CIVIL ENGINEERING REPORT FOR:

MOUNT PROSPECT

CONSTANTIA, CAPE TOWN, ERF 2641 & 2643

Compiled by: Ian Moolman
Email: ianm@sutherlandengineers.com
Date: 19 August 2015

Project No.: 4232

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<th>Pete Jordan</th>
</tr>
</thead>
</table>
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                 Constantia, 7806  
                 Cape Town |
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<tr>
<th>Contact Person:</th>
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</table>
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1. INTRODUCTION:

The Mount Prospect Housing Development includes 60 residential units developed by Property Development Projects. The total site area is 38,600m². Refer Figure 1.

Sutherland Engineers are the consulting civil and structural engineers for the development. The Civil services report forms part of the civil engineering brief. MLB Architects has been tasked to do the architectural design.

2. TERMS OF REFERENCE:

The terms of reference for the Engineering Services Report can be summarized as follow:

- Obtain all services information relating to the proposed development.
- Liaise with the City of Cape Town to identify the availability of roads and services. Reference should be made to the “Comment on Water and Sanitation Capacity for the proposed development of Erf 2641 – 2643- Constantia”, dated 2nd July 2015 from the Water and Sanitation department.
- Provide a Civil Services Report.
3. PROFESSIONAL TEAM:

<table>
<thead>
<tr>
<th>Function:</th>
<th>Company:</th>
<th>Contact Person:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management;</td>
<td>Planning Partners</td>
<td>Geoff Underwood</td>
</tr>
<tr>
<td>Landscape Architect;</td>
<td></td>
<td>Jaco Jordaan</td>
</tr>
<tr>
<td>Town Planning</td>
<td></td>
<td>Tim Florence</td>
</tr>
<tr>
<td>Architect</td>
<td>MLB Architects</td>
<td>Quinton Lawson</td>
</tr>
<tr>
<td>Heritage</td>
<td>Bridget O'Donoghue</td>
<td>Bridget O'Donoghue</td>
</tr>
<tr>
<td>Environmental</td>
<td>Sillito Environmental Consulting</td>
<td>Colleen McCreadie</td>
</tr>
<tr>
<td>Civil and Structural</td>
<td>Sutherland Engineers</td>
<td>Salvatore Errera</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td>Ian Moolman</td>
</tr>
<tr>
<td>Geotechnical Engineering</td>
<td>Core Geotechnical</td>
<td>John Yates</td>
</tr>
<tr>
<td>Water consulting</td>
<td>Freshwater Consultant cc</td>
<td>Liz Day</td>
</tr>
</tbody>
</table>

4. LOCATION OF PLANNED DEVELOPMENT:

The Development is located in Constantia on Pagasvlei road 36. The erf is bounded to the north by the Constantia Wine Estate, to the east by two residential erven and Olive road, to the south by the Pagasvlei road and to the west by three residential erven. Access to the erf is on the south western corner of the site from Pagasvlei road.

There are no flood lines influencing the proposed development.

5. LAND USE:

The land was utilized for agricultural use in the past. There are two main sheds on the property and one main dwelling. The site is overgrown by vegetation with a fair amount of trees.

The land is proposed to be used for a residential development.

6. GEOTECHNICAL INFORMATION:

A geotechnical investigation and report was done in February 2015 by Mr John Yates from Core Geotechnical Consultants. This report is available on request.

The site has a general fall from the north to the south of between 8% and 10%, with the valley in the middle at the lower end of the site. A wetland area has been identified by Ms Liz Day from the Freshwater Consulting Group at the last mentioned lower end of the site.
Extracts from the geotechnical report:

- Transported soils of colluvial origin, comprising silty sands and clayey sands of variable but generally loose consistency, occur from ground level to depths of the order of 0.5-1.9 m approximately below present ground surface.
- The colluvial soils are directly underlain by residual granite soils.
- Residual granite soils were observed to extend to depths in excess of 2.8 m below ground level in places.
- The water table depths of between 1.1 m and 1.7 m below ground level were recorded in mid- to late-summer.

7. TOPOGRAPHICAL SURVEY INFORMATION:

A detailed Topographical survey was done in November 2014 by David Hellig & Abrahamse Professional Land surveyors. This survey is available on request.

8. CIVIL ENGINEERING SERVICES:

8.1 General:

This report deals with the external and internal services required for the proposed Residential Development.

