

# KWAZULU-NATAL: DEPARTMENT OF EDUCATION

## Pit Latrine Treatment Pilot Projects at Bucklands - and Sinathing Primary Schools

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## 1. BACKGROUND

### 1.1. General

Pit latrines are probably the oldest as well as the crudest method of sewage disposal around. Dating back to antediluvian times, the modern pit latrine can be quite a smart structure with ventilation, molded seat and ablution facilities contained in an air-conditioned man-made capsule. A large percentage of the world's population rely on these devices for their creature comforts.

### 1.2. How Pit Latrines Work

Natural bacteria in the urine-pasty fluid slurry of faecal sludge degrade the volume of COD over time into:

1. Natural gasses, which escape via the hole in the seat
2. Water, which slowly seeps through the five faces of earth into which the (conventionally) rectangular hole has been excavated.

Microorganisms latent in the surrounding soil will progressively 'polish' the seeping fluid even further, returning it ultimately to potable quality before it re-joins the subterranean water table. This process can be speeded up and refined by treating the pit latrines with BioSol SL36.

### 1.3. Treatment with BioSol SL36:

The company was tasked to do a Pit Latrine Treatment pilot for the Department of Education and Training with its unique BioSol SL36 organic product. An official from the Department – Mr Paul Mornet – accompanied BioPower Corporation Group throughout the treatment process.

The Pit Latrine Pilot was carried out at the Buckland - and Sinathing Primary Schools in KZN.

#### ***What is BioSol SL36?***

BioSol SL36 is the organic product BioPower uses to treat Flush Tech Sanitation Systems (FTS), Waste Water Treatment Works (WWTW), as well as pit latrines, abattoirs, septic tanks and restaurants. It works by breaking down organic waste in all the above mentioned systems, and eliminates bad odours. BioSol SL36 is not a chemical based product, but 100% organic which means that there is no negative impact on ecological- and biological systems. It contains fossilized peat and free lignin in a water soluble form. Between 90 and 120 billion bacteria exist in each litre of BioSol SL36 – these replicate and add to the local bacteria to enhance the natural digestion process.

Other organic products on the market are enzymes which means that as soon as it has done its work it is depleted and needs to be restocked. What sets BioSol SL36 apart from these products is the fact that it contains living organisms that produces the same enzymes, BUT instead of getting depleted, the organisms reproduce and continuously produces these products.

BioSol SL36 contains the following organic elements:

- Bacteria that occur naturally in the fossilized peat
- Added bacteria with specific abilities
- Naturally occurring nutrients that is specific to the bacteria
- Biologically treated water

Though the number of bacterial species is important regarding the effectiveness of a microbial blend, even more important is the combination of species and related sub species. Bacteria in the BioSol SL 36 blend have been tailored to ensure the most efficient and effective digestion process of organic matter. The fact that BioSol SL36 stays dormant until a catalyst is added, coupled with the fact that only 8% of bacteria expire in a 12-month period, means that this product is extremely effective.

### ***What is the Flush-Tech Sanitation System?***

The Flush Tech Sanitation System (FTS) solution is based on the Sequence Batch Reactor (SBR) principle in conjunction with our bio product BioSol SL36.

The system consists of a Tank (system) divided in an anaerobic, anoxic and aerobic chamber. The entire system is fully automatic and is calibrated to operate for a specific HRT of a few hours depending on the organic load rate present. An inlet screen is fitted which removes large solids e.g. disposable nappies etc. which needs to be cleaned daily (manually or automatically) and disposed of. To ensure that the sludge storage tank never needs to be emptied, a biological product called BioSol SL36 is added to ensure that the correct bacterial levels within the system is maintained.

The system is designed for rural applications where there is no access to sewerage treatment and can replace e.g. pit latrines, chemical toilets, etc. where possible. Typical applications include schools, RDP housing estates as well as informal settlements and total Communities.

Job creation also involves appointing people responsible for cleaning the inlet screen and disposing of the debris.

The FTS can be designed to accommodate several houses up to communities with a single Unit.

The FTS (various sizes available) combine the best elements of anaerobic and aerobic digestion to provide superior wastewater treatment. The system readily and consistently meets the secondary treatment standards of COD, BOD and mg/L TSS as required by the Department of Water and Sanitation (DWS).

## 2. TREATMENT: SINATHING PRIMARY SCHOOL

### 2.1. Background Information

|                          |                                |
|--------------------------|--------------------------------|
| LEARNERS:                | 1116 (Estimated: 50% males)    |
| TEACHERS:                | 24 (Estimated figure)          |
| AVAILABLE LATRINES: MALE | 10 latrines (Estimated figure) |



The process was initiated on 22 June 2017 at the Septic Tank ablation facilities of the Sinathing Primary School under the supervision of Mr Paul Mornet.

