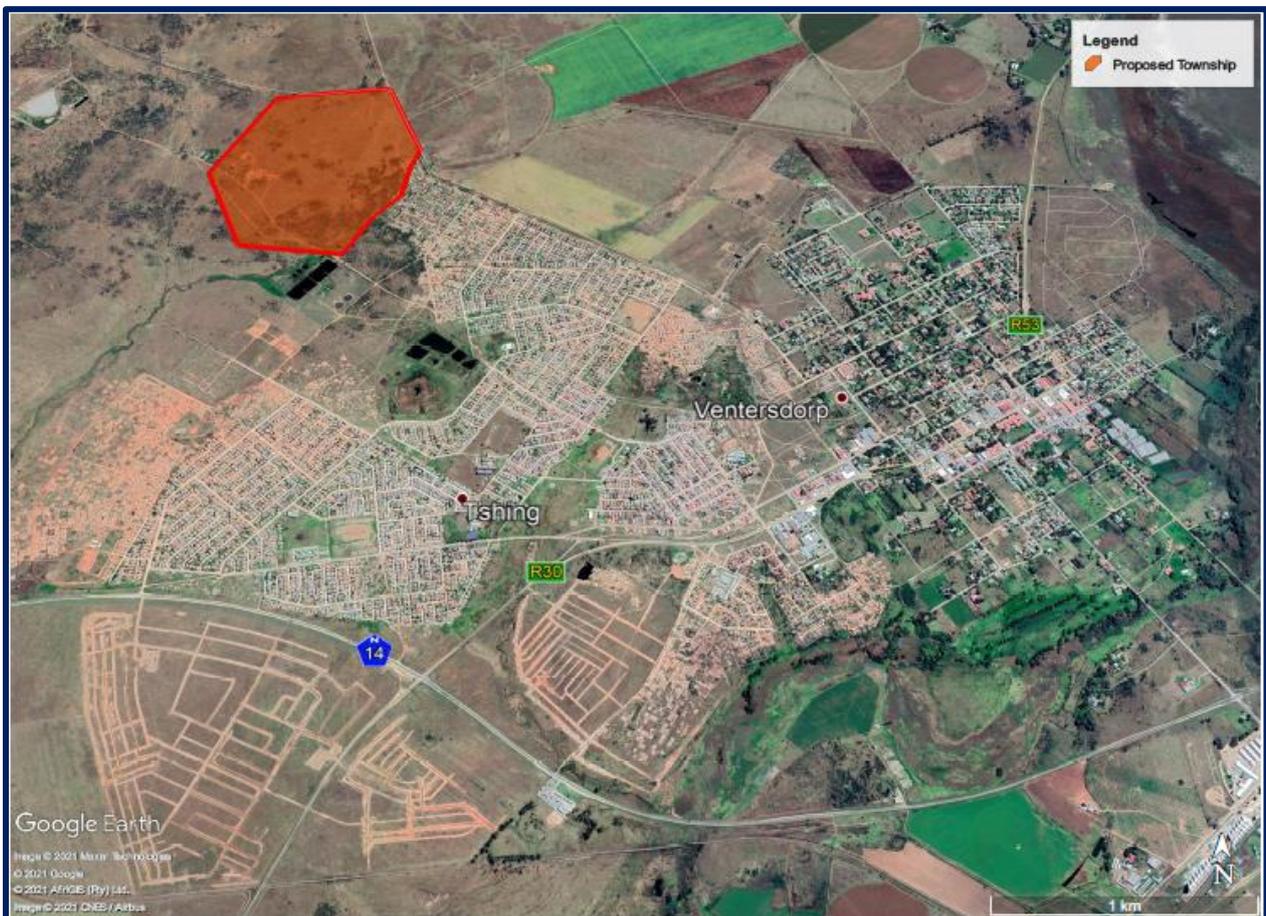


Figure 1: Project Location

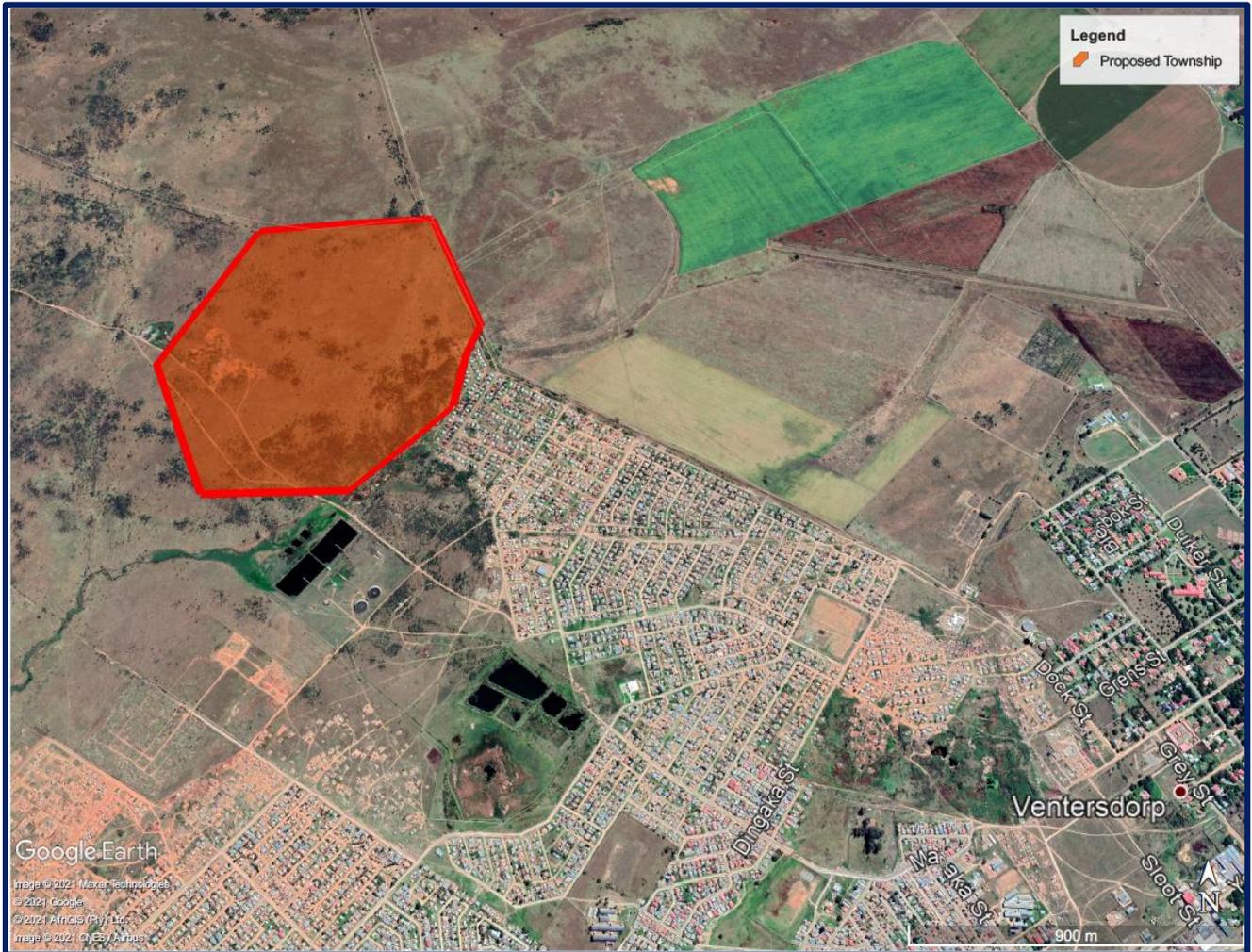


Figure 2: Locality Map (Study Area)

4. SITE VISIT

A site investigation was conducted on the 8th of May 2021, during which the site conditions and services were noted and recorded. The proposed site will be developed as per the Draft Township Layout that was issued by Nkanivo Development Consultants provided on **Appendix A** of this report.