The design parameters used to determine the level of service for the Civil Engineering Services Report are in accordance with:


b. The technical requirements and standard details of the local authorities.

8.2 Bulk (External) Services:

8.2.1 Water:

There is an existing 150ø water main to the south of the site along Pagasvlei Road with a static and peak pressure of 121.2m and 96.39m respectively. This line has a peak flow and velocity of 0.38l/s and 0.02m/s. The water network has sufficient capacity, in terms of flow rate and pressure, to supply the proposed demand of 3.80l/s of the development.

There are no bulk water pipelines in the immediate facility of the proposed development.

8.2.2 Sewerage:

There is an existing 150mmØ sewer main in Pagasvlei Road, with relative spare capacity. There is however insufficient capacity in the 600ø bulk sewer main just upstream of the Raapkraal Pump station. There are proposed Master Plan Projects to upgrade two pump stations and the outfall bulk sewer main, but the timing and budgeting for the upgrades will have to be agreed with the Reticulation District Head, Mr Ian Isaacs.

It is expected that the additional 1.87 l/s expected from the development will not have a major additional negative impact in the interim.
This proposed development is situated within the catchment of the Cape Flats Wastewater Treatment Works. The treatment plant has sufficient unallocated capacity to handle the anticipated 46.2 kl/d flow rate from this development.

8.2.3 Storm Water:

The existing stormwater system near the site consist of a headwall and two 600ø pipes crossing the Pagasvlei road on the southern boundary and an open trench beyond.

8.2.4 Roads:

The existing entrance to the site from Pagasvlei road on the southern corner of the site will be utilized. It is purposed that this junction is upgraded with the traffic circle in Pagasvlei road to improve the traffic reticulation and general public safety. Claude from the City of Cape Town traffic engineers at the South Peninsula offices reviewed the traffic circle and expressed his acceptance thereof.

8.3 Internal Services

The design parameters used to determine the level of service for the Civil Engineering Services Report are in accordance with:


b. The technical requirements and standard details of the City of Cape Town.

8.3.1 Water:

The internal water pipes will be sized to cater for the development’s peak water demand. The water reticulation will consist of 160mmø and 110mmø uPVC class 12 pipes.

8.3.1.1 Design Standards:

The water supply will consist of a 160mmø water main with a bulk water meter chamber (in accordance with the Municipality standards) situated conveniently for the water inspector to take the regular readings.

The internal water reticulation will supply the domestic and fire requirements for the development.

8.3.1.2 Water Demand:

The water usage designed for the proposed development is based on a water demand of 1100 ℓ per dwelling /day.

The annual average daily demand (AADD) for the proposed development will be approximately 0,76 ℓ/s, with an Instantaneous peak flow of 3.82 ℓ/s
when a peak factor of 5 is used.

8.3.1.3 **Residual Pressures:**

The minimum residual pressure designed for, under instantaneous peak demand, will be 25m. The maximum residual pressure designed for under zero flow conditions will be 90m. The City of Cape Town indicated that the existing static and peak pressures are 121.2m (12 bar) and 96.39m (9.6 bar) respectively. This is substantial and a pressure reducing valve may be needed to protect the internal water pipe infrastructure.

8.3.1.4 **Fire Flow:**

The fire fighting requirements have been based on a design flow of 25ℓ/ş at 15m residual head, in accordance with the Low Risk Category (as stated in the Red Book).

8.3.2 **Sewerage:**

The sewer pipes for the proposed development will be sized to cater for the development’s peak flow conditions.

8.3.2.1 **Design Standards:**

The sewer reticulation will consist of 110mmØ and 160mmØ (class 34 heavy duty uPVC) solid wall pipes. Sewage will gravitate to the southern boundary. From here the single 160ø sewer pipe will cross the Pagasvlei road and connect to the existing municipal sewer system.

8.3.2.2 **Estimated Sewerage Flow:**

Upon evaluation of the proposed development sewer requirements of 750 ℓ/day/dwelling, the total average daily flow rate was calculated to be 0.5 ℓ/s with a the peak design flow rate of 1.9 ℓ/s. This peak design flow rate makes allowance for 5% extraneous flow and a peak factor of 3.5.

8.3.3 **Stormwater:**

The “Management of Urban Stormwater Impacts Policy” dated 27 May 2009 sets the requirement to attenuate the stormwater runoff and to improve the stormwater quality from developed site as per best management practices. Refer the Stormwater Management Plan dated 2015.08.19 for the proposed stormwater management and reticulation on site.

