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SPEKBOOM TOWNHOUSE COMPLEX: ERF 3279 AND 3280 HUMANSDORP

QUEEN STREET SEWER PUMPSTATION CAPACITY ASSESSMENT JULY 2024

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1. Introduction

Uhambiso Consult (Pty) Ltd was appointed by Johan Britz, on behalf of the developer of Spekboom Townhouse Complex, to undertake a capacity assessment of the existing Queen Street sewer pumpstation and rising main. This investigation aims to assess whether these facilities can adequately accommodate the drainage requirements of the proposed Spekboom Townhouse Complex development. The development is situated on Erf 3279 and 3280 in Humansdorp, which falls under the jurisdiction of the Kouga Local Municipality.

The scope of the assessment is only to determine the capacity of the pumpstation and rising main and the design sewer flow expected to flow to said pumpstation. The scope does not include a condition assessment of the existing infrastructure or a capacity assessment of the gravity reticulation to the pumpstation, or after the rising main to the Waste Water Treatment Works.

2. Development Location and Extent

The proposed development on Erf 3279 and 3280 is located south of Kort Street, Humansdorp, running parallel to R330, as indicated in Figure 1 below.

Figure 1: Erf 3279 and 3280 Locality Plan

The proposed development comprises the construction of a townhouse complex on Erf 3279 and an apartment complex on Erf 3280, totalling 194 units as indicated in Table 1 below.

Table 1: Proposed Development on Erf 3279 and 3280

	Bedroom	Bathroom	Sqm	Quantity Units	Est No. of persons
Home Type A	3	2	60	29	131
Home Type B	2	1	50	37	130
Apartment Type A	3	2	60	16	72
Apartment Type B	2	1	50	72	188
Apartment Type C	1	1	40	40	60
			Total	194	581

Figure 2: Layout Plan of Proposed Development on Erf 3279

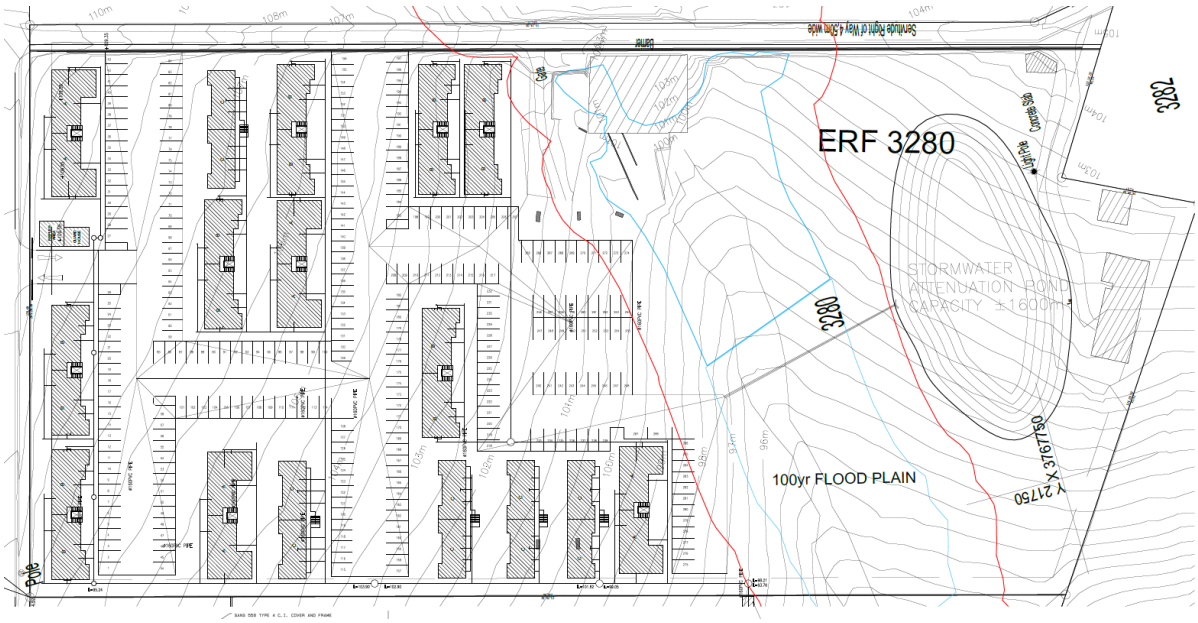

Figure 3: Layout Plan of Proposed Development on Erf 3280

3. Sewerage

3.1 Design Standards

The following design standards were used:

