SERVICES AVAILABILITY REPORT

AUGUST 2023

ERF 1466, FRANSCHHOEK
"FRANSCHHOEK SKYTRAM"

PREPARED FOR:

THE FRANSCHHOEK CABLEWAY COMPANY (PTY) LTD

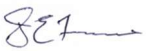
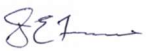
EFG Engineers (Pty) Ltd

Transport, Infrastructure, Municipal Services & Development

3A Queen Street, Durbanvile 7551
P.O. Box 3800, Durbanville
Tel: 021 975 3880
Fax: 021 975 3850
web: www.efgeng.co.za

`Ref: 937/01/wvr

	EFG ENGINEERS (Pty) Ltd	Document No:	F8.6/2
Doc Owner:	EFG Engineers (Pty) Ltd	Pages:	-
ISO 9001:2015 Reference:	8.6	Rev:	00
VERIFICATION PAGE		Date:	03.2022
Project Number:	937-Erf 1466, Franschhoek		
Prepared For:	The Franschhoek Cableway Company (Pty) Ltd		
Representative:	Alwyn Laubscher (Project Manager)		
Email:	alwyn@al-a.co.za		
Tel:	021 979 4984		
Cell:	083 659 8111		
EFG Director:	David Faure		
EFG Manager:	Werner van Rooyen		

REVISION CONTROL & VERIFICATION		**NAME:**	**SIGNATURE:**	**DATE:**
REV0	AUTHOR:	WVR		2023/02
	CHECKED BY:	DF		2023/02
	AUTHORISED BY:	WVR		2023/02
REV1	AUTHOR:	WVR		2023/08
	CHECKED BY:	DF		2023/08
	AUTHORISED BY:	WVR		2023/08
	AUTHOR:			
	CHECKED BY:			
	AUTHORISED BY:			
	AUTHOR:			
	CHECKED BY:			
	AUTHORISED BY:			

QUALITY VERIFICATION

This report has been prepared under the controls established by a Quality Management System that meets the requirements of ISO 9001: 2015.

© COPYRIGHT: EFG Engineers (Pty) Ltd

TABLE OF CONTENTS

1) INTRODUCTION 1
2) LAND USE 1
3) DEVELOPMENT DEMAND 4
4) SERVICES EVALUATION 5
4.1 Potable Water Demand 5
4.2 Sewer capacity demand 8
4.3 Stormwater run-off 10
4.3.1 Existing stormwater system 10
4.3.2 Stormwater Management: Runoff Quantity 10
4.3.3 Stormwater Management: Runoff Quality 11
5) CONCLUSIONS 14
6) RECOMMENDATIONS 15

LIST OF FIGURES

Figure 1.1: Locality Plan 1
Figure 3.1: No. of Visitors per Month (Peak Season; 3 000 Visitors per day) 4
Figure 3.2: Hourly Accumulation of Visitors (Peak Season; 3 000 Visitors per day) 5

LIST OF TABLES

Table 2.1: Proposed Land Use Components for the Lower Station (Footprint Area) 2
Table 2.2: Proposed Land Use Components for the Upper Station (Footprint Area) 3
Table 3.1: Visitors per Day per Month (Peak Season; 3 000 Visitors per day) 4
Table 4.1: Estimated current water demand 6
Table 4.2: Estimated proposed water demand 7
Table 4.3: Estimated current sewer demand 8
Table 4.4: Estimated proposed sewer demand. 9
Table 4.5: Comparison of pre- and post-development stormwater run-off (Base station) 10
Table 4.6 Comparison of pre- and post development stormwater run-off (Top station) 10

APPENDICES

Appendix A: Site Development Plan
Appendix B: Existing and Proposed Water & Sewer Layout (Lower Station)
Appendix C: Existing and Proposed Stormwater Layout (Lower Station
Appendix D: Existing and Proposed Stormwater Layout (Lower Station
Appendix E: Capacity Correspondence
Appendix F: Existing Municipal Stormwater Infrastructure
Appendix G: Municipal Confirmation of Agreement

1) INTRODUCTION

Franschhoek Cableway Company (Pty) Ltd appointed EFG Engineers (Pty) Ltd to prepare a Services Availability Report for the proposed cable way project i.e. Franschhoek Skytram

The cableway will be a tourist attraction proposed to operate from Erf 1466, Franschhoek i.e., *Haute Cabrière*, along the R45 (MR191, km26.61). The cableway is to be constructed from Erf 1466 to a point near the peak of Middagkrans Mountain in Franschhoek. The cableway route to be followed will be in a south-easterly direction to the top of Franschhoek Mountain situated above the Franschhoek Pass. Refer to **Figure 1.1** for a locality plan.

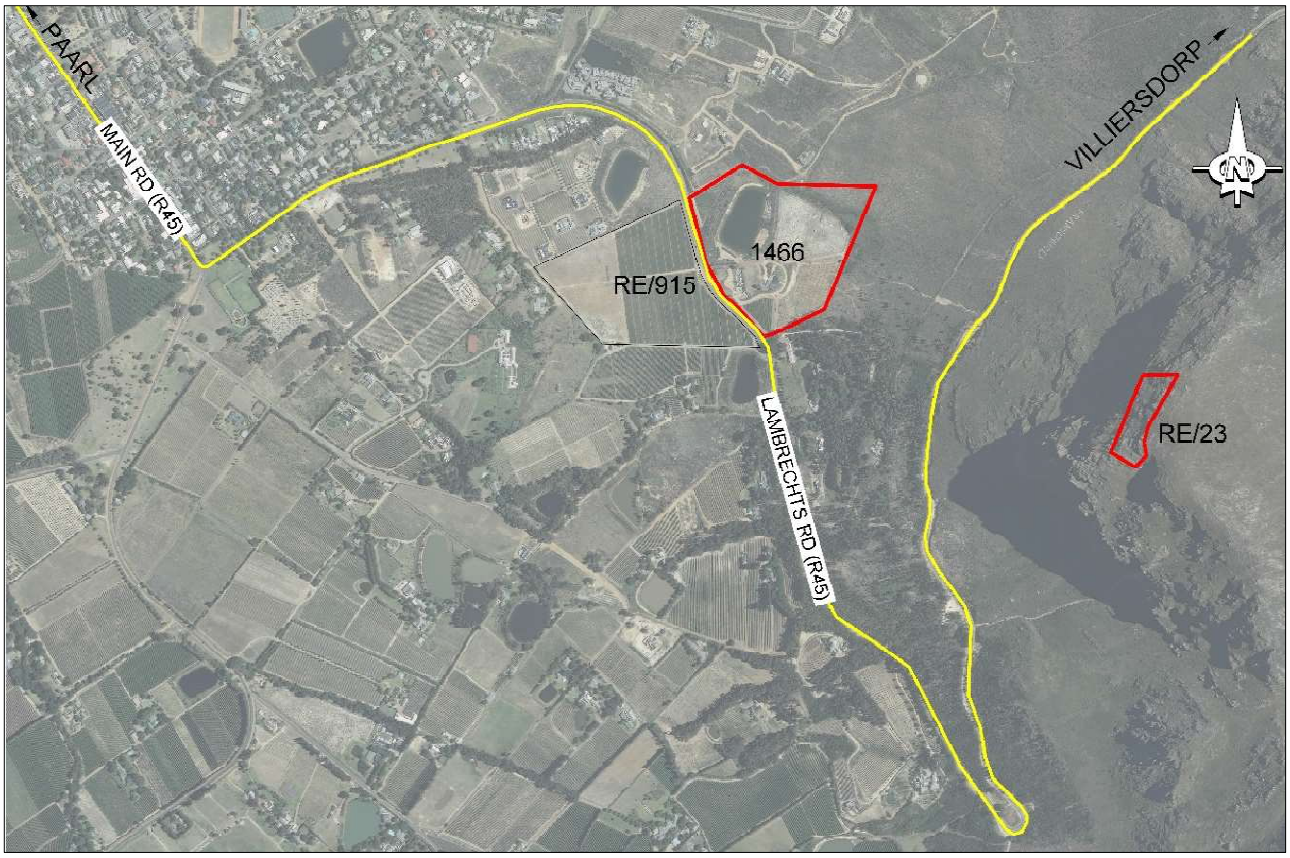


Figure 1.1: Locality Plan

This report evaluates the estimated demand for services of the proposed development in comparison with the current demand for services of the erven and whether the existing civil services system in the vicinity of the site will be able to accommodate the estimated demand of the proposed development.

2) LAND USE

Erf 1466 is zoned as Agricultural land (Stellenbosch Municipality Zoning Scheme). Existing land uses include a wine cellar, wine tasting facilities and restaurant. A portion of the site forms part of the Mont Rochelle Nature Reserve.

The proposed development elements include the construction of a Base Station and minor amenities at *Haute Cabrière*.

The Upper Station is planned for the Middagkrans Mountain and will include walkways, viewing platforms, wine tasting, commercial, restaurant and restroom facilities. Site Development Plans are attached as **Appendix A**.

A breakdown of the proposed land use components at the lower and upper stations in terms of Footprint Area are given in **Table 2.1 and Table 2.2** for which rights are now being applied. The components that would typically contribute to GLA is highlighted in yellow.

Table 2.1: Proposed Land Use Components for the Lower Station (Footprint Area)

Land Use Component	Lower Station (footprint m²)	Assumed 85% m² GLA (minimum)
Existing Pavillion Restaurant & Wine Tasting (*the wine cellars will have a low parking rate*)	**236**	**201**
Existing Underground Barrel Maturation Cellar and Conference Area	**1660**	**1411**
Existing Guard House	6	-
Existing Grape Reception Area	134	-
Total - Existing Facilities	**2036**	**1612**
Reception and upstairs office (excl. balcony) (38m²+182m²-22m²)	**198**	**168**
Ticket office	**38**	**32**
Café / Coffee shop	**114**	**97**
Outdoor concrete seating area	**65**	**55**
Walkway Link	307	-
Lower station platform extent by GAG (overlaps with Lower station machine room below of 334m²)	395	-
Parking structure forecourt	1810	-
Parking structure (Level P1 incl. ramp) (overlaps with the generator, wine dispatch, stores and lockers = 182m²)	1713	-
Ablutions	114	-
Total – Lower Station	**4754**	**352**

Based on **Table 2.1**, the additional GLA after constructing the components for the Lower Station as highlighted in yellow will typically range from ±350m² to ±450m² GLA (assuming that the GLA ranges from 85% to 100% of the footprint area).