The piped system will be designed for a pipe flow velocity of 1.0m/s to prevent siltation and erosion.

8.3.4 **Roads:**

The proposed internal roads to the development will be surfaced and will be in accordance with the theme of the development.

8.3.4.1 **Road widths:**

All of the internal roads will be a minimum of 5.0m for two directional traffic and 3m for one directional traffic.
8.3.4.2 Pavement design:
The proposed pavement design is as follows.

<table>
<thead>
<tr>
<th>Surfacing</th>
<th>Sub base</th>
<th>Sub grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>60mm clay pavers</td>
<td>150mm thick G5-type</td>
<td>150mm G7-type material. (In-situ material may be used if acceptable)</td>
</tr>
<tr>
<td></td>
<td>material.</td>
<td></td>
</tr>
</tbody>
</table>

9. CONCLUSION

The civil services report for the proposed Mount Prospect Housing Development Constantia confirms that the roads and services are available for the proposed development.

Ian Moolman
Sutherland (Pty) Ltd.

07 SEPTEMBER 2015
Date
COMMENT ON WATER AND SANITATION CAPACITY FOR THE PROPOSED DEVELOPMENT OF ERF 2641-2643-CONSTANIA

Background
Sutherland engineers have been appointed to compile a service report for a new housing development due to take place in Constantia. This development will be made up of five different types of dwelling units and will amount to 60 dwellings in total.

This letter provides an overview of the existing water and sewer infrastructure in the vicinity of the development.

Table 1.1: Estimated water and sewer demands based on gross floor area obtained using applicable floor space ratio from the town-planning scheme. (Departmental Standards and Redbook Chapter 9)

<table>
<thead>
<tr>
<th>ERF Number/ Portion Number</th>
<th>Potable Water Demand</th>
<th>Sewer Flow*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Average Daily Demand (kl/d)</td>
<td>Peak Daily Water Demand (l/s) (PF= 5)</td>
</tr>
<tr>
<td>Erf 2641-2643</td>
<td>66.0 kl/d</td>
<td>3.80 l/s</td>
</tr>
</tbody>
</table>

* Based on a 70% sewer flow design criterion for flats

Water Reticulation
This development falls within the South Peninsula- Monterey water distribution zone.

To the south of the site along Pagasvlei Road is a 150mmØ water main with a static and peak pressure of 121.2m and 96.39m respectively. This line has a peak flow and velocity of 0.38l/s and 0.02m/s. The water network has sufficient capacity to supply the proposed demand of 3.80l/s of the development.
See figure 1 for existing water network layout.

**Bulk Water**
No bulk water pipelines or infrastructure under the control of the Bulk Water Branch exists in the immediate vicinity of the proposed development.

The bulk supply system has sufficient water resources, treatment, bulk storage and conveyance capacity to supply the estimated annual average daily demand of 66.0 kl/day of the proposed development.

**Sewer Reticulation**
There is an existing 150mmØ sewer main in Pagasvlei Road, with relative spare capacity greater than 80%. The flow from this development will gravitate to Tokai Pump Station and then discharge to a 600mmØ bulk sewer main, which has insufficient capacity just upstream of Raapkraal Pump Station. Future Master Plan projects are required to upgrade both pumping stations and the outfall sewer feeding to the Raapkraal pump station.

**Proposed Master Plan Projects**

<table>
<thead>
<tr>
<th>Master Plan Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP-TK-02</td>
<td>Upgrade pumping station</td>
</tr>
<tr>
<td>CAP-RK-01</td>
<td>Upgrade pumping station and outfall sewer</td>
</tr>
</tbody>
</table>

The sewer reticulation network has insufficient unallocated capacity.

The Reticulation District operational staff has reported surcharging in winter and have put remedial measures in place at the pump station. The situation is being monitored.

The timing and budgeting for the upgrades will have to be agreed with the Reticulation District Head, Ian Isaacs. It is however expected that the additional 1.87 l/s expected from the development will not have a major additional negative impact in the interim.

**Wastewater**
The anticipated wastewater flow from the proposed development has been calculated to be 46.20kl/d.

This proposed development is situated within the catchment of the Cape Flats Wastewater Treatment Works. The treatment plant has sufficient unallocated capacity to handle the anticipated wastewater from this development.