5. FLOODLINE

The site is bordered by a watercourse which is approximately 750m South of the development.

6. WETLANDS

A wetland was noted approximately 100m on the southern direction of the edge of boundary for the proposed Township.

7. LAND USE

The land available for the proposed development is 88.31 Hectares. The site is zoned according to the table listed below. The zoning consists of the Residential 1, Residential 3, Business 1, Institutional, Recreational, Municipal, Public Open Space and Streets.

ZONING	LAND USES	NO. OF ERF	TOTAL ERVEN	AREA (Ha)	AREA%
RESIDENTIAL 1	Dwelling Unit	1-819	819	36.76	41.56
RESIDENTIAL 3	Flats/ Groups Units	820-821	2	0.82	0.93
BUSINESS 1	Commercial Use	822-827	6	0.40	0.45
INSTITUTIONAL	School	828	1	3.29	3.71
INSTITUTIONAL	Creche	829-832	4	0.25	0.32
INSTITUTIONAL	Public Worship	833-836	4	0.31	0.35
RECREATIONAL	Sports Centre	837	1	1.93	2.18
GOVERNMENT	Clinic	838	1	0.42	0.47
MUNICIPAL	Municipal Purposes	839-840	2	0.76	0.86
PUBLIC OPEN SPACE	P.O.S	841-842	2	22.59	25.53
STREETS				20.93	23.66
TOTAL		842		88.46	100

Table 1: Land usage from Nkanivo Development Draft Township Layout

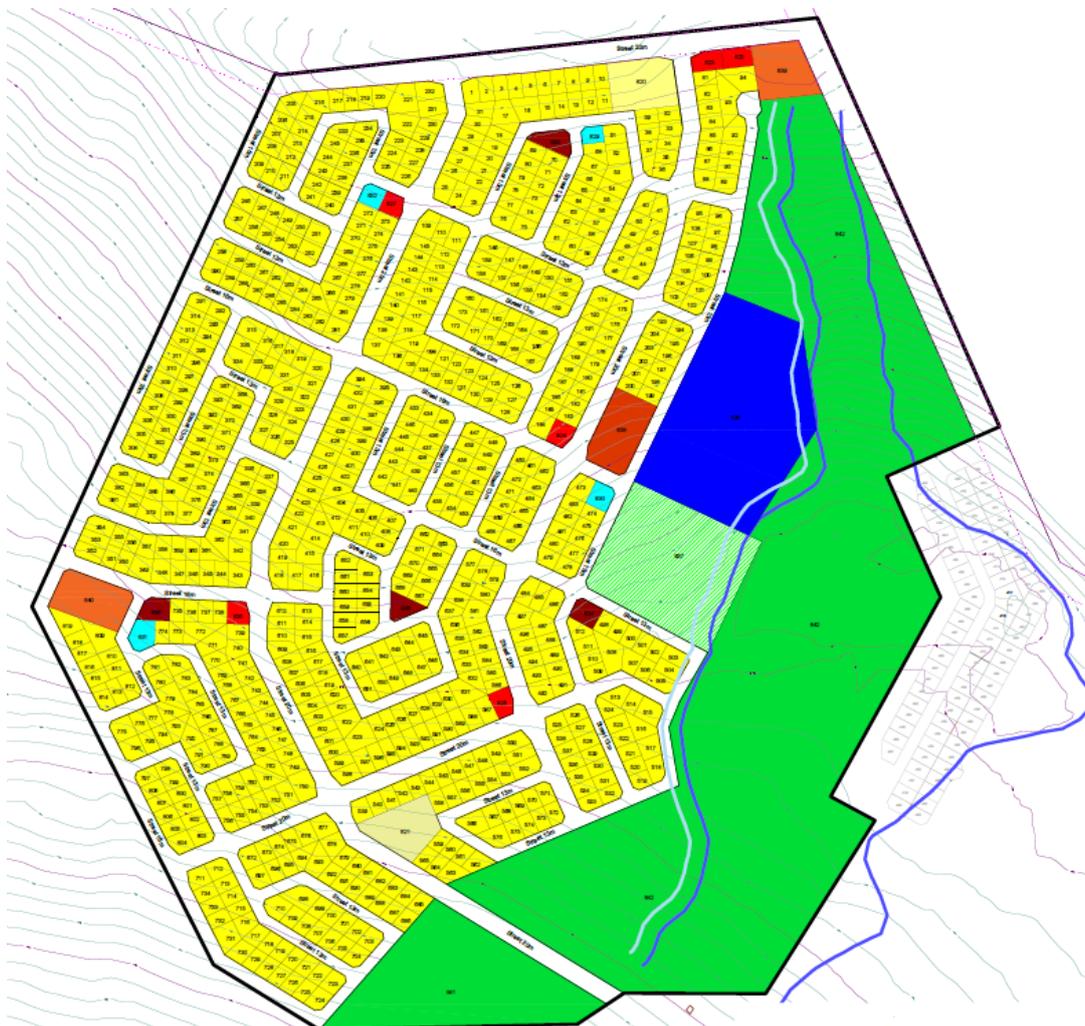


Figure 3: Draft Township Layout

8. WATER

8.1 Findings and Status Quo

Water is primarily obtained from underground boreholes in the Ventersdorp area. Ventersdorp collects spring water from the Ventersdorp Eye, which is delivered to the treatment plant through a 3km concrete lined canal. The water treatment work's estimated design capacity is 14Ml/day, but it is currently unable to function at full capacity.

The water is reticulated through a 300mm diameter bulk water pipeline from the water treatment plant to the Ventersdorp reservoirs. According to the municipality this bulk line was recently upgraded to a 500mm diameter pipeline. The reservoir site consists of five water storage facilities, namely:

- Reservoir 1 with a capacity of 2000 ML and a top water level of 1507.2m,
- Reservoir 2 with a capacity of 2760 ML and a top water level of 1507.2m,
- Reservoir 3 with a capacity of 5500 ML and a top water level of 1507.2m,
- Elevated tower 1 with a capacity of 700ML and a top water level of 1526,59m and
- Elevated tower 2 with a capacity of 500ML and a top water level of 1516,118m.

This is as shown in figure 4 below and figure 8 is as received from the municipality. Due to the topography, the existing reservoir site remains the only viable storage option. If sized properly, future projects can be served by new dedicated bulk distribution mains that extend from the current reservoir site.

During the site investigation it was noted that the site is currently not serviced. The nearby community of Tshing Extension 5 is serviced from the Ventersdorp reservoirs and is currently metered by the municipality (see figure 7).



Figure 4 : Ventersdorp Reservoirs



Figure 5: Proposed Development site



Figure 6: Proposed Development site in relation to the reservoir site



Figure 7: Metered water supply in Tshing Ext. 5

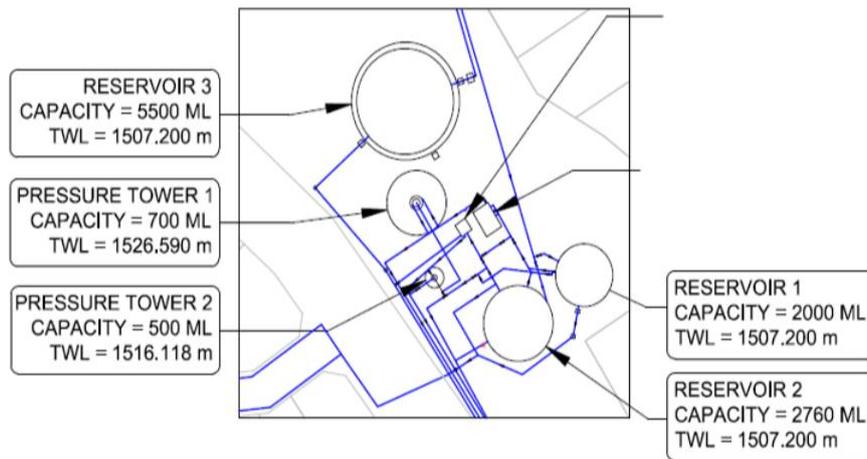


Figure 8: Reservoir Layout at the reservoir existing site as received from the municipality

8.2 Fire Water Status Quo

During the site visit no fire hydrants were noted on the proposed site and no provision for fire was made.

