

SALDANHA BAY MUNICIPALITY

CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE, VREDENBURG

Preliminary Engineering Report (Revision 0)

301038

COMPILED FOR:

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SALDANHA BAY MUNICIPALITY**CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

DOCUMENT REVIEW

PROJECT NUMBER : 301038

PROJECT NAME : CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154
IRDP ERVEN IN LOUWVILLE, VREDENBURG

CLIENT : SALDANHA BAY MUNICIPALITY

DOCUMENT AUTHOR : Mr. J. de Klerk

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PROJECT DIRECTOR : Mr. F. van Loggerenberg

REVISION RECORD

Revision	Date	Description	Prepared	Checked	Approved

**SALDANHA BAY MUNICIPALITY
CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

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SALDANHA BAY MUNICIPALITY**CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE, VREDENBURG**

1. INTRODUCTION

Saldanha Bay Municipality appointed iX engineers to investigate the existing bulk services and compile a services report for the installation of engineering services for the proposed development of 154 IRDP erven on erf 7752 and portion of erf 1003 in Louwville. This report will mainly focus on the existing and proposed infrastructure, to demonstrate how it will conform to all requirements and to describe the implementing, management and funding strategy.

The main findings and recommendations are summarised in this report.

2. LOCATION

Vredenburg is situated within the boundaries of Saldanha Bay Municipality.

Vredenburg includes the suburb of Louwville, which consists mainly of a residential area with many high-density low-income housing units.

The proposed consolidated erf for the development falls on the 2 single residential erven (erf nos. 7752 and portion of erf 1003) and is situated in the residential area of Louwville.

The exact location of this proposed development in Louwville is as follows:

- Latitude (S) 32° 54' 54"
- Longitude (E) 18° 00' 26"

The proposed development is situated within a 1,4 km radius from the town centre of Vredenburg.

3. AVAILABLE INFORMATION AND INVESTIGATIONS

The following information was made available to us:

- Preliminary Erf Layout (Draft 9), as produced by Rumboll CK and Partners.
- As-built drawings as produced by Saldanha Bay Municipality.
- Water Master Plan dated January 2012 and Sewer Master Plan dated January 2012 preformed for Saldanha Bay Municipality (GLS Consulting).
- Capacity Analysis of Bulk Water and Sewer Services
(GLS Consulting letter dated 21 February 2019), (see attached Annexure B).

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4. SITE TOPOGRAPHY AND SOIL CONDITIONS

The site for the proposed development is evenly sloped and approximately 67m above sea level. The topography of the proposed site for development has an even gradient with some flat areas, which is a common phenomenon to the surrounding area. Existing contours of the proposed site indicate that the natural gradient of the site falls from the northern boundary to the southern side with a height difference of approximately 7m over approximately 400m (i.e. average gradient of 1:60).

Uniform soil conditions occur over the entire site for the proposed development. The soil conditions mainly consist of calcareous and clayey sand of varying depths, underlain by calcrete.

5. CLIMATE AND VEGETATION

The climate of the area is typical to that of the West Coast. The area falls within the winter rainfall region with the bulk of the rainfall occurring between May and August. The average rainfall is 230mm per annum. The prevailing wind direction is south-westerly. The average daily temperature varies from 15°C to 27°C in the summer and 7°C to 18°C in the winter.

The vegetation of the site for the proposed development can mainly be classified as Saldanha Flats Strandveld. Mass earthworks was completed on an area of the development for an existing informal sports field, that is currently not being used.

6. EXISTING SERVICES IN VREDENBURG**6.1 WATER SERVICES**

Bulk water is supplied to Vredenburg and surrounding townships from the Berg River Water Scheme via the Withoogte Treatment Works and Besaansklip Reservoir. From here water is supplied to Vredenburg, Louwville, Paternoster, Jacobsbaai and the immediate rural areas.

The existing Louwville reservoir, with a total capacity of 3.0 Mℓ, supplies water to the Louwville Big PRV pressure zone.

Water is supplied from the reservoirs via pipelines varying from 200 mm Ø to 50 mm Ø.

An existing 150 mm Ø water pipeline is situated north of the proposed development adjacent to Kootjieskloof Street (Louwville Big PRV zone). An existing 150 mm Ø water pipeline is situated west of the proposed development adjacent to Maclon Street (Hospital PRV zone).

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6.2 SANITATION SERVICES

Sanitation refers to the principles and practices relating to the collection, removal or disposal of human excreta, household waste water and refuse as they impact upon people and their environment. Good sanitation includes appropriate health and hygiene awareness and behaviour as well as acceptable, affordable and sustainable sanitation services. And no doubt that sanitation is affected by and affects water resource availability, and therefore it needs to be incorporated when developing water reconciliation strategies. According to the South Africa census completed in 2011, about 7% of the people in Vredenburg do not have water borne sewage and 25% of the people do not have piped water inside their dwelling.

The development falls within the existing Vredenburg gravity drainage area, which gravitates to the WWTW.

The Vredenburg WWTW is currently being upgraded. The facility has a design hydraulic capacity of 2.50 Ml/d. The plant consists of inlet works, anoxic reactor with mixers, aeration reactor, two secondary settling tanks (clarifiers), recycle pumps from aeration to the anoxic reactor, sludge return (RAS) pump station with two screw pumps for recycling settled sludge from the clarifiers to the aeration reactor, waste activated sludge (WAS) pumps to deliver waste sludge from the aeration reactor to the sludge dewatering belt press, Sludge dewatering belt press, three maturation ponds, chlorination equipment and irrigation pump station. Effluent is currently being discharged from the facility to the adjacent Vredenburg Golf course.

6.3 ROADS AND STORMWATER

Two existing streets are adjacent to the development. Kootjieskloof street is situated north of the development and Maclon street to the west.

The abovementioned streets are surfaced and have road furniture. The existing roads in and around the future development consists of a mixture of chip and spray (13,2mm and 6,7mm) and asphalt surfacing.

