Riebeek Kasteel Development

Erf 878, Riebeek Kasteel, Swartland Municipality

Civil Engineering Services Report

Ref. 20041 Rev. F

September 2026

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TABLE OF CONTENTS

1. INTRODUCTION 1
2. DEVELOPMENT OVERVIEW 1
2.1 Locality 1
2.2 Cadastral/Servitudes 2
2.3 Existing Topography & Bulk Services Connections 2
2.4 Description of proposed development 3
3. GEOTECHNICAL CONDITIONS & SITE CLEARANCE 4
3.1 Geotechnical Conditions 4
3.2 Site Clearance & Site Preparation 5
4. ROADS, ACCESS, AND PARKING AREAS 7
4.1 External Roads and Traffic Impact Study 7
4.2 Internal Roads and Parking Areas 9
5. STORMWATER DRAINAGE 13
5.1 External Stormwater Management 13
5.2 Internal Stormwater Network 13
6. WATER RETICULATION 16
6.1 Municipal Water Network and Connections 16
6.2 Internal Water Reticulation 18
7. SANITATION 19
7.1 Municipal Foul Sewer Network 19
7.2 Internal Sewage Network 20
8. CONCLUSION 21

APPENDIX A: Cadastral
APPENDIX B: Topographical & Services Survey
APPENDIX C: Subdivision & Rezoning Plan (Rev. 78)
APPENDIX D: Stormwater Attenuation and Emergency Overland Escape Routes
APPENDIX E: Capacity Analysis of the Bulk Water & Sewer Services, dated 14-01-2025, compiled by *GLS Consulting (Pty) Ltd*

1. INTRODUCTION

The purpose of this report is to address all civil engineering issues generated from the proposed development. The following documents and guidelines have been used in the civil engineering services infrastructure design for this development:

- The Topographical & Services Survey of the site done by *JOUBERT & BRINK SURVEYS & by CK RUMBOLL & PARTNERS (July 2021)* – ***Appendix B***
- The Subdivision & Rezoning Plan (SRP), compiled by *InterActive Town & Regional Planning* – ***Appendix C***
- Traffic Impact Study, dated 20-11-2025, compiled by *Route2 Transport Strategies*– ***not bound into this report***
- Capacity Analysis of the Bulk Water & Sewer Services, dated 14-01-2025, compiled by *GLS Consulting (Pty) Ltd* – ***Appendix E***
- The standard guidelines for residential developments as stipulated in the "GUIDELINES FOR HUMAN SETTLEMENT PLANNING AND DESIGN" *(CSIR "Red Book")*
- The "ROADS DRAINAGE MANUAL" as published by the South African National Roads Agency

2. DEVELOPMENT OVERVIEW

2.1 Locality

The proposed development is planned on Erf 878, Riebeek Kateel, which is situated within the Swartland Municipal Region. The total size of the erf is approximately 11ha and has an irregular rectangular shape which is surrounded by residential erven along the northern and eastern boundaries.

The site is bounded by Church Street (*R311*) to the west, and Fontein Street to the East, and a stream from west to east adjacent and across the northern boundary of the property

Fig 1: Locality Plan



2.2 Cadastral/Servitudes

*Refer to **Appendix A** for the Surveyor General Documentation for the site.*

There are two existing servitudes on Erf 878, i.e. a stormwater servitude on the northern boundary of the site and a right of way along the southern boundary.

Several new services servitudes on erf 878 to protect proposed civil engineering services, and to allow for overland stormwater escape routes, will be required.

A new services servitude across erven 1304 & 203 will be required to accommodate a proposed municipal foul sewer line to connect on an existing foul sewer line within Fountain Street – ***Figure 2.***

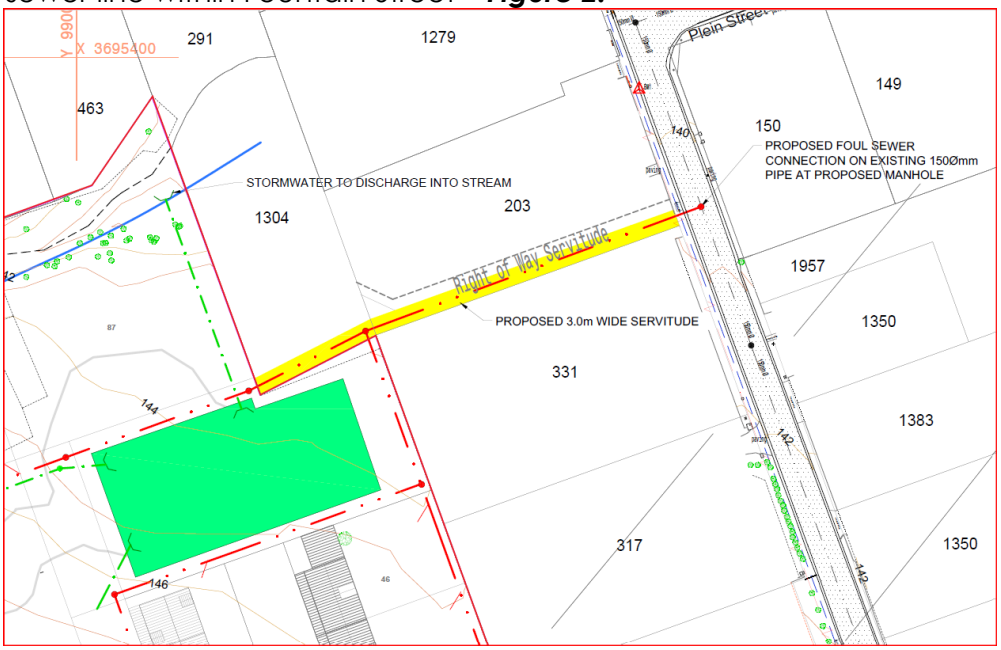


Fig 2: Services Servitude

2.3 Existing Topography & Bulk Services Connections

A Topographical & Services survey, ***Appendix B*** to establish the current contours and other features such as the existing buildings, kerbing, services, and trees, was undertaken during 2021.

Refer to ***Figure 3*** for the following roads/services connections:

- Roads at **RD1** (southbound left-in only)**, RD2, RD3 & RD4**
- Foul Sewer at **FS1, FS2 & FS3**
- Water at **W1 & W2**
- Stormwater at **SW1, SW2 & SW3**



Fig 3: Roads & Municipal Services Connections

2.4 Description of proposed development

The proposed mixed-use development is shown in ***Table 1.*** *Refer to* ***Appendix C*** *for the Subdivision & Rezoning Plan (SRP).*

Zoning	Area	% of Total	Erven
Residential Zone 1: Low Density	38178m²	34.5%	46
General Residential Zone 2: Town Housing	7031m²	6.3%	24
General Residential Zone 3: Flats (Consent for shops & home occupation)	8789m²	7.9%	7
Resort Zone (Events & wedding venue)	7607m²	6.9%	1
Business Zone 1: General Business	275m²	0.2%	1
Open Space Zone 2: Private Open Space	29323m²	26.5%	8
Transport Zone 2: Roads	19592m²	17.7%	3
Total	**110796m²**	**100%**	**90**

Table 1: Land Use

3. GEOTECHNICAL CONDITIONS & SITE CLEARANCE

3.1 Geotechnical Conditions

R. A. Bradshaw & Associates cc, Consulting Engineering Geologists, undertook geotechnical investigations during July 2021 to evaluate items such as the existing soil conditions/properties, to establish the current water table etc. The location of the trial pits is shown on ***Figure 4***.

The entire Report ref. 1-176721 is available on request.

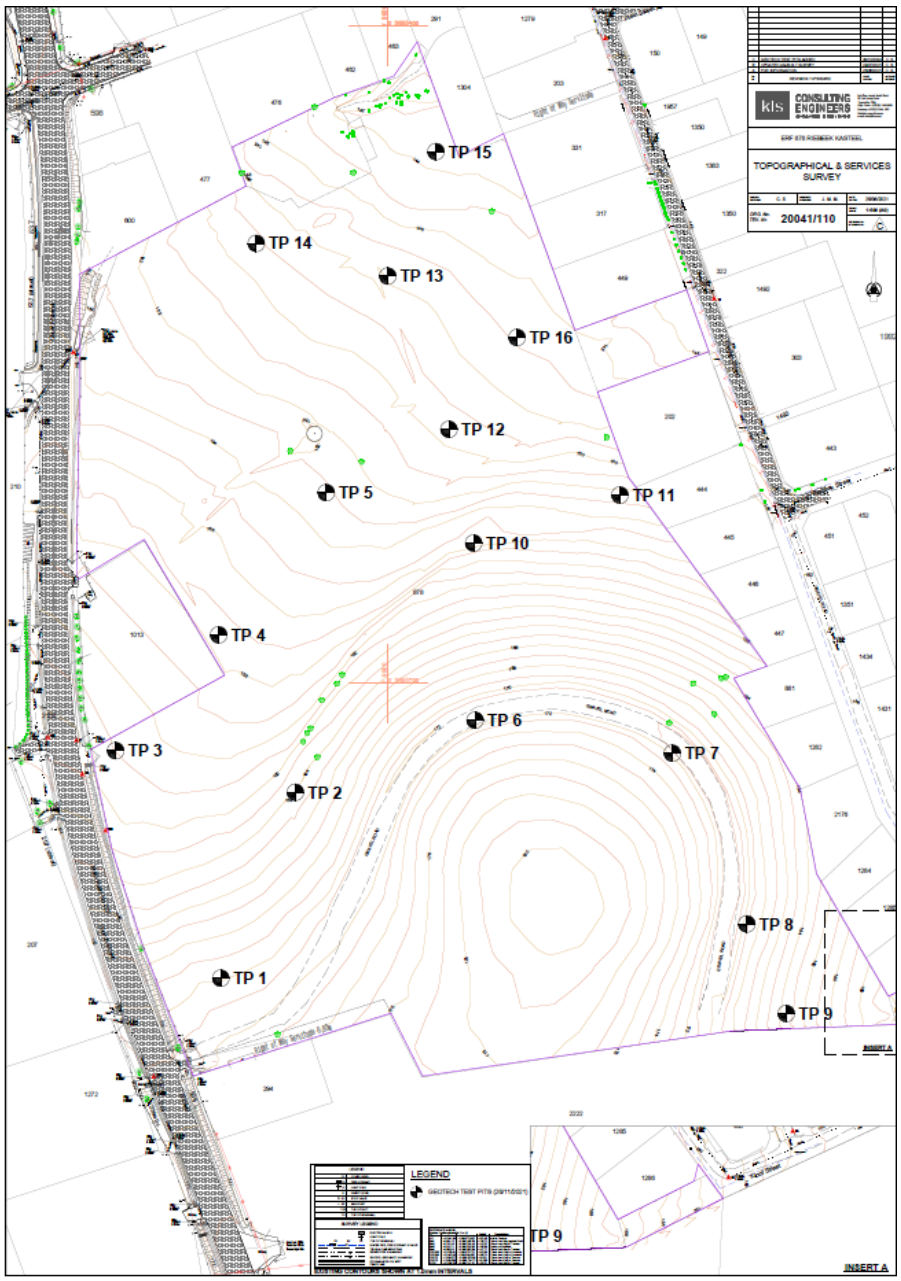


Fig 4: Layout of Trial Pits – also shown on ***Appendix B***

3.2 Site Clearance & Site Preparation

Below find extracts from the Geotechnical Report – not bound into this report:

