Port Elizabeth

25 November 2018

Jaco Architect's

Dear Jaco

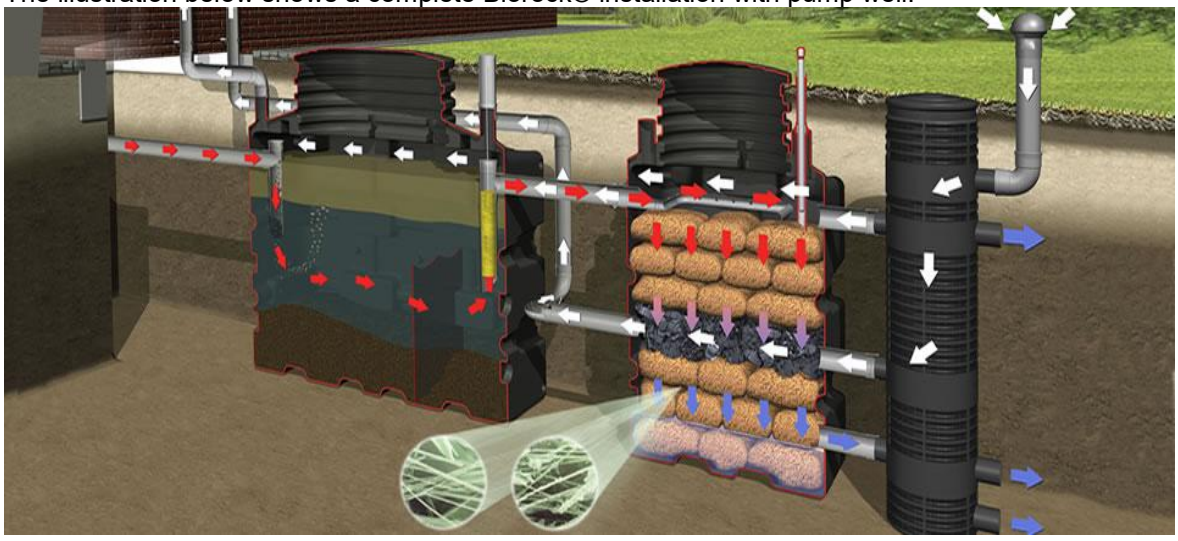
Proposal: Turnkey Biorock® On-site Domestic Effluent Treatment Plant installation

Thank you for your interest in Biobox, the leaders in innovative on-site waste water treatment systems. Our robust and modular Biorock® on-site wastewater treatment plants produce clear & recycled treated water and feature low maintenance and operator input.

We would propose that we install a Ecorock 1500 retrofitted to the new 60000Lt conservancy tank. The new Biorock® sewage treatment unit will be installed in the position as indicated by the site plan, and in such a way to permit gravity flow through the treatment unit without further pumping. The treatment system will provide removal of the organic and physical pollutants and a reduction in the nutrients, and the treated effluent will be applied for irrigation of the lawns and/or garden.

This proposal is based on the preference for a low-tech, low-energy solution requiring little operator input or maintenance. The Biorock® produces a high final effluent quality well within the requirements of the General Authorisation Limits for effluent discharge, requiring no electricity for the treatment process, in a compact, silent and visually unobtrusive system. We have allowed to execute the project on a turnkey basis.

The illustration below shows a complete Biorock® installation with pump well.



We herewith provide our price and general specification for the supply and installation of the specified packaged wastewater treatment plant.

We have pleasure in quoting as follow.

1. **Scope of supply**

With the data provided to us, we recommend that a Ecorock 1500, a packaged domestic sewage treatment plant (STP) capable of treating domestic effluent for up to 10 population equivalent units in typical usage per unit, be supplied and installed by ourselves. The complete system will comprise of the existing 6000Lt primary tank and a new Ecorock 1500 with pump well and automatic submersible discharge pump.

An effluent brush filter will be fitted to the outlet of the primary tank to retain solids within the primary tank. This effluent filter would only be removed for cleaning when the primary tank is desludged, that is once every 3 – 4 years, or as necessitated by inspection.

It will be necessary to desludge the primary collection tank periodically as sludge and scum will accumulate within the tank. Only the sludge has to be removed off-site, not the entire contents of the tank. Based on the proposed design load, desludging will be required every 3 – 4 years and <3,600ℓ by volume will need to be removed and then refilled with clean water.

Storm water must not flow into the system, including the primary tank. The property owner must ensure that all gulley's are protected from rainwater ingress such as gutter downpipes and surface water run-off.

The installation of the Biorock-S STP will require an excavation of 4,500mm (long) x 2,500mm (wide) x 2,070mm (deep), by ourselves, the base of the excavation will be filled with a 200mm river sand base (supplied by ourselves) and levelled. We will use the TLB (supplied by ourselves) to lower the BIOROCK into the excavation, connect the pipework (supplied by ourselves) from the primary tank and backfill the system with river sand (river sand supplied by ourselves) while simultaneously filling the unit with water (supplied by yourselves). The backfill will be manually compacted by ourselves. The installation of the BIOROCK unit will require approximately 10m³ backfill material and 6,500ℓ of water in total.

We will install a pump well and a DAVEY D25VA 0.25kW automatic submersible lift pump adjacent to the Biorock STP outlet to lift the treated effluent from the Biorock outlet through an inline chemical tablet feeder to the irrigation point.

One 50Hz/220V single-phase power supply will be required, by others, in the form of armoured cabling at the pump well to operate the 1 off 0.25kW submersible discharge pump.

