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Greys Gift Lodge

– Eastern Cape –

- Sewage and Waste Water Treatment Plant.
- Optional Systems, Units and Services.

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“Working together towards a cleaner and healthier environment”

1 Introduction

- a. This document serves as an introduction to our Sewage and Waste Water Treatment Plant, proposed for Greys Gift Lodge.
- b. The document also gives the undertakings, guarantees and conditions of construction, implementation and commissioning of the plant.
- c. We also introduce optional systems, units and services we offer that are relevant to a project of this nature.

2 Submerged Aerated Sewage and Waste Water Rehabilitation Plant (SWRP) – Plant Discussion

- a. Introduction
 - i. Relevant information and assumptions
 - 1 Estimated persons (Total)
 - a. 60 Persons.
 - b. Plant maximum capacity: 75 persons.
 - 2 Type plant
 - a. Submerged and naturally covered (or partly submerged, depending on soil and terrain).
 - b. Aeration.
 - c. Disinfection.
 - 3 Type effluent
 - a. Household Waste Water.
 - b. Household Sewage.
 - 4 Rehabilitated effluent use options
 - a. Irrigation.
 - b. Animal drinking water.
 - c. Toilet flushing.
 - d. Combination of the above.
 - b. General Plant information
 - i. OBN Sewage and Waste Water Rehabilitation Plants are designed to have the minimum impact on the environment. The plant is normally constructed below ground level, but can be constructed on ground level, depending on conditions and requirements. The plant does not have any open chambers.

- ii. The plant has been designed for low maintenance operations and utilizes the minimum power possible. Solar power can be used.
- c. Compliance with the specifications as set out by the Department of Water and Environmental Affairs (DWAE) and other regulatory institutions
 - i. OBN ensures that the quality of the final effluent released by the plant equal or betters the standards set by DWAE and/or other regulatory institutions.
 - ii. Approval for the construction, implementation and operation of an OBN plant will be obtained beforehand where required.
 - iii. Detailed professionally plans will be drafted and approved before construction commences.
- d. Regular water testing
 - i. We recommend (it is also mandatory by law) that regular analyses of the rehabilitated effluent be taken to ensure that the quality complies with DWAE standards.
- e. Technologies used
 - i. OBN uses recognized and approved sewage and waste water rehabilitation technologies.
 - ii. There are no movable parts in the plant and maintenance is therefore minimal. An effluent release pump may, however, be required depending the desired application of the effluent.
- f. Products and units used in the plant
 - i. Organic waste metabolizing and pathogen restriction:
 - 1 Biologic – Blend of natural class one bacteria (Aerobic and anaerobic) with the ability to accelerate the metabolizing of organic solids, oils, greases, fats, starches, proteins, detergents, hydrocarbons, etc.
 - 2 Pathogen restriction.
 - 3 Odour restriction.
 - 4 Product available in liquid and slow release solid and granular form.
 - ii. Nutrient and pathogen restriction:
 - 1 Solar powered ultrasonic wave reduction of nutrients, nitrates, sulphates, phosphates and other pathogens.
 - 2 Stimulates friendly bacteria in clearing water of unwanted components.
 - 3 Reduces harmful bacteria concentrations.

- 4 Reduces the physico-chemical and biological components
- 5 Reduces sludge.
- 6 Minimum maintenance.
- 7 Environmentally friendly and safe.

g. Principles of the plant

i. Sewage is collected from a network of sewage pipes that is routed to the SWRP for treatment and rehabilitation.

ii. Handling of Solids and Screening

- 1 The handling of solids, separation and primary settling take place in the anaerobic phase.
- 2 The floatable solids will move to the surface, whilst those that settle will sink or precipitate to the bottom. Floating solids can be cleaned manually as required.
- 3 No solid screening usually takes place in this phase, or prior to waste entering the facility. The presence of a screen attracts flies and foul odours. Should a screen, however, be required, it can be incorporated with ease.
- 4 The plant has been designed with a “solid’s storage capacity” that allows longer intervals for the clean out of the first chamber (between one and three years). The intervals between cleaning operations can be prolonged by adding biological additives that will speed up the biodegrading process of the solids. This is imperative and something we seriously point out. Plant performance will also be enhanced substantially.