A total of 10 latrines are all constructed on top off a 40m<sup>3</sup> Septic Tank. Treatment of the septic tank with BioSol SL36 will be done weekly, and monitored for a total of four (4) weeks. The sludge level at the start of the treatment was 490mm from the top of the septic tank.

The shock dosage of 1ℓ BioSol SL36 per toilet was applied on Day 1. The standard dosage rate of 50mℓ per week for every 5 people should be maintained for future progress – thus 500mℓ per toilet. (Shock dose was calculated on this ratio)



## 2.2. Monitoring

The ten (10) treated toilets were monitored from the 22<sup>nd</sup> of June 2017.

*NOTE: Where the normal configuration has 4-6 people using a latrine, in this case there were an estimated 50+ per pit latrine*

| Date       | Level of Septic Tank | Remarks   |
|------------|----------------------|---|
| 2017/06/22 | 490mm                | Starting Level  |
| 2017/06/29 | 550mm                | 60mm drop (Septic tank = 5m x 4m x 2m) or 1.2m <sup>3</sup> |
| 2017/07/06 | 610mm                | 60mm drop (Septic tank = 5m x 4m x 2m) or 1.2m <sup>3</sup> |
| 2017/07/13 | 625mm                | 15mm drop (Septic tank = 5m x 4m x 2m) or 0.3m <sup>3</sup> |
| 2017/07/19 | 665mm                | 40mm drop (Septic tank = 5m x 4m x 2m) or 0.8m <sup>3</sup> |



### 3. TREATMENT: BUCKLANDS PRIMARY SCHOOL

#### 3.1. Background Information

|                                |                       |
|--------------------------------|-----------------------|
| LEARNERS:                      | 92 (Estimated figure) |
| TEACHERS:                      | 4 (Estimated figure)  |
| AVAILABLE PIT LATRINES: FEMALE | 4 Pit latrines        |
| AVAILABLE PIT LATRINES: MALE   | 3 Pit latrines        |



The process was initiated on Monday 29 June 2017 at the Septic Tank abluion facilities of the Bucklands Primary School, under the supervision of Mr Paul Mornet.

A total of 7 Pit Latrines are all constructed on top off an estimated 40m<sup>3</sup> septic tank. Treatment of the Septic Tank with BioSol SL36 will be done weekly, and monitored for a total of four (4) weeks. The sludge level at the start of the treatment was 1 280mm from the top of the septic tank.

The shock dosage of 200mℓ BioSol SL36 per toilet was applied on Day 1; The standard dosage rate of 50mℓ per week for every 5 people should be maintained for future progress – 100mℓ per toilet. (Shock dose was calculated on this ratio)

#### 3.2. Monitoring

The ten (10) treated toilets were monitored from 29<sup>th</sup> of June.



*NOTE: Where the normal configuration has 4-6 people using a pit latrine, in this case there were an estimated 12 per pit latrine*





| Date       | Level of Septic Tank from the top | Remarks   |
|------------|-----------------------------------|---|
| 2017/06/29 | 1 250mm                           | Starting level  |
| 2017/07/06 | 1 490mm                           | 240mm drop (Septic tank = 7m x 3m x 2m) or 5.04m <sup>3</sup> |
| 2017/07/13 | 1 570mm                           | 80mm drop (Septic tank = 7m x 3m x 2m) or 1.68m <sup>3</sup>  |
| 2017/07/19 | 1 730mm                           | 160mm drop (Septic tank = 7m x 3m x 2m) or 3.36m <sup>3</sup> |

#### 4. PROBLEMS AND CHALLENGES

- There were complaints regarding bad odours made by the school in Sinathing
- There has been a large build-up of sludge in both septic tanks at the two schools
- Capacity of toilets are seriously affected by the sludge build-up
- Honeysucker (vacuum) trucks dispose the of the waste, which is very costly to the DOE
- The use of harsh chemicals such as Jeyes Fluid and HTH pool cleaner to counter odour – this is a mistake because the latent bacteria that occur naturally are killed off, the faecal mass builds up and the odour worsens, attracting flies that may carry and spread dangerous diseases

#### 5. RECOMMENDATIONS

##### 5.1. Short Term Solution

Referring to the results obtained during this short pilot, it is recommended that BioSol SL36 be applied continuously to the pit latrines, ensuring an odour free environment, with a minimum of sludge build-up.


The objective of this pilot program was to prove value and efficiency of our Pit Latrine/toilet/septic tank treatment. It will further prove the effectiveness of our product in the treatment of Pit Latrines/septic tanks. This report serves as a detailed overview on the project undertaking, the logistics involved, the success and challenges that were faced and overcome.

##### 5.2. Medium- to Long Term Solution

To ensure the long-term viability of sanitation systems at Bucklands – and Sinathing Primary Schools, and to ensure the general health of the community, BioPower Corporation Group proposes the construction of package plants – more specifically our Flush-Tech Sanitation System – to alleviate the sanitation challenges of the area.