- The Neighbourhood Planning and Design Guide ("The Red book"): CSIR, 2019;
- Kouga municipal design requirements;
- SANS 1200 series for civil engineering;
- South Africa Water Quality Guidelines Volume 1: Domestic Use, DWAF, 1993;
- Nelson Mandela Bay Municipality Sewer design requirements.

Following consultation with the Kouga Municipality's Water and Civil Services Manager, Andre Botha, and a comparison of the calculated flows with the measured flows of the 2015 Humansdorp Sewer Master plan, the design requirements of the Nelson Mandela Bay Municipality (NMBM) were selected as the basis for the capacity assessment.

3.2 Pre-development Sewage Flow

The figures indicated in Table 2 below represent the theoretical flow values for the existing number of connections to the Queen Street pumpstation, prior to the Spekboom development. Unit flow values and peak factors indicated are based on the NMBM sewer requirements, unless indicated otherwise.

Table 2: Pre-development sewage flow

Land Use	Units	m^3/Unit/d	m^3/d
Medium Density Residential	109	0.625	68.125
Low Density Residential	19	0.75	14.25
Cluster Housing - High Density	17	0.4	6.8
Businesses / Commercial*	9	0.052	0.468
Number of persons =			745
Harmon Peak Factor =			3.8
Peak Dry Weather Flow (PDWF) (l/s)=			**3.94**
Peak Wet Weather Flow (PWWF) (l/s)=			**7.89**

*Commercial flow estimated using flow figures from the Red Book

3.3 Post-Development Sewage Flow

The figures indicated in Table 3 below represent the theoretical flow values calculated following the completion of the Spekboom development and connection to the Queen Street pumpstation. Unit flow values and peak factors indicated are based on the NMBM sewer requirements, unless indicated otherwise.

Table 3: Post-development sewage flow

Land Use	Units	m^3/Unit/d	m^3/d
Medium Density Residential	109	0.625	68.125
Low Density Residential	19	0.75	14.25
Cluster Housing - High Density	17	0.4	6.8
Businesses / Commercial*	9	0.052	0.468
Cluster Housing - Medium Density	66	0.4	26.4
Flats - Low Density	128	0.4	51.2
Number of persons =			1326
Harmon Peak Factor =			3.718
Peak Dry Weather Flow (PDWF) (l/s)=			**7.20**
Peak Wet Weather Flow (PWWF) (l/s)=			**14.39**

*Commercial flow estimated using flow figures from the Red Book

The proposed development will increase the Peak Dry Weather Flow by 3.26 l/s to a total of 7.2l/s. This will be transported to the Queen Street pumpstation through a combination of gravity and pumped sewer mains as part of the proposed development.

3.4 Existing Sewage Infrastructure and Capacity

The Queen Street pumpstation is located off Queen Street, Humansdorp. It collects the sewage in the centre of town and pumps it to the manhole on the watershed, from where it gravitates to Kwanozamo Waste Water Treatment Works.

The pumpstation comprises of two sumps with a plastered building on top of the older sump. The older sump is unused. The pumpstation has been vandalized and the Kouga municipality intends to reinstate Mechanical and Electrical components of the pumpstation.

The pumpstation and 625m long, 160mm diameter rising main is shown in Figure 4 and 5 below.

Figure 4: Existing pumpstation and rising main

Figure 5: Existing Queen Street Pumpstation – Site Investigation 3 July 2024

Flash Electrical in Humansdorp in collaboration with Northfield Engineering from Gqeberha, confirmed the pump that will be reinstated to be a Gorman-Rupp V3A-B pump, running at 2000 – 2050 RPM.