5.1. Site Clearance and Preparation

Site clearance and preparation for road construction will include but not necessarily be limited to the following:

- The positions of all the trial pits should be identified before any clearing or construction commences and the loose backfill should be removed and replaced with sand that is compacted to at least 95% of mod ASSHTO dry density to avoid having soft 'spots' below the roads.
- Felling and removal of trees and their stumps.
- Removal of the grass and fynbos vegetation including roots. Exposures in the trial pits indicated that root growth extends to a depth of at least 150mm but the depth varies and an average of 75mm to 100mm would generally be applicable with roots extending to greatest depth in the Northern Soil Profile and in the southwestern parts of the Southern Soil Profile.
- Removing various fences and remnant fence poles.
- It is anticipated that the surficial soils in the Northern Soil Profile would become waterlogged after periods of rainfall and it would not be possible to drive wheeled vehicles around the site without some form of pioneering such as placement of crushed gravel or rubble.

5.2. Preparation of the Subgrade

Subgrade preparation should be relatively straightforward in the Southern Soil Profile for those parts of the internal roads in the area near TP1 and TP2 and downslope from TP9. The composition of the subgrade will vary with combinations of gravelly colluvium, silty soils and schist occurring because the road bed must be cut into the cross fall in places. Preparation of the newly exposed subgrade would include in-situ compaction to a minimum of 95% of mod AASHTO maximum dry density to ensure a subgrade of generally G9 quality.

The section of internal road from just to the east of TP2 rises over the edge of and onto the existing road/track that then passes over TP6 and TP7 and eventually runs over the eastern edge of the existing embankment fill near TP8 before joining the steeply, easterly sloping section of the road that runs to the southeastern exit/entrance off/onto the property. The material in the filled portion on the downslope side of the track apparently comprises a mixture of clayey sandy gravel, residual Malmesbury soil and weathered schist. The quality of workmanship and the degree of compaction of this fill are unknown and it is recommended that the fill is re-worked, and a small bench or benches are constructed onto which the new engineered fill can then be placed.

In the Northern Soil Profile, the subgrade will mainly comprise alluvial wash sands and silty sands over clayey soils. Subgrade preparation will be impossible at present because of the high moisture content and local free water in the surficial soils. The soils will merely pump if compaction is attempted. Installation of the recommended drainage will assist in drying out the soils, but the process will be very slow and potentially impractical as a quick solution. Ideally therefore, construction, particularly in this part of the sit, should be conducted during the dry period of the year. The newly exposed 'dry' subgrade should then be compacted to 95% of mod density to ensure generally G9 subgrade conditions.

5.3. Subsurface Drainage

With a gravelly soil overlying effectively impermeable residual cohesive soils and weathered bedrock in the Southern Soil Profile, a seasonal perched water table would probably develop at the contact between the coarse surficial soils and the underlying soil and bedrock. Given the steepness of the slopes in this area and the proximity of the erven and houses to the roads, installation of conventional subsurface drainage upslope of the roads is probably not viable, but water flow could occur at the contact when the contact is exposed in cuttings and a toe drain will therefore be essential.

The typical profile of sandy soils over cohesive soils in the Northern Soil Profile has and will give rise to a perched water table with groundwater flow at or near the contact between the two soil types. Conventional subsurface drainage must therefore be provided next to all roads. The invert of the drains should be placed below the contact between the two soil types, i.e. typically at or below a depth of 0.9m to ensure that the water is intercepted. A fin-type drain should be considered. The construction of the drains should commence in the lower parts of the site and progress upslope.

The nature of the spring is not fully understood and formal surface and possibly subsurface drainage measures will probably be required to control and direct flows.

Ad hoc additions to the planned formal subsurface drainage layout for the site might be required to intersect and/or control seepage flows.

5.4. Excavation Conditions

The trial pitting indicated that all materials to a depth of at least 1.3m can be excavated with a digger/loader. The excavation would be classified as Soft Excavation Class according to SANS 1200D, grading to Intermediate Excavation Class in places towards the bottom of this depth range.

To avoid disputes over classification, measurement and payment, Soft and Intermediate Excavation Classes should be combined into one excavation class for this project and that all materials that can be excavated with a twenty-tonne excavator should fall within this project specific class.

4. ROADS, ACCESS, AND PARKING AREAS

4.1 External Roads and Traffic Impact Study

Below find an extract from a Transport Impact Study (Ref. TRAF 1967, version 005), dated 02 September 2026 compiled by Jac Botha of *Route2 cc*:

SURROUNDING AND FUTURE ROAD NETWORK

R46 (Trunk Road 2401)

The R46 is a Class 2 Provincial Road linking Wellington & Ceres to the east with Malmesbury & the N7 to the west. The road is a single carriageway road and surfaced shoulders.



R311 (Main Road 227)

This Provincial Road is a Class 2 Provincial Road to the north of Riebeek Kasteel and a Class 3 mobility road with one lane per direction.

Two (2) positions for access is proposed, with the proposed "Access 1" as a full access intersection across from The "Farm Access Road" and "Access 5" to be an only left-in link into the development.



Main Street

Main Street is a Class 5 local access street and is a single carriageway road. The proposed "Access 2" will be off this street across from Maree Street, thus forming the 4th leg of the intersection.



Fontein Street

Fontein Street is also a Class 5 single carriageway local access street. The proposed "Access 3" will be off this street forming a new intersection.



Kloof Street

Kloof Street is a Class 5 local access street and will be extended westwards to form "Access 4" into the development mainly for the "Residential 1" Erven.



PUBLIC TRANSPORT & NON-MOTORISED TRANSPORT

Background

In terms of the "National Land Transport Act" (NLTA) (Act No.5 of 2009), it is required that an assessment of public transport be included in traffic impact studies. The following comments are relevant.

Public Transport

The Riebeek Kasteel CBD is well served by minibus-taxi thus no additional facilities will be required.

Non-motorised Transport (NMT)

The existing sidewalks within the CBD will be linked to the new sidewalks within the development.



4.2 Internal Roads and Parking Areas

The design philosophy for the proposed internal road network will be similar to that of a typical urban road network, which includes a minimum 2.0% crossfall and minimum 0.5% longitudinal slope. This road network will consist of 5.0m, 5.5m & 6.4m wides asphalt or brick paved roads with formal kerbs/edgings, roadside channels and a stormwater drainage system consisting of an underground pipe/road edge culvert network.

The internal road reserves will be 10 - 25m wide.

Below find the typical road cross sections for road reserves 10m and 13m width respectively **(Fig's 5 & 6)**.

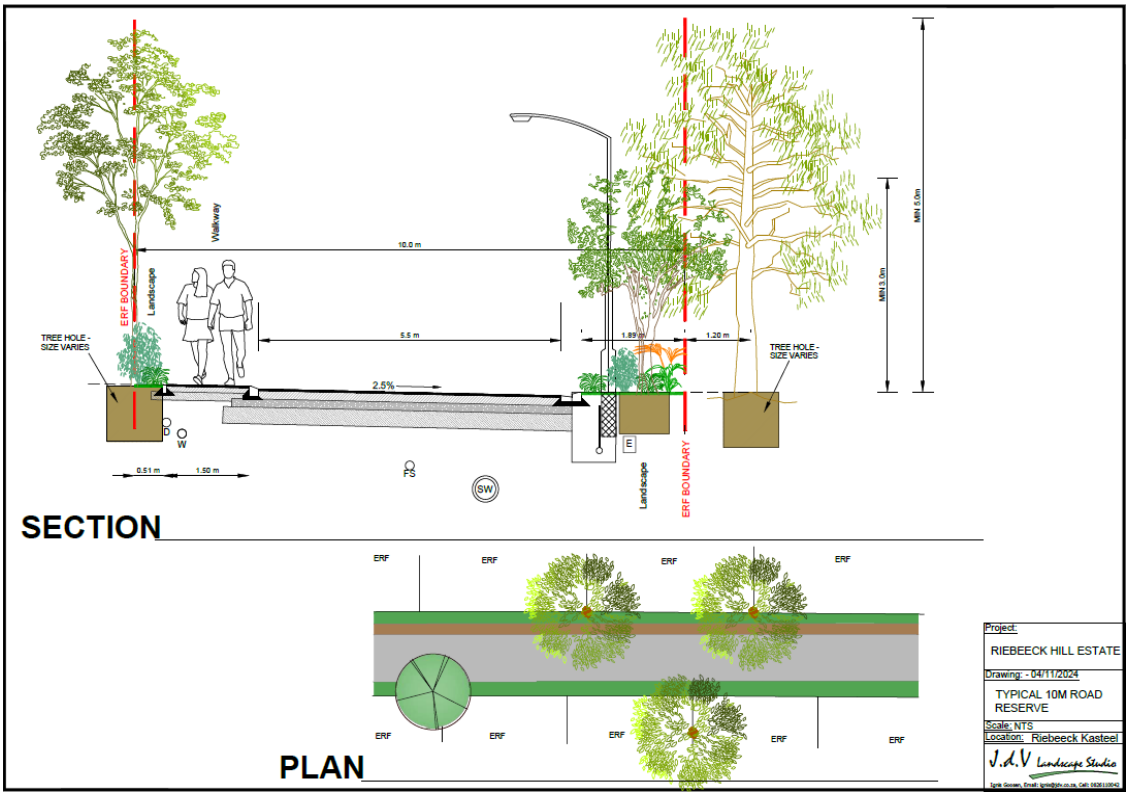


Fig 5: Typical X-Section (10m road reserve)