Storm water of the surrounding area drains via the roads to catch pits, from where it is drains through 375mm Ø underground stormwater pipes. The stormwater discharges in the existing canals (north and south of the proposed development), which drains to an existing retention pond situated in Louwville.

No subsoil storm water drainage system exists next to the existing roads.

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7. NEW SERVICES FOR PROPOSED DEVELOPMENT**7.1 WATER SERVICES**

GLS Consulting (Pty) Ltd was appointed to provide a report as an extension to the Water Master Plan (performed for Saldanha Bay Municipality, February 2019) for the proposed development. GLS Consulting (Pty) Ltd report is attached to **Annexure B**.

It is proposed that new 160 mm / 110 mm diameter uPVC Class 12 pipelines be installed within the road reserves 1,0 m from the erf boundary. The water network will be connected (at one place) to the existing 150 mm Ø main supply water pipeline situated north of the proposed development adjacent to Kootjieskloof Street (Louwville Big PRV zone). The internal design for this proposed development will also require new fire hydrants positioned at a maximum of 180 m (moderate fire-risk) from each other. See **Annexure E** for layout of the proposed water.

Erf connections will be 25/20 mm diameter HDPE Class 12 pipelines installed for each erf.

The existing water reticulation network of the Louwville Big PRV zone has sufficient capacity to accommodate the proposed development.

Two 160mm diameter uPVC Class 12 bracing connections are recommended for the existing Hospital PRV zone and Louwville Big PRV zone, situated on the corner of Kootjieskloof and Malcon street.

The existing Louwville reservoir (capacity of 3Mℓ, supplies water to the Louwville Big PRV pressure zone) has enough storage capacity available to accommodate the proposed development.

The design standards are according to the Guidelines for Human Settlement Planning and Design. The design criteria applied to the water supply system components of Paternoster (including 10 % water losses), are as follows:

Abbreviations:

- AADD = Annual average daily demand
- PFd = Peak day factor (1,5 assumed)
- PDD = Peak day demand (midsummer peak day demand)
= PFd x AADD
- PHD = Peak hour demand
= PFh x AADD
- PFh = Peak hour factor (4,0 assumed)

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TABLE 1: ESTIMATED WATER CONSUMPTION FOR THE DEVELOPMENT

AREA	Units	c/unit	PER CAPITA CONSUMPTION@ (ℓ/c/d) / (AADD
Water Demand: Housing units	154	6	100	92.400 Kℓ/d
Church / Chreche	1		Not peak times	0 Kℓ/d
SUBTOTAL				92.400 Kℓ/d
10 % ⁽¹⁾ Water losses				9.240 Kℓ/d
TOTAL for AADD (Incl. Losses)				101.460 Kℓ/d
PDD (1.5 x AADD)				152.460 Kℓ/d
PHD (4.0 x AADD)				405.840 Kℓ/d
Additional Reservoir Capacity (AADD x 2 days)				202.920 Kℓ

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7.2 SANITATION SERVICES

GLS Consulting (Pty) Ltd was appointed to provide a report as an extension to the Sewer Master Plan (performed for Saldanha Bay Municipality, February 2019) for the proposed development. GLS Consulting (Pty) Ltd report is attached to **Annexure B**.

An existing 300 mm diameter outfall sewer pipeline is currently running through the development, situated to the southern boundary adjacent to the existing stormwater canal. There is a portion of the pipeline that needs will be re-laid within the proposed road reserve.

It is proposed that new 160 mm diameter uPVC 400 KPa pipelines be installed for the internal sewer network, 1,50 m from the erf boundary. Minimum pipeline gradients will be 1:180 and maximum 1:10. The sewer network will connect to the existing 300 mm diameter outfall sewer. See **Annexure D** for a layout of the proposed sewer.

Erf connections will be 110 mm diameter uPVC 400 KPa pipelines (minimum gradient 1:60), installed for each erf.

The existing bulk sewer reticulation system between the proposed development and existing WWTW has the capacity required.

The ADWF of the development is 77 Kℓ/d (0,89 ℓ/s). At an infiltration rate of 25 %, a PWWF for the development is calculated at 368 Kℓ/d (4,26 ℓ/s).

Abbreviations:

- ADWF = Average Dry Weather Flow
- PF = Peak Factor (According to the Harmon Formula)
- PDWF = Peak Dry Weather Flow (ADWF x PF)
- PWWF = Peak Wet Weather Flow (PDWF x 25%)

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7.3 ROADS AND STORMWATER

Access roads to the development will be from Kootjieskloof street (250m from Maclon street) and Maclon street (127m from Kootjieskloof street).

Proposed new roads situated in the 16m road reserves will be 5,0m wide, and new roads situated in the 10m road reserves will be 4,5m wide. The 5,0m wide roads will have kerbs installed on both sides, namely CK5 and MK10, while the 4,5m wide roads will have CK5 and edging (90mm). See **Annexure C** for proposed street layouts.

The geometric design of the project streets will be done in accordance with the recommended design standards.

Surface drainage will be accommodated on the streets and will consist of a CK5 kerb. Storm water runoff will be discharged on surface and into kerb inlets will be provided at certain positions.

The minimum K- values and vertical design criteria will be according to the normal standards.

Road signage should be provided where applicable.

The design approach for this project will be based on the following principles:

- To optimise the use of in-situ materials.
- To provide an appropriate pavement structure for the selected design life.
- The design must be economical and cost effective also in terms of maintenance operations.

The following pavement structure are envisaged for the new roads but are subject to final design and approval by Saldanha Bay Municipality.

Asphalt surfacing (5,0m wide roads)

- 25mm asphalt surfacing
- 125mm G4 base course compacted to 98% MOD AASHTO
- 150mm G5 base course compacted to 95% MOD AASHTO
- 150mm in-situ material compacted to 93% MOD AASHTO (100% for sand)
- Precast concrete kerbs, CK5 and MK10.

