

Reference: CES – Bakubang Villa Bulk Services Upgrade

Date: 4 November 2016

LDV Construction Management (Pty) Ltd
5 Autumn Road
Johannesburg
2128

Attention: Mr. Francois O’Kelly

Dear Sir,

**Re: BAKUBANG – UPGRADING AND AUGMENTING OF BULK CIVIL INFRASTRUCTURE
FOR THE PROPOSED NEW VILLA DEVELOPMENT**

Domestic Water Storage & Waste Water Treatment System Upgrade

Terms of reference

RMCE has undertaken the design of the upgrade and extensions to the bulk civil infrastructure for Bakubung Lodge in the Pilansberg National Park. The upgrade to the civil infrastructure has been undertaken in accordance with the Environmental Authorization and Record of Decision in terms of Section 22(3) of the Environmental Conservation Act , 1989 (Ref EIA 99/2003NW dated 21/05/2004).

Upgrades to the bulk civil infrastructure include the following activities:

1. Construction of a new package Waste Water Treatment Plant (WWTP)
2. Construction of a new 1 MI potable water storage reservoir.

Both facilities have been designed to service the water consumption and treatment demands of the future developments at Bakubung Lodge.

The existing infrastructure at Bakubung Lodge has been compared to the proposed new infrastructure build for compliance (as well as possible improvements) with the Environmental requirements of the national park and local authority.



Existing Infrastructure:

Waste Water Treatment Plant (WWTP)

The existing waste water treatment plant at Bakubung is summarized as follows:

- The WWTP and water storage and pump facilities covers an area approximately 5650m² in size. The treatment plant is fenced area which has been cleared of indigenous vegetation.
- Existing plant is designed for an average treatment capacity of 127 kl/day. The current plant cannot treat the future volumes of waste water produced by the lodge and spillage and overflows may become a common occurrence.
- WWTP is a fixed plant consisting of a macerator, septic tank, aeration basin, single clarifier and contact storage tank.
- Treated effluent is currently allowed to flow through a reed bed into the non-perennial stream draining into the Matlhogaabone River running to the north of the plant.
- The existing plant is gravity fed from the sewerage reticulation system from the hotel.
- The current plant is located approximately 150m from the non-perennial stream.
- Minimal amounts of treated effluent is recycled for irrigation purposes on the Bakubung property.

Potable Water Storage Facility

The existing potable water storage facility at Bakubung is summarized as follows:

- 4 No. 270 kl reservoirs located in the existing WWTP facility.
- Each 270 kl reservoir is 140m² in area – total coverage (excluding pump stations and associated pipework = 560m²).
- Potable water is pumped into the existing water reticulation network.
- The operation of the current system is labour and energy intensive and does not function efficiently.
- Continued operation of the existing potable water network is leading to fatigue on the network with water wastage in the form of pipeline leakage and regular maintenance.
- Current potable water tanks are located in an WWTP area earmarked for demolition and rehabilitation.



New Infrastructure:

Waste Water Treatment

The new waste water treatment plant proposed as part of the bulk service upgrade project at Bakubung is summarized as follows:

- The new WWTP is a containerized treatment plant which is capable of treating 160 m³ / day (Phase 1) and a total of 240 m³ / day (Phase 2). The new WWTP will consist of 3 No. x 12m shipping containers capable of processing 80m³ / day / plant.
- The treatment plant covers a much smaller footprint of 310m², which consists of the containerized WWTP and a buried buffer tank.
- The containerized WWTP houses the aerobic, clarifiers and disinfection phases within the 12m x 2.4m plant footprint, with the aneorobic phases contained in a buried 360 m³ buffer tank.
- The new plant has been located in site where minimal clearance of natural vegetation will occur. No trees will be cut or removed during the construction of the new WWTP.
- The new buried buffer tank has been sized to handle 1.5 times the capacity of the future projected average daily discharge of the hotel, thus eliminating any potential for spills.
- The new plant is gravity fed from the sewerage reticulation system from the hotel, thus requiring very little maintenance.
- The quality of effluent treated and discharged by the new package WWTP complies with the South African General Discharge limits.
- The new plant will NOT discharge into the any natural water course.
- Treated effluent from the plant will be pumped to the existing irrigation network at Bakubung. This will reduce the current water demand required by the hotel to meet domestic and irrigation requirements.
- The existing (old) WWTP will be demolished and rehabilitated with a water hole and indigenous vegetation to cover the area.
- The current plant is located approximately 150m from the non-perennial stream and in excess of 50m from the Bakubung property boundary.

Potable Water Storage Facility

The proposed new potable water storage facility at Bakubung is summarized as follows:

- 1 No. 1 MI reservoirs located above the existing maintenance workshops at Bakubung.
- The new reservoir is 380m² in area and will be located in an area with minimal clearance of natural vegetation.



- Potable water is gravity fed into the existing water reticulation network.
- The storage and reticulation of the new system is both energy and operationally efficient.
- Operation of the new facility will increase the lifespan of the existing potable water network and reduce fatigue and maintenance on the system. This will translate into water savings.

Environmental Compliance

The upgrade of the new civil infrastructure at Bakubung complies with the following applicable specific conditions stipulated in the Environmental Authorization and Record of Decision (Ref EIA 99/2003NW dated 21/05/2004), namely:-

General Items:

The design and construction of the new infrastructure at Bakubung will in compliance with the Environmental Authorization and Record of Decision (Ref EIA 99/2003NW).

Specific Items relating to the Sewerage treatment plant:

- 7.1.15 Any overflow into the non-perennial stream, which drains into the Matlhogaabone River is not allowed, unless the treated effluent meets the special limits requirements of the National Water Act, 1998 (Act No 36 of 1998). **Treated effluent will not draining into any natural water course. Treated effluent will be used for irrigation purposes as it meets DWAF general standards requirements.**
- 7.1.16 The applicant should provide the Department of Water Affairs & Forestry (DWAF) with proof that the sewerage treatment plant treatment system to be implemented on-site will comply with the requirements of the department. **The package WWTP is guaranteed by the supplier that the treatment process will produce treated effluent which meets DWAF general standards requirements.**



VARIABLES AND SUBSTANCES	EXISTING SA GENERAL STANDARDS	EXISTING SA SPECIAL STANDARDS
Chemical Oxygen Demand	75 mg / l	30 mg / l
Ionized and unionized ammonia (as N)	3.0 mg / l	2.0 mg / l
Nitrate (as N)	15 mg / l	1.5 mg / l
pH	Between 5.5 and 9.5	Between 5.5 and 7.5
Residual Chlorine (as Cl)	0.25 mg / l	0
Suspended solids	25 mg / l	10 mg / l
Phosphorous (Ortho Phosphate) (as P)	10 mg / l	1 mg / l
Total Iron (as Fe)	0.3 mg / l	0.3 mg / l
Faecal Coliforms per 100ml	1000	0

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