This solution would be included in the new permanent settlement currently under construction, and not for the informal settlement currently in use.

## 6. TESTIMONIALS



Keeping the world alive.

SEWAGE TREATMENT WORKS \* PIT LATRINE TREATMENT \* RURAL BIOGAS DIGESTERS \* FLUSH-TECH SANITATION SYSTEM \* SUSTAINABLE ECO-AGRI VILLAGES \* ACADEMIA \* BIOMASS TO BRIQUETTES

### TESTIMONIAL

#### BIOSOL SL36 PIT LATRINE TREATMENT PROGRAMME

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**PERSONAL/INSTITUTION DETAILS**

Institution Name: SINATHING PRIMARY

Contact Person: MR ZULU SGM




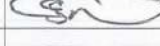
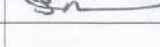
Contact Number: 072 820 3231


Physical Address: ALONG SINATHING ROAD  
NEAR AMAKHOLWA HIGH SCHOOL


**DETAILS OF TREATMENT**

Number of Treatments: 5

Starting Sludge Level: 490 mm Ending Sludge Level: 665 mm

| Date      | Measurement (from top in mm) | Odour Scale (0 = no smell; 5 = extreme stench) | Signature   |
|-----------|------------------------------|--|---|
| 22/6/2017 | 490 mm                       | 5  |  |
| 29/6/2017 | 550 mm                       | 1  |  |
| 6/7/2017  | 610 mm                       | 0  |  |
| 13/7/2017 | 625 mm                       | 0  |  |
| 20/7/2017 | 665 mm                       | 0  |  |


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**EVALUATION**

1. Has BioSol SL36 removed the bad odours from the Pit Latrine/s?
 

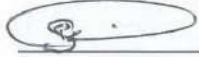
YES  NO
2. Has BioSol SL36 improved the sludge level of the Pit Latrine/s?
 


YES  NO
3. Is BioSol SL36 the answer to your sanitation problems and would you recommend it to other people?
 

YES  NO

**REMARKS:**

Biosol has removed 100% bad odour, improved drastically the sludge level of Pit Latrine. The school was unable to use the nearby classes (toilet) due to bad odour. The neighbouring school families were also complaining because of bad odour. However since the introduction of Biosol, the school is a different place neighbour is happy, teachers are happy. We recommend all schools to try Biosol to have a complete change of bad odour.

  
Owner Signature

  
Manager Signature

Date: 19-07-2017

Date: 20/7/2017

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## TESTIMONIAL

### BIOSOL SL36 PIT LATRINE TREATMENT PROGRAMME

#### PERSONAL/INSTITUTION DETAILS

Institution Name: Bucklands P. Selloo  
 Contact Person: Thembekhe Zung  
 Contact Number: 012 46 96 483  
 Physical Address: Bucklands P. Selloo  
Solomon Brothers

#### DETAILS OF TREATMENT

Number of Treatments: \_\_\_\_\_  
 Starting Sludge Level: 1250 mm Ending Sludge Level: 5

| Date                                | Measurement (from top in mm) | Odour Scale (0 = no smell; 5 = extreme stench) | Signature   |
|-------------------------------------|------------------------------|--|-------------|
| 29/6/2017                           | 1250 mm                      | 5  | <i>Zung</i> |
| 6/7/2017                            | 1490 mm                      | 3  | <i>Zung</i> |
| 13/7/2017                           | 1570 mm                      | 2  | <i>Zung</i> |
| <del>20</del> <sup>19</sup> /7/2017 | 1730 mm                      | 1  | <i>Zung</i> |
|                                     |                              |  |             |
|                                     |                              |  |             |

**EVALUATION**

1. Has BioSol SL36 removed the bad odours from the Pit Latrine/s?

YES  NO

2. Has BioSol SL36 improved the sludge level of the Pit Latrine/s?

YES  NO


3. Is BioSol SL36 the answer to your sanitation problems and would you recommend it to other people?

YES  NO

**REMARKS:**

Biosol intake kakhulu iyabulala  
amaqcewane kanti pitini nephungo  
asisehale. Siyayincama kakhulu  
I Biosol. Zonke izikole ziyancama  
ukwesiza kweNkampani ye Biosol.

  
Owner Signature

  
Manager Signature

Date: 19 07 2017

Date: 20/7/2017

## 7. CONCLUSION

Through our proven organic products and technology – BioSol SL36, skills development, work creation programs and expertise, BioPower Corporation Group is confident that our solution to sustain and improve sludge- and odour levels in pit latrines/toilets could help all schools, municipalities as well as the country in general.

Our unique concept will improve the life quality and health of people, whilst at same time protecting water resources and the environment in general. With support and assistance from stakeholders, such as National and Local Government, we can make a difference at the Schools

***Compiled by the BioPower Corporation Group technical team***

***July 2017***