Table 2.2: Proposed Land Use Components for the Upper Station (Footprint Area)

Land Use Component	Top Station (footprint m²)	Assumed 85% m² GLA (minimum)
Curio / Souvenir shop	**61**	**52**
Adventure centre / Kiosk	**50**	**43**
Enviro & Heritage centre	**104**	**88**
Franschhoek Vignerons wine bar	**152**	**129**
Café (restaurant) incl. BOH	**233**	**198**
Fine dining restaurant incl. BOH	**328**	**279**
Top station platform (overlaps with WC's & dry store = 55m², Pergola with poly carb = 136m², control room-GAG = 40m², Souvenir shop = 61m²)	493	-
Timber decking	2372	-
Yard area	30	-
Ablutions	46	-
Walkway / paths (613m long @ 1.5m wide)	920	-
Total – Top Station Footprint (excl. Curio / Souvenir shop overlapping with the top station platform)	**4728**	**789**

Based on **Table 2.2**, the additional GLA after constructing the components for the Top Station as highlighted in yellow will typically range from ±800m² to ±950m² GLA (assuming that the GLA ranges from 85% to 100% of the footprint area).

The total new GLA for the Lower and Top Stations is therefore between ±1150m² - ±1350m².

3) DEVELOPMENT DEMAND

Trip data was received from the client based on their expectations considering other cableway facilities. The number of visitors for the proposed cableway facility in Franschhoek is anticipated to vary from a minimum of 120 visitors per day (during off-peak season) to a maximum of between 2 500 to 3 000 visitors per day over a 12-hour period during peak season (i.e., an average of 250 visitors per hour for 3 000 visitors per day in peak season).

Table 3.1 and **Figure 3.2** show the anticipated number of daily visitors per month based on a maximum of 3 000 visitors per day in the peak season i.e., December/January/February.

Table 3.1: Visitors per Day per Month (Peak Season; 3 000 Visitors per day)

Month	# people / day	# days	Total # people / month (assuming no downtime)
Jan	3 000	31	93 000
Feb	3 000	28 (29*)	84 000 (87 000*)
Mar	1 800	31	55 800
Apr	900	30	27 000
May	600	31	18 600
Jun	300	30	9 000
Jul	120	31	3 720
Aug	180	31	5 580
Sep	960	30	28 800
Oct	960	31	29 760
Nov	1 200	30	36 000
Dec	3 000	31	93 000
Total	**16 020**	**365 (366*)**	**484 260 (487 260*)**

*Leap year

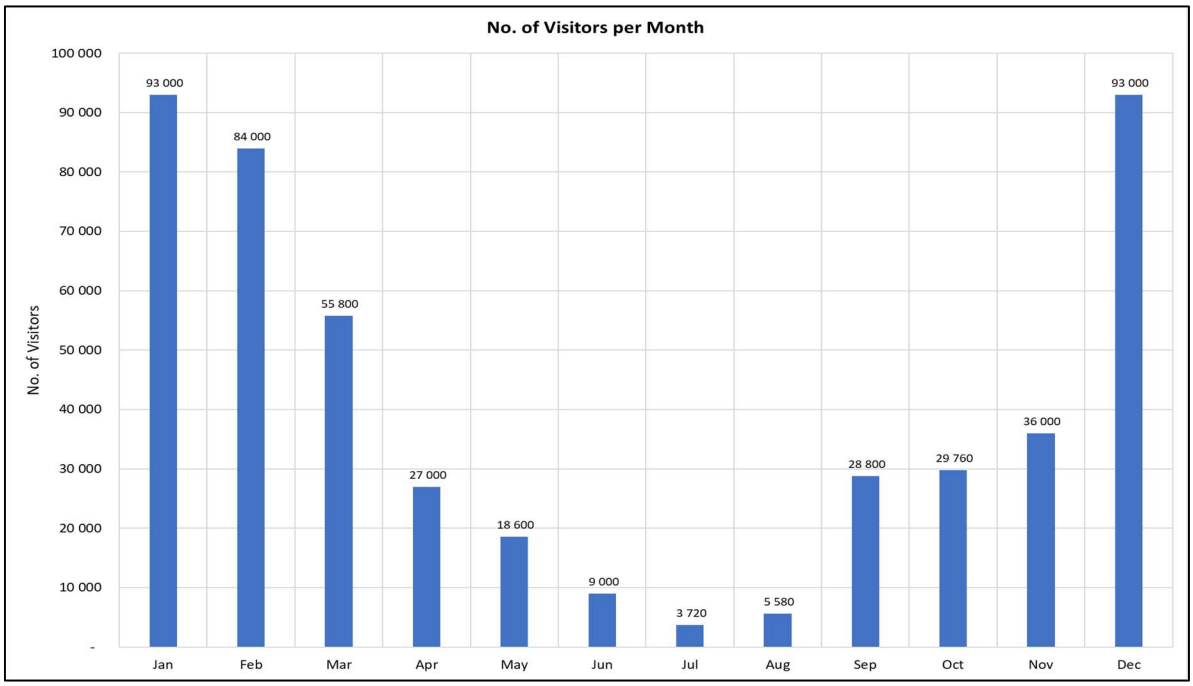


Figure 3.2: No. of Visitors per Month (Peak Season; 3 000 Visitors per day)

Visitors per Day (Hourly Distribution)

The proposed cableway facility will be able to accommodate in the order of ±550 visitors on the top of the mountain at any given time.

Figure 3.3 shows the assumed hourly distribution of visitors travelling up and down to/from the mountain per hour and the resulting accumulation of visitors on top of the mountain of up to ±550 visitors.

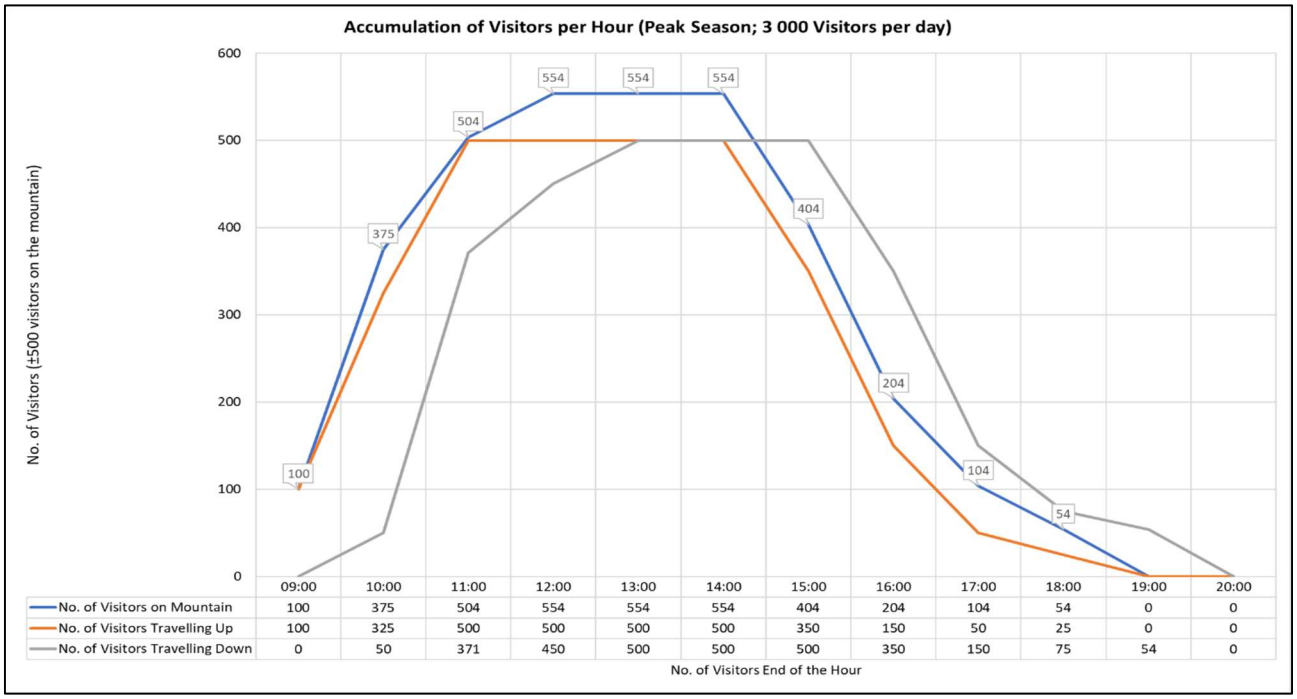


Figure 3.3: Hourly Accumulation of Visitors (Peak Season; 3 000 Visitors per day)

4) SERVICES EVALUATION

Existing services information in the vicinity of the erven in question was obtained from Haute Cabriere, Stellenbosch Municipality and the Stellenbosch Municipality's master planning consultant. The erven's current demand for civil services (water, sewerage, and stormwater) was estimated, as well as the future demand of the proposed development. The projected impact of the proposed development on the existing municipal services system was evaluated. The existing and proposed civil services layouts for the bottom station is given in **Appendix B** and **Appendix C**.

4.1 Potable Water Demand

According to the information obtained, Haute Cabriere receives its portable water from a nearby borehole located on Erf RE/915 on the property directly opposite Erf 1466 (also owned by Haute Cabriere). According to the latest performance report **(Appendix D)** completed by GEOSS South Africa (Pty) Ltd , the average daily yield from the borehole was determined as ±36780 ℓ/day. There are also several other backup boreholes on the same property which they have never needed to make use of, as the primary borehole always had sufficient capacity.

At present, Erf 1466 consists of approximately ± 2036 m² business and commercial space, and the current water demand of the erven is estimated according to *The Neighbourhood Planning and Design Guide (Red Book)* and given in **Table 4.1.**

Table 4.1: Estimated current water demand

Current	No.	Unit	Litres/ Unit/day	Demand (Litres/day)
Haute Cabriere Existing infrastructure				
Restaurant	65	persons	10	650
Wine cellar (Old tasting room)	36	persons	10	360
Wine cellar (Old restaurant)	75	persons	10	750
Marketing Office	17.6	per 100 m²	650	114.4
Manager's Office	16.5	per 100 m²	650	107.25
Dispatch Area	26.65	per 100 m²	650	173.225
Wine Cellar (industrial)	Stellenbosch Municipality		8393	8393
			AAD Flow (Litres)	**10548**
Peak Factor (hour) (Red Book, Table J.9)				**3.30**
			Peak Water Flow (ℓ/s)	**0.403**

The estimated water demand for the proposed development is calculated according to the envisaged land uses of the present and proposed structures on the erf. The proposed water demand of the erf is also estimated based on *The Neighbourhood Planning and Design Guide (Red Book)* and is given in **Table 4.1:**

Table 4.2: Estimated proposed water demand

Proposed	No.	Unit	Litres/ Unit/day	Demand (Litres/day)
Haute Cabriere Existing infrastructure:				
Restaurant	65	persons	10	650
Wine cellar (Old tasting room)	36	persons	10	360
Wine cellar (Old restaurant)	75	persons	10	750
Marketing Office	17.6	per 100 m²	650	114.4
Manager's Office	16.5	per 100 m²	650	107.25
Dispatch Area	26.65	per 100 m²	650	173.225
Wine Cellar (industrial)	1	Stb Municipality	8392.85714	8392.85714
Base Station:				
Cable Car Platform	398	per 100m²	200	796
Reception, Ticket sales	236	per 100m²	650	1534
Outdoor Seating Area	65	per person	20	1300
Coffee Shop & Ablution	228	person	10	2280
Upstairs Offices	182	per 100m²	650	1183
Generator/ wine dispatch/ stores	182	per 100m²	500	910
Car Park	0.1713	per ha	1000	171.3
Top Station:				
Cable Car Platform, Control Room	397	per 100m²	400	1588
Curio Shop	61	per 100m²	650	396.5
Café & Kiosk	50	person	10	500
Fine Dining & Vignerons Wine Bar & E&H	112	person	10	1120
Control room, store & WC	100	per 100m²	500	500
Arena	20	per person	20	400
			AAD Flow (Litres)	**23227**
Peak Factor (hour) (Red Book, Table J.9)				**3.30**
			Peak Water Flow (l/s)	**0.887**

Table 4.2 shows that the proposed annual average daily water demand is **± 23 227 litres per day** with a peak flow rate of **0.887 l/s**. Thus, an additional **12679 litres per day** (or peak flow rate of **0.484 ℓ/s** higher) will be required to accommodate the proposed development's water demand, in which the existing Borehole can still cover with regards to its current yield.