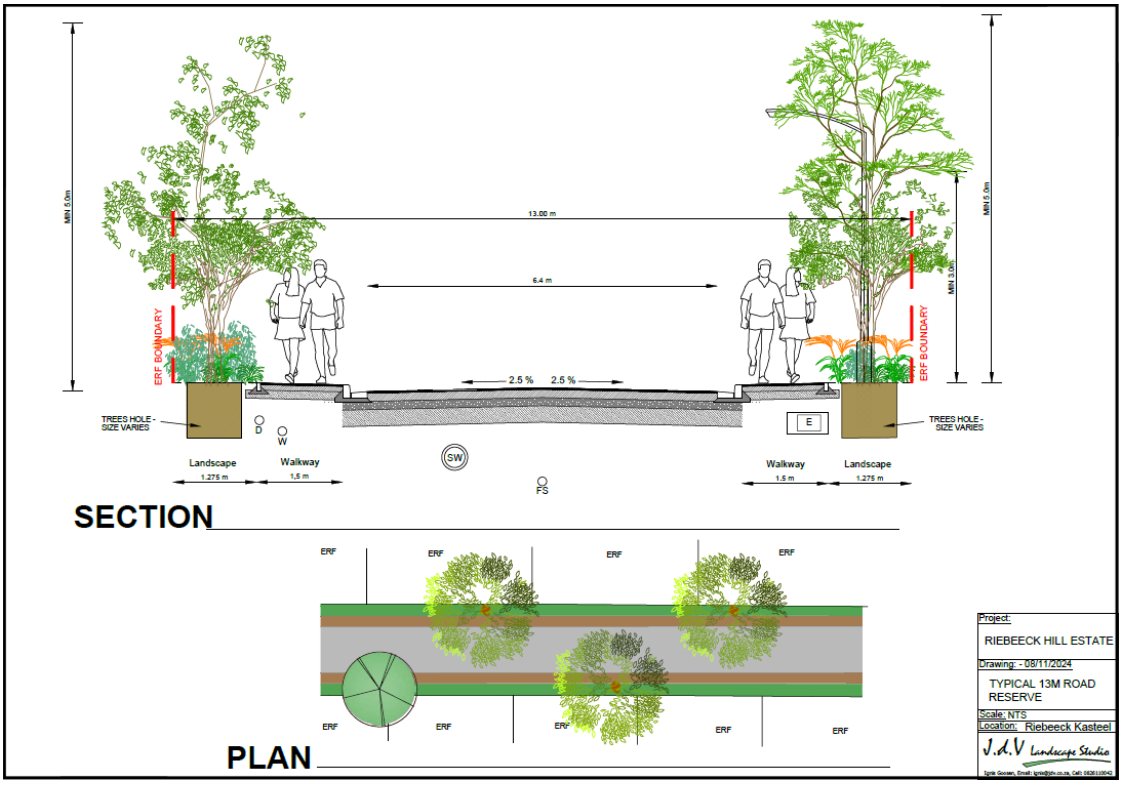


Fig 6: Typical X-Section (13m road reserve)

Below find a few turning simulations:



1 Car Turning Simulation
Scale: 1:2000



1 Fire Truck Turning Simulation
Scale: 1:2000



1 Truck Turning Simulation
Scale: 1:2000



1 Truck Turning Simulation
Scale: 1:2000

All internal roads within development clusters will be designed for low heavy vehicle traffic (*construction vehicles, furniture removal and refuse trucks*):

- Road Category C/D (TRH4) or UC (UTG)
- Pavement Class ES 0.1 (TRH4).
- Structural design period 20 years
- Surface finish: Asphalt or Concrete paving

Extract from TIS:

CONCLUSION & RECOMMENDATIONS

The Traffic Impact Study investigated the potential traffic impact of proposed development on **Erf 878 Riebeek Kasteel, Western Cape Province**.

The analysis showed that the proposed development traffic will have limited to no impact along the adjacent roads and/or intersections.

To cater for the additional traffic only the following road and/or intersection upgrades are proposed:

- **Intersection 5: Fontein Street and Proposed Access Road no 2** – priority controlled with an eastbound 3rd leg (Access Road No 3).
- **Intersection 6: Fontein Street and Kloof Street** – priority controlled with an eastbound 3rd leg (Access Road No 3).
- **Intersection 7: R311 (Church Road), Farm Access Road and Proposed Access Road no 1** – staggered intersection with 4-way stop control with a 4th westbound leg (Access Road No 1).

With regards to sight distances the following can be concluded:

- **Intersection 2:** >100m westbound & eastbound = sufficient.
- **Intersection 5:** >100m northbound & southbound = sufficient.
- **Intersection 6:** >100m northbound & eastbound = sufficient.
- **Intersection 7:** +/- 75m northbound & >150m southbound = proposed 4-way stop controlled intersection.

5. STORMWATER DRAINAGE

5.1 External Stormwater Management

A preliminary investigation indicates that there is an existing stormwater course running along the northern boundary. Stormwater flows from west to east via an underground culvert crossing Kerkstraat upstream of the site – ***Appendix B***:

1. An open stream clipping the north-western corner of erf 878
2. An underground system adjacent (north) of erf 878
3. An open stream across the north-eastern portion of erf 878
4. An underground system downstream of the north-eastern corner of the site – details unknown at this stage. No as-built information could be provided by the local authority, nor could any other usable information be sourced. A proposal for additional survey input was in the meantime requested from the land surveyor who did the 2021 Topographical & Services Survey – ***Appendix B.*** Proposal/quotation received & submitted to developer.

The pre-development site primarily drains towards the northeast, towards this existing water course, with a portion along the southern boundary, approximately 13.5% of the total site, draining towards the south-eastern corner of the site, onto the Kloof Street Road reserve.

Discussions with Swartland Municipality has indicated that there is no additional capacity within the existing external stormwater system and allowance should thus be made for on-site attenuation of the post development run-off to pre-development flow rates.

5.2 Internal Stormwater Network

The KLS approach for stormwater management aims to:

- Keep natural drainage patterns in the post development site, where possible, within the constraints of the new developed site
- Protect adjacent and downstream properties, water courses and infrastructure from the impacts of increased post development runoff
- Improve the quality of runoff by reducing the total amount of suspended solids, nitrogen, and phosphorus content
- Promote infiltration
- Implement best management practices for a water sensitive urban design and sustainable stormwater management

The standard stormwater principles, as stipulated by the relevant guidelines mentioned in section 1 of this document, the guidelines of the local authority and the following minimum specifications will be implemented for the design of the internal stormwater system:

- Minimum pipe specification: Class 100D Concrete spigot & socket pipes for all municipal installations.
- Minimum pipe diameter: 300mm Nominal diameter
- Minimum pipe gradient: Minimum self-cleansing velocity 0.9m/s inside a half-full pipe
- Maximum spacing between manholes/inlets/catchpits: 90m
- Design attenuation storage volume: 1:50-year peak post development storm event
- Maximum attenuated outflow rate: 1:2 yr RI pre-development

The development is divided into six primary sub-catchments, of which only catchment 6 will drain to the municipal network unattenuated. Refer to ***Appendix D*** for the internal sub-catchments, proposed location of the attenuation facility and the emergency overland escape routes.

Preliminary stormwater calculations were done as per Alternative 3 of the Rational Method, using historical rainfall data from the SAWS database and typical runoff factors for the pre- and proposed post-development site. – see ***Table 2***:

Table 2: Runoff Calculation Parameters		
Reference Coordinates	33°23'; 18°54'	
MAP (mm)	648	
Total Catchment Size (m²)	110000	
Attenuated Catchments (1-5) (m²)	95100	
Unattenuated Catchment (6) (m²)	14900	
Pre-Dev Run-Off Coeff	C_{pre}	0.233
Post-Dev Run-Off Coeff	C_{post}	0.750
Peak Storm Duration	T_c *(min)*	15.00

The internal stormwater network, i.e. the minor network, will be designed to have sufficient capacity to adequately manage and convey up to a 1:10 year rainfall event into the underground municipal stormwater network.

The proposed internal stormwater system will consist of open swales, an underground gravity pipe network, roadside channels and inlet structures that will drain the impermeable and semi-impermeable surface areas. The internal stormwater system for the development will connect to the municipal network as discussed in section 5.1 and as shown on ***Figure 3.***

Table 3 summarises the predicted pre- and post-development flows:

Table 3: Flood run-off: Rational method (Alternative 3)

$$Q_T = \frac{C_T I_T A}{3,6}$$

Return Period (years), T	**2**	**5**	**10**	**20**	**50**	**100**
Point rainfall (mm), P_T (SAWS) 15 minutes	8.5	11.4	13.5	15.7	18.8	21.4
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	34.0	45.6	54.0	62.8	75.2	85.6
Area reduction factor (%), ARF_T	100	100	100	100	100	100
Average intensity (mm/hour), I_T	34.0	45.6	54.0	62.8	75.2	85.6
Peak flow (m3/s) - pre-development						
Catchment 1-5	0.21	0.28	0.33	0.39	0.46	0.53
Catchment 6	0.03	0.04	0.05	0.06	0.07	0.08
Peak flow (m3/s) - post-development						
Catchment 1-5	0.67	0.90	1.07	1.24	1.49	1.70
Catchment 6	0.11	0.14	0.17	0.19	0.23	0.27

The internal roads infrastructure will be designed in such a way that during rainfall events with a return period larger than 1:10 years, the proposed roads, walkways, parking areas and channels will act as overland flow routes which will channel and convey the surface run-off via predetermined escape routes towards the attenuation pond or intended overland discharge point (for Catchment 6).

The new stormwater attenuation facility and internal swale will be constructed as part of the development. The main purpose of these facilities will be to attenuate run-off and promote on-site infiltration. The attenuation facility, and to a lesser part the swale, will be designed to retain the required volume of 991m³, required to attenuate up to a 1:50 year post-development flood for the contributing catchments, while discharging a peak flow equal to the 1:2-year pre-development flow.