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Asphalt surfacing (4,5m wide roads)

- 25mm asphalt surfacing
- 100mm G4 base course compacted to 98% MOD AASHTO
- 125mm G5 base course compacted to 95% MOD AASHTO
- 150mm in-situ material compacted to 93% MOD AASHTO (100% for sand)
- Precast concrete kerbs, CK5 and edging (90mm wide).

Run-off peaks with return period of the 1:2-year flood frequency will be used in the stormwater run-off calculations to confirm the required pipeline diameters.

The Manning equation for circular pipes and the design flow charts were used to determine the required pipeline diameters and to confirm the capacities required.

Minimum longitudinal slopes play a major role in the design of the capacity of the pipelines, as well as in obtaining self-cleansing velocities to prevent siltation and thus keep maintenance to a minimum.

The proposed 375mm Ø underground stormwater pipe system with grid inlets will be constructed to ensure sufficient drainage from the area. The proposed stormwater system will drain to the existing stormwater concrete canal and connect to the existing canal at three points. See **Annexure F** for proposed stormwater layout.

The stormwater design will allow for the 1:2 and 1:50 year floods.

An external stormwater report was completed in regards with the existing canal to determine the 1:50 and 1:100 flood lines along the canal.

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7.4 MASS EARTHWORKS

An existing sports field is located east of the proposed development, next to the creche / church erf. Embankments is visible on both sides of the field. The existing slope across this field is very flat (less than 0,5% gradient).

Mass earthworks is proposed for this area of the development (approx. 2,0 Ha), to ensure that the gradient across the erven is not to flat (minimum 0,5%) or to steep (maximum 3,0%).

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8. PROJECT BUDGET

The total estimated cost for the Civil Engineering Services and top structures for 154 IRDP erven in Louwville (Vredenburg) is detailed below:

CONSTRUCTION			
CIVIL			
DESCRIPTION	INTERNAL SERVICES	EXTERNAL SERVICES	TOTAL AMOUNT
Preliminary and general	R 991,985.00	R 323,050.00	R 1,315,035.00
Site clearance	R 78,000.00		R 78,000.00
Mass Earthworks (on erven)	R 241,800.00		R 241,800.00
Proposed new streets	R 2,653,775.00		R 2,653,775.00
Sewer network	R 704,000.00		R 704,000.00
Stormwater and subsurface drainage	R 408,000.00		R 408,000.00
Water reticulation and erf connections	R 830,250.00		R 830,250.00
Cable ducts (electrical)	R 44,100.00		R 44,100.00
Sewer Main (300mm dia)		R 436,000.00	R 436,000.00
2,4m high fencing (ClearVu)		R 1,050,000.00	R 1,050,000.00
Water Reticulation (bracings)		R 76,000.00	R 76,000.00
160mm dia water main to connect to existing 150mm dia		R 38,750.00	R 38,750.00
SUB TOTAL	R 5,951,910.00	R 1,920,900.00	R 7,872,810.00
Contingencies (10%)	R 595,191.00	R 192,090.00	R 787,281.00
SUB TOTAL (CIVIL CONSTRUCTION)	R 6,547,101.00	R 2,112,990.00	R 8,660,091.00
TOP STRUCTURES			
DESCRIPTION	INTERNAL SERVICES	EXTERNAL SERVICES	TOTAL AMOUNT
Top structures (154 houses)	R 14,410,976.58		R 14,410,976.58
SUB TOTAL	R 14,410,976.58	R 0.00	R 14,410,976.58
Contingencies (10%)	R 1,441,097.66	R 0.00	R 1,441,097.66
SUB TOTAL (TOP STRUCTURES)	R 15,852,074.24	R 0.00	R 15,852,074.24
SUB TOTAL (CIVIL & TOP STRUCTURES CONSTRUCTION)	R 22,399,175.24	R 2,112,990.00	R 24,512,165.24

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INDIRECT COSTS			
DESCRIPTION	INTERNAL SERVICES	EXTERNAL SERVICES	TOTAL AMOUNT
1. Project inception:			
Pre-planning (1.1)	R 60,000.00		R 60,000.00
Facilitation (1.2)	R 40,000.00		R 40,000.00
2. Work packages / design phase:			
Project Management (2.1)	R 140,000.00		R 140,000.00
Geotechnical Investigation (2.2)	R 31,200.00		R 31,200.00
Contour Survey (2.3)	R 6,000.00		R 6,000.00
Town Planning (2.4)	R 100,000.00		R 100,000.00
Civil Engineers fee (2.5)	R 205,000.00		R 205,000.00
3. Infrastructure construction (Child 1):			
Site supervision (3.1)	R 96,000.00		R 96,000.00
Land surveying and pegging (3.2)	R 72,000.00		R 72,000.00
Environmental control officer (3.3)	R 19,000.00		R 19,000.00
Health and Safety Officer (3.4)	R 14,000.00		R 14,000.00
Construction Phase Project Management (3.5)	R 100,000.00		R 100,000.00
Geotechnical Variance Management (3.6)	R 7,000.00		R 7,000.00
General Plan registration fee (3.7)	R 17,000.00		R 17,000.00
EIA and Heritage Studies (3.8)	R 100,000.00		R 100,000.00
Health and Safety work (3.9)	R 5,000.00		R 5,000.00
4. Top Structure (Child 2):			
Architectural design (4.1)	R 138,000.00		R 138,000.00
Top Structure Project management (4.2)	R 296,000.00		R 296,000.00
Construction clerk of works (4.3)	R 238,000.00		R 238,000.00
5. Project Close out			
Certification and as built drawings (5.1)	R 15,000.00		R 15,000.00
Top Structure Project management (5.2)	R 5,600.00		R 5,600.00
Beneficiary Administration (5.3)	R 45,000.00		R 45,000.00
Ad hoc (allowance)	R 300,000.00		R 300,000.00
Professional fees		R 211,299.00	R 211,299.00
Site supervision (Construction Monitoring)		R 60,000.00	R 60,000.00
Disbursements		R 22,500.00	R 22,500.00
SUB TOTAL (INDIRECT COSTS)	R 2,049,800.00	R 293,799.00	R 2,343,599.00
SUB TOTAL (DIRECT & INDIRECT COSTS) (EXCLUDING VAT)	R 24,448,975.24	R 2,406,789.00	R 26,855,764.24

