

CIVIL ENGINEERING SERVICES REPORT

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PROVISION OF MUNICIPAL SERVICES TO SLOVO PARK INFORMAL SETTLEMENT

SERVICE PROVIDER:

CLIENT:



human settlements
Department of
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EXECUTIVE SUMMARY

Free State Department of Human Settlement has identified a need to assist Masilonyana Local Municipality (MLM) with the technical capacity to address some of the key function of local government. This include the establishment of Township in Brandfort with Slovo park being the targeted spatial location. This proposed township is located in close proximity within a renowned of Majwemasweu Township.

As part of the township establishment and to commence with the process of establishment of such developments, Free State Department of Human Settlements has commissioned Vexocom (Pty) Ltd to commence with a study to determine the feasibility thereof.

This report is part of the series of studies which address the infrastructure needs and capacity within the municipality which have bearing on the establishment of the proposed townships. The report addresses civil related infrastructure regarding supply and demand for residential, industrial and business with regards to water and sanitation (sewer network) as well as future capacity pertaining to the proposed township development within MLM. Essentially, it attempts to answer whether the current civil infrastructure would be adequate to cater for the fully developed Slovo park residential area.

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Appendix 1: Proposed Slovo Park Township Development

List of acronyms and abbreviations

WWTP	Waste Water Treatment Plant
AADD	Average Annual Daily Demand

1. Introduction

The proposed area of development consists of approximately 2000 erfs in total, which cover a total of 126ha. The erfs are distributed as follows;

Slovo Park (residential: 1826 erfs: 55.2ha, businesses 8 erfs: 8.2ha, crèche 3 erfs: 1.7ha, primary school 1erf: 3.2ha, secondary school 1erf: 5.5ha, churches 4erfs: 4.4ha, special 3 erfs: 2.6ha, municipal 1 erf: 0.7ha, undetermined 9erfs: 3.2ha and open public spaces 10 erfs: 11ha).

The purpose of the civil engineering services assessment is to determine the availability and capacity of existing bulk services with a view to servicing the proposed development. This report presents the findings of a preliminary desktop investigation relating to bulk services, and further sets out the criteria and standards for the internal services.

The engineering services addressed in this report are the following:

- Potable water
- Sanitation
- Roads
- Stormwater management

2. Background

Slovo Park is an informal settlement in Brandfort that has sprouted over the years due to the shortage of housing. It is in the peripheral of Brandford town, and in Majwemasweu Township in particular. Masilonyana Local Municipality has taken the executive decision to formalise this area and provide municipal services to the residents. In this regard the provincial government through the Department of Human Settlements has made an initiative to assist the municipality to accelerate and finalise the process. As such Vexocom (Pty) Ltd was appointed by Masilonyana Local Municipality Department of Human Settlements to undertake the preliminary assessment of the potential to provide services to this development.

3. Site location

The Masilonyana Local Municipality Offices are situated in Theunissen, in the eastern part of the Lejweleputswa District Municipality of Free State Province. Brandfort. It is a small agricultural town in the central Free State province of South Africa. The nearest city is Bloemfontein, Brandford is about 60 km northeast of Bloemfontein. The geographical co-ordinates for the proposed township are as follows:

Slovo Park Latitude: 28°41'29.19"S

Longitude: 26°26'36.92"E

Figure 1 below shows the proposed township.