The ABT Grigg method was used for preliminary attenuation pond sizing, as summarized in ***Table 4***:

Table 4: Attenuation Dam Sizing: ABT Grigg Method		
$V_{st} = 60 \left(\frac{1+m}{2}\right) q_{pa} t_{ca} (1-a)^2$		
Ratio of Hydrograph Recession Time	m	**1**
Post-development Time of Concentration	t_{ca} (in min)	**15.00**
1:50 Post-development Peak Discharge	q_{pa} (in $m^3/_{sec}$)	**1.490**
1:2 Pre-development Peak Outflow	q_{pb} (in $m^3/_{sec}$)	**0.209**
q_{pb}/q_{pa} =	*a*	**0.140**
Storage Volume Required V_{st} =	**V_{st} (in m^3)**	**991**

The gradually sloping (typically 1:3) inside embankments of the attenuation dam and swale will be planted with indigenous vegetation which will act as bio-filters. The invert level of the outlet pipe/structure will be raised to ensure water build-up inside the bio-filter during rainfall events and ensure design outflow rates are achieved.

The attenuation facilities will promote infiltration into the subsurface water reserves, selected vegetation will effectively reduce the phosphorus content of water passing through, and stilling basins at inlets will ensure sufficient settling o suspended solids, preventing it from entering the external infrastructure.

6. WATER RETICULATION

6.1 Municipal Water Network and Connections

Discussions with Swartland Municipality indicated that there is an existing 200mm diam. watermain situated within Fontein Street which the proposed development could connect to – ***Figure 3.***

This was confirmed by a the GLS Capacity Analysis, dated 14-01-2025 – ***Appendix E***.

Following, find an extract relating to the findings from the Report:

The developer of Erf 878 in Riebeek Kasteel may be liable for the payment of a Development Contribution (as calculated by the Swartland Municipality) for bulk water and sewer infrastructure as per Council Policy.

The water master plan indicated that the proposed development should be accommodated in the existing Riebeek Kasteel reservoir zone. The proposed connection to the existing reticulation system should be made to the existing 200 mm Ø pipe in Fontein Street.

There is sufficient capacity in the existing Riebeek Kasteel water system to supply the proposed development on Erf 878 with sufficient water pressure and fire flow.

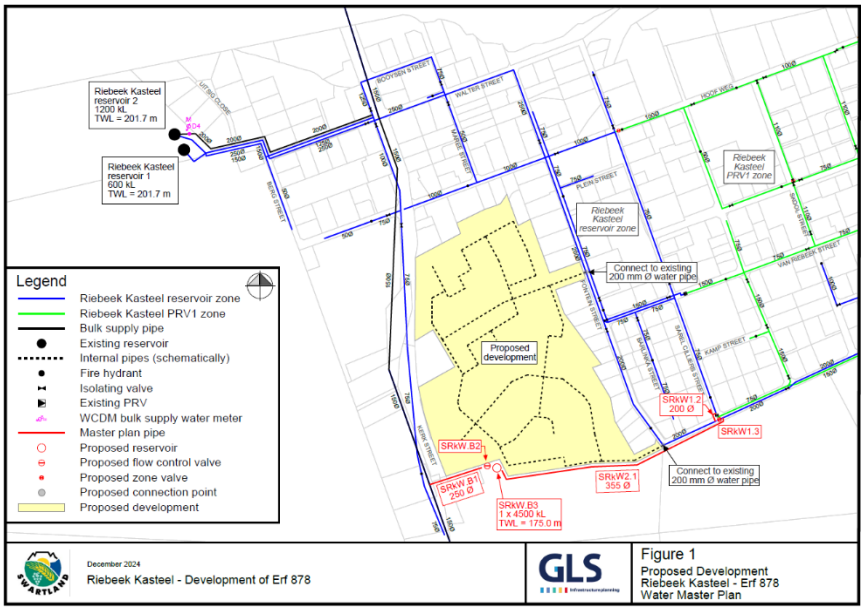
Riebeek Kasteel has insufficient reservoir storage capacity to accommodate the proposed development and the implementation of master plan items SRkW.B1, SRkW.B2, SRkW.B3, SRkW1.2, SRkW1.3 & SRkW2.1 are proposed in order to augment reservoir storage capacity for Riebeek Kasteel.

The preliminary cost estimate for the infrastructure required for <u>additional reservoir storage</u> to accommodate the proposed development is shown below. Also refer to ***Fig. 1*** from the GLS report:

• SRkW.B1 :	120 m x 250 mm Ø new bulk supply pipe	R	440 000 *
• SRkW.B2 :	150 mm Ø flow control valve	R	376 000 *
• SRkW.B3 :	4,5 ML new reservoir for Riebeek Kasteel (new reservoir site at southern side of town)	R	18 039 000 *
• SRkW1.2 :	20 m x 200 mm Ø new inter-connection pipe	R	112 000 *
• SRkW1.3 :	1 x 200 mm Ø valve to insert and close	R	194 000 *
• SRwW2.1 :	400 m x 355 mm Ø new supply pipe	R	2 222 000 *
	Total	R	21 383 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT – Year 2024/25 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

Note that the routes of the proposed pipelines and the position of the proposed valves and reservoir are schematically shown on Figure 1 attached, but have to be finalised subsequent to detailed pipeline route, valve placement and reservoir location investigations.



6.2 Internal Water Reticulation

The proposed internal water reticulation network will consist of a 110mm/160mm uPVC Class 12 potable water ring main, with 32mm diameter connections to each erf.

The bedding and blanket material for the internal waterpipe network will be clean sand from on-site excavations and will comply with SABS 1200 regulations for Class C bedding and blanket.

Fire hydrants will be spaced for Low-risk category 1.

*Refer to **Table 5** for the Water Demand Calculations.* The calculated GAADD of 87.2 kL/d is within allowance reflected in the GLS master planning AADD allowance of 98.0 kL/d.

Erf 878, Riebeek Kasteel, SDP - Rev. 78

03-09-2026

Item no	Description	Total no. of	Area	Water demand per day			TOTAL (litre)
				Per unit litre per unit/room	Area litre per hectare	Area litre per 100 m2	By area/ number
1	**Residential**						
1.1	Single Residential Zone 1	46 units	± 38 178 m²	600			27 600
1.2	General Residential Zone 2: Town Houses	24 units	± 7 031 m²	400			9 600
1.3	General Residential Zone 3: Flats	7 units	± 3 516 m²		21 000		7 383
2	**Resort Zone:** Wedding Venue	1 units	± 3 043 m²			600	7 303
3	**Commercial**						-
3.1	Business Zone 1: General Business	1 units	± 110 m²			200	88
4	**Public Open Space**	8 units	± 29 323 m²		12 000		35 188
				Gross annual average daily water demand (GAADD)			**87 162 l/day**
				Demand per day			**1.01 l/s**
				Instantaneous Peak Demand (P(i) = 9)			**9.08 l/s**
				Fire Flow (based on 1 hydrant)			**15.00 l/s**

Design Methodology:

a) Units: Yield in litre per unit per day - SANS 10252-1; CSIR The Neighbourhood Planning and Design Guide Table J.2 Section J; Redbook - Table 9
b) Peak factor calculation:
Peak factor calculation as per Red Book Fig. 9.11 Chapter 9. Peak factor = 9
c) Fire Flow (Low Risk): 900 l/min for 1 hours, 1 hydrant: 15.0 l/s (fire engineer to confirm)
d Suggested Watermain pipe sizing - 160mm Watermain and 110mm Subnetworks (uPVC Class 12 or HDPE PN 12.5)
e No allowance was made for irrigation demand as the irrigation reticulation will feed off a borehole

Table 5: Water Demand

7. SANITATION

7.1 Municipal Foul Sewer Network

Preliminary discussions with Swartland Municipality confirmed that there is an existing underground foul sewer system within Fontein Street which the proposed development could connect to. This was confirmed by a the GLS Capacity Analysis - ***Appendix E***.

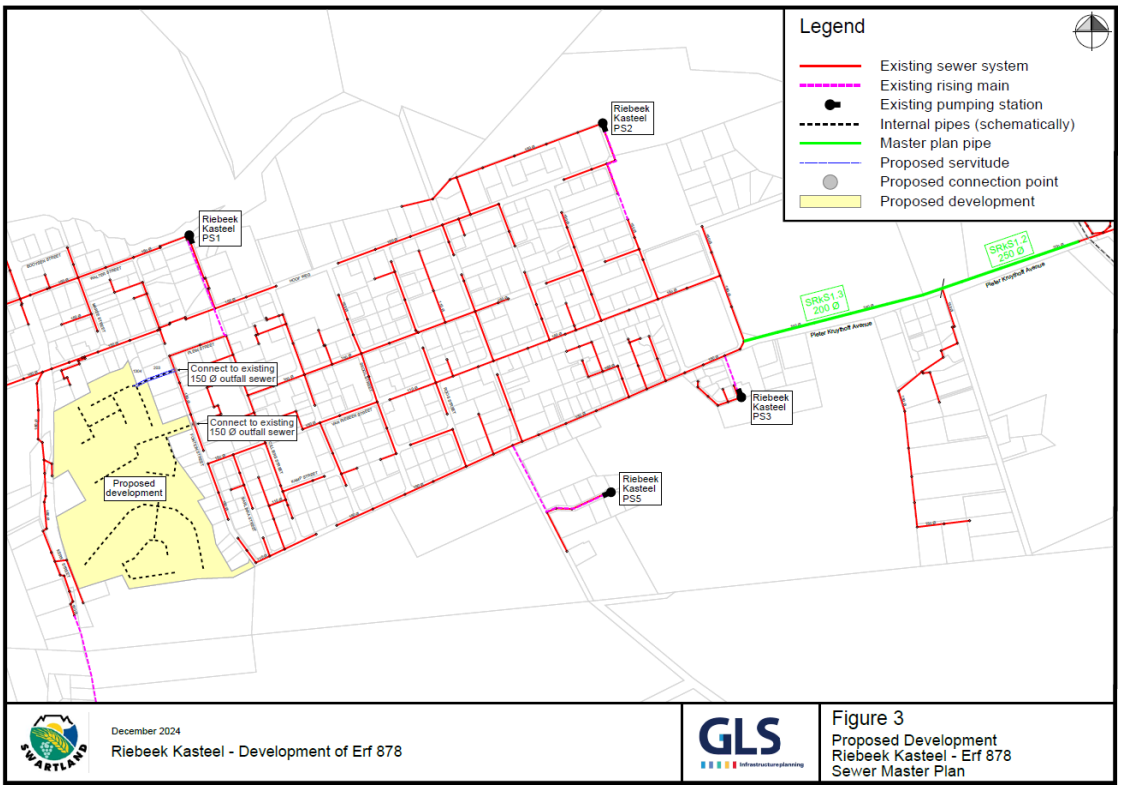
Multiple connections will be required due to the existing topography of the site – ***Figure 3.*** Below find an extract relating to the findings from the Report:

> The developer of Erf 878 in Riebeek Kasteel may be liable for the payment of a Development Contribution (as calculated by the Swartland Municipality) for bulk water and sewer infrastructure as per Council Policy.