8.3 Summarized Findings of the Current Water and Fire Water System

The proposed site is currently not serviced, and the surrounding areas are receiving adequate water. A bulk water analysis and master plan was previously conducted by Moedi Consulting Engineers. The provision and master planning for water infrastructure is as shown in **Annexure A**. During this master planning, it was established that the current water storage capacity will not be sufficient for the planned developments within Ventersdorp and upgrades of the water infrastructure will be required to meet future requirements.

8.4 Water Supply for the Proposed Development

8.4.1 General Design Criteria

The water demand calculations were done according to the design standards and specifications from Section J of “The Neighbourhood Planning and Design Guide (Also known as the Redbook) 2019 version”.

Design Element		Criteria
1.	Average Annual Daily Demand (AADD) Residential	0.6 – 0.80 Kl/unit/d
2.	Average Annual Daily Demand (AADD) Residential 2 (Flats)	0.40 – 0.45 Kl/unit/d
3.	Average Annual Daily Demand (AADD) Business/ Commercial	0.65 Kl/unit/d
4.	Average Annual Daily Demand (AADD) Clinic	0.60 Kl/unit/d
5.	Average Annual Daily Demand (AADD) Sports Centre	0.60 Kl/unit/d
6.	Average Annual Daily Demand (AADD) School	0.60 Kl/unit/d
7.	Average Annual Daily Demand (AADD) Creche	0.60 Kl/unit/d
8.	Average Annual Daily Demand (AADD) Municipal Purposes	0.60 Kl/unit/d
9.	Average Annual Daily Demand (AADD) Places of Worship	0.60 Kl/unit/d
10.	Gross Average Annual Daily demand	10% Losses
11.	Peak Factor	1.5
12.	Capacity of Reservoir Storage	48 of AADD
13.	Minimum Head Under Instantaneous Peak Demand	10m
14.	Maximum Head under zero flow conditions	90m

Table 2: Water Supply General Criteria

8.4.2 New Development Water Demand Calculation

Table 3 below shows the summary of calculated water demand for the proposed new development of Portion 3 of the farm Doornpan 193 IP. Therefore, the following calculations stipulate the required water demand for the intended development as shown on the draft township layout (shown in Figure 3 above).

Land Use	No. of Erven	No. of Units	Area (Ha)	F.A.R	Unit Flow	Unit of Measure	Water Demand (Kl/d)	
Residential	1-819	819	36,76		0,6	Kl/ unit	491,4	
Residential 2 (Flats)	2	45	0,82		0,45	Kl/ unit	20.25	
Business/ Commercial	6		0,40	0,4	0,65	Kl/100m ²	10,4	
Clinic	1		0,42	0,4	0,6	Kl/100m ²	10,08	
Sports Centre	1		1,93	0,4	0,6	Kl/100m ²	46,32	
School (Educational)	1		3,29	0,4	0,6	Kl/100m ²	78.96	
Creche (Educational)	4		0,25	0,4	0,6	Kl/100m ²	6	
Municipal Purposes	2		0,76	0,4	0,6	Kl/100m ²	18.24	
Places of Worship (Institutional)	4		0,31	0,4	0,6	Kl/100m ²	7,44	
Public Open Spaces	2		22.59	0,4				
Total AADD							689,09 Kl/d	7.98 l/s
Total GAADD							758,00 Kl/d	8,77 l/s
PAADD							1137,00 Kl/d	13,16 l/s

Table 3: Calculated Average Water Daily Demand

8.4.3 Proposed Bulk Water Supply

The proposed water line recommends that the new development site be directly serviced from the Ventersdorp reservoir/s (Co-ordinates 26°18'43.49"S, 26°48'47.10"E). The current reservoir site is approximately 2 kilometres away from the proposed development site, with an estimated 31m difference in ground elevation (between the reservoir and the development site). As a result of the elevation difference the proposed bulk water can take advantage of the gravity and deliver water to

the proposed site. Figure 9 below shows the proposed 2900m long bulk water pipeline from the reservoir to the proposed development site.

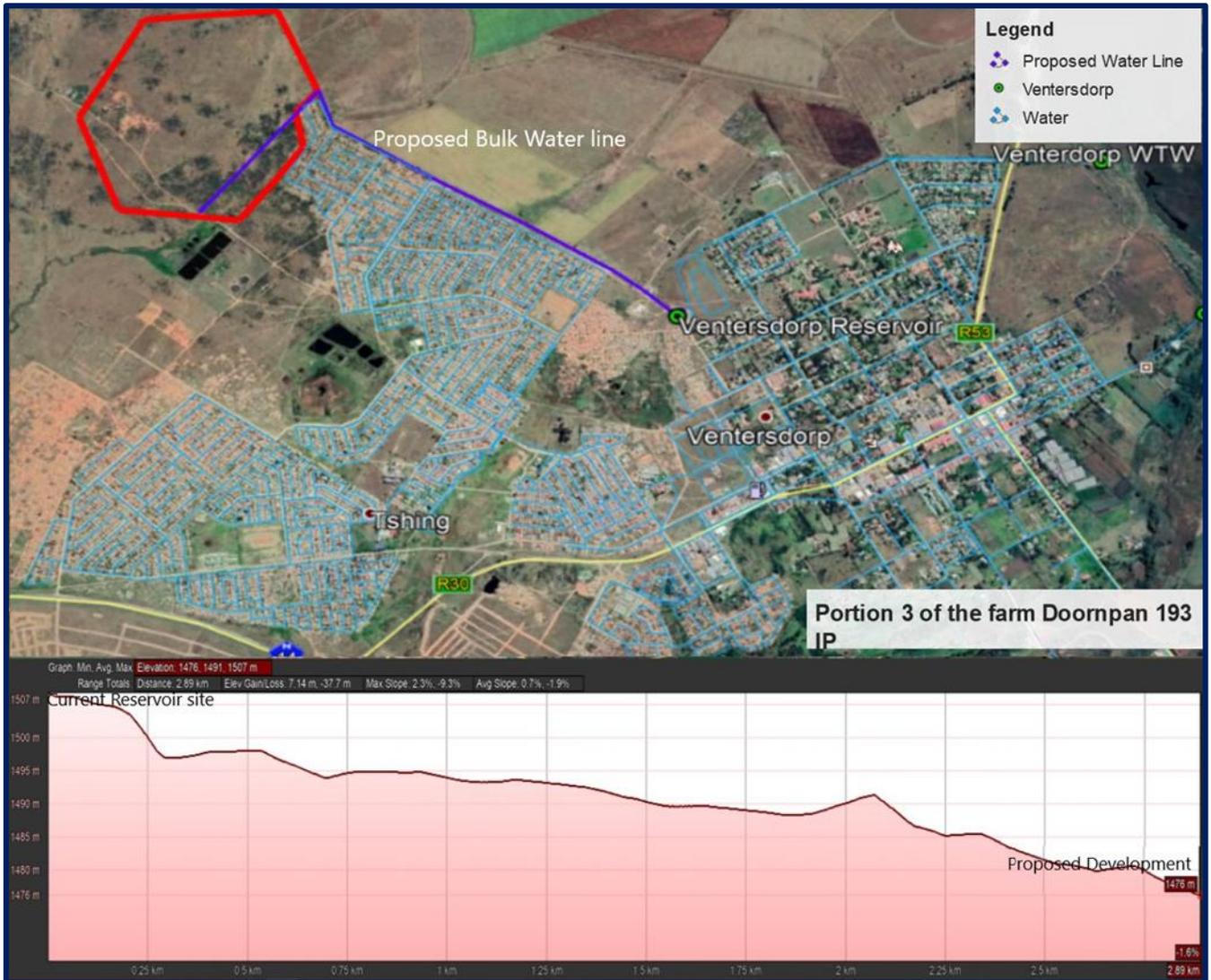


Figure 9: Proposed bulk water supply layout and long section

9. SANITATION

9.1 Findings and Status Quo

Sanitation facilities, like most of the other infrastructure elements in the Ventersdorp region, have vastly improved. Almost 90% of the population has direct access to sanitation services, with only 4% of the population having access to less than basic sanitation. Currently, the Ventersdorp town is serviced by the Ventersdorp Waste Water Treatment Works (WWTW). The design capacity of the wastewater plant is currently 6 Mℓ /day. A bulk sewer analysis and master plan was previously conducted by Moedi Consulting Engineers. The provision and master planning for waste water infrastructure is as shown in **Annexure B**. Through a reticulation network and outfall sewer lines, the waste water facility receives sewer generated from the Ventersdorp town, nearby businesses, industrial areas and domestic sewer. Figures 10 and 15 show that a 500m radius buffer zone was taken into consideration and it must be noted that a very small part of the proposed development area falls within the buffer zone.