**Conclusion**
The existing water reticulation network is sufficient to service the proposed development.

The timing and budgeting of the upgrades will have to be agreed with the Reticulation District Head. Remedial measures taken operationally is expected to cope with the additional flow in the interim.
It should be further noted that:

- Water and Sanitation services are to be designed according to Departmental Service Standards and approved prior to construction.

- Handover of Water and Sanitation services will be subject to quality control during construction.

**General/Disclaimer**

Information provided is based on best available data.

The flows and pressures provided in this comment are theoretical and not measured. The infrastructure as-built information referred to and used in the hydraulic models are based on the GIS asset records, while modelled pressures, flows, velocities, capacities and volumes are based on hydraulic models of current land use and demands. Where appropriate, future land use and demands are considered and the impact of a development compared to that currently planned for the same land and surroundings.

Please note that this letter is not agreement to provide a water or sewer connection to the development. A formal application must be made in this regard to the Reticulation branch of the City of Cape Town’s Water and Sanitation Department.

This comment on confirmation of the ability to service the development does not confer any rights of development, which will be determined by the approved land use application process being followed. The capacity indicated will only be reserved for the development to occur within its application approved period, but in any case not longer than 5 years, after which it needs to be re-applied for.

Yours Faithfully

2015/07/08

Jaco de Bruyn

Head

Signed by: Jaco de Bruyn

On behalf of

Peter Flower

DIRECTOR: WATER & SANITATION DEPARTMENT

---------------------------------------------
**Notes/Legend**

**Head (m)**
- Head (m) <=0.0 m
- 0.0 m < Head (m) <=16.0 m
- 16.0 m < Head (m) <=20.0 m
- 20.0 m < Head (m) <=45.0 m
- 45.0 m < Head (m) <=60.0 m
- 60.0 m < Head (m) <=90.0 m
- 90.0 m < Head (m)

**Diameter 100.00 mm**
- Flow 2.34 l/s, Velocity 0.30 m/s
- Flow 0.00 l/s, Velocity 0.00 m/s
- Flow 2.17 l/s, Velocity 0.28 m/s
- Flow 0.58 l/s, Velocity 0.07 m/s
- Flow 0.33 l/s, Velocity 0.04 m/s
- Flow 0.12 l/s, Velocity 0.02 m/s
- Flow 0.18 l/s, Velocity 0.02 m/s

**Diameter 150.00 mm**
- Flow 1.21 l/s, Velocity 0.07 m/s
- Flow 0.84 l/s, Velocity 0.05 m/s
- Flow 0.49 l/s, Velocity 0.03 m/s
- Flow 0.00 l/s, Velocity 0.00 m/s
- Flow 0.80 l/s, Velocity 0.05 m/s
- Flow 1.88 l/s, Velocity 0.24 m/s
- Flow 2.96 l/s, Velocity 0.17 m/s

**Scale 1:2224.139**

**Project Title:** Mount Prospect

**Drawing Title:** Existing Water Network

**Figure:** 1

**All information shown must be verified on site before commencing any planning or construction.**

**Alle inligting soos getoon, moet op terrein geverify word voordat enige beplanning of konstruksie kan plaasvind.**

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**City of Cape Town**

**Stad Kaapstad**
Project Title: Constantia Erven 2641 & 2643
Drawing Title: Existing Sewer Network Layout

Notes/Legend

- MD = Modelled Diameter (mm)
- DF = Design Flow (l/s)
- IPDWF = Instantaneous peak Dry Weather Flow (l/s)

Gravity Pipes
- Relative Spare Capacity < 0.0%
- Relative Spare Capacity < 30.0%
- Relative Spare Capacity < 60.0%
- Relative Spare Capacity < 90.0%
- Relative Spare Capacity > 90.0%

Manhole
- Pump Structure

Legend:
- PROPOSED DEVELOPMENT
- PAGASVLEI
- MOUNT PROSPECT
- PROSPECT TER
- MOUNT PROSPECT
- BRINK
- OLIVE

ALL INFORMATION SHOWN MUST BE VERIFIED ON SITE BEFORE COMMENCING ANY PLANNING OR CONSTRUCTION.

Figure: 2

Proposed Development

Scale 1:2500

0 50 100 150 200 meters

CITY OF CAPE TOWN
VREKO TASEKAPA
STAD KAAPSTAD

Making process possible. Together.