The static head of the pump system is 26.65m. The pump and rising main produces the pressure/flow curves indicated in Figure 6 below, resulting in a duty/operation point of 53.9m3/h (or 15 l/s) at a total pumping height of 28.8m. Flow at 15 l/s results in a velocity of 0.74 m/s in the rising main, the rising main therefore has spare capacity and flow can be increased to 30 l/s which will result in a velocity of 1.5 m/s.

The pump delivery of 15 l/s is slightly more than the forecasted peak weather flow of 14.39 l/s. This shows that the pump capacity is too low for safety to prevent possible over spills during extreme wet weather.

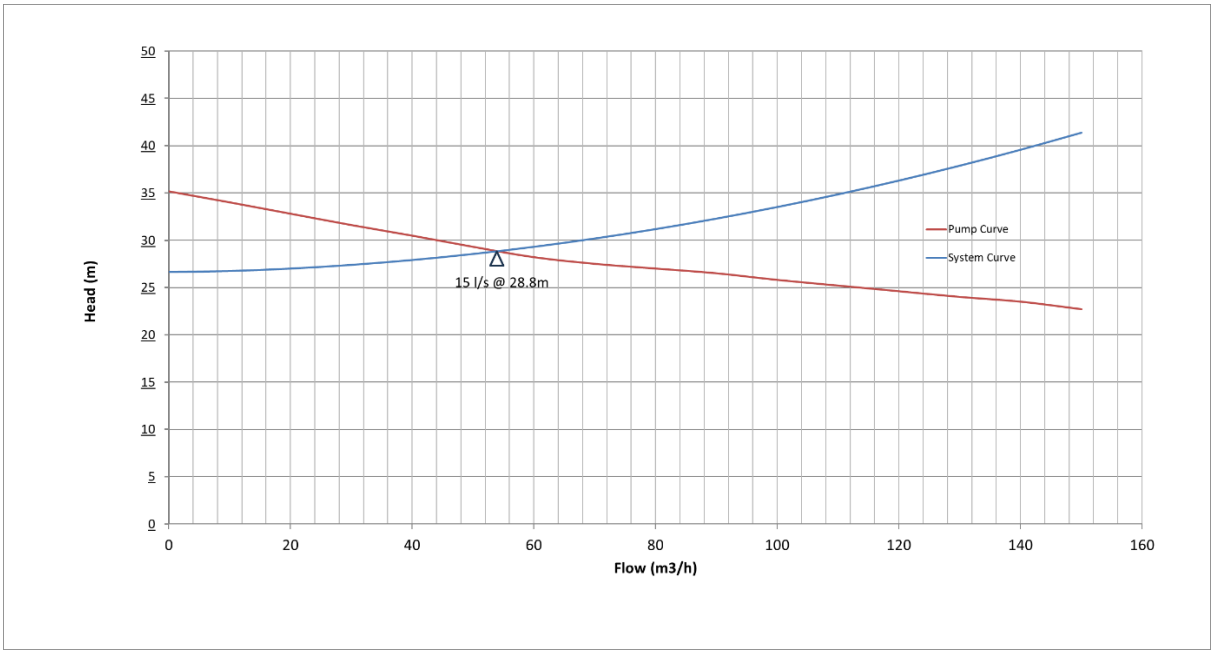

Figure 6: Pump and System Curve

Due to the condition of the Queen Street Pumpstation, the depth of the sump could not be determined and therefore the number of times that the pump would switch on and off during normal operating conditions could not be ascertained.

4. Conclusion and Recommendations

The proposed pump system has adequate capacity to convey the post-development peak dry weather flow.

The pump delivery is only marginally more than the forecasted peak weather flow. This shows that there is no sufficient margin of safety and that the pump capacity is too low to prevent possible over spills during extreme wet weather conditions. It is recommended that a larger pump be considered due to the lack of standby capacity.

Should Kouga Municipality proceed with the proposed installation, it is recommended that telemetry systems are installed to monitor the inflow to the pumpstation as well as the pump operation hours, during both dry and wet conditions to determine the suitability of the pump station for the sewage system.