During the site investigation it was evident that the proposed development site has no existing sewer reticulation system. The nearby community of Tshing Extension 5 is serviced by an existing sewer reticulation system. This is as shown in figures 12 and 13 below.

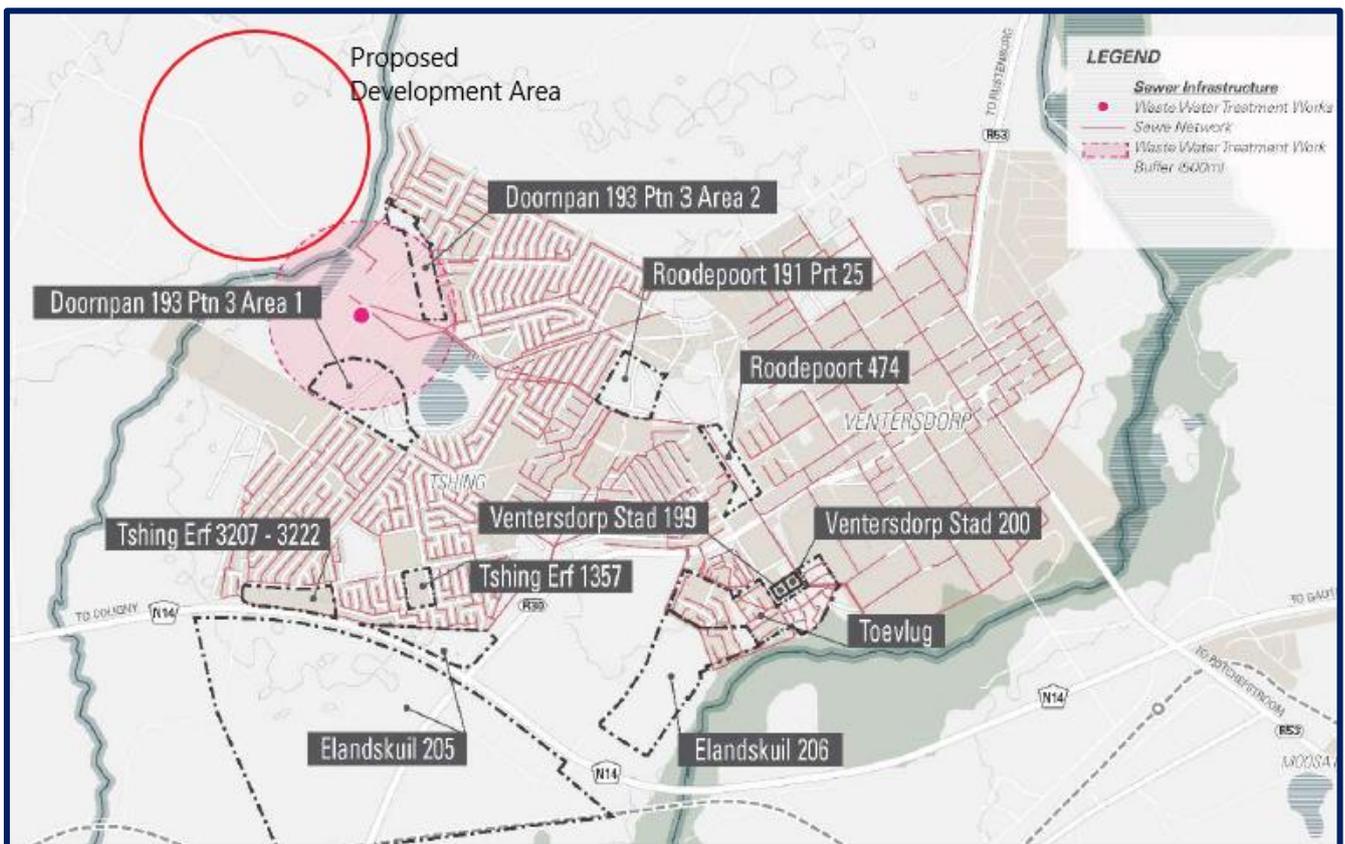


Figure 10: 500m Waste Water Treatment Works Buffer Zone.



Figure 8: Proposed Development site



Figure 9: Existing Waste Water Treatment



Figure 10: Proposed Development area in relation to the WWTW.



Figure 11: Outfall sewer manhole in Tshing Ext. 5

9.2 Summarized Findings

The area of the proposed new development does not have existing sanitation. Nearby settlements have dedicated sewer reticulation networks which discharge sewer at the Ventersdorp WWTW. Furthermore, it has been established that a small portion of the proposed area falls within the buffer zone, however that does not affect the development of the proposed settlement. The proposed master plan conducted by Moedi Consulting Engineers states that the local municipality should prioritize the upgrading of the WWTW to accommodate all future developments including Portion 3 of the farm Doornpan 193 IP.

9.3 Sewer Demand for the Proposed Development

9.3.1 General Design Criteria

The sewer flow calculations were done according to the design standards and specifications from Section K of “The Neighbourhood Planning and Design Guide (Also known as the Redbook) 2019 version”.

Design Element		Criteria
1.	Average Annual Daily Demand (PDDWF) Residential	0.48 – 0.56 Kl/unit/d
2.	Average Annual Daily Demand (PDDWF) Residential 2 (Flats)	0.38 – 0.43 Kl/unit/d
3.	Average Annual Daily Demand (AADD) Business/ Commercial	0.52 Kl/unit/d
4.	Average Annual Daily Demand (AADD) Clinic	0.48 Kl/unit/d
5.	Average Annual Daily Demand (AADD) Sports Centre	0.48 Kl/unit/d
6.	Average Annual Daily Demand (AADD) School	0.48 Kl/unit/d
7.	Average Annual Daily Demand (AADD) Creche	0.48 Kl/unit/d
8.	Average Annual Daily Demand (AADD) Municipal Purposes	0.48 Kl/unit/d
9.	Average Annual Daily Demand (AADD) Places of Worship	0.48 Kl/unit/d
10.	Allowance for Infiltration	15%
11.	Peak Factor	2.5

Table 4: Sewer Flow General Criteria

9.3.2 New Development Sewer Flow Calculation

Table 5 below shows the summary of calculated sewer flow for the proposed new development of Portion 3 of the farm Doornpan 193 IP. The following calculations stipulate the anticipated sewer flows for the intended development as shown on the draft township layout (shown in Figure 3 above).