It is proposed that the ±6000l of potable water required at the top station, be carted up the mountain by making use of one of the 2000l tanks situated in the base of the cable cars. The water in the base of the cable car also acts as ballast during windy periods and the counterbalance system increases electricity efficiency. Water arriving at the top station will be transferred to the 40KL storage tanks positioned in front of the counter-weight mechanism room at the top station. From the storage tanks potable water will be distributed towards the required facilities by means of a piped pump system. Reticulation to be finalised during design development phase.

4.2 Sewer capacity demand

After a site visit to the Haute Cabriere Estate and a meeting with the operational manager the current situation in terms of foul sewer collection on site, and discharge into the existing infrastructure was determined. All foul sewerage generated on site is conveyed to an internal holding tank by means of pipework. The internal holding tank is situated inside the erf boundary approximately 7m from the Lambrecht Street's boundary, as indicated in Appendix B.

From the internal holding tank the effluent is then pumped towards an existing ±160mm sewer pipe running along Lambrecht Street. The above-mentioned pipe was installed by Stellenbosch Municipality to service Erf 1644 and Erf 1467 that is situated upstream from Haute Cabriere. From Haute Cabriere this pipe runs in a north westerly direction towards the existing sewer infrastructure situated within the residential development located on Erf RE/ 2813, as can be seen in Appendix B. Even though this pipe was installed by the Stellenbosch Municipality, it is not recorded on any existing services information received from their master planning consultant.

The current sewer demand of the properties is estimated based on *The Neighbourhood Planning and Design Guide (Red Book)* and given in **Table 4.3**

Table 4.3: Estimated current sewer demand

Current	No.	Unit	Litres/ Unit/day	Demand (Litres/day)
Haute Cabriere Existing infrastructure				
Restaurant	65	persons	8	520
Wine cellar (Old tasting room)	36	persons	8	288
Wine cellar (Old restaurant)	75	persons	8	600
Marketing Office	17.6	per 100 m²	520	91.52
Manager's Office	16.5	per 100 m²	520	85.8
Dispatch Area	26.65	per 100 m²	520	138.58
Wine Cellar (industrial)	Stellenbosch Municipality		6714	6714
			AAD Flow (Litres)	**8438**
Peak Factor (hour) (Red Book, Table K8)				**3.7**
Extraneous flow				**30%**
			Peak Foul Sewer Flow (ℓ/s)	**0.464**

The estimated sewer demand for the proposed cableway development is calculated according to the envisaged land uses of the erf. The proposed sewer capacity demand of the erf is also estimated based on *The Neighbourhood Planning and Design Guide (Red Book)* and is given in **Table 4.3**

Table 4.4: Estimated proposed sewer demand.

Proposed	No.	Unit	Litres/ Unit/day	Demand (Litres/day)
Haute Cabriere Existing infrastructure:				
Restaurant	65	persons	8	520
Wine cellar (Old tasting room)	36	persons	8	288
Wine cellar (Old restaurant)	75	persons	8	600
Marketing Office	17.6	per 100 m²	520	91.52
Manager's Office	16.5	per 100 m²	520	85.8
Dispatch Area	26.65	per 100 m²	520	138.58
Wine Cellar (industrial)	1	Stb Municipality	6714.28571	6714.28571
Base Station:				
Cable Car Platform	398	per 100m²	160	636.8
Reception, Ticket sales	236	per 100m²	520	1227.2
Outdoor Seating Area	65	per person	16	1040
Coffee Shop & Ablution	228	person	8	1824
Upstairs Offices	182	per 100m²	520	946.4
Generator/ wine dispatch/ stores	182	per 100m²	400	728
Car Park	0.1713	per ha	800	137.04
Top Station:				
Cable Car Platform, Control Room	397	per 100m²	320	1270.4
Curio Shop	61	per 100m²	520	317.2
Café & Kiosk	50	person	8	400
Fine Dining & Vignerons Wine Bar & E&H	112	person	8	896
Control room, store & WC	100	per 100m²	400	400
Arena	20	per person	16	320
			AAD Flow (Litres)	**18581**
Peak Factor (hour) (Red Book, Table K8)				**2.6**
Extraneous flow				**30%**
			Peak Foul Sewer Flow (l/s)	**0.740**

Table 4.4 shows that the proposed daily sewer demand is **± 18581 litres per day** with a peak flow rate of **0.740 l/s**. Thus, an additional **10143 litres per day** (or peak flow rate of **0.276 l/s** lower), will be required to accommodate the proposed development's sewerage.

Haute Cabriere (Erf 1466) has an official agreement in place with Franschhoek Country Estate (FCE) situated to the North of Erf 1466. The agreement allows for the sewerage generated by Haute Cabriere to be conveyed through the FCE sewer system. The agreement makes allowance for a flow rate of 1l/s per day for 365days a year. Taking the proposed development into account, this agreement should still suffice as the peak flow as calculated in Table 3.4 above has an estimated peak flow of 0.740/s.

The capacity in this system, and also the network downstream was confirmed with the master planning consultants(**GLS Consulting)** According to correspondence from GLS **(Appendix E)**, the impact of the proposed development on the existing network is very small and through the analysis of the existing system it was determined that there is enough capacity in the existing network to accommodate the additional flow. There is however one short section of pipe in the existing model further downstream, that has very limited

capacity, while the pipe directly adjacent to it does have sufficient capacity. If it is in fact confirmed on site that the pipe is indeed below capacity the connection can be transferred to the adjacent pipe that does have sufficient capacity.

It is proposed that sewerage generated at the top station be gravity fed towards a central holding tank and then pumped towards one of the 3 x 40KL storage tanks positioned in front of the counter-weight mechanism room at the top station. Sewerage will then be transferred from the storage tank into one of the 2000l tanks situated in the base of the cable cars. The raw sewerage will then be carted down the mountain, where it will be pumped into a piped system and from there into the existing sewer system. Detail regarding the pump and piped system will be finalised during the design development phase.

4.3 Stormwater run-off

4.3.1 Existing stormwater system

Except for some light bush cultivation around the dam and the land used for the vineyard, Erf 1466 today consists of a restaurant, wine cellar (old tasting room), wine cellar (old restaurant), marketing office, managers office, dispatch area, and an industrial wine cellar. Every other location is either paved or has grass. According to Haute Cabriere Management, the vineyard, and most of the higher located hardened surface drains towards the primary Dam situated in the norther corner of Erf 1466. The rest of the stormwater run-off generated on site, makes its way towards toward Lambrecht's Road (R45), partly overland land and by means of a closed stormwater system. In existing services information received from the Stellenbosch Municipality, there are no existing municipal stormwater infrastructure in the area immediately surrounding the property, see **Appendix F**. The closest stormwater infrastructure is located inside Franschhoek Country Estate. Existing services information was also requested from Western Cape Government and feedback suggested that there are no record drawing information on all relevant platforms.

After the site visit and a meeting with the operational manager at Haute Cabriere it was established that currently the stormwater diverted to the primary dam gets utilised to replenish the dam's water levels through several open trenches as indicated in **Appendix B**. Water levels in the dam mainly decreases since it gets used for irrigation purposes. The dam has a weir in the north-eastern corner that acts as an emergency overflow, diverting the access water toward a natural stream running along the northern edge of the property.

Hardened surfaces situated below the level of the retention dam currently gets accumulated by catchpits with outlets towards the side drain along Lambrecht Street. The side drains along Lambrecht Street eventually makes its way towards other retention dams lower down towards town.

4.3.2 Stormwater Management: Runoff Quantity

The existing stormwater run-off for the pre-developed erven and future stormwater run-off for the post-developed erf were estimated by means of the *Rational Method (SANRAL Drainage Manual 6th Edition)* for the 2 to 100-year floods. Please refer to **Table 4.5.**

Table 4.5: Comparison of pre- and post-development stormwater run-off (Base station)

Return period (years)	2	5	10	20	50	100
(BS) (Pre-development Peak flow (l/s)	142.2	216.2	284.2	441.12	591.0	741.9
(BS) (Post-development Peak flow (l/s)	224.4	326.2	411.8	510.9	674.9	836.3
Additional Peak flow (l/s)	82.2	110.0	127.6	69.78	83.9	94.4

Table 4.6 Comparison of pre- and post development stormwater run-off (Top station)

Return period (years)	2	5	10	20	50	100
(TS) (Pre-development Peak flow (l/s)	26.167	39.789	52.297	67.769	95.561	125.387
(TS) (Post-development Peak flow (l/s)	61.821	87.038	106.51	127.472	158.541	185.142
Additional Peak flow (l/s)	35.654	47.249	54.213	59.703	62.98	59.755

The tables above indicate that there will be a slight increase in stormwater runoff produced post-development throughout a range of return periods. The main contributor to the increase in the stormwater run-off can be attributed to additional area of the erf being covered with roofing, and parking areas. It should be noted that the decks proposed for the new development (Top & Base station) are perforated and therefore is not seen as impermeable area.

It is recommended that all surface run-off from the proposed parking area, parking forecourt, ticket office, coffee shop and Town Square area be diverted towards an underground stormwater system with an outlet into the existing retention dam (**See Appendix B**). The run-off generated over these areas will include roof water and other hardened surface water run-off and will be collected by means of catchpits/ gullies or connected straight into the underground stormwater system. Stormwater run-off generated on the service road that leads to the base station will be diverted towards the retention dam by means of down chutes at constant intervals along the route. The areas mentioned above will all be positioned at a higher level than the top bank of the retention dam and can therefore easily be diverted there. Existing lower lying hardened areas, like the service road that eventually joins the main access will be removed and replaced with landscaping according to the landscaping architects drawing.

