BART SENEKAL INC.
Consulting Civil & Structural Engineers

12 Alexander Street, Stellenbosch 7600
P.O.Box 1196, Stellenbosch 7599
Telephone (021) 883-8710
Fax No. (021) 887-6547
E-mail info@bs-inc.co.za

DATE: 5 March 2018 YOUR REF: OUR REF: 1377 / A2

PROPOSED RESIDENTIAL DEVELOPMENT ON REMAINDER OF FARM BRANDWACHT No. 1049, STELLENBOSCH

REPORT ON PROVISION OF CIVIL ENGINEERING SERVICES

1. INTRODUCTION

The proposed residential development on Remainder of Farm Brandwacht No. 1049, Stellenbosch comprises approximately 250 residential erven of varying sizes in a private estate. This report summarises the current situation with regard to the provision of the basic civil engineering services, i.e. water supply, sewerage, stormwater drainage and solid waste removal to the proposed development.

The development proposal is indicated on the site development plan by TV3 Planners & Architects in Appendix A. The concept of the civil engineering services is as indicated on Drawing 1377/01 in Appendix B.

2. SITE LOCATION AND DESCRIPTION

The property is located in the Brandwacht area of Stellenbosch.

The property is bordered to the north by Brandwacht-aan-Rivier residential estate, the Upper Brandwacht suburb and the Brandwacht Spruit, to the west by Brandwacht Office Park and the Brandwacht Manor House property, to the south by Trumali Road, and to the east by the foothills of Stellenbosch Mountain.

The site has a moderate to steep fall of approximately 1 in 10 in a north westerly direction.

3. WATER SUPPLY

3.1 Demand :

The demand for potable water for the proposed development is calculated as follows:

Single residential: 250 units @ 0,80 kl/unit/day = 200 kl/day

BART SENEKAL & PARTNERS INCORPORATED (Reg. 94/07928/21)
Directors: LJ Louw, Pr Eng, B Eng BW Senekal, Pr Eng, B Eng. NDI

The development is classified as a "low-risk" fire protection area, with a required fire flow of 15 ℓ/s at 7m minimum residual head.

3.2 Storage :

The development will be serviced with water storage capacity from two pressure zones due to the substantial level difference across the site. The lower portion of the development will be serviced from the Municipality's Paradyskloof 2 reservoir system at TWL (Top Water Level) = 222.5m. The higher portion of the development will be serviced from the Municipality's Brandwacht reservoir system at TWL = 280m. In both cases future augmentation of the storage capacities form part of the Municipality's Water Master Plan.

3.3 Supply :

Supply of potable water to the lower portion of the development will be from a proposed supply line of approximately 200mm Ø from the Paradyskloof 2 reservoir system. The location of the municipal watermain is as indicated on the drawing. Supply of potable water to the higher portion of the development will be directly from the Brandwacht reservoir through a dedicated supply watermain of approximately 160mm Ø.

3.4 GLS analysis :

The subject property has been taken into account in the latest Water Master Plan (refer future development area "S66" = ± 291 residential units) of the Stellenbosch Municipality compiled by GLS. It will be a requirement from the Municipality that the development proposal be evaluated against the model for the Water Master Plan by GLS for indication of any bulk water upgrades that may be required. Bulk water upgrades are generally implemented through BICL's funding.

4. SEWERAGE

4.1 Run-off :

Sewage run-off from the proposed development is calculated as follows:

Single residential: 250 units @ 0,65 kl/unit/day = 163 kl/day

4.2 Drainage :

Similarly as for water supply, the subject property has been taken into consideration in the latest Sewer Master Plan (refer future development area "S66") of the Stellenbosch Municipality.

The municipality's Sewer Master Plan indicates a connection for development area "S66" to the privately owned Brandwacht sewerage system, which drains across the Brandwacht Spruit and becomes a municipal system in Lower Dalsig and along the R44 Main Road towards the Stellenbosch Municipality's Waste Water Treatment Works (WWTW) in Devon Valley. As the

permission of the Brandwacht Master HOA will be required for a connection to their private system, we propose that an alternative option for sewerage be available.

The alternative option entails a connection to the municipality's 150mm Ø sewer main along the lower portion of Trumali Road. The said pipeline connects to the 300mm Ø sewer main through Die Boord residential suburb to Die Boord sewer pump station at the end of Rokewood Avenue. At Die Boord sewer pump station, sewage is pumped across the Eerste River to the bulk sewer that gravitates towards the Stellenbosch Municipality's Waste Water Treatment Works (WWTW) in Devon Valley.

This alternative for sewerage will possibly not be favoured by the Municipality, as it will convey the sewage though a pump station (Die Boord PS), a principle that is generally less favourable if a gravity flow system is available, as will be the case with a connection to the Brandwacht private sewerage system.

4.3 GLS analysis :

Similarly as for water supply, it will be a requirement from the Municipality that the development proposal be evaluated against the model for the Sewer Master Plan by GLS for indication of any bulk sewer upgrades that may be required.

4.4 Treatment :

Sewage from the development will be treated at the Municipality's Waste Water Treatment Works in Devon Valley. The treatment capacity of the WWTW has recently been upgraded, and sufficient spare capacity exist to accommodate this development.

5. STORMWATER DRAINAGE

5.1 General

The general stormwater drainage direction of the property is to the north and northwest as indicated on the concept engineering services plan. The Brandwacht Spruit is the natural drainage system of the area, and all stormwater run-off needs to reach the Brandwacht Spruit via existing pipe of overland draining routes. One of these draining routes is across Farm 1049/3 (Manor House property) and careful consideration will be given during the detail planning for protection of the said property.

5.2 Peak Run-off

The 50-year stormwater run-off from the undeveloped site is estimated at 0.89 m^3/s. The 50-year stormwater run-off from the fully developed site is calculated at 4.16 m^3/s, thus an increase of 3.27m^3/s from the pre-development run-off.

5.3 Peak Stormwater Attenuation

It is proposed that stormwater run-off from the development be drained through attenuation ponds on route towards the Brandwacht Spruit.

Our calculations indicate that a total storage volume of approximately 3 500 m^3 will be required to attenuate the post-development 50-year run-off to be in line with the pre-development run-off from the site. We propose that the stormwater attenuation be achieved by way of 3 separate attenuation facilities, one of them the existing dam. The proposed locations of the attenuation facilities are as indicated on the concept engineering services plan.

6. SOLID WASTE REMOVAL

Solid waste generated by the development is calculated as follows:

Single residential: 250 units @ 0,04 t/unit/week = 10,0 t/week

The Stellenbosch Municipality indicated that they can provide a waste removal service to the development. The Municipality's refuse truck does not enter private estates and a refuse bin storage area needs to be provided at the entrance to the estate. Alternatively, the development will make use of a suitable, private, waste collection company for the removal of solid waste from the development.

8. CONCLUSION

From the above it is concluded that:

(a) The required basic civil engineering services for the proposed development, i.e. potable water, sewerage and solid waste removal can be accommodated by the Stellenbosch Municipality in their existing infrastructure.

(b) Attenuation of peak stormwater run-off from the developed site will be implemented on site by way of three storage ponds.

For BART SENEKAL & PARTNERS

L J Louw Pr. Eng.