Land Use	No. of Erven	No. of Units	Area (Ha)	Unit Flow	Water Demand (Kl/d)	
Residential	1-819	819	36,76	0,48	393,12	
Residential 3 (Flats)	2	45	0,82	0,38	17,10	
Business/ Commercial	6		0,40	0,52	8,32	
Clinic	1		0,42	0,48	8,07	
Sports Centre	1		1,93	0,48	37,06	
School (Educational)	1		3,29	0,48	63,17	
Creche (Educational)	4		0,25	0,48	4,8	
Municipal Purposes	2		0,76	0,48	14,59	
Places of Worship (Institutional)	4		0,31	0,48	5,95	
Public Open Spaces	2		22.59			
PDDWF					552,17 Kl/d	6,39 l/s
15% Infiltration					82,83 Kl/d	0,96 l/s
Total IPWDF					635,00 Kl/d	7,35 l/s
Total IPWWF					1587,49 Kl/d	18,37 l/s

Table 5: Calculated Sewer Flows

9.3.3 Proposed Bulk Sewer

There is a difference in elevation between the proposed development site and the Tshing ext 6 sewer pump station of approximately 10m. The proposed bulk sewer line can gravitate towards the Tshing Ext 6 sewer pump station (Co-ordinates 26°18'29.95"S, 26°47'34.50"E) then be pumped to the waste

water treatment works (Co-ordinates 26°18'41.19"S, 26°47'35.83"E) by means of the 110mm diameter existing rising main. Figure 15 below shows that the proposed development site and the Tshing ext 6 sewer pump station are 200m away from the WWTW.

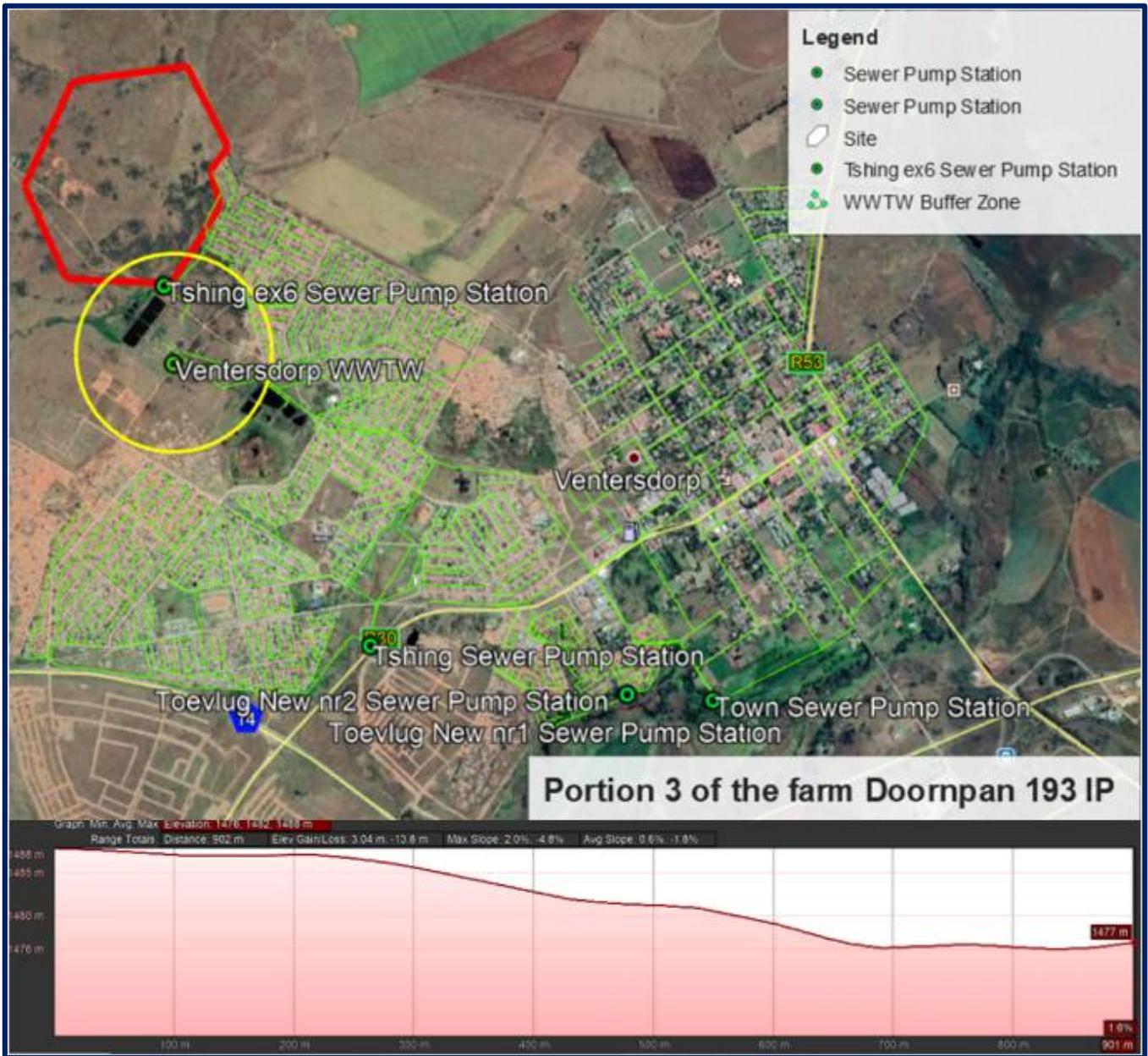


Figure 12: 500m Waste Water Treatment Works Buffer Zone in relation to the site.

10. ROADS

10.1 Existing Roads Infrastructure

The following information was recorded on the existing roads:

- The site is bordered by the National Road N14 and Road R30 which connects the site from N14 and R53.
- The R30 and R50 are regional roads connecting Ventersdorp to Potchefstroom, Coligny, Koster, Derby and Klerksdorp.
- The access road which connects the site from R30 is Dock Street, which can be classified as Class 5b, is surfaced for approximately 1.9km (as shown in blue below), and turns into a gravel road.
- The road is approximately 5.5m wide, which is the standard width for residential access.
- It is approximately 2.0km in length from the R30 to the end of Dock street (surfaced), as shown below:
- No road signs were recorded on the above-mentioned street.