iii. Primary Settling Phase

- 1 The primary settling phase operates in totally anaerobic conditions.
- 2 The design of the primary settling phase allows for the separation of floating solids and non floating solids.
- 3 The remaining effluent (middle section) is routed to the next phase (secondary settling phase).
- 4 The primary settling phase also initiates anaerobic digestion.

iv. Secondary Settling and Treatment Phase

- 1 This phase operates in anoxic conditions and facilitates the secondary settling and biodegrading.
- 2 The digesting phase is very important, as the solids are biodegraded to smaller parts, which is routed to the next phase.
- 3 Ultrasonic treatment against nutrients, nitrates, sulphates, phosphates and pathogens.

v. Aerobic Digestion – The “polishing phase”

- 1 In this phase the digestion takes place in an aerated environment.
- 2 The small solids are now further biodegraded into even smaller particles.
- 3 Because aerobic bacteria operate in this phase, it is imperative to aerate the chamber with fine air bubbles, which is absorbed in the liquid. The bacteria perform at their optimum in an oxygen rich environment.
- 4 Another very important function is performed in this phase - the “nitrification cycle”. This function is responsible for the further breaking down of nitrites, nitrates and ammonia.

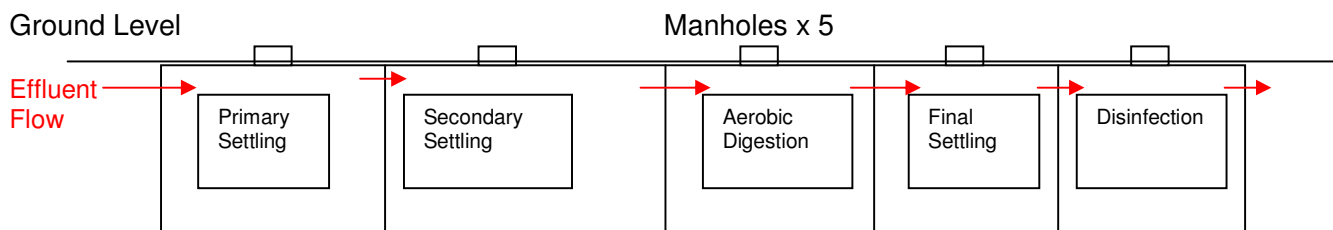
vi. Final Settling

- 1 Remaining solids in the liquid settles in this phase and forms a “sludge blanket”.
- 2 The sludge blanket plays a very important role in the process. When it matures it can be re-circulated to the primary settling chamber to “seed” or inoculates the raw sewage entering the plant.

vii. Disinfection and Sterilization

- 1 In this phase the final effluent is prepared for discharge.
- 2 The effluent is sterilized to eliminate any harmful bacteria.

h. Basic lay out of the Aerated Submerged SWRP



3 Submerged Aerated Sewage and Waste Water Rehabilitation Plant (SWRP) – Initial Estimates and Conditions

a. Assumptions

- | | |
|------------------------------------|--------------|
| i. Number of units | 1 |
| ii. Total persons | 60 |
| iii. Estimated flow volume per day | 15,000 litre |
| iv. BOD Load handled per day | 3 kg |
| v. Retention time | 4.5 days |