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PROJECT INCOME			
DESCRIPTION	INTERNAL SERVICES	EXTERNAL SERVICES	TOTAL AMOUNT
Housing subsidies:			
Civil services (A Grade) (R 43 626 / erf)	R 6,718,404.00		R 6,718,404.00
Top structures (R 110 947 / top structure)	R 17,085,838.00		R 17,085,838.00
Municipal Contribution (external services)		R 2,406,789.00	R 2,406,789.00
SUB TOTAL (INCOME)	R 23,804,242.00	R 2,406,789.00	R 26,211,031.00
SURPLUS (+) / DEFICIT (-)	-R 644,733.24	R 0.00	-R 644,733.24

Notes:

1. Contract price adjustment not included.
2. All above cost excludes 15% VAT.
3. All above cost excludes Electrical network.

Due to the remote location of Louwville, approximately 160km from Cape Town, the Preliminary and General cost for the project will be higher as the contractor qualified for this construction work will most probably be based in Cape Town. Although most material can be sourced locally, some of the materials will have to be hauled from Cape Town which will increase the construction cost.

9. PROJECT PROGRAMME

For Anticipated planning programme, see **Appendix G** attached.

For Preliminary Project implementation plan (construction), see **Appendix H** attached.

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10. PROJECTED CASH FLOW

The projected cash flow (based on estimated cost and anticipated programme) for the Civil Engineering Services and top structures for 154 IRDP erven in Louwville (Vredenburg) is detailed below:

CIVIL						
DESCRIPTION	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	TOTAL AMOUNT
Civil (Indirect costs)	R 581,700.00	R 459,409.30	R 500,889.70	R 0.00	R 0.00	R 1,541,999.00
Civil (Construction)			R 8,225,091.00	R 435,000.00		R 8,660,091.00
SUB TOTAL (CIVIL)	R 581,700.00	R 459,409.30	R 8,725,980.70	R 435,000.00	R 0.00	R 10,202,090.00
TOP STRUCTURES						
DESCRIPTION	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	TOTAL AMOUNT
Top Structures (Indirect costs)	R 30,000.00	R 50,000.00	R 79,600.00	R 539,200.00	R 102,800.00	R 801,600.00
Top Structures (Construction)				R 12,752,074.24	R 3,100,000.00	R 15,852,074.24
SUB TOTAL (TOP STRUCTURES)	R 30,000.00	R 50,000.00	R 79,600.00	R 13,291,274.24	R 3,202,800.00	R 16,653,674.24
TOTAL (CIVIL & TOP STRUCTURES)	R 611,700.00	R 509,409.30	R 8,805,580.70	R 13,726,274.24	R 3,202,800.00	R 26,855,764.24

Notes:

1. Contract price adjustment not included.
2. All above cost excludes 15% VAT.
3. All above cost excludes Electrical network.

SALDANHA BAY MUNICIPALITY**CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE, VREDENBURG**

11. RECOMMENDATION

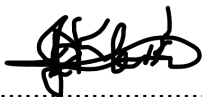
The civil engineering services and top structures for the proposed development of 154 IRDP erven were prioritised by Saldanha Bay Municipality and will be implemented as soon as funding is acquired.

Considering the terrain, proposed upgrading scenarios and expectations, the following findings:

- Funding (see project budget) should be obtained for this project (subsidies).
- Additional funding (see project budget) is required for this project. The subsidy amount (for construction) for A grade civil services is not adequate.
- Additional funding (see project budget) is required for the external services (Municipal Contribution).
- Tenders should be invited for the internal civil engineering services as discussed in this report.
- The estimated budget can be financed during five financial years (Civil and top structures).

12. CONCLUSION

We trust that this report meets your expectations and provides enough motivation for funds to be allocated to this project.