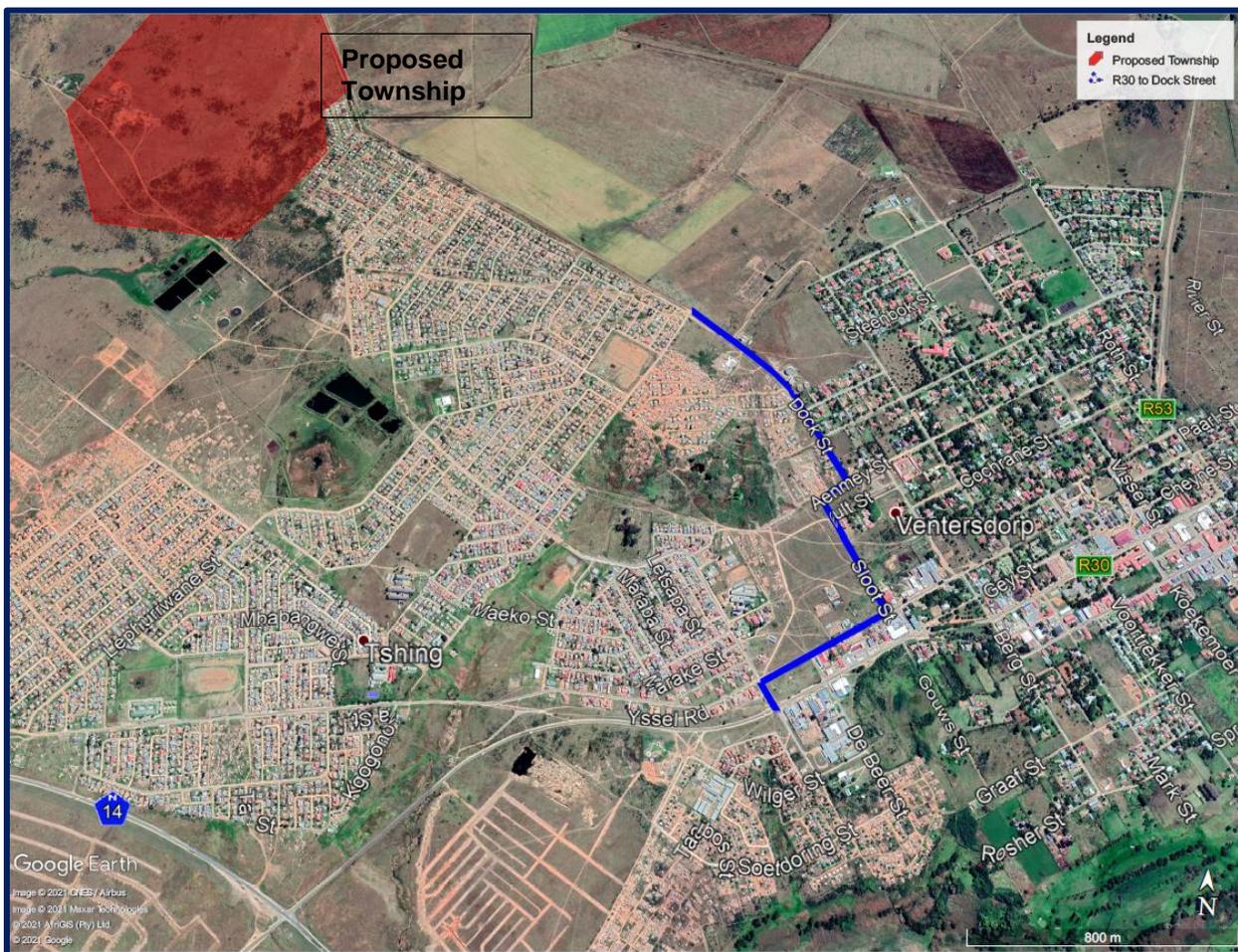


Figure 13: Existing Roads Network



Figure 14: End of surface: Dock Street furnished with an edge beam



Figure 15: Internal access road from Dock Street to the proposed Development

10.2 Proposed Roads Infrastructure

Proposed Route

The proposed recommended route is as shown below; for ease of access to site, Dock Street can be used as the connector road as illustrated in the figure below: The total length of the proposed route is 2.8km. Due to the slope of the proposed route, the road can be designed as a channel, as illustrated on Figure 20 below; which will ensure efficient drainage.

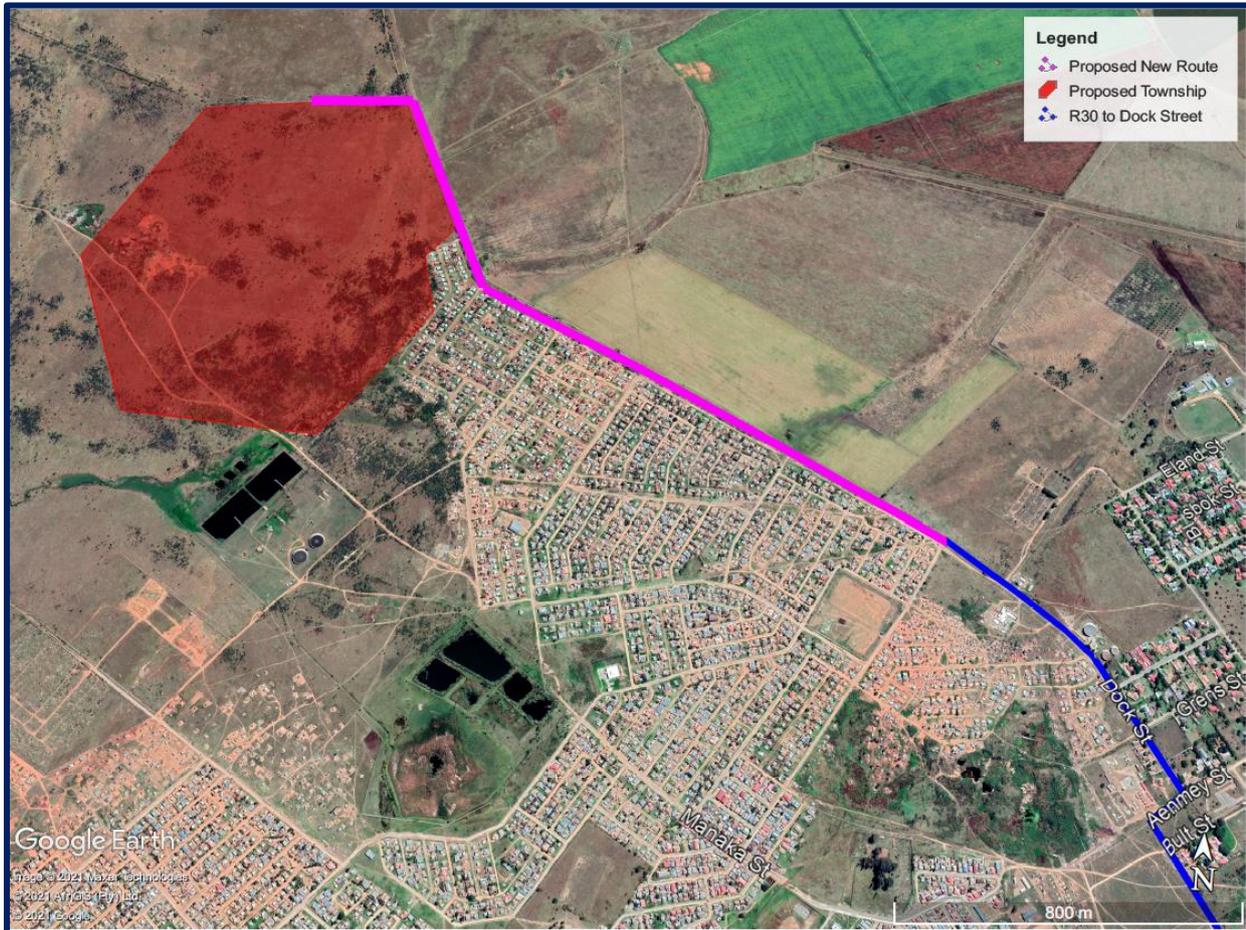


Figure 16: Proposed Route to the Development

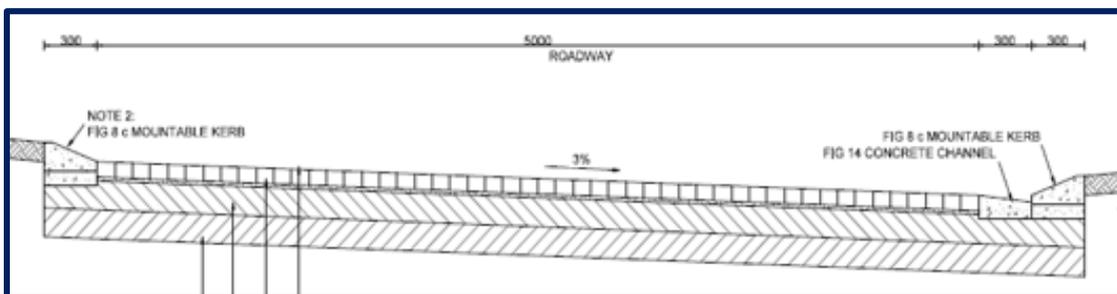


Figure 17: Typical Section through road

10.2.1 Typical Roads Geometry

All roads should be in compliance with the Guidelines for Human Settlement and Design (Red Book) The typical roads geometry should be as per the table below:

Geometric Design Standard		
Design Element	Design Parameter	Design Value
Min turning radius: Collector Roads Local Streets	Multi-link trucks, heavy vehicle, articulated bus, single unit bus / semi-trailer Passenger car	15m
Speed Design: Collector roads Local streets		60km/h 40km/h
Stopping Sight Distance: Collector roads Local streets		80m 50m
Super elevation Local streets	Not to be considered	2-4 % None
Min k-values (Sags & Crests): Collector streets Local streets Camber		3%

Table 6: Geometric Design Standards

10.2.2 Typical Roads Pavement Design

It is anticipated that the typical road layers shown below can be adequate for the proposed route, however this will depend on the traffic counts and the geotechnical studies which will inform the pavement design. The typical section might change, should it be discovered that there will be trucks using the road.

