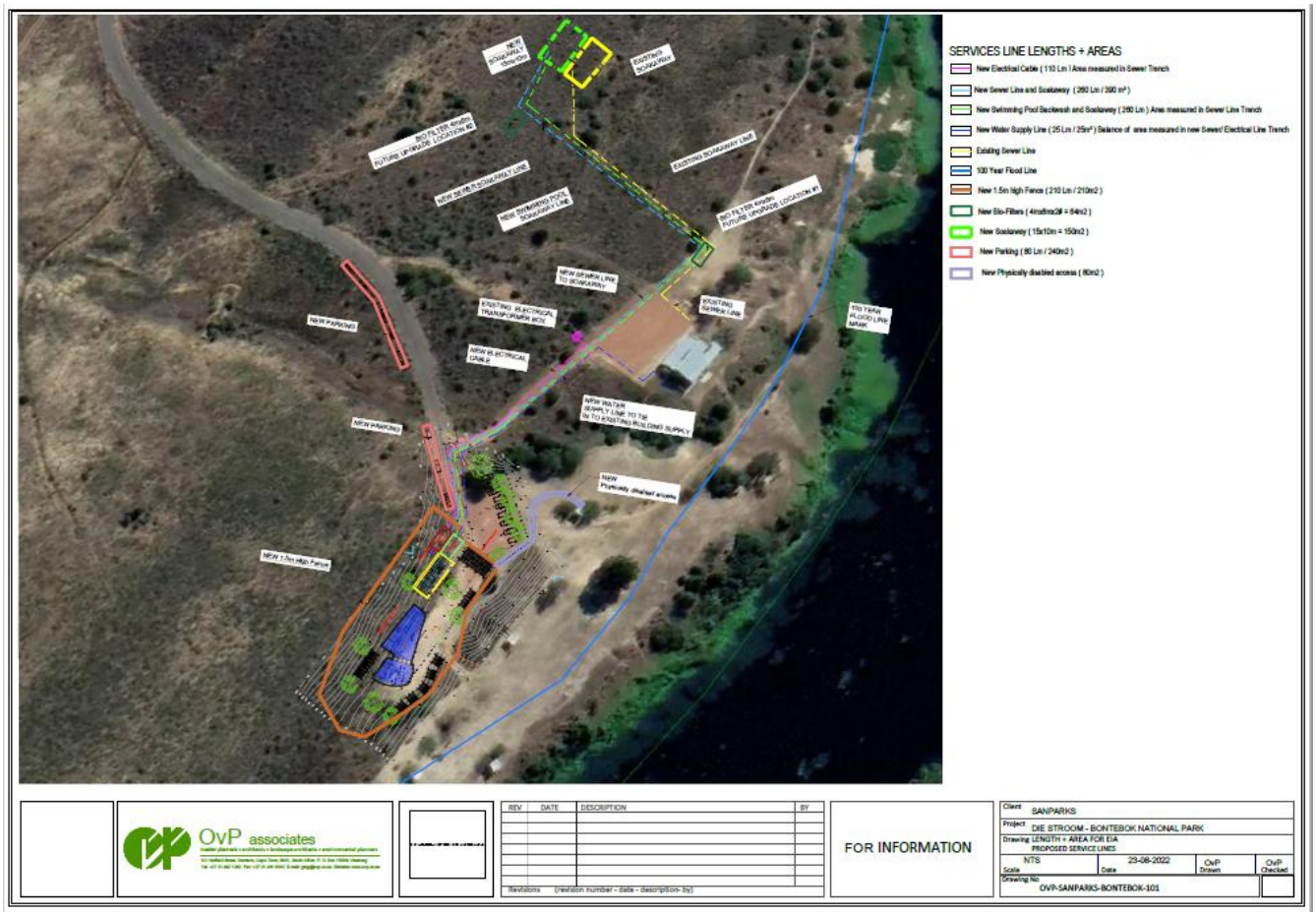
BONTEBOK NATIONAL PARK

SERVICES FOR SWIMMING POOL DEVELOPMENT AT DIE STROOM IN BONTEBOK NATIONAL PARK

1. BULK SERVICES

LAYOUT



2. AREAS FOR DEVELOPMENT

New Proposesd areas

- Pool Backwash tank slab = 15m^2 for 5000L JoJo Tank
- Septic tank and Pump chamber = 40m^2
- Pool pump room = 40m^2
- Ablutions/Shower/Change Area = 105m^2
- Swimming Pool = 315m^2

- Terrace less Pool = 1115m^2
- Fence = 210 LM
- Physically Disabled Ramp =80m^2
- Parking = 240m$_2$

New Services Areas

- Electrical Cable = 110LM (Area measured in sewer trench calculation)
- Sewer line /Soak-away = 260LM (Area = 390m^2)
- Pool back-wash and soak-away = 260LM (Area measured in sewer trench calculation)
- Water supply line = 25LM (AREA 25m^2) (Balance of Area measured in sewer trench calculation)
- Soak-away = 150m^2
- Biofilter = 64m^2

NOTE!! All services will be installed in previously destirbed pathways/road reserves and should the required cover not be achieved, concrete encased service dutcs will be installed.

