

**PROPOSED VICTORIA MOTHER AND CHILD CENTRE  
OF EXCELLENCE HOSPITAL ON ERF 9194, PIETERMARITZBURG**

**BULK SERVICES REPORT AND STORMWATER MANAGEMENT**

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**1. INTRODUCTION**

Sukuma Consulting Engineers have been appointed to prepare a report on bulk service requirements for a proposed development comprising a Mother and Child Hospital, Staff apartments and Boutique Hotel, on Erf 9194, Pietermaritzburg, which comprises a sub-phase of the Victoria Country Estate.

**2. BULK SERVICES**

**2.1 Roads**

Access to the site is available off Peter Brown Drive. A traffic impact assessment is currently being undertaken to determine any road improvements/upgrading of Peter Brown Drive that may be necessary as a result of the proposed development.

**2.2 Water**

**2.2.1 Preliminary Design Criteria** in determining requirements were applied as follows:

- New hospital building – 147 beds @ 300ℓ/bed/day
- Boutique Hotel – 50 beds @ 200ℓ/bed/day
- 20 Apartments @ 600ℓ/unit/day

Based on the above the total daily demand is calculated at 66kℓ/day. Applying a peak factor of 4,0 the design peak demand is 3.52 ℓ/sec

**2.2.2 Domestic Water Supply**

Supply to the site is from an existing main in Peter Brown Drive which was upgraded to supply the then proposed Club House Village in approximately 2009. This water supply main tees off the existing A.C. main in the vicinity of the Link Road / Peter Brown intersection (opposite the Montrose Park Village entrance).

The design criteria at the time assumed a residual pressure of 5 Bar available at the tee-off point from the existing reticulation system which was adequate to supply the peak demand proposed at the time of 4,9 ℓ/sec which exceeds the demand for the current development proposal.

Based on this criteria therefore , the existing supply main to the proposed development has the capacity to supply the amended land use demand requirement.

### **2.2.3 Fire Supply**

The original fire design, prior to the revised land use proposal, indicated that twin pumping connections (twin boosters) would be required at the entrance to the development to boost the pressures within the development to achieve acceptable pressures at hydrants operating under fire conditions, in accordance with the applicable SANS 10400 (2011) standards for fire installation. This requirement will also need to be taken into account in the design of the internal fire protection.

### **2.3 Sanitation**

The development will connect a proposed waterborne sanitation network to an existing 160mm diameter dedicated outfall pipeline situated outside the northern boundary of the site.

## **3. STORMWATER MANAGEMENT**

### **3.1 Existing Stormwater Drainage**

The site is divided by a main watercourse which runs south - north through the centre of the site, and a minor watercourse which passes through the northwest portion of the site, both discharging onto the VCC Golf Course, which ultimately drains to the Town Bush Stream.

The natural catchment area to the South of the site feeding these watercourses is relatively small, measuring only approximately 16.7 Ha in extent.

The natural overland flow has been altered with the construction of the N3 Freeway to the South of the site, and Peter Brown Road adjacent to the site, the end result being that the entire catchment now drains to the central watercourse.

The minor watercourse to the West only conveys minor run-off from a small portion of Peter Brown Drive which discharges onto the site through a nominal 600mm diameter pipe.

### **3.2 Internal Stormwater Management**

#### **3.2.1 Existing watercourses**

- The minor watercourse to the West is unaffected by the development proposals.
- In order to accommodate the buildings and access roads proposed it will be necessary to extend the existing stormwater pipe culvert currently discharging into the central watercourse, along the alignment of the central watercourse to a point to be determined at preliminary design stage. Preliminary design proposals will be submitted for Local Authority approval as part of the design processes.

### 3.2.1 Stormwater Attenuation

Protection of receiving watercourses is a critical aspect in the design of **Sustainable Drainage Systems (SuDS)** . General principles which should be applied are:

- To ensure that wherever possible the frequency of discharge rates from the new development proposals is similar to that of the equivalent green-field conditions , and
- To ensure that wherever possible the frequency of volumes of runoff from the new development is similar to that of the green-field conditions

In applying the above principles , the Msunduzi Municipality requires that the volume of additional stormwater runoff generated by any change of land use through development shall be calculated for a 1:50 storm recurrence period at 30 minute storm duration , and shall be attenuated within the site , and released at pre-development flow rate.

Criteria applied and results of our analysis are highlighted hereunder.

### 3.2.2 Design Parameters and Calculations

Rational Method has been applied, using:

- Rainfall intensity of 165mm per hour
- Run-off coefficients as per tables below

	MAP =830	C	Grassland		Dense bush	
			%	c	%	c
Surface slope	Vleis and Pans (less than 3%)	0.05				
	Flat areas (3 to 10 %)	0.08	100	0.08		
	Hilly (10 to 30%)	0.16			100	0.16
	Steep	0.25				
Permeability	Permeable	0.08				
	Semi-permeable	0.15	100	0.15	100	0.15
Vegetation	Light bush	0.11	20	0.022		
	Dense bush	0.04			100	0.04
	Grasslands	0.21	70	0.147		
	No vegetation	0.28	10	0.028		
				<b>0.43</b>		<b>0.35</b>

**Table 3.2.2: Flows and attenuation**

AREAS	Run-off co-efficient	AREA ( m <sup>2</sup> )		Q 50 (Intensity = 165mm/hr)	
		Pre-Development	Post Development	Pre-Development	Post Development
Roof areas	0.85	0	7100	0.000	0.277
Hardened areas, paving and driveways	0.85	0	8400	0.000	0.327
Dense bush	0.35	8575	4287.5	0.138	0.07
Grassland	0.43	15925	4712.5	0.314	0.093
<b>Totals</b>		<b>24500</b>	<b>24500</b>	<b>0.451</b>	<b>0.766</b>
Difference (m <sup>3</sup> /sec )				<b>0.3141</b>	
Attenuation required for 30 minute storm (cubic metres)				<b>282.7</b>	

### 3.2.3 Attenuation Requirements

Table 3.2.2 above indicates that on – site stormwater runoff attenuation of approximately 300 cubic metres would be required to satisfy municipal criteria, for the proposed development.

During development of preliminary designs, measures will be investigated to assess options available to achieve the above requirement.

Due to the nature of the development and the site options are generally limited and it is envisaged that criteria will be achieved mainly through a combination of :

- Shallow attenuation within parking areas
- Construction of underground attenuation chambers

Detailed proposals will be incorporated into final architectural and engineering designs for the project , and will be developed utilising The South African Guidelines for Sustainable Drainage Systems ( WRC Report TT558/13 – May 2013)