	80 mm interlocking block paving 20 mm river sand.
	150mm C4 stabilised sub-base compacted to 97% Mod. AASHTO density,
	150mm G7 Imported gravel selected material to 95% Mod. AASHTO density
	Rip and recompact in-situ roadbed G7 material at 93% Mod. AASHTO or 500 mm dump rock Pioneer Layer, (where underground water is encountered)

Table 7: Typical Road Layerworks for Internal Access Roads

11. STORMWATER DRAINAGE

11.1 Existing Stormwater Infrastructure

There is no stormwater that was noted around site. A wetland was noted and captured as shown in the figure below.

A stormwater management plan for the site should be carried out.



Figure 18: A wetland that was 100m away from site

11.2 Proposed Infrastructure

The stormwater management system within the proposed site shall be designed in accordance with the Red Book.

The stormwater can be collected as illustrated on Figure 20. All the stormwater can be discharged on the low point as illustrated on the figure below.

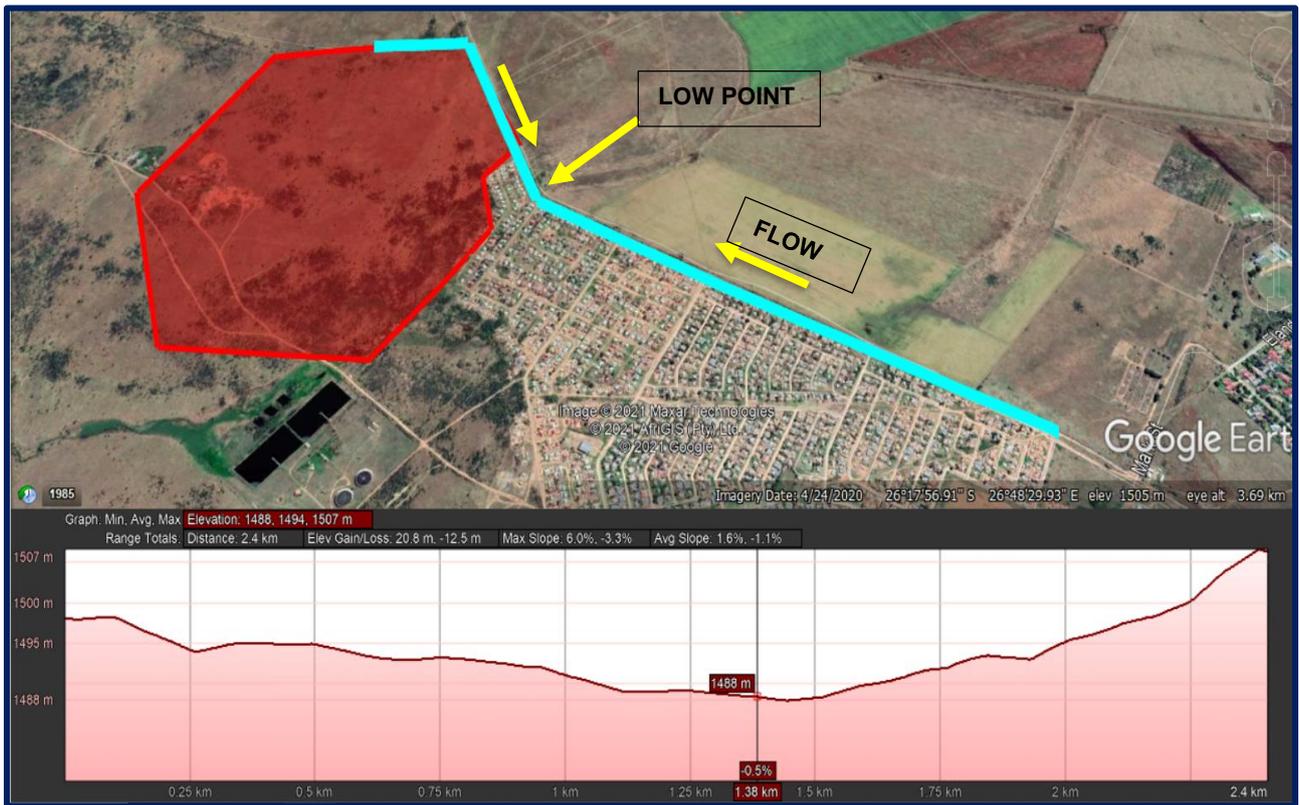


Figure 19: Internal access road from Dock Street to the proposed Development

11.2.1 Standards and Specifications

Minimum Pipe size	: 450 mm
Pipe Material	: Ogee pipes
Minimum Gradient	: 1:150
Catch pit, junction boxes etc	: In accordance with the Red Book

11.2.2 Design Criteria

Return Period:	1:5 years for the combined pipe and road systems
Design Method:	Rational method
Average yearly rainfall to be used	585mm.

11.3 Planned Stormwater Drainage

The surface stormwater system will consist of a combination of surface channels as well as underground conduits which eventually drain into the natural stream. The surface channels will be designed for the minor storms and the underground conduits will be designed for both the minor and major storms. The stormwater system is also designed to incorporate measures or structures to deal with erosion control, silt control as well as control of the peak discharge from the development.

The following standards shall be followed:

- Concrete V-drains next to the road will form part of the minor system designed to drain a storm with a 1:5-year return period.
- The road network in conjunction with V-drains will form the major drainage system and designed to cater for the 1:50 year storm event.
- Natural watercourses and low points shall be assumed as natural escape routes for runoff and floods larger than 1:50 years.
- The pipe classes for the underground system would be class 75D underneath roads and class 50 – 75 D for other areas according to final designs. The minimum flow speed should be 0.8 m/s whereas the maximum will be 3m/s. The manholes should be distant at 90 m centres maximum.

12. RECOMMENDATIONS

12.1 Water Use

It is recommended that the upgrade of the Water Treatment Works be considered by the municipality in order to accommodate the development of Portion 3 of the farm Doornpan 193 IP.

12.2 Sanitation

The Ventersdorp Waste Water Treatment Works has currently reached its design capacity and the upgrade of the Works should be considered by the municipality in order to accommodate the development of Portion 3 of the farm Doornpan 193 IP

12.3 Roads

The proposed route can be used as the main access from R30 to the Proposed New Township.

12.4 Stormwater

A floodline determination study and Stormwater Management Plan for the site is to be conducted.