The existing retention dam can retain a water volume of ±44 000m³ over an area of approximately 11000m². The very small volume of additional run-off generated by the larger area of impermeable area of the proposed development, can be accommodated by the existing retention dam without any alterations. If it is in future deemed necessary the invert level of the overflow weir situated in the north easter corner of the dam can be lifted by very little to accommodate additional volume, due to the big surface area. By lifting the overflow weir by only 100mm an additional volume of 1100m³ can be attenuated with no/ minimal construction. The approximately 400m³ required to be attenuated for the 1:50 year flood, can be accommodated in the existing retention dam to reduce the impacts of the run-off on receiving aquatic environments and lower lying properties. Stormwater runoff quality will be discussed in the next section of this report.

The upper station runoff calculations are based on Greenfields for the pre-development runoff and is compared to the post development flow generated by the proposed impervious surfaces. These impervious surfaces include a solid roof (±1500m²), the upper station platform (493m²) and a kiosk (50m²). Technically the volume of attenuation required for the top station is approximately 38m³ however, because the upper station is situated within the Mont Rochelle Nature Reserve there are no other properties or formalised stormwater channels in proximity that must be protected from the very small increased run-off. It is however recommended that the roof downpipes be fitted with downpipe filters.

The proposed stormwater layout, stormwater management and landscaping plan will be finalised during the design development phase of this project.

4.3.3 Stormwater Management: Runoff Quality

The Water Quality volume (WQV) is used to determine the volume of water from small storm events where the focus is on treating for water quality and alleviating the risk of pollution associated with the site in question. The South African Guidelines for Sustainable Drainage Systems, state that pollution concentrations during the early stages of a rainfall event are relatively higher, this phenomenon is known as the first flush.

Stellenbosch Municipality requires treatment for the ½-year, 24-hour storm for the full post developed property of 101941m^2 (Erf 1466 & Top station). Preliminary calculations shown below indicate that a stormwater volume

of approximately ±696m³ should be treated before being released into the existing stormwater system. The additional capacity available in the retention dam, will also be sufficient to accommodate the quality volume as mentioned above. Due to the fact that the inlet to the dam is situated at the opposite end of the overflow weir the runoff generated by the proposed development will be contained and/or filter pollutants that flush off the landscape and proposed hardened surfaces.

It is proposed that the volume of 50m³ runoff that must be treated at the top station, majority of which will be roof water, will primary be treated by filters fitted to the roof downpipes. The filtered runoff will then be spread over the natural ground/ vegetation and make its way down the mountain. All pollutants and suspended solids that might (highly unlikely) be in the runoff will be removed before it gets received by any natural watercourse.

Water Quality Volume (WQV)

[SUDS - L2.3.3]

$$WQV = \frac{P\,R_V\,A}{1000}$$

WQV =	Water Quality Volume (m³)
P =	total rainfall depth (mm) (Interpolated from COCT rainfall grid)
I =	Percentage of Impermeable Cover (%)
R_V =	RV = 0.05 + 0.009 × I - volumetric runoff coefficient (0.05 – 0.95)
A =	Total drainage area (m²)

Zone - Description	A (m²)	I (%)	R_V	P (mm)	WQV (m³)
Base station	98265	**±23.9**	**0.265**	24.9	**646**
Top station	3676	**±100**	**0.550**	24.9	**50**
Total	101941				**±696**

Stormwater runoff quantity as well as quality can be retained and treated with the use of appropriate Best Management Practices (BMPs). The following conceptual BMPs may also be considered for this specific development:

1. Filtration BMPs such as small detention ponds, Sand filters, Swales and Rain gardens to create extended drain time, promote stability and reduce pollution to the receiving water bodies.

4.3.4 Stormwater Erosion Protection Alternatives (Top-station)

Due to the environmental sensitivity of the area surrounding the Top-station, any concentrated stormwater flow from down pipes or any other structure, will have to be mitigated and minimised as far as possible. The only way of achieving this is to recreate sheet flow at all outlets where stormwater is concentrated. It is advised that the following options be considered during the detail design phase of this project:

Downspout Pipe Spreaders

Run-off generated by all roofs at the top station will be guided down the building by means of down pipes as per conventional construction methods. One way of recreating sheet flow where the run-off is now concentrated, is to fit perforated pipes horizontally just above the natural ground level as indicated in Figure 5 below.

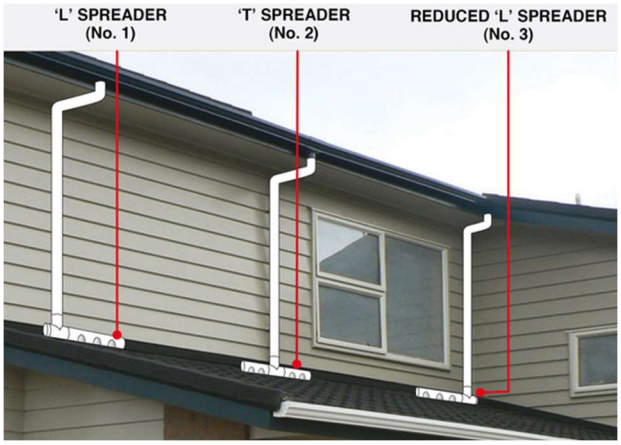


Figure 4.1:Downspout spreader

Figure 5 above shows different options of these perforated pipes that can be implemented in the form of an "L or T" spreader of which could be utilised at various pipe lengths to discharge water evenly in different directions along the building. It should be noted that further investigation must be conducted on what the appropriate perforation diameter size will allow for the required sheet-flow.

Beany Block

The Beany Block system consists of a series of Base Blocks of standard channel section and Top Blocks of inverted channel section with an opening in one side face, that can either be used to collect or dispose of water horizontally into or out of the channel section.

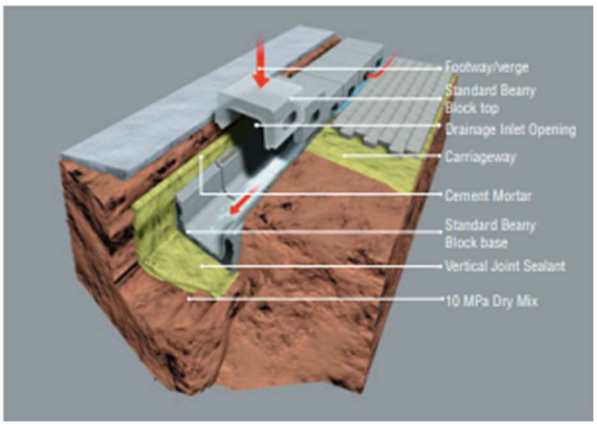
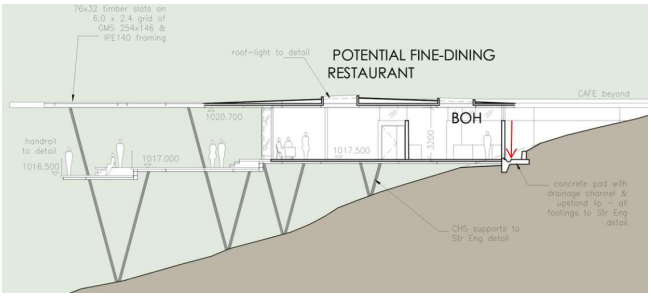


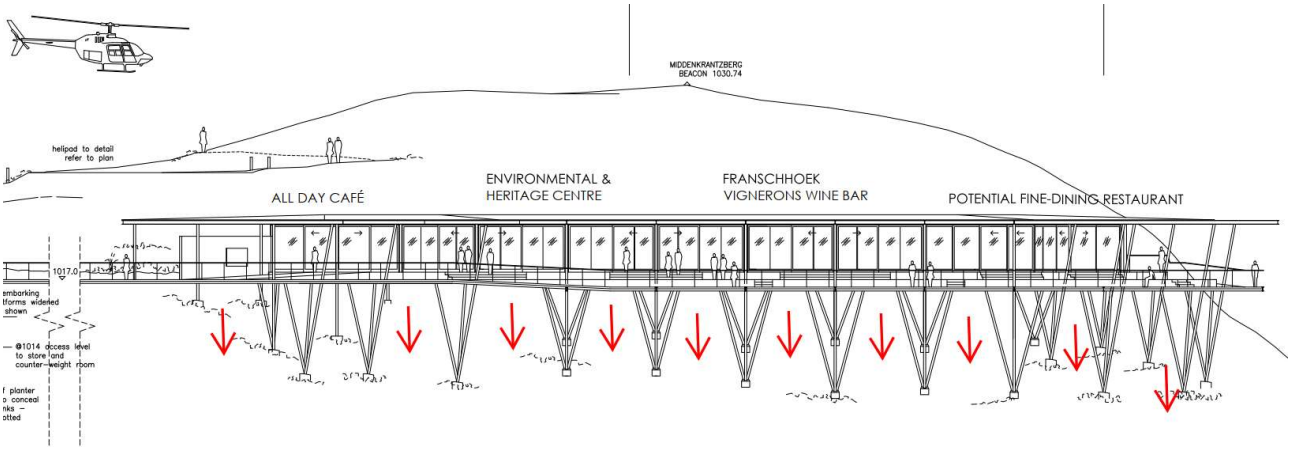
Figure 4.2: Combined Channel

For our particular usage, this system would need to have inlets vertically from the down pipes for stormwater run-off generated on the roof of the main building. Stormwater can then build up in the channel, laid without any slope, and then be disposed horizontally at a higher level when reaching the level of the second opening on the side of the top blocks. By doing this the stormwater run-off generated on the roof of the main building will be dispersed along a wide area and therefore imitating sheet-flow along the building.

The above-mentioned erosion protection alternatives can be used in a variety of ways, all of which are dependent on the overall layout of the top station and the various positions in which the downpipes will be placed. The methods discussed above will be able to accommodate all possible downpipe positions and the best way of dealing with unwanted concentrated flow conditions.



The down pipes may be placed at the back of the structure, which rests on the mountain as shown in the side view of the top-station in the figure above, and it is in this configuration that both the alternatives discussed can be utilised. In this configuration, the downpipes will run stormwater generated on the roof either into the channel kerb combination or into pipe spreaders, which will then be disbursed through much smaller outlets to facilitate a constant discharge rate down the rocky mountain face.



The figure above indicates a front view of the Top-station, and the red arrows indicate the desired sheet flow to be recreated below the building. The possibility of using a combination of the two alternatives is also an option.

5) CONCLUSIONS

Based on the findings of this report the following conclusions are drawn:

- Potable water is currently supplied to Haute Cabriere by means of a borehole located on the property (RE/ 915) on the opposite side of Lambrechts Road (R45). This property is also managed and owned by Haute Cabriere. According to the latest performance report (Appendix D) done on all the existing boreholes on the property, boreholes are managed well and functioning sufficiently to service the demand of the current activities and also the proposed development. Therefore, there are no need to upgrade the existing water system that is serviced by the multiple boreholes on the property.