> A servitude through Erven 203 and 1304 in favour of Swartland Municipality will have to be registered to allow the northern part of the proposed development to be connected to the existing outfall sewer in Fontein Street.
>
> The existing sewer reticulation system from Erf 878 to the main outfall sewer in Pieter Cruythoff Avenue has sufficient capacity to accommodate the proposed development. Bulk sewers in Pieter Cruythoff Avenue (from the bottom of Kloof Street towards the railway line) are however at capacity and should be upgraded through the implementation of master plan items SRkS1.2 & SRkS1.3 in order to accommodate the proposed development in Riebeek Kasteel.

GLS proposed the upgrading of the existing bulk sewer infrastructure – *refer to* ***Figure 3*** *(from the GLS report),* although the current main outfall sewer has sufficient capacity to accommodate the proposed development.

> The following master plan items will be required to augment capacity within the existing Riebeek Kasteel bulk sewer system in order to accommodate the proposed development together with other future development areas:
>
> Network upgrades
>
> - SRkS1.2 : 300 m x 250 mm Ø upgrade 250 mm Ø outfall sewer R 1 137 000 *
> - SRkW1.3 : 535 m x 200 mm Ø upgrade 160 mm Ø outfall sewer R 1 659 000 *
>
> Total R 2 796 000 *
>
> (* Including P & G, Contingencies and Fees, but excluding VAT – Year 2024/25 Rand Value. This is a rough estimate, which does not include major unforeseen costs).
>
> Note that the routes of the proposed pipelines are schematically shown on Figure 3 attached, but have to be finalised subsequent to detailed pipeline route investigations.



7.2 Internal Sewage Network

The internal sewage infrastructure will consist of a 160mm diameter uPVC Class 34 gravity pipe network and round precast concrete manholes in the road reserves. Each property cluster will have a 110mm diameter connection point/manhole, situated at the lowest portion of the erf.

All pipes will be laid at a minimum gradient of 1:120, with clean sand bedding and blanket installed around the pipe to comply with SABS Class 1200 regulations.

*Refer to **Table 6** for the Sewage Yield Calculations.* The calculated AADSY of 46.8 kL/d is within allowance reflected in the GLS master planning PDDWF allowance of 68.6 kL/d.

Erf 878, Riebeek Kasteel, SDP - Rev. 78

03-09-2026

Item no	Description	Total no. of	Area	Sewage Yield per day			TOTAL (litre)
				Per unit litre per unit/room	Area litre per hectare	Area litre per 100 m2	By area/ number
1	**Residential**						
1.1	Single Residential Zone 1	46 units	± 38 178 m²	540			24 840
1.2	General Residential Zone 2: Town House	24 units	± 7 031 m²	360			8 640
1.3	General Residential Zone 3: Flats	7 units	± 3 516 m²		18 900		6 644
2	**Resort Zone:** Wedding Venue	1 units	± 3 043 m²			540	6 573
3	**Commercial**						
3.1	Business Zone 1: General Business	2 units	± 110 m²			180	79
4	**Public Open Space**	8 units	± 29 323 m²				-
				Annual Average Daily Sewage Yield (AADSY)			**46 777 l/day**
				Flow over 24 hour day = daily flow/24/60/60			**0.54 l/s**
				Peak Factor = 3.50			
				Peak Daily Dry Weather Sewage Yield (PDDWSY)			**1.89 l/s**
				Infiltration = 15%			
				Peak Daily Wet weather Sewage Yield (PDWWSY)			**2.18 l/s**

Design Methodology:
a Units: Yield in litre per unit per day - SANS 10252-1 and CSIR Red Book Table C.1 Chapter 10 Appendix C
b Yield in litre per day - Assume 90% of water consumption for Units
c Peak factor calculation: 3.5
d Assume infiltration of 15%: During Heavy Rainfall in Winter

Table 6: Sewage Yield

8. CONCLUSION

This report confirms that Civil Engineering bulk Services are available or could be made available for this development, and that the Subdivision & Rezoning Plan ***Appendix C***, is supported from a Civil Engineering perspective, on the following conditions:

i) that agreement between developer & the Swartland Municipality is reached in accordance policy, on the value of Development Contribution (bulk water infrastructure) which could be used towards "reservoir infrastructure" (by others)

ii) that agreement between developer & the Swartland Municipality is reached in accordance policy, on the value of Development Contribution (bulk foul sewer infrastructure) which value could be used towards upgrading of existing bulk infrastructure (in accordance GLS *Fig. 3, or portion therefore*), by developer

iii) that the proposed road intersection onto Kerkstraat (at RD2) is approved by the Provincial Roads Authority

APPENDIX A

Cadastral

8922-85

SIDES Metres		ANGLES OF DIRECTION		CO-ORDINATES System Lo.19° Y		X	
			Constant	± 0,00		+3 600 000,00	
AB	51,95	244 06 00	A	+ 9 906,66	+	95 155,76	
BC	28,90	249 59 10	B	+ 9 859,93	+	95 133,07	
CD	18,87	214 13 20	C	+ 9 832,78	+	95 123,18	
DE	55,71	340 02 10	D	+ 9 822,17	+	95 107,58	
EF	22,78	242 47 00	E	+ 9 803,16	+	95 159,94	
FG	95,52	340 02 50	F	+ 9 782,89	+	95 149,52	
GH	54,07	250 03 40	G	+ 9 750,29	+	95 239,31	
HJ	30,00	340 09 00	H	+ 9 699,46	+	95 220,87	
JK	54,02	70 03 40	J	+ 9 689,28	+	95 249,08	
KL	41,57	340 02 50	K	+ 9 740,06	+	95 267,51	
LM	106,74	323 48 ~~18~~ 20	L	+ 9 725,87	+	95 306,58	
MN	16,10	70 09 00	M	+ 9 662,83	+	95 392,72	
NO	26,46	329 15 10	N	+ 9 677,97	+	95 398,19	
OP	35,00	250 09 00	O	+ 9 664,44	+	95 420,93	
PQ	55,52	340 08 30	P	+ 9 631,52	+	95 409,05	
QR	89,~~92~~ 93	323 48 20	Q	+ 9 612,66	+	95 461,27	
RS	132,65	63 17 00	R	+ 9 589,57	+	95 533,85	
ST	126,67	81 41 20	S	+ 9 678,06	+	95 593,49	
TU	68,06	153 00 50	T	+ 9 803,40	+	95 611,80	
UV	94,48	72 20 50	U	+ 9 834,28	+	95 551,15	
VW	64,13	158 48 00	V	+ 9 924,31	+	95 579,80	
WX	45,40	162 25 20	W	+ 9 947,50	+	95 520,01	
XY	46,99	167 58 30	X	+ 9 961,21	+	95 476,73	
YZ	69,92	240 57 20	Y	+ 9 971,00	+	95 430,77	
ZA'	72,08	149 22 20	Z	+ 9 909,87	+	95 396,82	
A'B'	35,~~39~~ 59	58 45 30	A'	+ 9 946,59	+	95 334,80	
B'C'	12,37	178 36 40	B'	+ 9 977,02	+	95 353,26	
C'D'	92,21	180 58 10	C'	+ 9 977,32	+	95 340,89	
D'E'	34,93	179 22 40	D'	+ 9 975,76	+	95 248,69	
E'F'	86,05	242 03 00	E'	+ 9 976,14	+	95 213,76	
F'A	18,84	159 42 30	F'	+ 9 900,13	+	95 173,43	
		Bothmaskloof A	△	+10 907,43	+	97 906,80	
		Uitkyk	△	+ 8 888,42	+	90 783,71	

Beacon Description:

F R	iron rail fence post
J L Q V F'	12 mm iron peg
All other beacons	15 mm iron peg

FOR SUBDIVISION OF THIS PROPERTY VIDE GENERAL PLAN No. 1731

The figure ABCDEFGHJKLMNOPQRSTUVWXYZA'B'C'D'E'F'

represents 12,1523 hectares *of land, being*

Erf 878 Riebeek Kasteel and comprising 1)-7) as enumerated alongside

situate in the Municipality of Riebeek Kasteel Administrative District

of MALMESBURY Province of Cape of Good Hope.

Surveyed in January, October 1985 and November 1984

by me,

Land Surveyor

This diagram is annexed to Cert. Consol. Title No. T.39770/1986 dated

I.f.o.