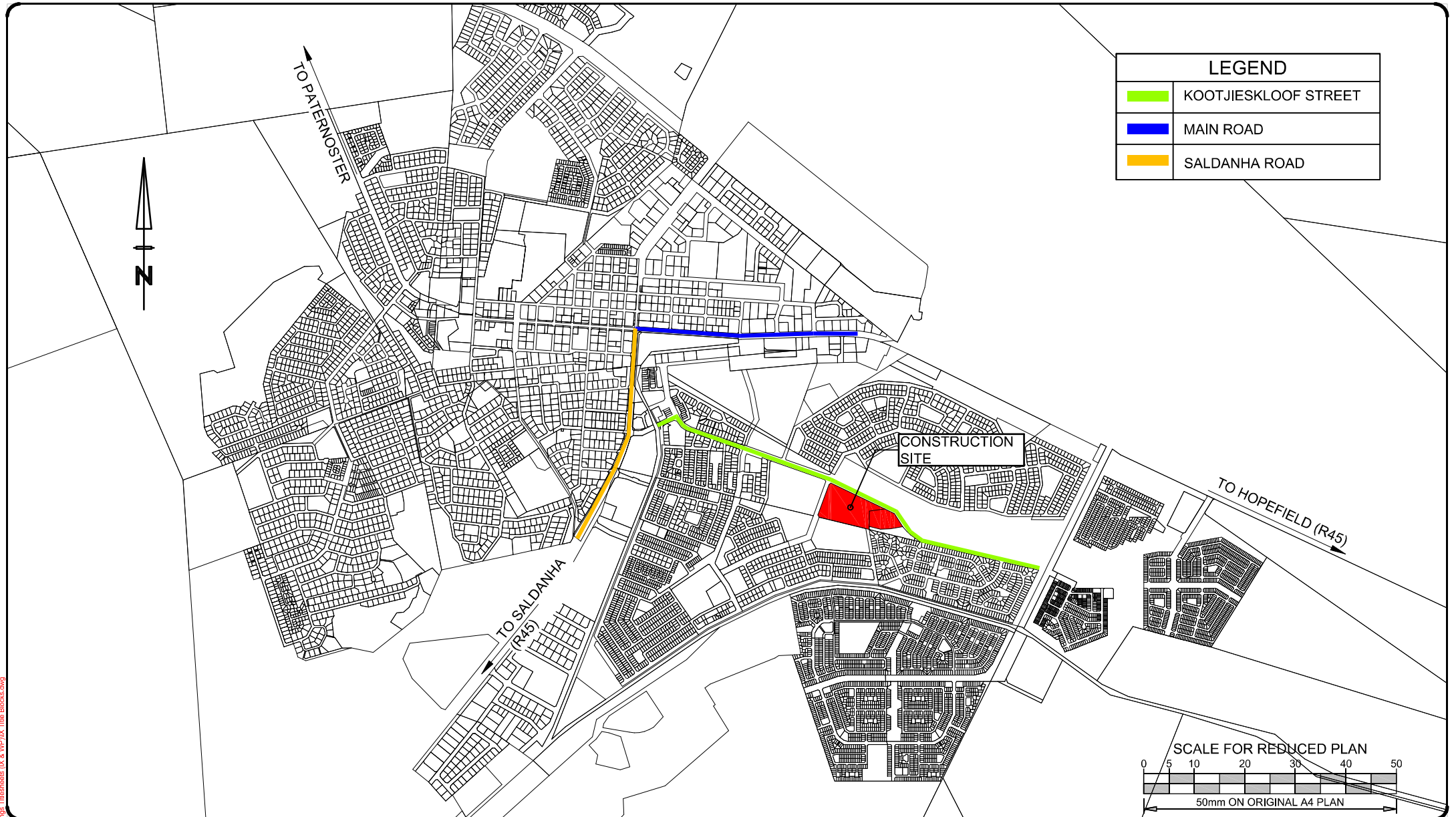


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J de Klerk Pr Tech Eng

Annexure A:

Locality Plan

P:\2017\2017-2018\Projects\00-000 Standards & Details Drawings\Title Sheets\IX & WP\IX Title Blocks.dwg



PRELIMINARY

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All dimensions must be verified on site before the works commence. Refer any discrepancies to the Engineer.

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CLIENT

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PROJECT

CONSTRUCTION OF CIVIL
ENGINEERING SERVICES IN
LOUWVILLE (154 IRDP ERVEN)

DRAWING DESCRIPTION

LOCALITY PLAN

DESIGNED J.de.K	DRAWN W.F.	CHECKED J.de.K
DATE 2019/03/26		SCALE N.T.S
DRAWING NUMBER STE/A-01		REV A

Annexure B:

Capacity Analysis of Bulk Water and Sewer Services (GLS Report)

21 February 2019

The Director: Technical Engineering Services
Saldanha Bay Municipality
Private Bag X12
Vredenburg
7380

Attention: Mr Gavin Williams

Dear Sir

DEVELOPMENT ON ERF 7752 & PORTION OF ERF 1003, VREDENBURG: CAPACITY ANALYSIS OF THE BULK WATER & SEWER SERVICES

The request by Mr Jean de Klerk of iX Engineers regarding comments on the bulk water and sewer supply to the proposed development (residential development on Erf 7752 & a portion of Erf 1003, Vredenburg) refers.

This document should inter alia be read in conjunction with the Water Master Plan (performed for the Saldanha Bay Municipality) dated January 2012 and the Sewer Master Plan dated January 2012.

The proposed development area was not taken into consideration for the January 2012 master plans for the water and sewer networks.

GLS is currently in the process of updating the January 2012 water and sewer master plans for the SBM and therefore the reinforcements to the existing water and sewer systems as proposed in this document will form part of the updated water and sewer master plans.

1. WATER DISTRIBUTION SYSTEM

1.1 *Distribution zone*

It is proposed in the Water Master Plan for Vredenburg that the proposed development area should be accommodated in the existing Louwville Big PRV zone. The connection to the existing system should be made to the existing 150 mm diameter pipe in Kooitjieskloof Street, as shown on Figure 1 attached.

The development is situated inside the water priority area.

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1.2 Water demand

The original water analysis for the master plan did not take the proposed development into account.

For this re-analysis, the total annual average daily water demand (AADD) and fire flows for the proposed development was calculated as follows:

- 154 Single residential erven @ 0,5 kl/day/unit = 77,0 kl/d
- Fire flow criteria (Moderate risk) = 25 l/s @ 7 m

1.3. Present situation

1.3.1 Bulk infrastructure

The existing bulk infrastructure supplying bulk water to the Louwville reservoir has sufficient capacity to accommodate the proposed development.

1.3.2 Reticulation system

The existing water reticulation network of the Louwville Big PRV zone has sufficient capacity to accommodate the proposed development.

In the Water Master Plan network reinforcements are however proposed within the existing Hospital PRV zone (to the west of the proposed development) and within the existing Louwville Big PRV zone (to the north of the development) and it is recommended that these master plan items are implemented as part of the development in order to improve network conveyance and redundancy within these networks.

1.3.3 Reservoir capacity

The existing 3,0 Ml Louwville reservoir (which supplies water to the Louwville Big PRV zone) has sufficient reservoir storage capacity available to accommodate the proposed development.

1.4 Implementation of the master plan

The following master plan items are proposed in the Water Master Plan to improve network conveyance and redundancy within the existing Hospital and Louwville Big PRV zones:

Network upgrade:

- | | | | |
|-----------|---|-----|-----------|
| • VBW2.4a | : 15 m x 160 mm Ø inter-connection pipe | = R | 53 000 * |
| • VBW2.4b | : 15 m x 160 mm Ø inter-connection pipe | = R | 53 000 * |
| | Total | = R | 106 000 * |

Notes:

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2018/19 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

The routes of the proposed inter-connection pipes are schematically shown on Figure 1, but have to be finalised subsequent to detail investigations regarding the positions of the existing zone valves.