  It is proposed that the ±6000l of potable water required at the top station, be carted up the mountain by making use of one of the 2000l tanks situated in the base of the cable cars.

- Haute Cabriere (Erf 1466) has an official agreement in place with a neighbouring development that allows for the sewerage generated by Haute Cabriere to be conveyed through their internal municipal system. This agreement was also confirmed by Stellenbosch Municipality (**See Appendix G**).

  The capacity in the existing sewer system, and the network downstream was analysed by the master planning consultants (**GLS Consulting)** and it was confirmed that there is enough capacity in the existing network to accommodate the additional flow of the proposed development.

It is proposed that sewerage generated at the top station be transferred to one of the 2000L storage tank at the base of the cable cart with a combination of gravity and pump systems. The raw sewerage will then be carted down the mountain, where it will eventually make its way into the existing municipal sewerage system.

- Currently the majority of stormwater runoff generated on Erf 1466 makes its way to the primary dam and then gets utilised for irrigation on the surrounding vineyards. Runoff generated on areas below the level of the retention dam currently gets accumulated by catchpits with outlets towards the open side drain along Lambrecht Street.

  It is recommended that all possible surface run-off from the proposed development be diverted towards the existing retention dam. The very small volume of additional run-off generated by the larger area of impermeable area of the proposed development, can be accommodated by the existing retention dam. The option of lifting the invert level of the existing overflow weir by only 100mm, an additional volume of 1100m³ can be accommodated in the retention dam. According to the preliminary calculations this additional volume should suffice to satisfy the attenuation and treatment volumes required by Stellenbosch Municipality.

  Volume of attenuation required for the top station is approximately 50m³ however, because the upper station is situated within the Mont Rochelle Nature Reserve there are no other properties or formalised stormwater channels in proximity that must be protected from the very small increased run-off. It is however recommended that the roof downpipes, be fitted with downpipe filters and that the primary filtered stormwater then be channelised towards either downspout pipe spreaders or a Beany Block system just above ground level to recreate sheet flow and avoid concentrated flow.

6) RECOMMENDATIONS

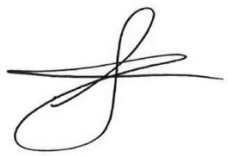
The Application for Consolidation, Rezoning, Approval of the Site Development Plan for Erven 1466 and RE/23 is hereby supported and recommended based on the following:

- According to the latest performance report done on all the existing boreholes on the property, boreholes are managed well and functioning sufficiently to service the demand of the current activities and the proposed development. Therefore, there are no need to upgrade the existing water system that is serviced by the multiple boreholes on the property. Reticulation layouts will be finalised during design development phase.

- The capacity in the existing sewer system, and the network downstream was analysed by Stellenbosch Municipalities master planning consultants and it was confirmed that there is enough capacity in the existing network to accommodate the minor additional flow generated by the proposed development. Sewerage will be carted down from the top station by cable cart and eventually make its way into the existing municipal sewerage system that has sufficient capacity.

- According to the preliminary runoff calculations the additional volume available in the existing retention dam, should suffice to satisfy the attenuation and treatment volumes required by Stellenbosch Municipality for the proposed development. At the upper station there are no other properties or formalised stormwater channels in proximity that needs to be protected from the very small increased run-off generated by the proposed development but, it is still proposed that stormwater run-off generated by roof downpipes be disbursed in a way to recreate sheet flow and prevent concentrated flow.

We trust that you will find the above report in order. Please do not hesitate to contact us if you have any queries.

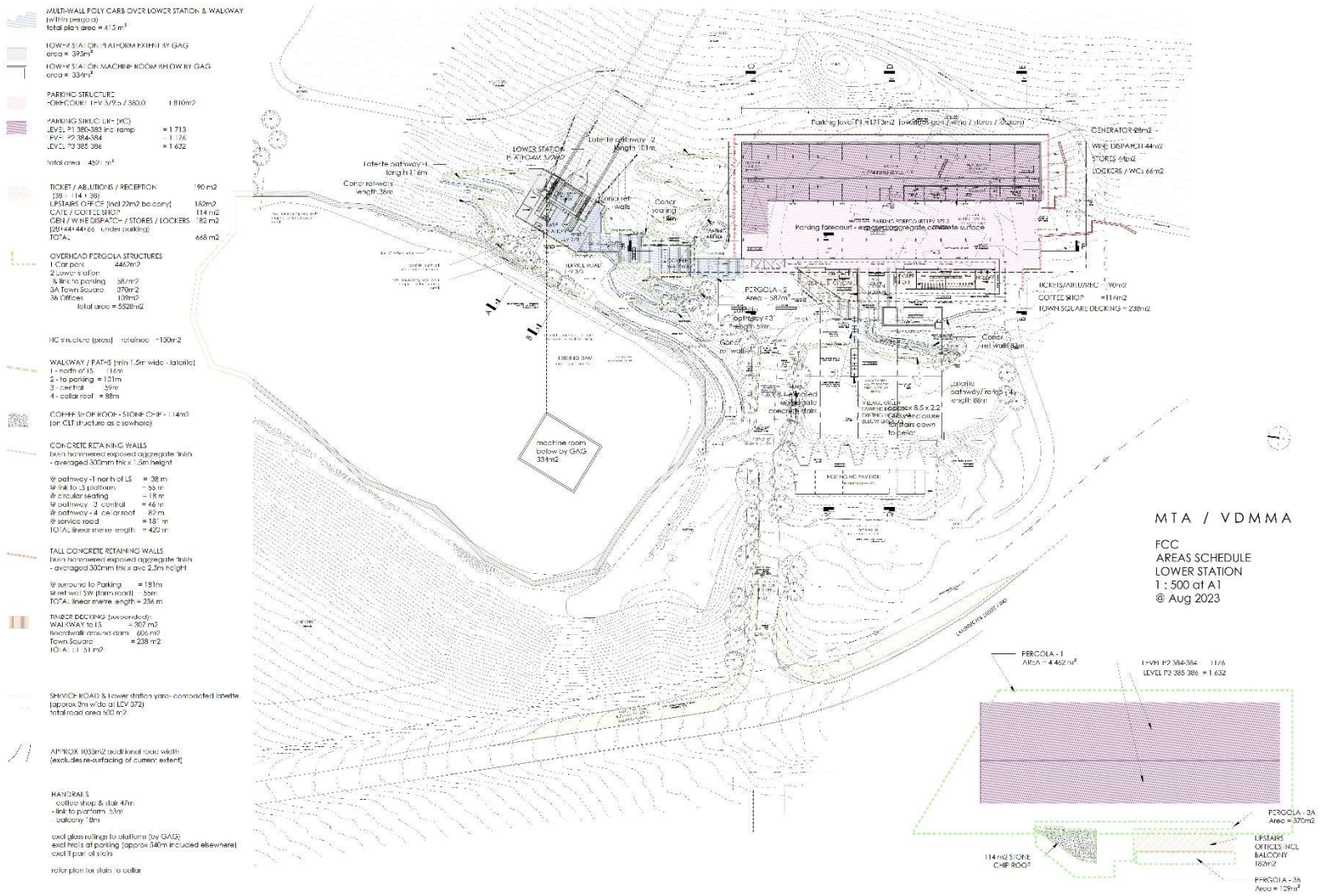


Werner van Rooyen (PrTech)

EFG Engineers (Pty) Ltd

APPENDIX A

Site Development Plan



UPPER STATION PLATFORM
total area = 493 m²

STRUCTURES:
full height glass west facing (views)
33% glass east facing (mountain side)

KIOSK	50m2
WCs & Dry store (below platform)	55m2
Disabled WC	10m2
CURIO-SHOP	61m2
CONTROL-ROOM (GAG)	40m2
CAFE / L&H-CLINIC / WINE-BAR / FINE DINING:	
Cafe	108m2
Enviro & Heritage Centre	104m2
Franschhoek Vignerons Wine-bar	152m2
Fine Dining	178m2
BOH (stores, kitchen, circ)	275m2
Ablutions	46m2
	863m2 total

(excludes external YARD of 30m2)

screening walls 2.4h
15 + 6 + 5 + 14 + 11 + 12 + 10 = 73m total length

3No. dividing wall panels = 28m total

solid roof over (CT with waterproofing)
@MAIN STRUCTURE = 379 m2
@ PLATFORM (10 + 61 + 40) = 111 m2
total 1490m2

skylights included

OVERHEAD PERGOLA STRUCTURES (un-planted)
- KIOSK = 237 m2
- UPPER STATION (with poly-carb) = 136m2
- CAFE, L&H, WINE & FINE DINING = 550 m2

total area = 923 m2

POLY CARB SHELL
(FRAME GRID AS PER PERGOLA)
total plan area = 136 m²

WALKWAY / PATHS
(to beacon / paragliding) = 613m

SIGNIL RETAINING WALLS (material on site)
averaged 300mm thk x 1.0m height
@ 1018 CONTOUR & PATHS = 213m

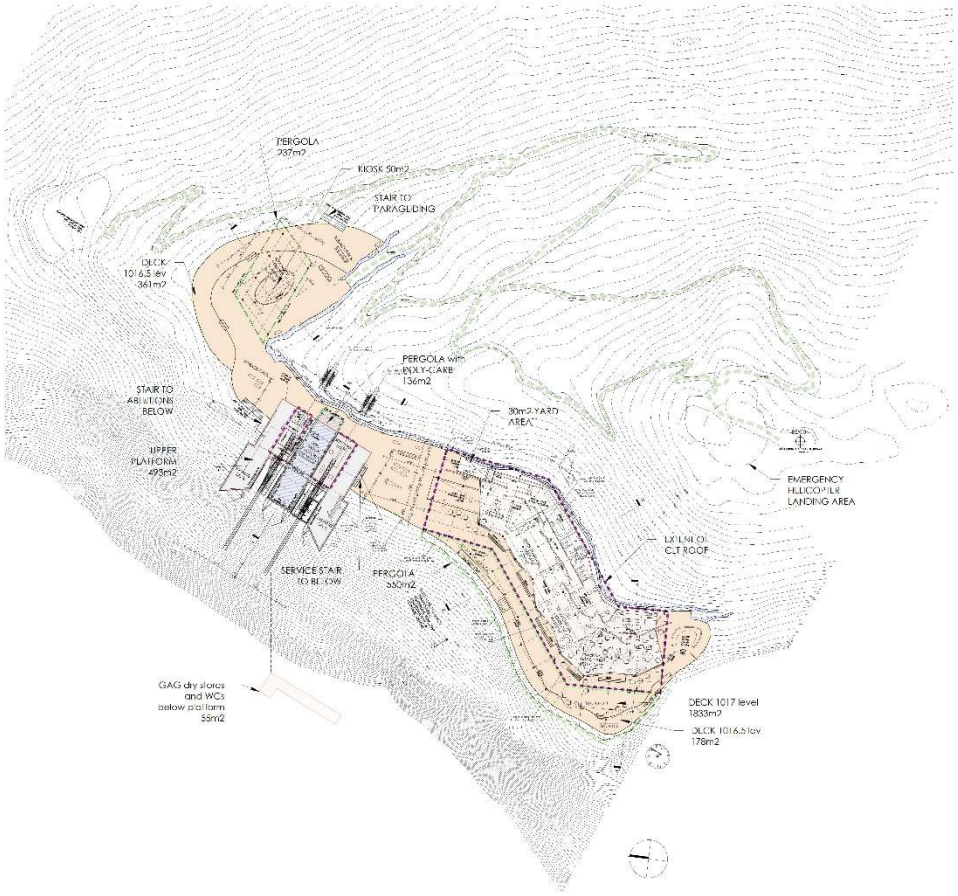
TIMBER DECKING (suspended):
@1016.5 incl ramps up = 361 + 178 m2
@1017.0 /1017.5 incl ramp & steps = 1833 m2