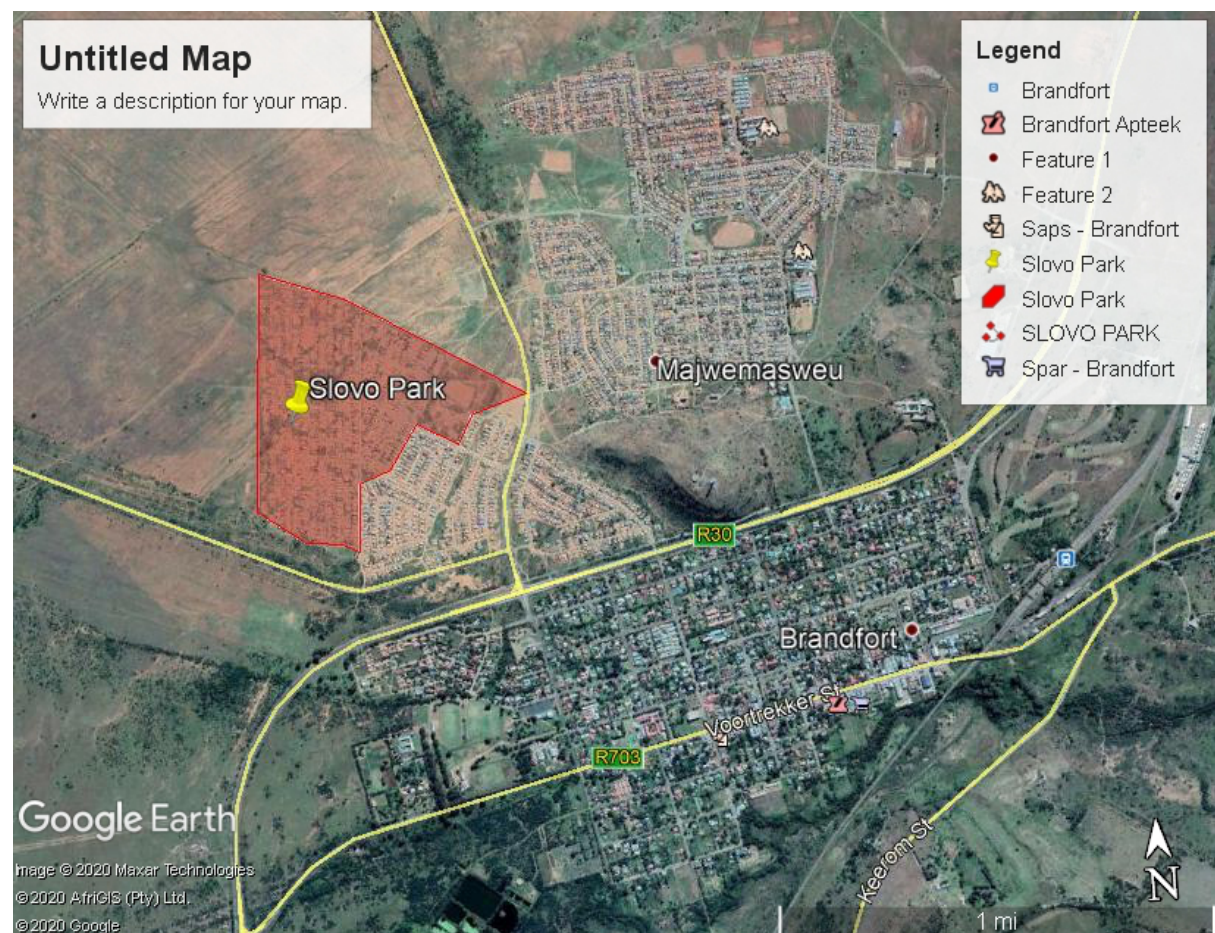


Figure 1: Locality Map of Slovo Park

The physical characteristics of the site can be summarized as follows:

- The area of the site is approximately 126 hectares.

- The site is currently occupied by informal settlements which need to be formalised for the dwellers.
- A geotechnical investigation has not been undertaken yet so the geology of the site is not known determined.
- Topographically, the site is a flat land.

4. Design Criteria

The following guidelines and references were used as the basis for the assessment of roads, storm water, water, sewage and solid waste services for the development:

- The “Guidelines for Human Settlement Planning and Design compiled under patronage of the Department of Housing by CSIR Building and Construction Technology” and the Municipality’s generally applied standards, or any such standards as may be required by a provincial or national authority where applicable.”, both hereinafter referred to as “The Guidelines”.
- SANRAL drainage Manual, 6th Edition (October 2013).
- Guidelines for Human Settlement, Planning and Design” (Red Book), published by the Building and Construction Technology Division of the CSIR; and
- South African Bureau of Standard (SANS1200) – Standardized Specialization for Civil Engineering Construction.
- Technical Recommendations for Highways (TRH4) – Structural Design of Flexible Pavements for Interurban and Rural Roads

5. Bulk Services

The availability of bulk services is governed by various factors. The main factors relate to future demand and actual implementation dates of approved land-uses. The sourcing of sufficient funding to finance bulk infrastructure for low cost housing projects poses an ongoing challenge. The implication is that even though Council may have approved a particular land use application, a Services Agreement must be concluded between the Masilonyana Local Municipality and the Developer that sets out the services requirements in detail, responsibilities for the provision of the various

services, the implementation and funding thereof. Please note that information on bulk and link services may change during a long application and approval process.

However, no development may connect to the municipal system unless the necessary bulk and link services are in place.

5.1 Bulk Water Supply

5.1.1 Estimated Water Demand

The bulk water supply from Sedibeng Water – project is one of the regional bulk infrastructure Grant (RBIG) projects currently being implemented in the free state with funding from the Department of water and sanitation (DWS). Currently water treatment works refurbishment is being considered for approval by MIG/GOGTA, Reservoir storage capacity is 7.6ML. The estimated Annual Average Daily Demand (AADD) for the proposed development is based on the design criteria from the Red Book Vol 2, as follows in Table 1 and 2:

Table 1: Water Demand Calculation for the Slovo Park Development

Estimated Water Demand for Slovo Park						
Planned Infrastructure						
Type of Development	Unit	Demand (l/Day)	GFA	Total Demand (l/Day)	Total Demand (kl/Day)	Total Demand (Ml/Day)
Residential	1826	600	551725	1095600	1095.60	1.096
Business	8	400	82217	3200	3.20	0.003
Schools	5	1000	86237	5000	5.00	0.005
Church	4	2000	44111	8000	8.00	0.008
Municipal	1	2000	0.7	2000	2.00	0.002
OPS	10	15000	109961	150000	150.00	0.150
Total				1263800	1263.8	1.2638

5.1.2 Internal Water Supply

It is proposed that the new networks will be connected to the closest existing bulk line if there is enough pressure at the connecting point. Alternatively, a connection will be made to the new bulk line that is planned for the area.