2. SEWER NETWORK

2.1 *Drainage area*

The development falls within the existing Vredenburg gravity drainage area. The recommended position for the sewer connection for proposed development is at the existing 450 mm Ø outfall sewer in Kooitjieskloof Street, as shown on Figure 2 attached.

The development is inside the sewer priority area.

2.2 *Sewer flow*

The proposed development was not taken into consideration as part of the original sewer master plan.

For this re-analysis, the peak daily dry weather flow (PDDWF) for the proposed development was calculated as 53,9 kℓ/d.

2.3 *Present situation*

The existing bulk sewer reticulation system between the proposed development and the Vredenburg Wastewater Treatment Works (WWTW) has sufficient capacity to accommodate the proposed development in the present system.

It has however been indicated that the existing bulk sewer running through the development area will need to be relayed to accommodate the proposed development.

3. CONCLUSION

The developer of Erf 7752 & a portion of Erf 1003 in Vredenburg may be liable for the payment of a Development Contribution (as calculated by the Saldanha Municipality) for bulk water and sewer infrastructure as per Council Policy.

There is sufficient capacity in the existing water network to accommodate the proposed development.

It is however recommended that master plan items VBW2.4a & VBW2.4b are implemented in order to improve network redundancy and conveyance within the existing Hospital PRV (to the west of the proposed development) and Louwville Big PRV (to the north of the development) zones.

There is sufficient capacity in the existing Vredenburg bulk sewer system to accommodate the proposed development within the existing system.

We trust that you find this of value.

Yours sincerely

GLS CONSULTING (PTY) LTD
REG. NO.: 2007/003039/07



Per: PC DU PLESSIS

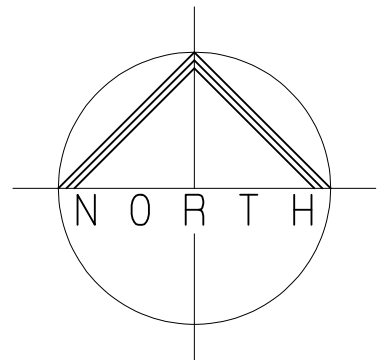
cc. iX Engineers
Unit 8 and 9
Atrium Building
Corner of Main and Union Street
Vredenburg
7380

Attention: Mr Jean de Klerk

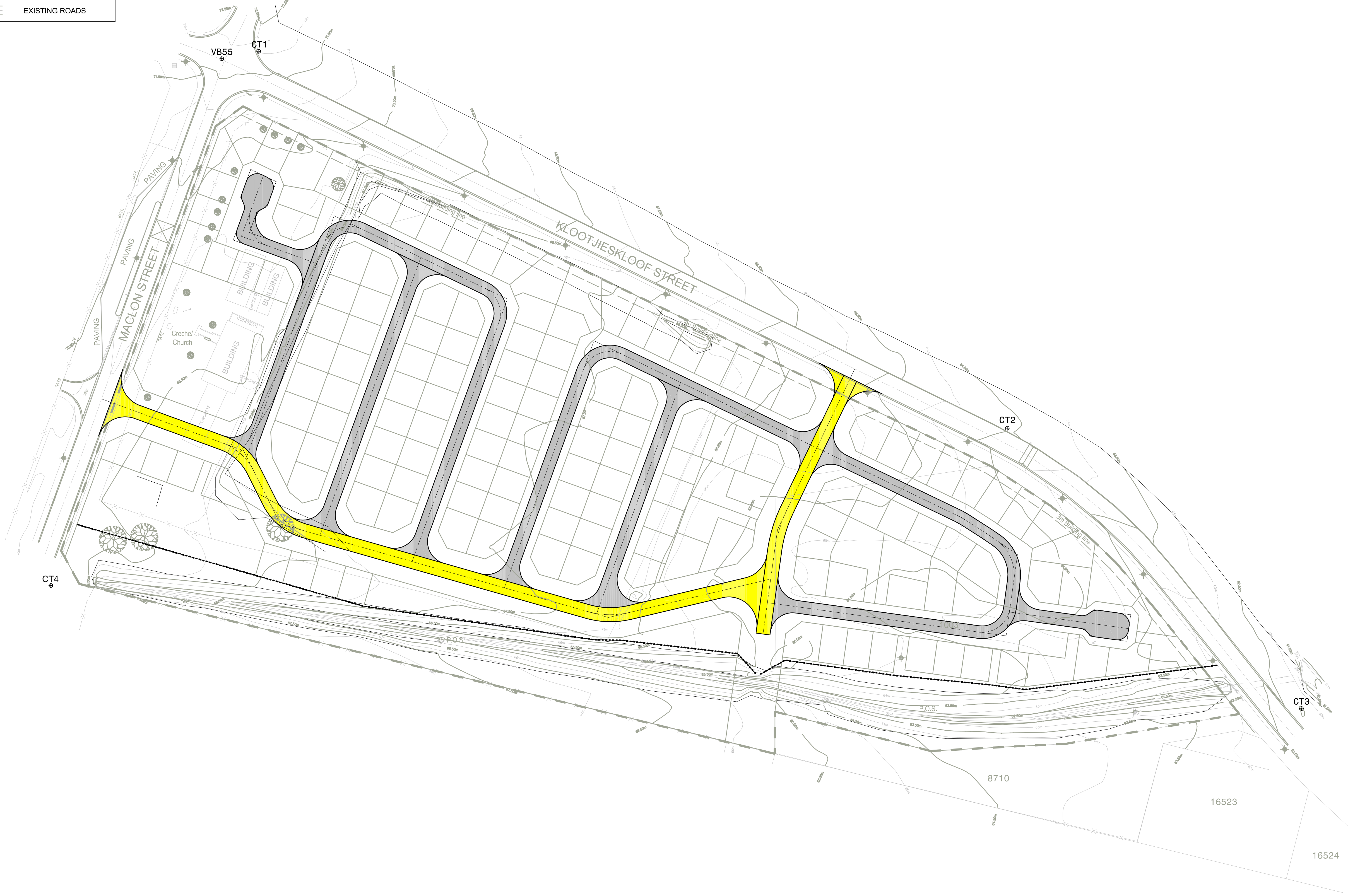
**SALDANHA BAY MUNICIPALITY
CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