TOTAL = 2 372 m2

HANDRAILS = 362m

Excl: glass railings at platform (by GAG)
Excl: if part of stair

3No. Stairs 32m2 (plan area)

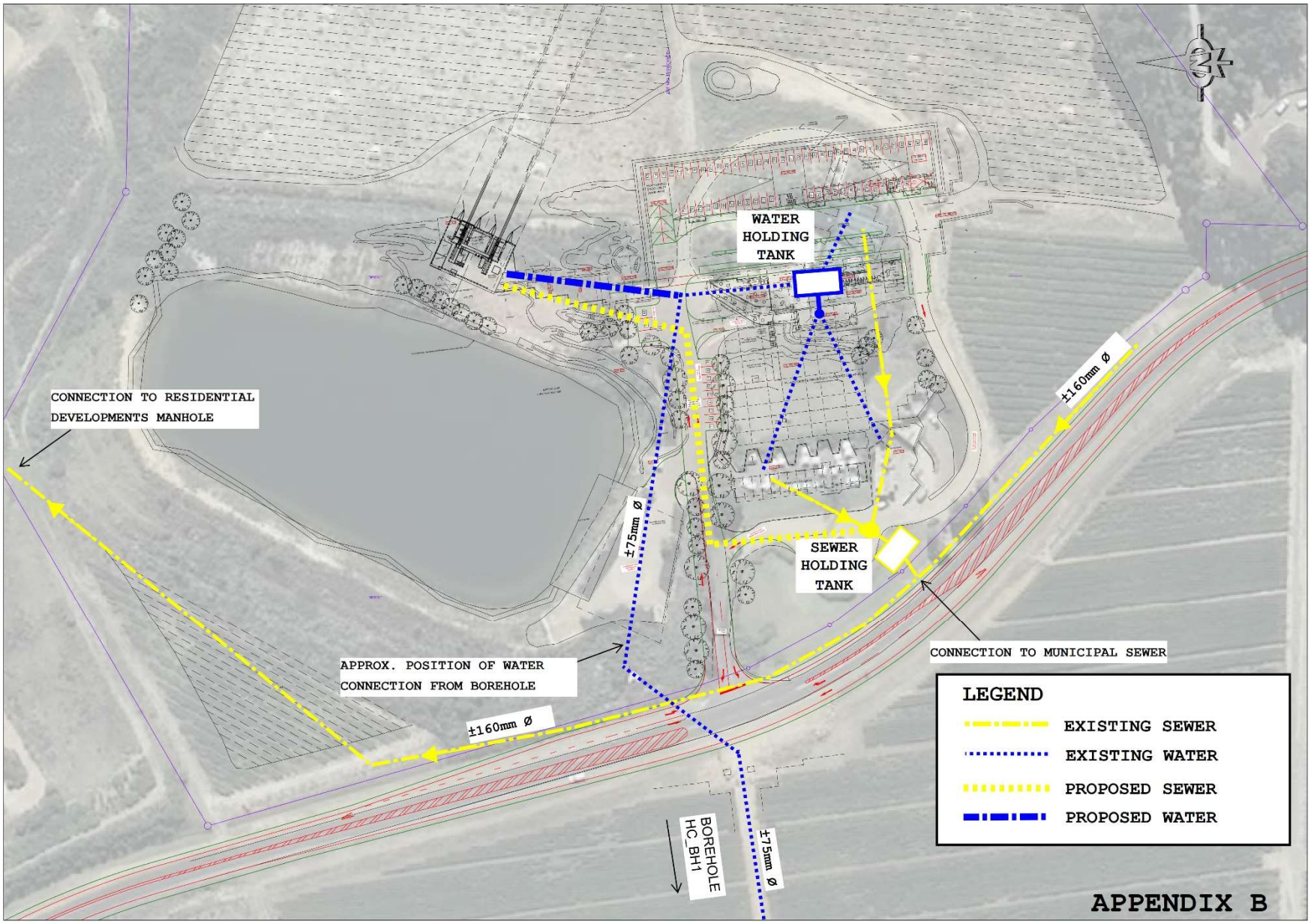


MTA / VDMMA

FCC
AREAS SCHEDULE
UPPER STATION
1 : 500 at A1
@ Aug 2023

APPENDIX B

Existing and Proposed Water & Sewer Layout (Lower Station)



APPENDIX C

Existing and Proposed Stormwater Layout (Lower Station)

APPENDIX D

Borehole Performance Report

GROUNDWATER AND EARTH SCIENCES
GEOSS
SOUTH AFRICA (Pty) Ltd

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

GEOSS Project No: 1294
25 February 2022

Takuan von Armin / Tim Hoek
Haute Cabriere and Clos Cabriere
Franschhoek
7690
(+27) 21 876 2630

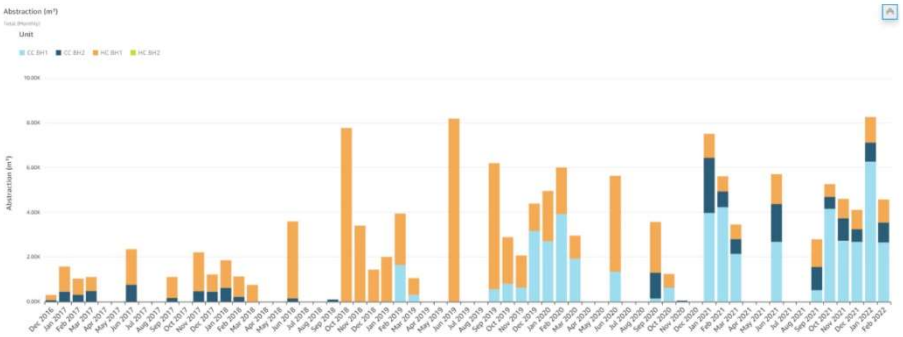
Dear Tim & Takuan,

Borehole monitoring data: Summary of site visit – 18 February 2022

GEOSS has completed the borehole data processing and a summary of analysis for the period of January – February 2022, is presented in the following table:

Borehole	Comment
HC_BH1	This borehole continues to perform well.
HC_BH2	All is in order at this site. This borehole serves as a background monitoring borehole for HC_BH1.
CC_BH1	All is in order – this borehole is performing well.
CC_BH2	All is in order – this borehole is performing well.
General Comment	The current abstraction should be maintained at all boreholes as they continue to perform well. There are no concerns on either farm.

The annual abstraction volumes to date are within the sustainable supply of the boreholes. The summary graph below (measured in cubic meters) has been included to show annual groundwater use between 2016 – the present at both Haute Cabriere and Clos Cabriere Farms. A total of 12,830 m^3 of groundwater have been abstracted from both farms for 2022.



The monitoring program for the rest of 2022 is provided in the table below, with the next site visit scheduled to take place in March 2022. The borehole locations are presented in Map 1 at the end of this report.

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600

PO Box 12412, Die Boord,
7613, South Africa

Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

January	February	March	April	May	June
July	August	September	October	November	December

Please go through the monitoring report and contact GEOSS if you have any questions or would like to discuss any aspects of the report.

Michael Holloway
Hydrogeologist

Zita Harilall
Hydrogeologist

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Borehole:	**HC_BH1**	
Location:	Haute Cabriere	
Contact:	Takuan von Arnim Tim Hoek Albertus Lourens	
Borehole details:	*East (dd_WGS84):*	19.132344
	South (dd_WGS84):	-33.914258
	Elevation (mamsl):	339
	Borehole depth (m):	58.6
	Pump depth (m):	55
Logger details:		LevelScout 2X (L60) SN: 122203809

Field Measurements:				
Date	*Time*	*WL (mbgl)*	*Flow meter (m^3)*	*Abstraction (Since previous monitoring period) m^3*
2022-02-18	09:36	21.43	77 358.09	1 029.87

Data Analysis:
During the current monitoring period, the groundwater level was measured at 21.43 meters below the ground level. Since the beginning of the summer season, water levels at this borehole have been steadily decreasing. Due to low rainfall and high demand for groundwater, water levels are likely to decrease over the next few months of the summer season. The borehole experience frequent abstraction with very good recovery. A total volume of 1 029.89 m^3 (daily average of 36.78 m^3) of groundwater has been abstracted from this borehole during the January – February 2022 monitoring period. Water levels remain above the pump inlet and the borehole continues to perform well.
Field Comments:
Logger data downloaded and field measurements taken.

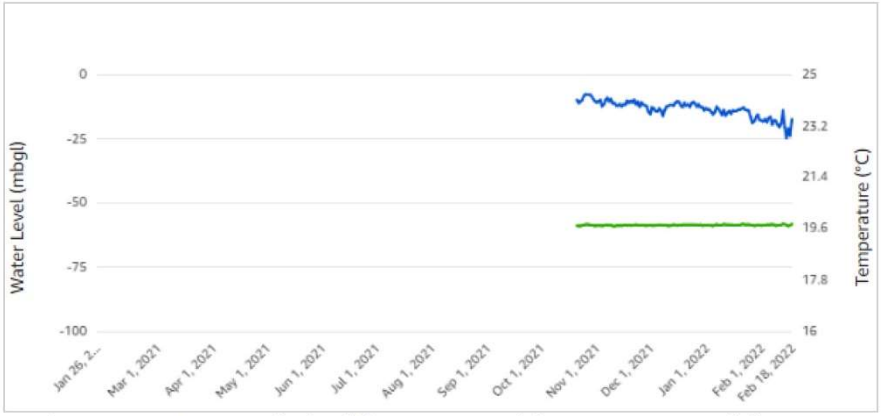


Figure 1: HC_BH1 – Water level and Temperature Graph from January 2021 until the present.