Registrar of Deeds

The original diagram is enumerated alongside

~~No.~~ ~~annexed to~~ ~~Transfer/Grant~~ ~~No.~~

File No. S/8106

S.R. No. B 2682/85

Comp. BH-4DN/W1 (854)
BH-4DB/W1 (856)

Beacons L, R acknowledged

C

OFFICE COPY

S.G. No. 8922-85

Approved

for Surveyor-General

1985-11-29

Components:

1) The fig. ABCDED'E'F' represents Erf 876 Riebeek Kasteel Vide Diagram No 8920/85 D/T 39767/1986

2) The fig. D'FLMNOxRSTntZA'B'C' represents Erf 872 Riebeek Kasteel Vide Diagram No 8916/85 D/T 1986- -39765

3) The fig. GHJK represents Erf 450 Riebeek Kasteel *Vide Diagram No 807/71 D/T 1973, 805,40202*

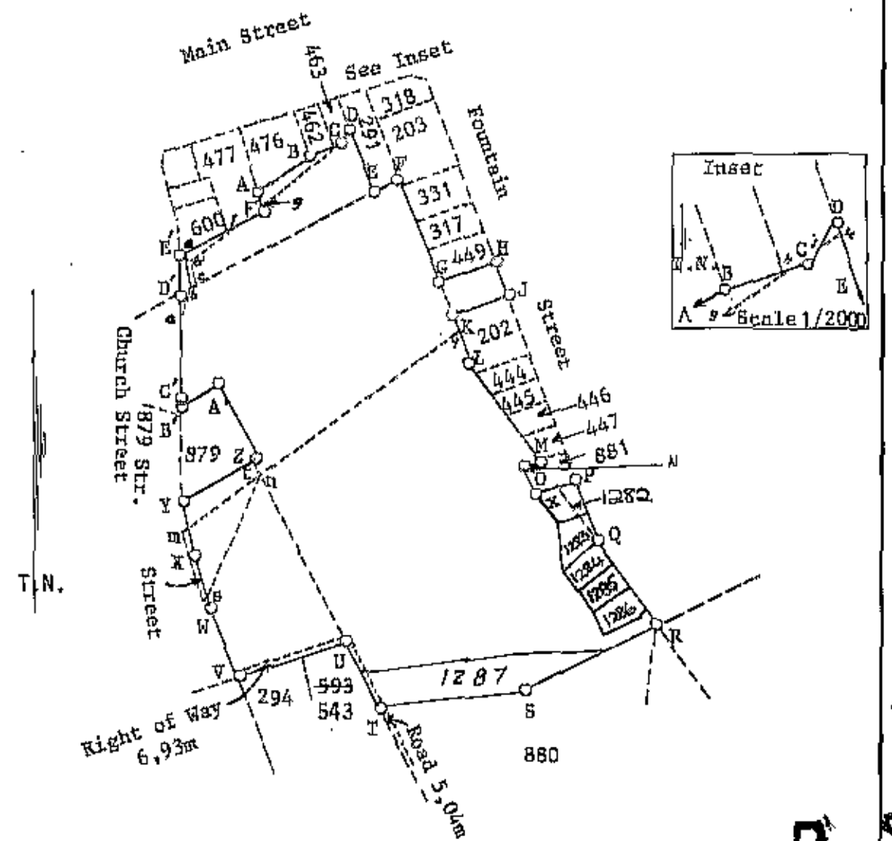
4) The fig. xPQ represents Erf 877 Riebeek Kasteel Vide Diagram No 8921/85 D/T 1986- -39769

5) *The fig. Ytnm represents Erf 873 Riebeek Kasteel* Vide Diagram No 8917/85 D/T 1986- -39763

6) The fig. mnsX represents Erf 875 Riebeek Kasteel Vide Diagram No 8919/85 D/T 1986- -39763

7) The fig. snUVW represents Erf 874 Riebeek Kasteel Vide Diagram No 8918/85 D/T 1986- -39763

Note:
The figure snyLMNOPQRSTUVW represents Quitrent Land, the Remainder is Freehold.



B

S

WALFORD ENGINEERING (Pty) Ltd
SEE BACK OF DIAGRAM

APPENDIX B

Topographical & Services Survey

No. Nr.	REVISION / WYSIGING	DATE DATUM	AUTHOR OUTEUR
C	GEOTECH TEST PITS ADDED	28/10/2024	C. S
B	UPDATED AS-BUILT SURVEY	23/07/2021	C. S
A	FOR INFORMATION	25/06/2021	C. S

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progress delivered

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Gauteng: +27(0)12 346 1672
Website: www.kls.co.za
e-mail: info@kls.co.za

ERF 878 RIEBEEK KASTEEL

TOPOGRAPHICAL & SERVICES SURVEY

DRAWN GETEKEN	C. S	CHECKED NAGESIEN	J. M. M.	DATE DATUM	25/06/2021

DRG. No. TEK. Nr. **20041/110**

SCALE SKAAL **1:500 (A0)**

REVISION No. WYSIGING Nr. C

TP 1
TP 2
TP 3
TP 4
TP 5
TP 6
TP 7
TP 8
TP 9
TP 10
TP 11
TP 12
TP 13
TP 14
TP 15
TP 16

Hoofweg 12,59m
Church Street
537 (street)
207 (street)
Main Road No 227
Church Street
212 (Street)
213 (Street)
536 (Street)
Plein Street
Right of Way Servitude
Fontein Street
Van Riebeek Street
Kloof Street
GRAVEL ROAD
Right of Way Servitude 6,93m
Brick Paving
Y 9900
X 3695400
Y 9900
X 3695700

598 600 292 210 2108 207 1013 1272 294 878 476 477 462 463 291 1279 1304 203 149 150 1957 1350 331 1383 317 1350 322 449 1492 1992 303 202 1493 443 444 452 445 451 446 1351 447 1434 881 1431 1282 1284 2176 1285 2222 1286

LEGEND

GEOTECH TEST PITS (28/11/2021)

LEGEND	
CL	COVER LEVEL
FH	FIRE HYDRANT
LP	LIGHT POLE
IL	INVERT LEVEL
SV	STOP VALVE
SP	SIGN POST
TOD	TOP OF DUCT
TH	TOP OF HEADWALL

SURVEY LEGEND

- ELECTRICAL BOX
- LIGHT POLE
- TOP OF HEADWALL (FH / SV / TH)
- WATER PIPE, FIRE HYDRANT & VALVE
- TELKOM CABLE/DUCTING
- SEWER PIPE & MANHOLE
- SW PIPE, GRID-INLET & MANHOLE
- STORMWATER CULVERT
- FENCE LINE

EXISTING CONTOURS SHOWN AT 1.0mm INTERVALS

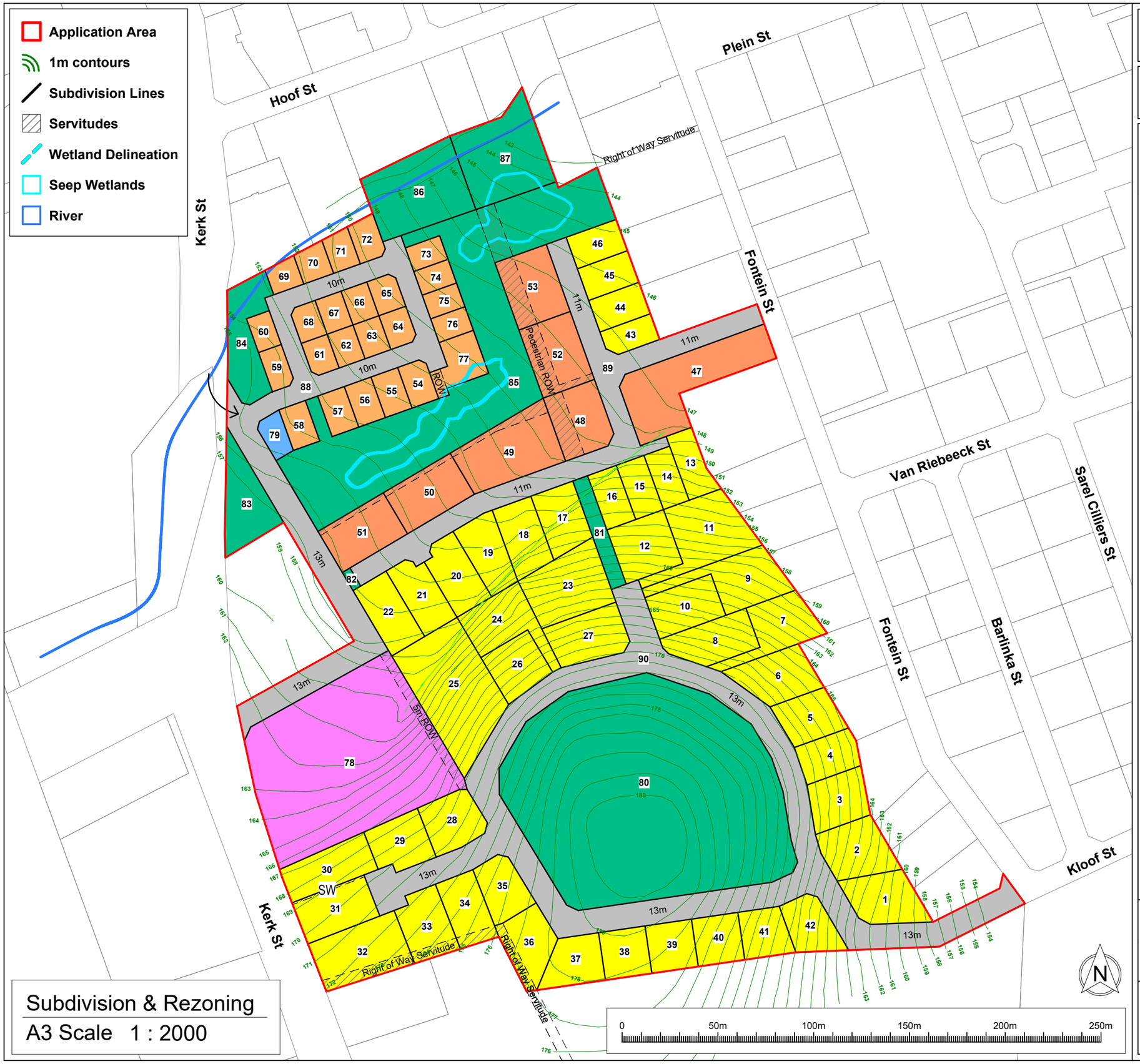
REFERENCE MARKS:
System: Hartbeesthoek94 / Lo 19

PT	Y	X	Height	Descriptions
AT1	+10 041,95	+3 695 726,07	+162,35	Nail in Tarmac
BM1	+9 801,10	+3 695 405,56	+139,72	12mm Iron Peg against Kerb
BM2	+9 751,49	+3 695 524,49	+143,07	12mm Iron Peg in Tarmac
BM3	+9 621,71	+3 695 823,80	+150,86	Centre of Manhole
BM4	+9 592,43	+3 695 802,69	+147,77	12mm Iron Peg in Tarmac
PRD203	+10 028,81	+3 695 767,27	+162,66	12mm Iron Peg in Concrete
PRD204	+10 043,45	+3 695 546,97	+155,74	12mm Iron Peg in Concrete
PRDT5	+10 006,77	+3 695 879,66	+169,21	12mm Iron Peg in Tarmac
PRDT6	+10 055,06	+3 695 724,72	+162,55	12mm Iron Peg in Tarmac
R1FN	+10 039,29	+3 695 741,51	+163,01	12mm Iron Peg in Tarmac