Annexure C:

Proposed Street Layout



LEGEND :	
	NEW 5m WIDE ROADS
	NEW 4.5m WIDE ROADS
	EXISTING ROADS



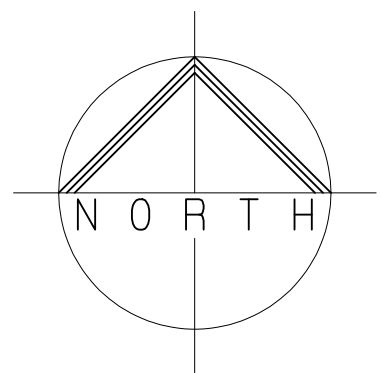
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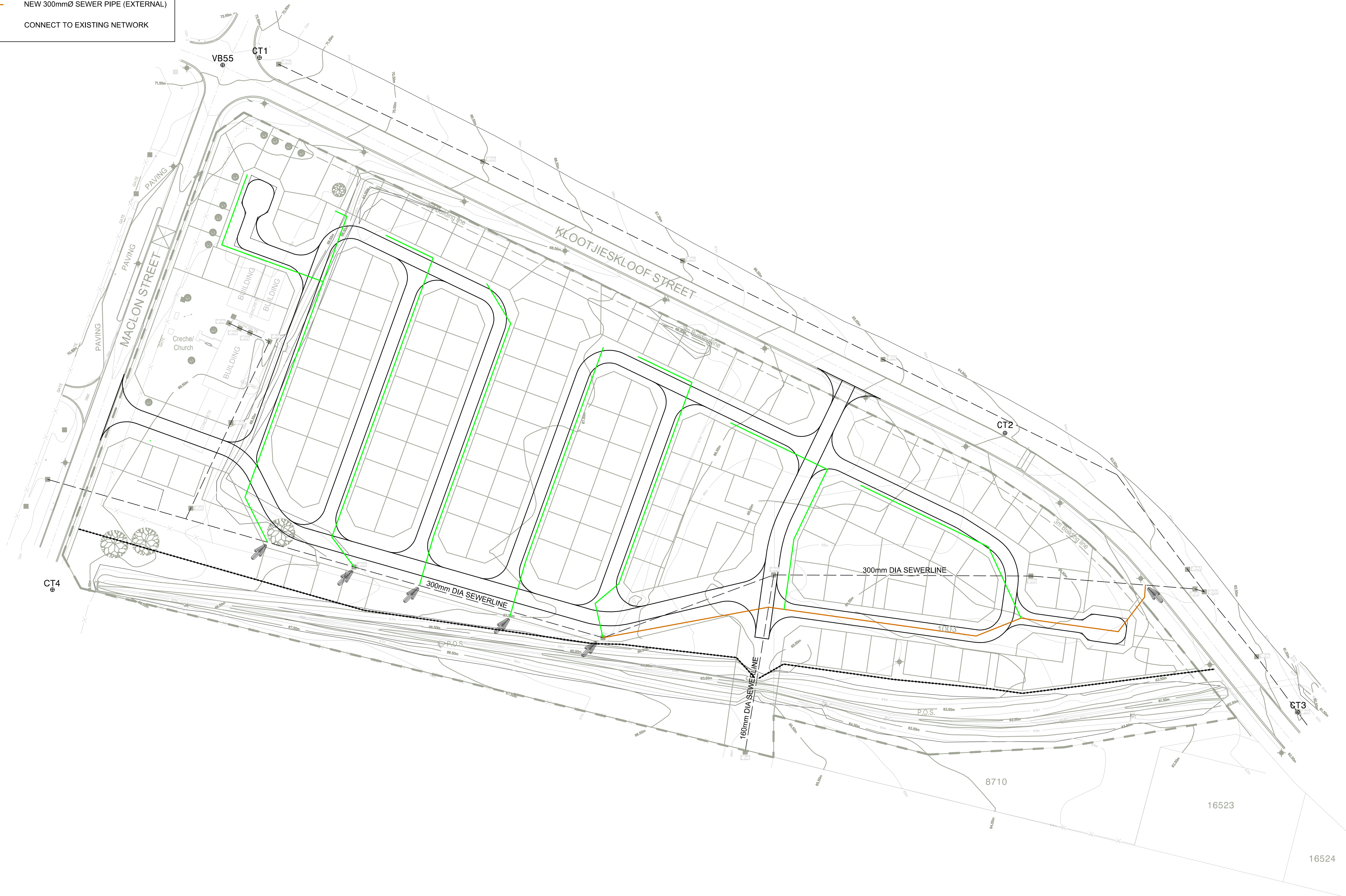
**SALDANHA BAY MUNICIPALITY
CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

Annexure D:

Proposed Sewer Layout



LEGEND :	
	EXISTING 300mm Ø SEWER PIPE
	NEW 160mmØ SEWER PIPE
	NEW 300mmØ SEWER PIPE (EXTERNAL)
	CONNECT TO EXISTING NETWORK



PRELIMINARY

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CONSULTING ENGINEER

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SIGNATURE	DATE	
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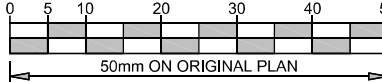
PROJECT

**CONSTRUCTION OF
CIVIL ENGINEERING
SERVICES IN LOUWVILLE
(154 IRDP ERVEN)**

DRAWING DESCRIPTION

**PROPOSED
SEWER LAYOUT**

SCALE FOR REDUCED PLAN



DATE	SCALE	ORIGINAL SIZE
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DRAWING NUMBER		REV
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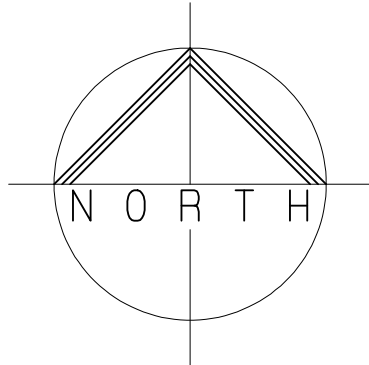
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**CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