GROUNDWATER AND EARTH SCIENCES
GEOSS
SOUTH AFRICA (Pty) Ltd

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600

PO Box 12412, Die Boord,
7613, South Africa

Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Figure 2: HC_BH1 – Long Term Water level and Temperature Graph

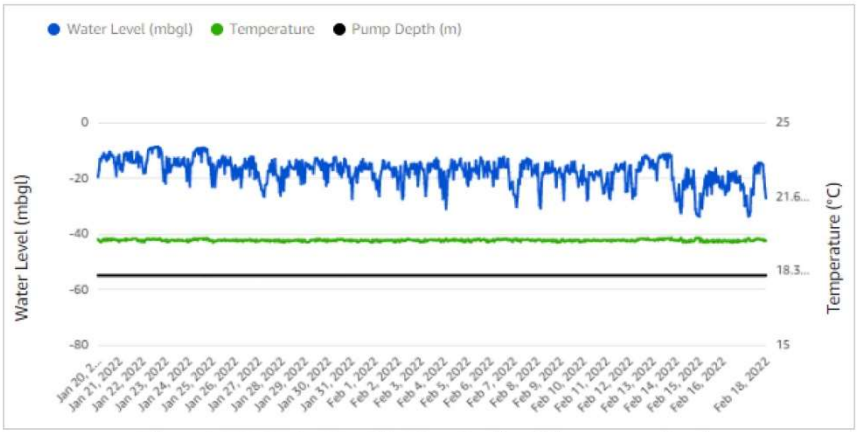


Figure 3: HC_BH1 – Monthly Water level and Temperature Graph

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Borehole:	**HC_BH2**	
Location:	Haute Cabriere	
Contact:	Takuan von Arnim Tim Hoek Albertus Lourens	
Borehole details:	*East (dd_WGS84):*	19.136005
	South (dd_WGS84):	-33.915808
	Elevation (mamsl):	379
	Borehole depth (m):	181.7
	Pump depth (m):	Unequipped
Logger details:		Unequipped

Field Measurements:				
Date	*Time*	*WL (mbgl)*	*Flow meter (m^3)*	*Abstraction (Since previous monitoring period) m^3*
2022-02-18	09:44	17.40	-	-

Data Analysis:
This borehole serves as a background monitoring hole to HC_BH1. Since the last measurement in January 2021, rest water levels have been constant at 17.40 mbgl. This borehole is located at the highest elevation and is quickest to respond to groundwater recharge due to its proximity to the Franschhoek Mountains. An increasing trend can be seen in water levels at this borehole since the onset of monitoring.
Field Comments:
Hand readings are taken. There is no logger installed at this site.

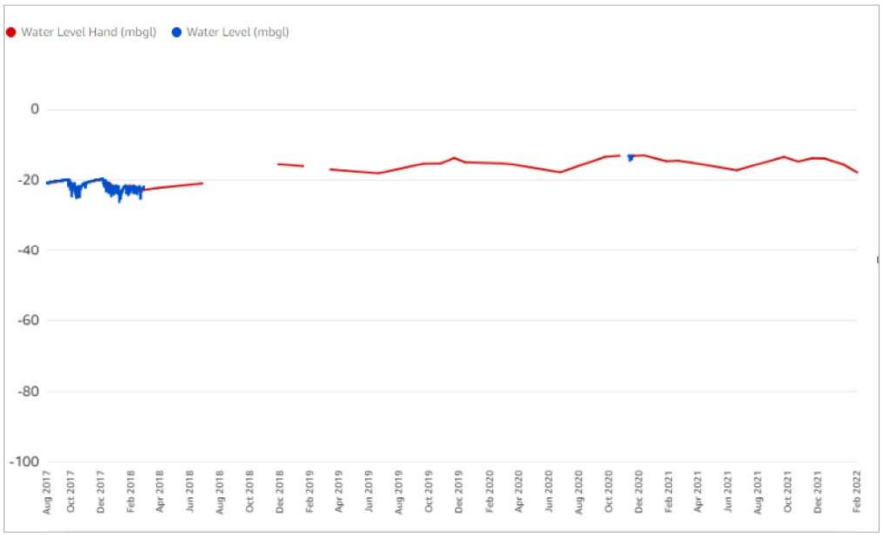


Figure 4: HC_BH2 – Water level and Temperature Graph

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600

PO Box 12412, Die Boord,
7613, South Africa

Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Borehole:	**CC_BH1**
Location:	Clos Cabriere
Contact:	Takuan von Armin Tim Hoek Albertus Lourens
Borehole details:	
East (dd_WGS84):	19.114428
South (dd_WGS84):	-33.915856
Elevation (mamsl):	159 m
Borehole depth (m):	150.41 m
Pump depth (m):	82 m
Logger details:	LevelScout 2X (L60) SN: 122203810

Field Measurements:				
Date	*Time*	*WL (mbgl)*	*Flow meter (m^3)*	*Abstraction (Since previous monitoring period) m^3*
2022-02-18	09:56	19.10	93 254.50	2 658.85

Data Analysis:
During the current monitoring period, the groundwater level was measured at 19.10 meters below the ground level. Water levels indicate a decreasing trend since the start of the summer season. Water levels are expected to decrease at this borehole in the next few months due to low rainfall and high demand for groundwater. The borehole indicates a good recovery after the abstraction event. The borehole experience frequent abstraction with water levels dropping to +/- 25 mbgl. A total of 2 658.85 m^3 has been abstracted at this borehole (daily average of ~ 94.95 m^3), which is less than the previous monitoring period.
Field Comments:
Logger downloaded and manual field measurements recorded. All is in order at this site.

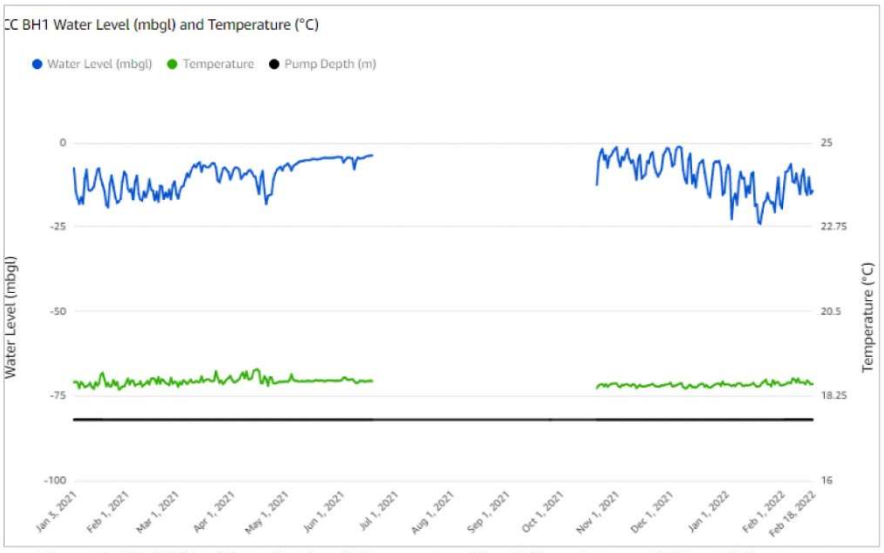


Figure 5: CC_BH1 – Water level and Temperature Graph from January 2021 until the present.

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

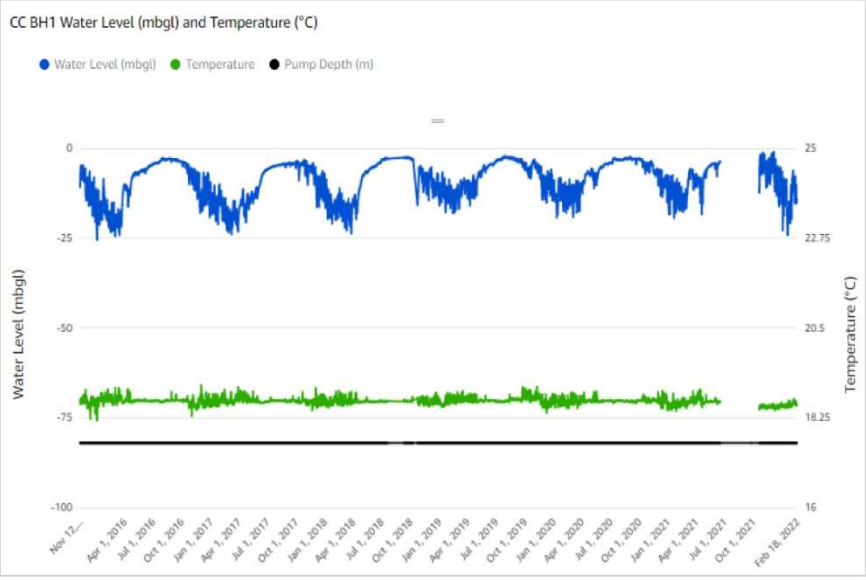


Figure 6: CC_BH1 – Long Term Water level and Temperature Graph

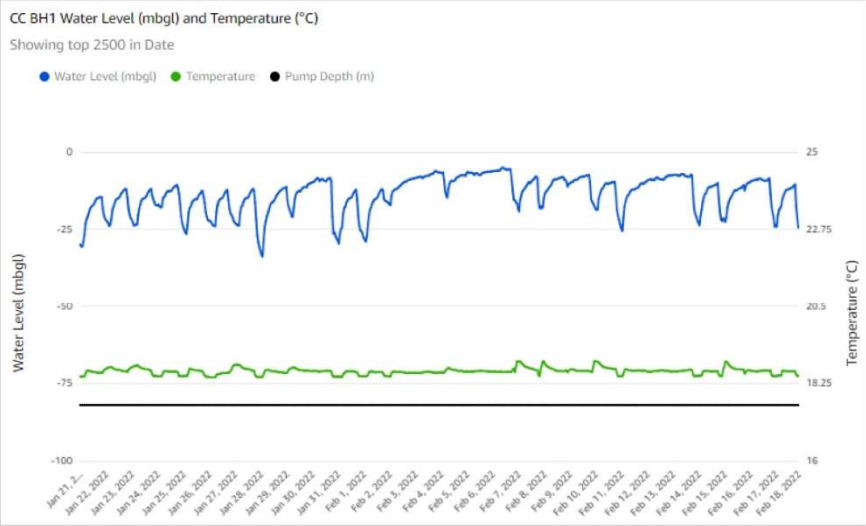


Figure 7: CC_BH1 – Monthly Water level and Temperature Graph

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Borehole:	**CC_BH2**	
Location:	Clos Cabriere	
Contact:	Takuan von Arnim Tim Hoek Albertus Lourens	
Borehole details:	*East (dd_WGS84):*	19.114253
	South (dd_WGS84):	-33.916717
	Elevation (mamsl):	261 m
	Borehole depth (m):	180.76 m
	Pump depth (m):	72 m
Logger details:		Solinst Logger SN: 62128477

Field Measurements:				
Date	*Time*	*WL (mbgl)*	*Flow meter (m^3)*	*Abstraction (Since previous monitoring period) m^3*
2022-02-18	10:06	20.77	10 470.58	880.36

Data Analysis:
During the January – February 2022 monitoring period, the water level was measured at 20.77 meters below ~~the~~ ground level. Water levels continue to indicate a slightly decreasing trend since the start of the summer season with low rainfall and high demand for groundwater. The logger data indicates frequent abstraction, with consistent drawdown and recovery at the borehole. A total of 880.36 m^3 has been abstracted at this site over the January – February 2022 monitoring period, which is higher than the previous monitoring period.
Field Comments:
Logger read and field measurements were taken. Borehole maintenance is in order.