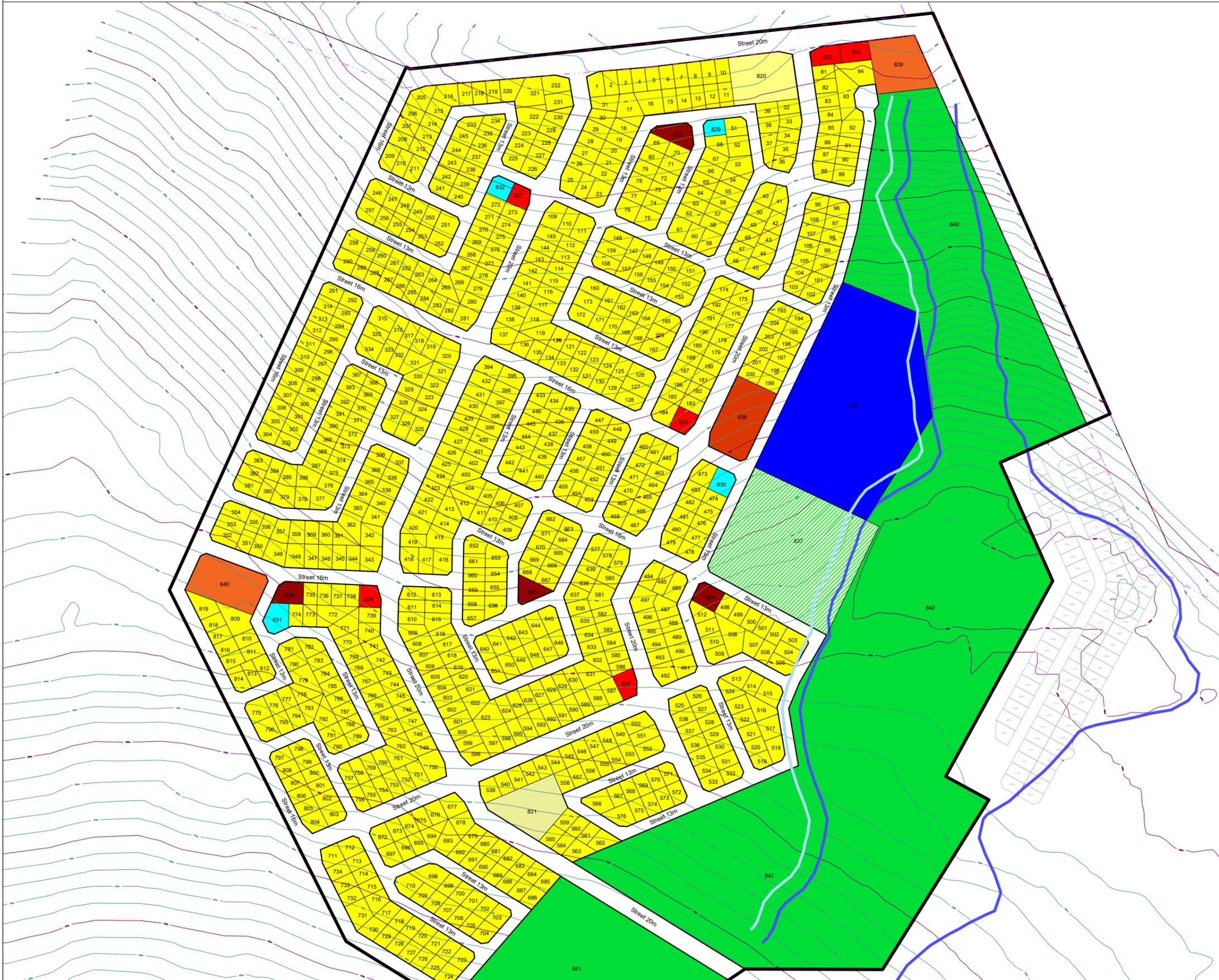
APPENDICES

APPENDIX A- DRAFT TOWNSHIP LAYOUT

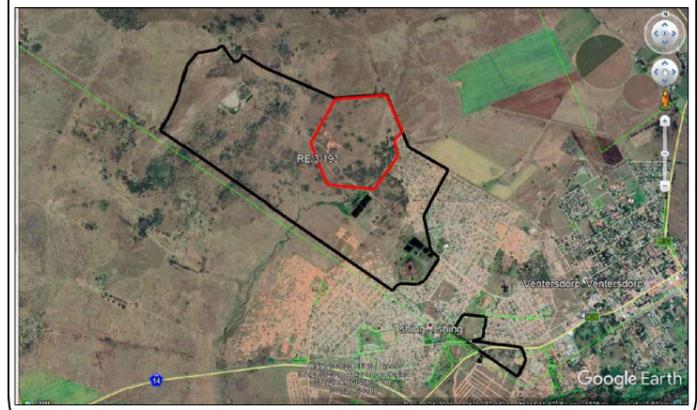
APPENDIX B- BULK WATER SUPPLY AND SANITATION LAYOUT FUTURE 15 YEARS

PROPOSED TSHING EXTENSION 11 TOWNSHIP

PORTION 3 OF THE FARM DOORNPAN 193 IP



LOCALITY MAP



ZONING	LAND USES	ERVEN	TOTAL ERVEN	AREA (HA)	AREA (%)	NOTATION
RESIDENTIAL 1	DWELLING UNIT	1-819	819	36.76	41.56	[Yellow]
RESIDENTIAL 2	FLATS/GROUPS UNITS	820-821	2	0.82	0.93	[Light Yellow]
BUSINESS 1	COMMERCIAL USE	822-827	6	0.40	0.45	[Red]
INSTITUTIONAL	SCHOOL	828	1	3.29	3.71	[Blue]
INSTITUTIONAL	CRECHE	829-832	4	0.25	0.32	[Cyan]
INSTITUTIONAL	PUBLIC WORSHIP	833-836	4	0.31	0.35	[Dark Red]
RECREATIONAL	SPORTS CENTRE	837	1	1.93	2.18	[Green]
GOVERNMENT	CLINIC	838	1	0.42	0.47	[Orange]
MUNICIPAL	MUNICIPAL PURPOSES	839-840	2	0.76	0.86	[Light Green]
PUBLIC OPEN SPACE	P.O.S	841-842	2	22.59	25.53	[Dark Green]
STREET				20.93	23.66	[Blue]
TOTAL DEVELOPABLE AREA			842	88.46	100%	

NOTES:

- Represents Proposed Township Boundary.
- All areas and distances are approximate and subject to final survey
- Average stand size is 400 m
- Street width 20m, 16m and 13m
- Represents the 1:100 Year Floodline
- Represents a registered servitude
- Represents the 20m Buffer

SURVEY NOTES:

CONTOUR INTERVALS 1 M IN ACCORDANCE TO REG. ORDINANCE

SURVEYOR GENERAL SYSTEM WGS 84

CLIENT:		JB MARKS LOCAL MUNICIPALITY	
CONSULTANTS	NAME	SIGNATURE	
TOWN PLANNER (NKANIVO DEVELOPMENT CONSULTANTS)			
FLOOD LINE ENGINEER (-)			
LAND SURVEYOR (WINDUS M & ASSOCIATES SURVEYS)			
CONSULTING ENGINEER (DALIMEDE PROJECTS (PTY) LTD)			
GEOTECHNICAL ENGINEER (SOILKRAFT CC)			
DESIGNED: NYIKO BALOYI	THESE DRAWINGS:		
CHECKED: SAMUEL CHAUKE Tech.Pl (-)	(A) ENJOY COPYRIGHT PROTECTION AND THE COPYRIGHT VESTS IN NKANIVO DEVELOPMENT CONSULTANTS UNLESS OTHERWISE AGREED IN WRITING		
DRAWING No: 2021-001	(B) MAY NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WHATSOEVER TO ANY PERSON WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT HOLDER		
DATE: 04/08/2021			

COMPILED BY:

Nkanivo
Development Consultants

Nkanivo House
Unit 79, Block 5, Lombardy Business Park
66 Graham Road
Pretoria 0084

CELL : 083 277 7347
TELL : 012 807 7445
eMail : info@nkanivo.co.za

<p>GEOTECHNICAL INFORMATION</p> <p>THE DESIGN OF THE LAYOUT PLAN IS BASED ON THE FINDINGS OF THE GEOTECHNICAL REPORT</p> <p>(REFER TO GEOTECH REPORT)</p>	<p>LAND INFORMATION</p> <p>FLOODLINE CERTIFICATE I HEREBY CONFIRM THAT THE ERVEN IN THE TOWN DOES NOT FALL WITHIN THE 1 : 100 YEAR FLOODLINE AS DESCRIBED IN THE WATER ACT/ACT 36 OF 1998, ARTICLE 144.</p> <p>SIGNED:</p>	<p>SCALE</p> <p>1 : 1 125 (A1 Format) 1 : 2 250 (A2 Format) 1 : 4 500 (A3 Format) 1 : 9 000 (A4 Format)</p>
--	---	--

APPENDIX B- BULK WATER SUPPLY AND SANITATION LAYOUT FUTURE 15 YEARS

VENTERSDORP BULK WATER SUPPLY FUTURE 15 YEARS

LEGEND

- EXISTING WATER NETWORK
- FUTURE WATER NETWORK
- PROPOSED BULK UPGRADES



VENTERSDORP DAILY SEWAGE GENERATED PER ZONE FUTURE 15 YEARS