INSERT A

APPENDIX C

Subdivision & Rezoning Plan



Subdivision & Rezoning

A3 Scale 1 : 2000

PROJECT

Erf 878 Riebeek Kasteel

TITLE

Subdivision & Rezoning Plan

Zoning	Area	% of Total	Erven
Residential Zone 1: Low Density	38178m²	34.5%	46
General Residential Zone 2: Town Housing	7031m²	6.3%	24
General Residential Zone 3: Flats (Consent for shops & home occupation)	8789m²	7.9%	7
Resort Zone (Events & wedding venue)	7607m²	6.9%	1
Business Zone 1: General Business	275m²	0.2%	1
Open Space Zone 2: Private Open Space	29323m²	26.5%	8
Transport Zone 2: Roads	19592m²	17.7%	3
Total	**110796m²**	**100%**	**90**

No.	Area	No.	Area	No.	Area	No.	Area
1	938 m²	24	1033 m²	47	2082 m²	70	284 m²
2	962 m²	25	2518 m²	48	986 m²	71	288 m²
3	781 m²	26	769 m²	49	1587 m²	72	318 m²
4	636 m²	27	965 m²	50	1011 m²	73	249 m²
5	731 m²	28	805 m²	51	986 m²	74	249 m²
6	948 m²	29	775 m²	52	1075 m²	75	249 m²
7	978 m²	30	951 m²	53	1062 m²	76	249 m²
8	909 m²	31	927 m²	54	328 m²	77	582 m²
9	1152 m²	32	1361 m²	55	333 m²	78	7607 m²
10	844 m²	33	846 m²	56	333 m²	79	275 m²
11	1428 m²	34	774 m²	57	333 m²	80	14183 m²
12	944 m²	35	696 m²	58	329 m²	81	494 m²
13	524 m²	36	848 m²	59	270 m²	82	51 m²
14	428 m²	37	720 m²	60	237 m²	83	1054 m²
15	463 m²	38	613 m²	61	264 m²	84	1114 m²
16	480 m²	39	613 m²	62	269 m²	85	8580 m²
17	771 m²	40	613 m²	63	269 m²	86	1941 m²
18	802 m²	41	610 m²	64	275 m²	87	1906 m²
19	778 m²	42	686 m²	65	275 m²	88	5738 m²
20	801 m²	43	388 m²	66	269 m²	89	4106 m²
21	744 m²	44	488 m²	67	269 m²	90	9748 m²
22	794 m²	45	489 m²	68	264 m²		
23	1370 m²	46	483 m²	69	246 m²		

INDEMNITY

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DRAWN BY	CHECKED BY	DATE
JM	AW	24-08-2026

SCALE (@ A3)	PROJECT NUMBER
As indicated	0001

DRAWING NUMBER

Rev 78

CLIENT

Huguemont Trust

InterActive Town & Regional Planning

Andre Wiehahn Pr Pln A/927/1996
B Art et Sc (Town and Regional Planning)
Telephone 028 312 1668
Cell phone: 082 466 0490
E-Mail: wiehahn.a@gmail.com

APPENDIX D

Stormwater Attenuation and Emergency
Overland Escape Routes

No. Nr.	REVISION / WYSIGING	DATE DATUM	AUTHOR OUTEUR
D	FOR INFORMATION	03/09/2026	T. K
C	FOR INFORMATION	05/12/2025	T. K
B	FOR INFORMATION	02/10/2025	C. S
A	FOR INFORMATION	03/07/2020	G. S

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Gauteng: +27(0)12 346 1672
Website: www.kls.co.za
e-mail: info@kls.co.za

ERF 878 RIEBEEK KASTEEL

STORMWATER ATTENUATION AND EMERGENCY OVERLAND ESCAPE ROUTES

DRAWN GETEKEN	C. S	CHECKED NAGESIEN	J. M. M.	DATE DATUM	03/07/2020
DRG. No. TEK. Nr.	20041/510			SCALE SKAAL	1:500 (A0)
				REVISION No. WYSIGING Nr.	D

CATCHMENT AREA 1

CATCHMENT AREA 2

CATCHMENT AREA 3

CATCHMENT AREA 4

CATCHMENT AREA 5

CATCHMENT AREA 6

ATTENUATION POND

PROPOSED SWALE

PROPOSED SWALE

Pedestrian ROW

Right of Way Servitude

Right of Way Servitude

Hoofweg 12,59m

Church Street

Main Road No 227

Church Street

Plein Street

Fontein Street

Van Riebeek Street

Kloof Street

	OVERLAND RUNOFF FLOW PATH
	EMERGENCY OVERFLOW

INSERT A

INSERT A

LEGEND	
CL	COVER LEVEL
FH	FIRE HYDRANT
LP	LIGHT POLE
IL	INVERT LEVEL
SV	STOP VALVE
SP	SIGN POST
TOD	TOP OF DUCT
TH	TOP OF HEADWALL

SURVEY LEGEND

ELECTRICAL BOX
LIGHT POLE
TOP OF HEADWALL
WATER PIPE, FIRE HYDRANT & VALVE
TELKOM CABLE/DUCTING
SEWER PIPE & MANHOLE
SW PIPE, GRID-INLET & MANHOLE
STORMWATER CULVERT
FENCE LINE

EXISTING CONTOURS SHOWN AT 1.0m INTERVALS

SUBDIVISION & REZONING PLAN - REV. 57, ON THIS DRAWING, SHOWN FOR CO-ORDINATION PURPOSES ONLY

REFERENCE MARKS:
SYSTEM: HARTBEESTHOEK94 / LO.19

Point	Y-Coord	X-Coord	Height	Description
AT1	+10 041,95	+3 695 726,07	+162,35	NAIL IN TARMAC
BM1	+9 801,10	+3 695 405,56	+139,72	12mm IRON PEG AGAINST KERB
BM2	+9 751,49	+3 695 524,49	+143,07	12mm IRON PEG IN TARMACA3
BM3	+9 621,71	+3 695 823,80	+150,80	CENTRE OF MANHOLE
BM4	+9 592,43	+3 695 802,69	+147,77	12mm IRON PEG IN TARMAC
PRD203	+10 028,81	+3 695 767,27	+162,66	12mmIRON PEG IN CONCRETE
PRD204	+10 043,45	+3 695 548,97	+155,74	12mm IRON PEG IN CONCRETE
PRDT5	+10 006,77	+3 695 879,66	+169,21	12mm IRON PEG IN TARMAC
PRDT6	+10 055,06	+3 695 724,72	+162,55	12mm IRON PEG IN TARMAC
R1FN	+10 039,29	+3 695 741,51	+163,01	12mm IRON PEG IN TARMAC

APPENDIX E

GLS Capacity Analysis of the
Bulk Water & Sewer Services (14-01-2024)

Revision 1

14 January 2025

The Manager: Civil Engineering Services
Swartland Municipality
Private Bag X52
Malmesbury
7229

Attention: Mr Esias de Jager

Dear Sir,

PROPOSED MIXED-USE DEVELOPMENT ON ERF 878, RIEBEEK KASTEEL: CAPACITY ANALYSIS OF THE BULK WATER AND SEWER SERVICES

The request by Mr Johan Malherbe of KLS Consulting Engineers regarding comments on the bulk water and sewer supply of the proposed development (proposed mixed-use development on Erf 878, Riebeek Kasteel), refers.

This document should inter alia be read in conjunction with the Water Master Plan (performed for the Swartland Municipality) dated June 2020 and the Sewer Master Plan dated June 2020.

The proposed development was conceptually taken into consideration for the June 2020 master plans for the water and sewer networks as future development area RK_02.

1. WATER DISTRIBUTION SYSTEM

1.1 *Distribution zone*

The master plan indicated that the proposed development should be accommodated within the Riebeek Kasteel reservoir water distribution zone. The connections to the existing reticulation system should be made to the existing 200 mm Ø pipe in Fontein Street, as shown on Figure 1 attached.

The development is situated inside the water priority area.

1.2 *Water demand*

The original water analysis for the master plan was performed with a total annual average daily demand (AADD) for the proposed development (future development area RK_02 in the June 2020 water master plan) of 57,9 kL/d.

GLS Consulting (Pty) Ltd
Reg no: 2007/003039/07

T +27 21 880 0388 www.gls.co.za
Head office: 15 Termo Lane, Techno Park, Stellenbosch, 7600, ZA | PO Box 814, Stellenbosch, 7599, ZA
Gauteng office: Walker Creek Office Park, 90 Florence Ribeiro Avenue, Brooklyn, Pretoria, 0181, ZA

Directors: Flip du Plessis, Tsolane Mokoena

For this re-analysis of the water master plan, the AADD and fire flow for the proposed development was calculated as follows:

Water demand:

• 100 Single residential units @ 0,6 kL/d/unit		=	60,0 kL/d
• 29 Town housing units @ 0,5 kL/d/unit		=	14,5 kL/d
• 0,21 ha area Flats @ 21,0 kL/d/ha		=	4,4 kL/d
• 0,31 ha Institutional area @ 19,2 kL/d/ha		=	6,0 kL/d
• 2 013 m^2 Business/commercial area @ 0,65 kL/d/100 m^2		=	13,1 kL/d
	Total	=	98,0 kL/d

Fire flow criteria:

- Moderate risk 1 = 25 L/s @ 15 m

1.3 *Present situation*

1.3.1 *Reticulation system*

The existing water reticulation system of Riebeek Kasteel has sufficient capacity in order to supply the proposed development with sufficient domestic and fire flow supply.

1.3.2 *Bulk supply*

The Riebeek Kasteel water system is supplied with bulk water from the West Coast District Municipality's (WCDM) bulk system. Bulk water is conveyed from the Swartland Water Treatment Plant (WTP) to the Kasteelberg reservoirs, from where water is then further distributed through a dedicated 200 mm Ø pipe (to Riebeek West) and 150 mm Ø pipe (from Riebeek West to Riebeek Kasteel).

The analysis of the capacity of the WCDM bulk water system in order to accommodate the proposed development is discussed in a separate report, addressed to WCDM.

1.3.3 *Reservoir capacity*

The criteria for total reservoir volume used in the Swartland Water Master Plan is 48 hours of the AADD (of the reservoir supply zone).