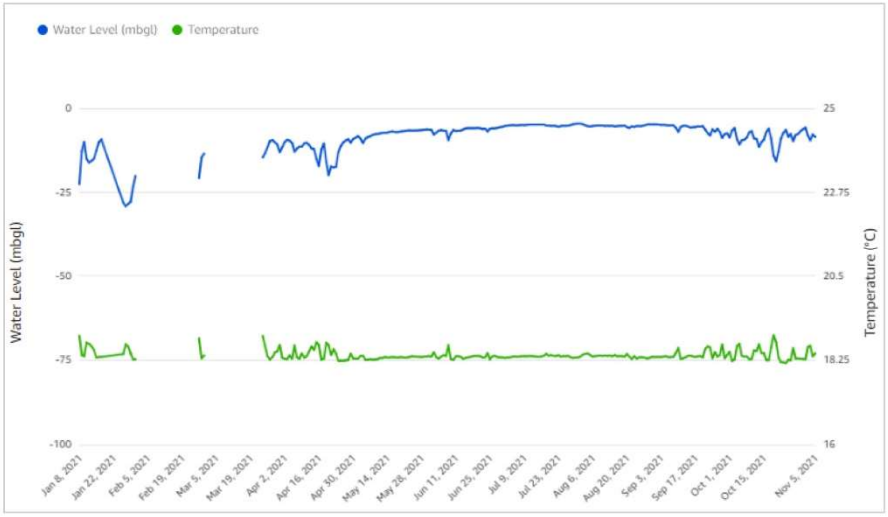


Figure 8: CC_BH2 – Water level and Temperature Graph from January 2021 until the present

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600
PO Box 12412, Die Boord,
7613, South Africa
Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

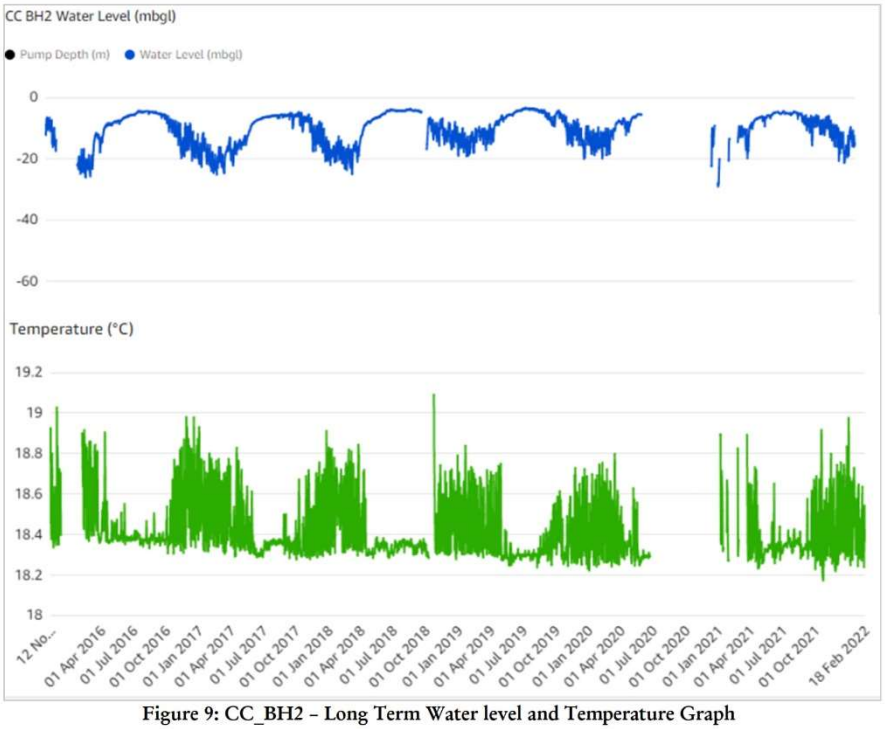


Figure 9: CC_BH2 – Long Term Water level and Temperature Graph

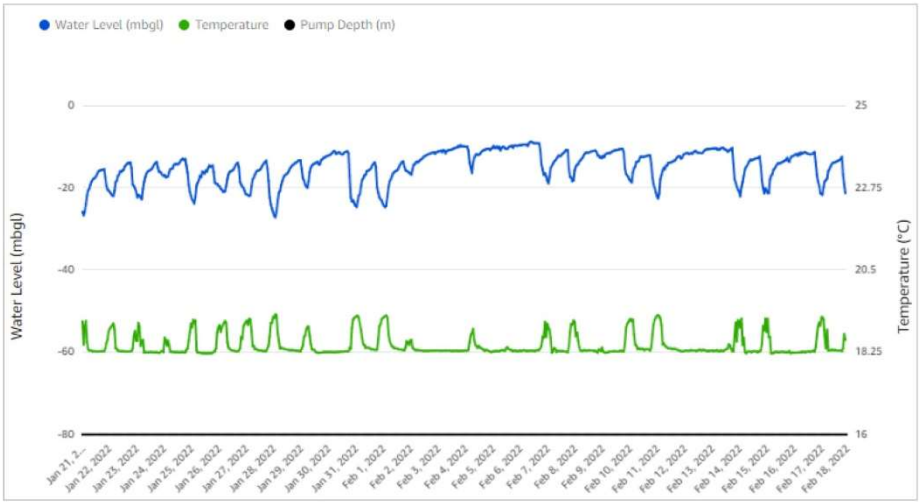


Figure 10: CC_BH2 – Monthly Water level and Temperature Graph

GROUNDWATER AND EARTH SCIENCES
GEOSS
SOUTH AFRICA (Pty) Ltd

Unit 12, Technostell
9 Quantum Street, Technopark,
Stellenbosch, 7600

PO Box 12412, Die Boord,
7613, South Africa

Tel: +27 (0)21 880 1079
info@geoss.co.za
www.geoss.co.za

Map 1: Borehole locality map of Haute Cabriere Farm.

APPENDIX E

Capacity Correspondence

RE: Bestaande Dienste - Franschhoek Water en Riool

FD

Flip du Plessis <Flip.duPlessis@gls.co.za>
To Werner van Rooyen
Cc Johann Rudolph

You forwarded this message on 2023/01/13 16:28.

Fig6.1c (Exist spare capacity - Franschhoek).pdf
660 KB

Translate message to: English | Never translate from: Afrikaans | Translation preferences

Hi Werner
Die impak van die ontwikkeling op die bestaande stelsel is nie baie groot nie.
Die analise van die bestaande stelsel wys dat daar kapasiteit is in die bestaande netwerk om die vloei te akkommodeer.
Daar is egter een pyp in die bestaande model wat nie kapasiteit is nie, maar die pyp direk aangrensend tot hom het wel kapasiteit.

As dit bevestig word in die veld dat dit 'n probleem is kan ons net oorgooi in die pyp wat kapasiteit het.

Vertrou dit is van waarde.
Groete
Flip

Flip du Plessis *BEng Civil Eng*
Civil Engineer III

GLS Infrastructure planning

T +27 21 880 0388
www.gls.co.za
Stellenbosch - Pretoria

The information contained in this email and any attachments thereto may be privileged or confidential and are only intended for the exclusive use and attention of the addressed recipient. If you have received this email by mistake, please delete same and advise the sender immediately. Our terms and conditions can be found on the GLS website: https://www.gls.co.za/terms.html

APPENDIX F

Existing Municipal Stormwater Infrastructure

APPENDIX G

Municipal Confirmation of Agreement

STELLENBOSCH
STELLENBOSCH • PNIEL • FRANSCHHOEK
MUNISIPALITEIT • UMASIPALA • MUNICIPALITY

☎ 021-808 8205
🖷 021-883 9874
Directorate: Engineering Services
Direktoraat: Ingenieursdienste
epos/email:
Kobus.Fourie@stellenbosch.gov.za

Our ref: Erf 1466 Franschhoek

Date: 04/09/2014

Mr. R van Niekerk
Haute Cabriére
P O Box 245
FRANSCHHOEK
7690

Sir,

ERF 1466 FRANSCHHOEK: SEWER CONNECTION

Your request regarding a written confirmation that the farm Haute Cabriére has been connected to the Municipal sewer system refers.

Background

During the development of the Franschhoek Country Estate (FCE) the municipal sewer system were extended to a position close to the north western corner of erf 1466 (Next to the R45, Lambrechts Road). The FCE is a private development and the engineering services situated on the property are regarded as private property and is maintained by the Home Owners Association.

According to our records the consulting engineers responsible for the design of the civil engineering infrastructure, Kwezi V3 (now Worley Parsons) did investigate the extension of the sewer system to accommodate the farm.

The Municipalities response on the request was that the management of Haute Cabriére and the FCE Home Owners Association came to an agreement that the sewage from Haute Cabriére may be conveyed through the system of the FCE.

The extension of the sewer system once an agreement has been reached will be the responsibility of the applicant as the sewer is regarded as a private sewer system.

STELLENBOSCH

STELLENBOSCH • PNIEL • FRANSCHHOEK

MUNISIPALITEIT • UMASIPALA • MUNICIPALITY

☎ 021-8088212
✆ 021-8088216

Department: Public Works
Departement: Publieke Werke

epos/email:
sabelom@stellenbosch.org

Our Ref: Mr Sabelo Mkize

Mpoti™ Fax Pad Ref.138.	PAGE: 1 OF 4
TO: Sakkie Lourens	FROM: Riaan Swiegers
CO: Clos Cabrière	CO: APEC
DATE: 20/3/06	PHONE NO: 9135414
FAX NO: 8763390	FAX NO: 9133926

2006-02-03

APEC (Pty) Ltd
P O Box 6019
WELGEMOED
7538

Sir

FRANSCHHOEK : CLOS CABRIERE LTD : SEWAGE MANAGEMENT : ERVEN 20, 21 & 23

Your letter dated 16 January 2006 refers.

The proposed connection to manhole "F" of erven 23 is approved with reference to the documents accompanying your request. Please note that the conditions of this approval include the approval of your request by the developers or owners of the erven where the manhole or connection point is situated.

The charges for bulk services for the connection will be R3 054,25 plus VAT, payable to the Stellenbosch Municipality in full.

It is further expected of you to comply with all conditions applicable to the bulk services and construction requirements.

For more information or further enquiry, please contact the referee.

Yours truly

pp MPOTI MACHABA
EXECUTIVE DIRECTOR: PUBLIC WORKS
(SGM/ma/cabriere Ltd)