TOTAL NEW DEVELOPMENT AREA = 2899 m^2

3. EXISTING AREAS

- Existing Road = 592m^2
- Existing Parking = 385m^2

Only maintenance work will be conducted on the existing road and parking area

TOTAL EXISTING ROAD and PARKING AREA = 977 m^2

4. WATER

Municipal Potable water is available on site. A new supply pipeline will be connected to the existing line which will supply the new development with pressurised water.

The new water reticulation system will consist of the Supply and Installation of:

(i) new 63mm Ø HDPE main pipeline from existing water supply pipeline

(ii) new House connection with water meters for the Swimming pool development.

Water Demand;

- 1 swimming pool (+- 350m^3) – will be filled over a couple of days
- Swimming pool water top-up and Backwash per day +- 1500L/day

- Swimming pool facility: 25-40L/person/day x 100 people = 4000L/day
- Irrigation of Lawns +-2000L/day

Total daily Water Demand = +- 7500L/day

5. SEWERAGE

All sewerage and grey water effluent from the Swimming Pool development, will be diverted to a new septic tank with a pump-sump from there the grey water will pump and dispersed to a Biofilter treatment plant and then pumped to a soak-away system.

The new sewage system will consist of the Supply and Installation of:

(i) new 110mm Ø uPVC pipeline from each building and between manholes up to the Septic Tanks
(ii) new 110mm Ø uPVC pipeline for grey-water from showers and wash-hand basins to the pump sump.
(iii) Construction of new Septic tank with Pump-sump and.
(iv) Installation and commissioning of sewer pumps.
(v) Installation of Biofilter Treatment Plant.
(vi) Installation of additional Soak-aways.

The new sewage system will consist of the following treatment phases.

Primary Phase Separation via septic tanks.

The septic tank allows for the gross removal of organic material by settlement and anaerobic oxidation. The septic tank makes provision for the accumulation of this material and has design features incorporated to ensure that this activity does not cause unnecessary blockages across the tank.

All septic tanks do require servicing and desludging at some stage since the rate of sludge accumulation exceeds the slow growth rate of the anaerobic bacteria and hence their capacity to break down organic material.

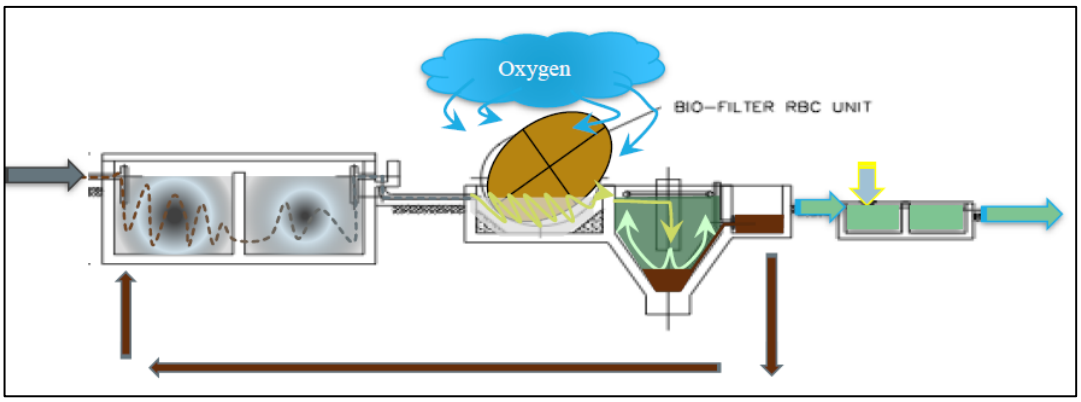
• The black water from the septic tank is then pumped to the RBC stage where further organic reduction and ammonia nitrification is achieved under aerobic conditions. The aerobic conditions are achieved by the rotation of the disc/s, on which the micro-organisms are attached and growing, at a low speed of approximately 3 to 4 RPM. The discs are manufactured from a polyurethane base and are 2m diameter discs assembled onto a 60mm steel shaft. The discs are high density and impermeable, and tend to float in the RBC basin, reducing the load imposed on the shaft.

Secondary Phase Separation via RCB (Settling)

- A secondary settling tank, or humus tank, is required for the collection and removal of surplus bacteria that is removed from the discs by the rotating action of the discs in and out of the water. The design utilises the standard Dortmund type tank for this application. The collected humus is returned to the septic tank for anaerobic digestion, eliminating the need for sludge drying beds on site. A small desludge pump of approximately 0.35kW is provided for this purpose.