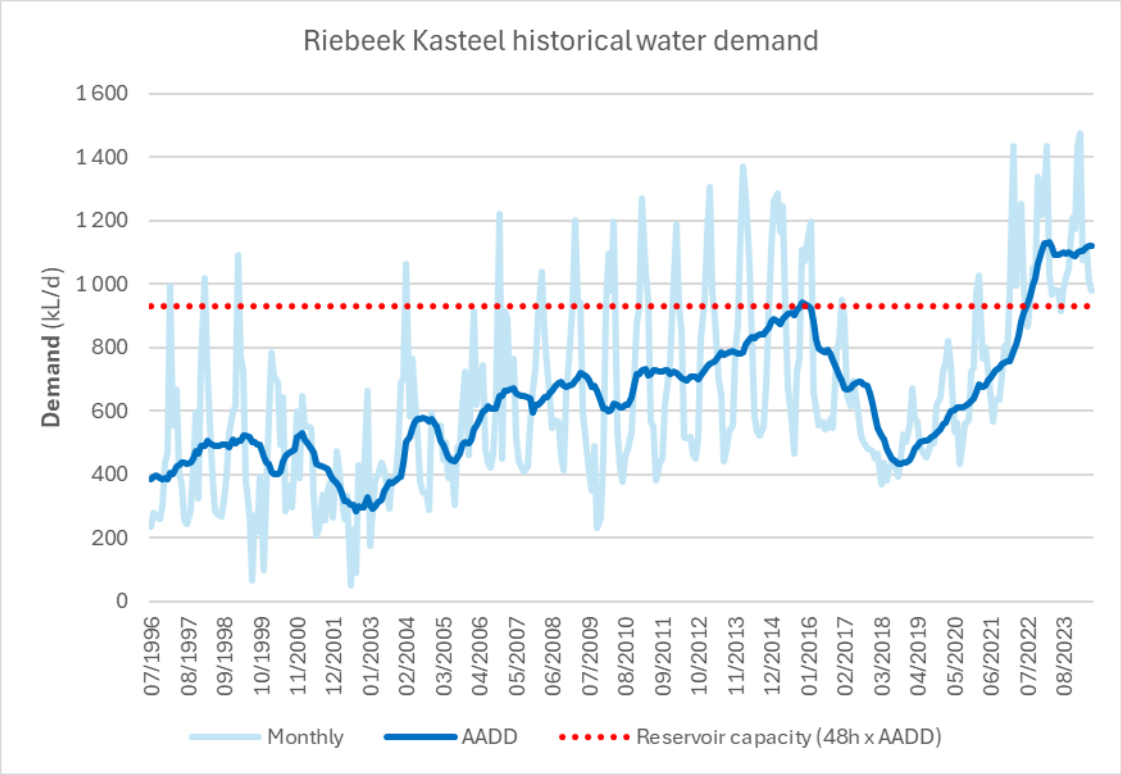
According to the water master plan the Riebeek Kasteel reservoir water supply area has a water demand of approximately 550 kL/d (based on the 2020 Water Master Plan, where the existing system was modelled with water demand figures from the 2018/19 financial year). The capacity of the existing Riebeek Kasteel reservoirs is 1 862 kL, which results in a reservoir storage capacity of 81 hours of the AADD.

The latest water demand readings obtained from WCDM (readings from July 2023 to June 2024), however, indicated that the water demand has increased significantly during the last 5 years from 550 kL/d (2018/19 financial year) to the current demand of 1 120 kL/d. The current demand for Riebeek Kasteel of 1 120 kL/d results in a current reservoir storage capacity of only 40 hours of the AADD supplied.

There is therefore insufficient capacity in the existing Riebeek Kasteel reservoirs to accommodate the proposed development.

Figure W1 below shows the historical water demand for Riebeek Kasteel from 1996 to 2024:

Figure W1: Riebeek Kasteel historical water demand



1.4 *Implementation of the water master plan*

The existing Riebeek Kasteel reservoirs have capacity to accommodate an AADD of 930 kL/d and it is therefore proposed that additional reservoir storage capacity is implemented by Swartland Municipality to accommodate additional developments in Riebeek Kasteel.

The current Riebeek Kasteel water system is supplied from the existing Riebeek Kasteel reservoirs with a Top Water Level (TWL) of 201,7 m above mean sea level (m a.s.l.). Water pressure to the lower lying supply areas in Riebeek Kasteel is reduced through the implementation of pressure reducing valves. In the water master plan a lower lying reservoir (at a TWL of roughly 175.0 m a.s.l.) is proposed for when the existing higher lying reservoirs reaches capacity. This reservoir should then supply directly to the existing Riebeek Kasteel PRV no. 1 water distribution zone, which will result that the existing Riebeek Kasteel reservoirs will supply a smaller supply area and consequently will have sufficient spare capacity available to accommodate the proposed development area.

It is therefore proposed that the new Riebeek Kasteel Lower reservoir and supporting infrastructure is implemented in order to accommodate the proposed development:

<u>Additional reservoir storage capacity</u>

• SRkW.B1 :	120 m x 250 mm Ø new bulk supply pipe	R	440 000 *
• SRkW.B2 :	150 mm Ø flow control valve	R	376 000 *
• SRkW.B3 :	4,5 ML new reservoir for Riebeek Kasteel (new reservoir site at southern side of town)	R	18 039 000 *
• SRkW1.2 :	20 m x 200 mm Ø new inter-connection pipe	R	112 000 *
• SRkW1.3 :	1 x 200 mm Ø valve to insert and close	R	194 000 *
• SRwW2.1 :	400 m x 355 mm Ø new supply pipe	R	2 222 000 *
	Total	R	21 383 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT – Year 2024/25 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

Note that the routes of the proposed pipelines and the position of the proposed valves and reservoir are schematically shown on Figure 1 attached, but have to be finalised subsequent to detailed pipeline route, valve placement and reservoir location investigations.

1.5 *Minimum items required*

There is sufficient capacity in the existing Riebeek Kasteel water reticulation system to supply the proposed development on Erf 878 with sufficient water pressure and fire flow.

Riebeek Kasteel, however, has insufficient reservoir storage capacity to accommodate the proposed development and the implementation of master plan items SRkW.B1, SRkW.B2, SRkW.B3, SRkW1.2, SRkW1.3 & SRkW2.1 are proposed in order to augment reservoir storage capacity for Riebeek Kasteel.

2. SEWER NETWORK

2.1 *Drainage area*

The master plan indicated that the proposed development should be accommodated in the existing Riebeek Valley pumping station (PS) sewer drainage area. The proposed connections to the existing sewer system are to the existing 150 mm Ø outfall sewer in Fontein Street, as shown on Figure 2 attached.

A servitude through Erven 203 and 1304 in favour of Swartland Municipality will have to be registered to allow the northern part of the proposed development to be connected to the existing outfall sewer in Fontein Street.

The development is inside the sewer priority area.

2.2 *Sewer flow*

The original sewer analysis for the master plan was performed with a total peak daily dry weather flow (PDDWF) for the proposed development (future development area RK_02 in the June 2020 sewer master plan) of 38,8 kL/d.

For this re-analysis, the PDDWF for the proposed development was calculated as 68,6 kL/d.

2.3 *Present situation*

The existing sewer reticulation system from Erf 878 to the main outfall sewer in Pieter Cruythoff Avenue has sufficient capacity in order to accommodate the proposed development within the existing Riebeek Kasteel sewer system.

The existing 160 mm Ø and 200 mm Ø main outfall sewers in Pieter Cruythoff Avenue (from the bottom of Kloof Street towards the railway line, as indicated on Figure 3 attached) are however at capacity and should be upgraded to larger diameters in order to accommodate any additional development within the upstream drainage area.

2.4 *Implementation of the master plan*

The following master plan items will be required to augment capacity within the existing Riebeek Kasteel bulk sewer system in order to accommodate the proposed development together with other future development areas:

Network upgrades

• SRkS1.2 : 300 m x 250 mm Ø upgrade 250 mm Ø outfall sewer		R	1 137 000 *
• SRkW1.3 : 535 m x 200 mm Ø upgrade 160 mm Ø outfall sewer		R	1 659 000 *
	Total	R	2 796 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT – Year 2024/25 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

Note that the routes of the proposed pipelines are schematically shown on Figure 3 attached, but have to be finalised subsequent to detailed pipeline route investigations.

2.5 *Minimum items required*

The minimum items required to accommodate the proposed development in the existing Riebeek Kasteel sewer system are master plan item SRkS1.2 & SRkS1.3 in order to augment capacity within the existing bulk sewer system.

3. CONCLUSION

The developer of Erf 878 in Riebeek Kasteel may be liable for the payment of a Development Contribution (as calculated by the Swartland Municipality) for bulk water and sewer infrastructure as per Council Policy.

The water master plan indicated that the proposed development should be accommodated in the existing Riebeek Kasteel reservoir zone. The proposed connection to the existing reticulation system should be made to the existing 200 mm Ø pipe in Fontein Street.

There is sufficient capacity in the existing Riebeek Kasteel water system to supply the proposed development on Erf 878 with sufficient water pressure and fire flow.

Riebeek Kasteel has insufficient reservoir storage capacity to accommodate the proposed development and the implementation of master plan items SRkW.B1, SRkW.B2, SRkW.B3, SRkW1.2, SRkW1.3 & SRkW2.1 are proposed in order to augment reservoir storage capacity for Riebeek Kasteel.

The sewer master plan indicated that the proposed development should be accommodated in the existing Riebeek Valley PS sewer drainage area. The proposed connections to the existing sewer system are to the existing 150 mm Ø outfall sewer in Fontein Street.

A servitude through Erven 203 and 1304 in favour of Swartland Municipality will have to be registered to allow the northern part of the proposed development to be connected to the existing outfall sewer in Fontein Street.

The existing sewer reticulation system from Erf 878 to the main outfall sewer in Pieter Cruythoff Avenue has sufficient capacity to accommodate the proposed development. Bulk sewers in Pieter Cruythoff Avenue (from the bottom of Kloof Street towards the railway line) are however at capacity and should be upgraded through the implementation of master plan items SRkS1.2 & SRkS1.3 in order to accommodate the proposed development in Riebeek Kasteel.

We trust you find this of value.

Yours sincerely,

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Per: PC DU PLESSIS

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