The energy-free aeration system of the Biorock® STPs will require the installation of a ventilation chimney with a wind-driven ventilator. The chimney will be at least 4,000mm high above the NGL of the Biorock to achieve maximum draught. The chimney can be installed to an adjacent wall. We will supply and install the chimney and wind-driven ventilator. The chimney and ventilator will be painted in a dark bush green colour to render it visually unobtrusive.

A clean 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.

2. **Commissioning, Operation and Maintenance**

The operational cost of a Biorock® STP is very low considering the fact that the only moving parts are the wind-driven ventilator and lift pump.

The Biorock® is ideally suited to variable load operating conditions and the process will start to operate within a couple of days of operation.

From a maintenance perspective, we would require that an operator inspects the plant at least once a week in order to ensure that there is water flowing into the Biorock® STP and that the discharge is clear and odourless.

In the case of a contact chlorination system (chemical tablet feeder), chlorine **or** bromine tablets must be added to the feeder as required.

The effluent brush filter must be cleaned when the septic tank is desludged. The septic tank must be desludged every 3 – 4 years or as deemed necessary by visual inspection.

This quotation includes for one routine inspection 1 - 2 months from date of installation. Water sampling for laboratory analysis of the raw and final effluent will be performed at this inspection and a status report will be forwarded to the nominated party thereafter.

Operator training will be provided upon completion of the installation.

All components used in our systems are SABS or equivalent and the serviceable components are readily available at most hardware stores.

3. Description of the proposed packaged waste water treatment plants

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

The following criteria were used as the basis for the design of the system:

Nitrogen contribution:	8g/pe.day^{-1}
Phosphate contribution:	1.3g/pe.day^{-1}

Maximum raw influent quantity and quality:

Average dry weather flow:	Up to 1.2m^3/day
Peak factor:	2
COD:	600mg/ℓ
NH4-N:	20mg/ℓ
O-PO4:	5mg/ℓ
TKN:	40mg/ℓ

Anticipated final effluent quality:

COD:	<50mg/ℓ
Suspended Solids:	<10 mg/ℓ
Ammonia Nitrogen:	<5mg/ℓ
Nitrate Nitrogen:	<10mg/ℓ
Total coli forms:	100/100mℓ (0/100mℓ if sterilised)
Faecal coli forms:	100/100mℓ (0/100mℓ if sterilised)
pH:	6<8

As the treatment system is based on biological processes and principles, it is unable to reduce heavy metals already present in the influent wastewater stream.

4. Warranties & Guarantees

All mechanical equipment is subject to the manufacturer's warranty, which is typically 3 years from date of sale. The rotomoulded tanks have a 25-year limited warranty from the tank manufacturer. All labour is warranted for 1 year from date of execution. Terms and Conditions Apply.

The Biorock® is CE-certified and complies with the stringent EN12566-3 standard of 2005. A copy of this standard is available on the Biobox website for reference.

5. Commercial terms

The price, in South African Rand and exclusive of 15% VAT, for the design, supply, installation, commissioning of the Biorock®-S Sewage Treatment Plant as specified in Section 1 above is **R 107,576.50**

6. Terms and Conditions of Sale & Service

Our standard terms and conditions of sale & service will apply and are available on request.

7. Payment Conditions

a. We require an 80% of contract value on order placement;
b. The remaining balance will be payable upon practical completion.

8. Delivery

Delivery time is currently 2-weeks ex-works Pretoria from receipt of deposit subject to prior sale or installation reservations.

Units are allocated to client orders only once the deposit payment has been received. We are unable to reserve units for clients without receipt of the above. We will endeavour to provide accurate delivery details, but the actual delivery date will be subject to shipping schedules.

9. General

a. Our work is carried out by qualified artisans and in accordance with the Occupational Health & Safety Act.
b. Systems are designed on the basis of receiving typical effluent to be expected from a residential development.
c. The system design parameters exclude non-organic matter. The effective operation of on-site sewerage treatment plants requires that the design and maintenance of the upstream reticulation is in order, particularly the septic tanks and grease traps.
d. Effective waste water treatment systems require regular inspection and pro-active maintenance. Information to aid the operator will be presented once the installation has been completed. Failure to regularly inspect the system and report malfunction will void the process design guarantee.
e. Practical completion is achieved when the system is switched on and/or able to receive and discharge treated sewage.
f. Pricing is subject to exchange rate fluctuations.
g. We have assumed that the site has good compactable and pickable soils. Should we encounter high water tables, rock, or other installation hindrances, allowance must be made for extra time and equipment to complete the installation. This will be an additional charge following consultation and approval by yourselves.
h. The treated effluent from the system will meet the waste water limit values applicable to the discharge of waste water general limits as specified by the local water affairs authorities.
i. Mechanical and electrical parts are limited to the manufacturer's warranty policies.
j. Any standing time due to external delays and/or factors that influence the ability for Biobox to conclude their on-site activities will be for the clients account.
k. It is recommended that phosphate-free laundry detergent is used to reduce the phosphate load.

10. Exclusions

The following are excluded from this quotation unless specified otherwise:

a. Fixtures or fittings to conceal the system(s);
b. Packaged plant maintenance agreement(s);
c. Cost of providing water and electricity during installation, commissioning, maintenance and operation.
d. Removal of excess soil
e. Building of manholes around lids.

We endeavour to continually improve their systems and may change the design or specifications without notice at any given time. This quotation is valid for a period of 30 (thirty) days from the date set out at the top of this quotation.

Please do not hesitate to contact me should you require any further information or would like to discuss this quotation.

Kind regards,

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Rudi Franz
0746129529