GREY AND BLACK WATER SYSTEM REPORT

RADISSON SAFARI LODGE DEVELOPMENT

THE KRUGER NATIONAL PARK
1. **Background:**

Malelane Safari Resort Investments (Pty) Ltd. is developing a 120-key tented lodge/hotel close to Malelane in the Kruger National Park. The hotel will be managed by a world class hotel operator with construction expected to start in 2015 on completion of the EIA, building design, construction planning and financial close.

The proposed hotel boasts a truly unique location in the Kruger National Park with the Crocodile River bordering the concession.

The developers would like to enhance the environmental sustainability of the property and highlight its “green credentials” as these will play a significant role in positioning the venue in the marketplace. Consequently, the developers will design and manage the hotel with these objectives in mind: Energy and water supply will be operated at world class efficiency levels while the use of renewable energy – to the largest extent possible - will be given priority over thermal resources.

The purpose of this memo is to outline what Utility Value Engineering believes is the optimal Potable Water solution for the project in terms of system design, operational performance, overall sustainability and cost.
Project brief

Grey and black water collection and treatment infrastructure:

The system is based on gravity transport from each platform to collection tanks concrete or prefabricated for underground collection.

Grease traps are installed where standard UG pipe are required, systems with junction, traps and rodding eye of 50 – 75 – 110 and 160mm will be installed to match the disposal rate.

Due to the land topography a number of collection tanks will be required.

The water will be transferred from the collection tanks to 2x 20kL holding tanks from where final transfer is made to the balancing concrete tank at the sewerage treatment plant.

The sewerage treatment plant operates with a steady intake and continuous flow of organic matter and oxygen for the organic process to conclude with clear water, no smell and any contamination treated with final OZONE radiation.

The plant terminates with a 100kL holding tank for waste water suitable for irrigation, car wash, cleaning etc.

The quality is suitable for return to natural water courses if not used.
Dear Gunther,

Thank you for your valued enquiry and we have pleasure in providing our quotation for your perusal and consideration. Bio Sewage Systems are proud of our many successful installations throughout Southern Africa and are constantly seeking ways to improve our products to suit the market.

We hope we have interpreted your requirements accurately and avail ourselves for any queries you may have in this regard.

1. Scope of supply

With the data provided to ourselves, we recommend the BioBE 60, a pocket waste water treatment plant capable of treating up to 60,000 litres per day assuming a constant flow over a 24-hour period. The installation of this system will require a concrete plinth of 7,000mm x 13,000mm (supplied by others).

The system comprises of 2 banks of 3 off 10,000lt bioreactors aerated by 2 off 0.75KW pumps per reactor, 2 off 5000lt canter to separate suspended solids and 1 off 10,000lt sterilisation/irrigation tank per bank, prior to discharge through 1 off .75KW centrifugal pump connected to the sterilisation tanks.

The raw effluent will be brought into the system inlet from the new flow equalisation tank, suggested size 4000mm X 8000mm X 2500mm at invert, (to be constructed by others) by means of a 0.75kw submersible sewerage pump, (one duty and one standby) by a 50mm CL6 uPVC or 50mm CL6 HDPE pipe (submersible pump, electrical cables & pipe work to be supplied by ourselves). Final polishing will be by means of a 0.66 kw Ozone Sterilisation System, rendering the entire process chemical free, accommodated within the sterilisation tank.

A 50Hz/380V three phase power supply in the form of 4-core armoured cabling with earth will be provided to the plant (By others), to operate 1 off 0.75KW submersible sewerage pump, 12 off 0.75KW aeration pumps, 1 off a 0.66kW ozone sterilisation unit and 1 off 0.75kW irrigation pump (electrical control panel to be supplied by ourselves). A water supply must be within reach to allow initial filling of the plant as well as for routine cleaning and servicing of the treatment system.

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**Directors:** L. Du Casse, J. Reicofse | **Company registration number:** K2011/00524/07

*Our General Conditions of Supply form an integral part of this quotation. They are binding in all respects unless otherwise expressly agreed upon in writing.*

*Special conditions of the purchaser*, which are contrary to these conditions of supply, are only valid if accepted in writing by ourselves.
2. Commissioning, Operation and Maintenance

The operational cost of a BioBE Waste Water Treatment (WWT) system is very low considering the fact that the only moving parts are the pumps. Once installed, the system will take some time to establish a good level of biomass, the bacteria which contribute to the biological treatment process. Depending on volume, nutrient loading and effluent chemical & biological toxicity, this may take anything from 3 – 4 weeks.

From a maintenance perspective, we would require that an operator inspects the plant at least once a week in order to ensure that the pumps are functioning correctly.

Should any of the pumps fail, these are very easily replaced by shutting off a stop cock on the pump and replacing the pump, which should take an artisan no more than 30-minutes. The pumps utilised are extremely robust and designed for continuous use in an application such as this. These plants have been specifically designed to operate in rural areas under difficult conditions however one must understand that as with any installation, maintenance must be undertaken to ensure the optimum operation of a system.

3. Description of the proposed packaged waste water treatment plants

The system consists of a combination of anaerobic, anoxic and aerobic reactors to achieve an effluent low in dissolved organic compounds as well as low total nitrogen content.

**Anticipated final effluent quality:**

- COD: <75mg/l
- Ammonia Nitrogen: <5mg/l
- Nitrate Nitrogen: <5mg/l
- Faecal coli forms: 500/1000ml (Only if sterilised)
- pH: <8.5

Bio Sewage Systems undertakes to ensure that effluent quality will meet the required specification within 6 weeks of installation and will maintain these values within the inclusive maintenance periods. We are unable to ensure compliance with the required specification if the plant is managed by an operator other than the one trained by ourselves and/or if the maintenance procedures have not been adhered to.

The same applies if the upstream reticulation is contaminated with non-organic or non-biodegradable substances.