It is recommended that the internal water supply system should comply with the following criteria:

- Metered connection to each unit.
- AADD: 600 l/d per unit for the residential areas.
- Internal pipes will be sized to cater for the instantaneous peak demand and fire flow. The relevant peak factor is dependent upon the number of units served.
- Network: Minimum 50mm uPVC pipe.
- Minimum residual pressure: 2.5bar for fire and 1.5bar for stand pipes and units.
- Pipe materials: Mains – uPVC/12 or similar; Erf connections – 20 mm Class 16
- Pipe class (pressure rating): dictated by static water pressure (likely class 12).
- Isolating valves – Position and type to comply with municipal standards.
- No valve to be installed in road surfaces.
- Fire flow: Fire hydrants, spaced maximum 240m apart.
- Minimum flow rate = 8.33 l/s per hydrant.
- Minimum residual head = 6m.

5.2 Bulk Sanitation

Sewage from the proposed development will be treated at the nearby WWTP.

5.2.1 Sewerage Flow

Sewer flows are based on the design criteria from the Red Book Vol 2 as 500l/day/du for low-income housing.

Table 2: Estimated Sewer Discharge for the Slovo park Development

Guidelines for Human Settlement (Sewerage) Treatment Plant	
Daily Water Demand for Slovo park = 1263(kl/day) x 60%	758
Add 15% Allowance for Extraneous Flow (kl/day) = 758 x 1.15	871.7
Estimated Extra Daily Sewerage Flow to Treatment Plant (kl/day)	872

The following criteria were used in arriving at the figures as outlined above, namely:

- 60% of water usage transformed into sewerage.
- 15% added for extraneous flow

5.2.2 Sewerage Infrastructure

No existing bulk sewer services exist for the site. The development will therefore require the construction of gravity sewer links. These lines will be combined with existing line drains to the WWTP in Brandfort.

It is recommended that the sewerage system should comply with the following criteria:

- Design flow: 500l/d/du
- Pipe material: uPVC
- Pipe sizes: Network - Minimum 160mm dia.
- Erf connections: 110mm diameter
- Minimum gradients: Drains (erf connections) - 1:120 Sewers - 1: 200
- Pipe lengths: Maximum 100m between manholes.
- Pipe cover: 1.4m below roadways / footways; 0.6m elsewhere.

5.3 Stormwater Management

The guiding principle underlying the stormwater management strategy is that, where possible, the peak runoff from the post-developed site should not exceed that of the pre-developed site for the full range of storm return periods (1:2 to 1:50). Where possible, measures should be incorporated into the site development plan to attenuate the post-development flows to pre-development rates.

Stormwater concentration will be avoided at all costs using a surface drainage mechanism. It is proposed that these developments will have surface drainage from the roads with slopes similar to that of the receiving ground. Stormwater from the road will be guided by cross fall and longitudinal slope toward a discharge point, catered for by dropping the kerb as required.

Underground stormwater pipe system will only be considered as a worst case if the ground slopes and the urban plan do not allow for ground drainage. If required, the system will have to collect water from all the streets and direct it to the lowest point of the whole development where it will then be sent to the nearest stream.

It is recommended that the stormwater system should comply with the following criteria:

- Return Periods: 1:2 to 1:100
- Pipe material: Concrete
- Pipe sizes: Network - Minimum 450mm dia.

5.4 Roads and Access

Slovo park informal settlement has gravel roads. It is proposed that the roads be upgraded to cater for the residents in the area as well as provision of public transport facilities. There is also a need to create main access roads that will link the development's road network to the main roads (R703) and also connecting roads to the Majwemasweu area.

It is recommended that the internal roads should comply with the following criteria:

- Min centreline radius: 15m (widening at bends where appropriate).
- Min kerb radius: 8 – 10m.

- Longitudinal gradients: 0.5% (min) and 12 – 16% (max).
- Vertical curve min length 20m.
- Cross fall / camber: 2 – 4%.
- Road width: 6m (3m lane in each direction)
- Design speed: 40km/h
- Surfacing: Concrete Block paving (Subject to municipal approval).
- Layer works: Dictated by geotechnical investigation and municipal standards.
- Provision for public transport infrastructure and amenities as required by the municipal bus public transport service

5.5 Conclusion

The report serves the purpose of providing, to the Client, the *status quo* regarding bulk water supply, bulk sanitation, stormwater management and roads around the Slovo park Informal settlement as well as future water, sanitation demands with its subsequent influence on existing infrastructure resources in Brandford.

The portable water supply from Sedibeng water is currently underway, the project seeks to upgrade the pipeline, booster pump stations and reservoirs from Sedibeng water. Currently Reservoir storage capacity is 7.6ML and the demand for Slovo park is 1263.8kl(1.3ML) therefore the reservoir will be able to handle the development.

MLM has an existing WWTW with a current capacity of 2.4MI/day which services Brandford and a few other areas, the plant is also under refurbishment with the intention to keep the capacity as it is. The proposed Slovo park development has an estimated contribution of 827kl/day (0.827MI/day). It is therefore concluded that there is sufficient capacity to accommodate the development.

Appendix 1: Proposed Slovo Park Township Development