Tertiary Phase Separation via RCB (Disinfection)

Since pathogenic bacteria are not removed by the micro-organism population generated in any sewage treatment process by any adequate degree, a tertiary disinfection stage is typically deployed to eliminate the potentially disease forming bacteria. Provision has been made for disinfection (sodium hypochlorite dosage recommended).



Basic Biofilter Treatment Plant operation

Disperse of treated water

The treater water will disperse into a soak-away system. The KayTech Infiltrator® Chamber is a pre-manufactured open underground unit that acts as a direct replacement for wastewater attenuation. Once construction begins Permeability testing on the soil will be caried out for measuring the rate at which water flows through the soil and the amount of KayTech Infiltrator® Chamber will be determined.

Typical installation of the The KayTech Infiltrator® Chamber

Discussions on other types of Sewer treatment Options

- **Conservancy Tanks**

  This option was not evaluated since the Park is not in the possession of the correct equipment or staff to carry out such duties.

  Long lead times to liaise with Municipalities to carried out honey sucking operations.

- **Municipal Sewer connection**

  This option was not viable/cost effective as the disturbance in the park would have a big impact on the environment (+- 2.9km from Die Stroom to Municipal sewer Connection point).

Sewerage production and Treatment;

- 100 people/day x 40L/person/day = 4 000L/day x 85% = 3 400L/d
- Septic Tank Size = 3,6m x 2,1m x 1,5m = 11,34m^3 = 11 340L (3 days Retention).
- Biofilter Treatment Plant (10KL/day plant)

SWIMMING POOL BACKWASH

All Back-wash water generated from the swimming pool will be diverted to a 5000L Prefabricated/Plastic tank which will allow for suspended solids to settle out before pumping it to a separate Soak-away system.

6. ELECTRICITY

Transformer and load CB

The current Eskom power supply is 50KVA.3k3 step down to 400V, the current load will be adequate for the development. .providing 3 phase -80 Main breaker at transformer and 63A 3 phase at pool precinct Main DB and 40 A at sub DB for ablution single phase

Routing

Current infrastructure will be upgraded to accommodate the area selected. Cables will be installed next to the. Road in trenches supplying a DB at the pool /pump house [Main DB] as listed
Contusing reticulation to the ablution facility and supply power to walk ways and parking /pool areas [Bollards] as required.

Cable and trenching

The required trenching at a cable depth of 900mm with relevant danger tape accompanying the cable at 600mm.and BCE wire relevant to the cable reticulation [no cable joints allowed in this reticulation [LV]

DB Boards Main and Sub DB board and cabling

The main reticulation from the transformer LV to terminate into the pool room for the pump and equipment. Out of the Main DB it will reticulate to the Ablution facility out wall mounted Sub DB that will provide lights for the ablution and outer lights [garden pool and walk ways]

Type of cable

BLACK PVC/SWA/PVC/Cu 600/1000V Multicore cables to SANS 1507 (TYPE P1)

1. 25mm² - 4 core SWA - BCE wire – 16 mm²
2. 16mm² - 3 core SWA - BCE wire – 6 mm²
3. 6-4mm² - 3 core SWA/ Norflex Surfix - BCE wire – 2.5 mm²

Outer lights

Bollards pool and walkway lights mounted lights will be along the road side at 10-20m intervals.

7. ROADS AND PARKING

Two areas were identified for upgrading;

1) New Parking 240m² - 12 parking bays **2) Existing Road and Parking 977m² - 9 Parking Bays**	

7.1 New Parking

New parking area with 12 bays will be established on the western side of the asphalt access road. It will be parallel parking and the surface material will be gravel.

Current condition:

- Gravel road shoulder with encroaching veld.
- No notable stormwater problems

Proposed works:

- Gravel surface.
- 1.8m wide and 74m long parking.
- 200mm imported gravel.

7.2 Existing Road and Parking

No new road and parking infrastructure is being planned in this area. Only maintenance work will be conducted on the existing road and parking area direct south of the asphalt access road end.

Current condition:

- Gravel road and parking
- No notable stormwater problems

Proposed works:

- Wet blading with patch imported graveling.

7.3 Existing Road Culverts

Google Map1: Area layout indecating possistion of pipe culverts and survace run-off.

Photo 1: Pipe culvert condition.

Pipe A
300mm dia concrete pipe culvert under asphalt road. The asset condition is classified as Good to Very Good.

Pipe B
600mm dia concrete pipe culvert under gravel road. The asset condition is classified as Good to Very Good.

The new proposed cable and pipeline infrastructure will only traverse the existing pipe culvert B. The planning is that the new services will cross the culvert between the two

headwalls above the pipe. It can be conformed that the culvert will be completely functional during construction and ifs current capacity and function will not be affected

The sizes of the existing pipe culvert A & B are adequate to accommodate the current surface run-off; the new development is downstream from the culverts and will not add to the current volume.

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