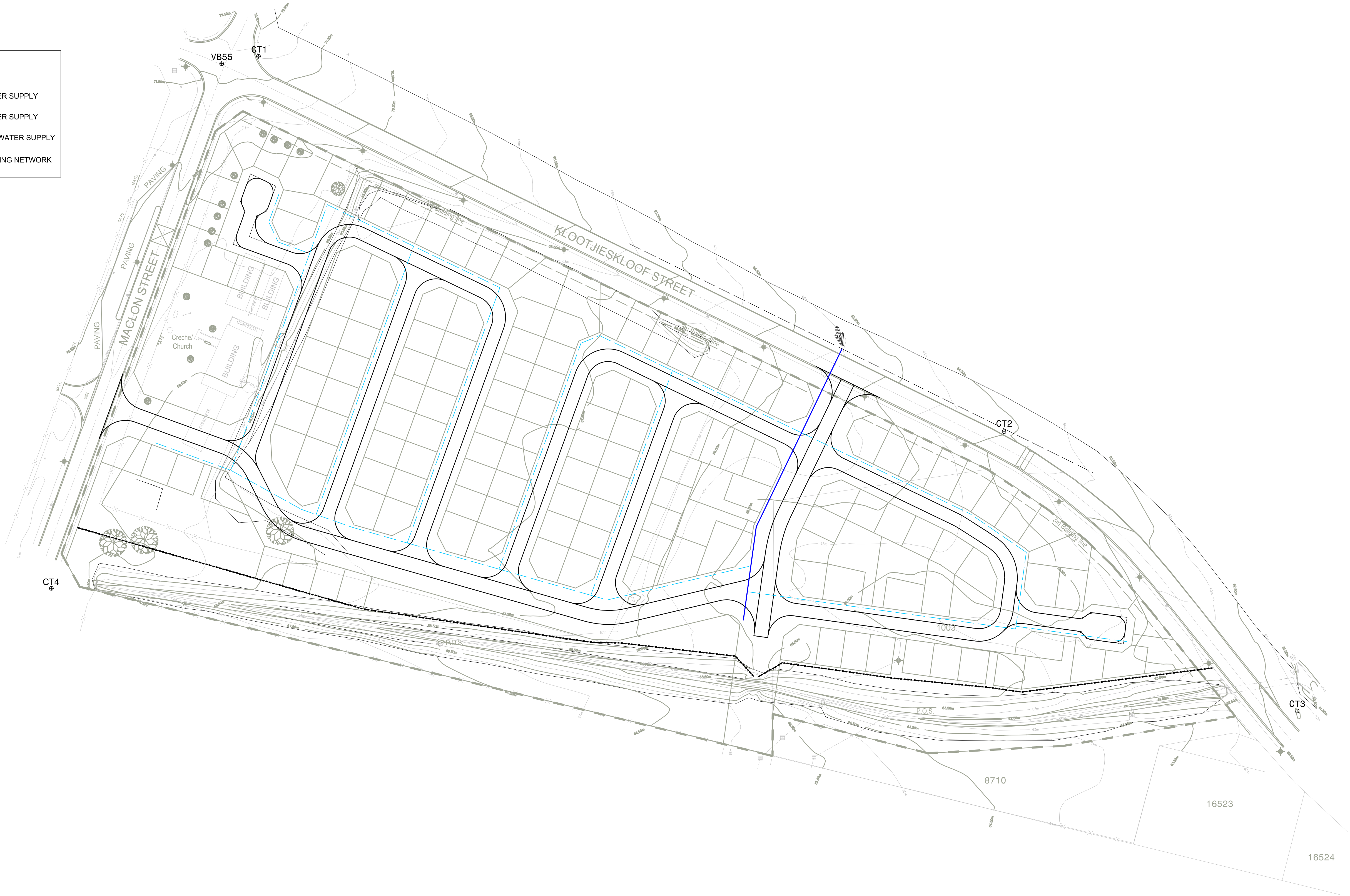
Annexure E:

Proposed Water Layout



LEGEND :

- NEW 160mm Ø WATER SUPPLY
- NEW 110mm Ø WATER SUPPLY
- EXISTING 150mm Ø WATER SUPPLY
- CONNECT TO EXISTING NETWORK



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CONSTRUCTION OF CIVIL ENGINEERING SERVICES IN LOUWVILLE (154 IRDP ERVEN)

PROPOSED WATER LAYOUT

SCALE FOR REDUCED PLAN
0 10 20 30 40 50
50mm ON ORIGINAL PLAN

DATE	SCALE	ORIGINAL SIZE
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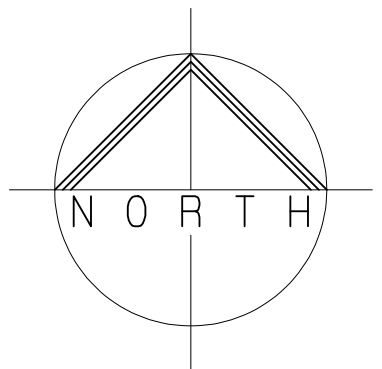
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**CONSTRUCTION OF CIVIL ENGINEERING SERVICES FOR 154 IRDP ERVEN IN LOUWVILLE,
VREDENBURG**

Annexure F:

Proposed Stormwater Layout



LEGEND :	
	PROPOSED 375mm Ø STORMWATER PIPE
	1 : 50 YEAR FLOOD LINE
	1 : 100 YEAR FLOOD LINE



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PROJECT

**CONSTRUCTION OF
CIVIL ENGINEERING
SERVICES IN LOUWVILLE
(154 IRDP ERVEN)**

DRAWING DESCRIPTION

**PROPOSED
STORMWATER LAYOUT**

SCALE FOR REDUCED PLAN



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DRAWING NUMBER		REV
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