b. Plant Dimensions and Volumes

i. Total Plant

1	Inside length	6.00 m
2	Inside width	3.75 m
3	Inside depth	3.00 m
4	Plant area	22.50 m ²
5	Plant volume	68.00 m ³

ii. Chamber Dimensions

1	Primary Settling Chamber	
	a. Inside length	1.25 m
	b. Inside width	3.75 m
	c. Inside depth	3.00 m
	d. Chamber area	4.69 m ²
	e. Chamber volume	14.06 m ³
2	Anoxic Digestion Chamber	
	a. Inside length	1.25 m
	b. Inside width	3.75 m
	c. Inside depth	3.00 m
	d. Chamber area	4.69 m ²
	e. Chamber volume	14.06 m ³
3	Aerobic Digestion Chamber	
	a. Inside length	1.25 m
	b. Inside width	3.75 m
	c. Inside depth	3.00 m
	d. Chamber area	4.69 m ²
	e. Chamber volume	14.06 m ³
4	Final Settling Chamber	
	a. Inside length	1.25 m
	b. Inside width	3.75 m
	c. Inside depth	3.00 m
	d. Chamber area	4.69 m ²
	e. Chamber volume	14.06 m ³
5	Disinfection Chamber	
	a. Inside length	1.00 m
	b. Inside width	3.75 m
	c. Inside depth	3.00 m
	d. Chamber area	3.75 m ²
	e. Chamber volume	11.25 m ³

c. Project general rulings and inclusions

i. Estimated construction time

- 1 Normal working time allowed
 - a. 3 months
- 2 Extension time (Rain and related)
 - a. 2 days Extension for each day lost.
- 3 Materials
 - a. SABS standard materials.

Contract insurance

- 3 Contract insurance for 6 months to be arranged (Standard Insurance)
- 4 Contract liability insurance amount – Contract amount

ii. Legislation and regulations

- 1 Complete operation subjected to the relevant legislations, regulations, by-laws, stipulations etc.

iii. Project Management

- 1 Structural Engineer
- 2 Hygienicor CC
- 3 OBN Projects

iv. Plant Structure Plans

- 1 Professional structure plans after approval

v. Free Hall Arrangements

- 1 Free Hall of 10 KM radius included

vi. CPA and Rise and Fall Arrangements

- 1 CPA arrangements
 - a. Contract Price Adjustment will be claimed

- 2 Rise and fall arrangements
 - a. Rise and Fall will be claimed for Cement and Steel
- vii. Labourers
 - 1 Number (Permanent and Casual)
 - a. Semi skilled and Labourers 15
 - b. Skilled Labour 5
 - 2 Transport and Accommodation
 - a. Transport
 - i. Staff transport to and from site included
 - b. Accommodation
 - i. Facilities (Toilets, Resting) facilities included
 - ii. Security accommodation facilities included
 - 3 Health and Safety
 - a. Occupational Health and Safety Act and Regulations 85 of 1993 (Complete)
 - i. GNR.929 OF 25 JUNE 2003
 - ii. GNR.1031 OF 30 MAY 1986
 - iii. GNR.692 OF 30 JULY 2001
 - iv. GNR.1010 OF 18 JULY 2003 ANNEXTURE A
 - v. GNR.2281 OF 16 OCTOBER 1987
 - vi. GNR.924 OF 03 AUGUST 2004
 - vii. GNR.307 OF 07 MARCH 2003
 - viii. GNR.1521 OF AUGUST 1988
 - ix. GNR.533 OF 16 MARCH 1990
 - b. Health and Safety plan and Audits included by a Certified Company.
 - c. Health and Safety manager, officers and office included
 - 4 Materials used and specifications (COLTO & SABS)
 - a. Foundation preparation and stabilization (COLTO)
 - b. Walls (SABS)
 - c. Slabs (SABS)
 - d. Shuttering (COLTO & SABS)
 - e. Reinforcing (COLTO)
 - f. Plaster (SABS)

- g. Sealing/Waterproofing (SABS)
- h. Manholes (SABS)
- i. Metabolizing, Disinfection and Discharging
 - i. Micro-organism/Bacteria dozing equipment
 - ii. Aeration pump
 - iii. Aeration, flow and discharge piping
 - iv. Bio-media
 - v. Ultrasonic transducer
 - vi. Sludge pump - optional
 - vii. Discharge pump - optional
 - viii. Plant electrical control box (Solar)

5 Contract terms

- | | |
|--------------------------------|-----|
| a. On acceptance | 60% |
| b. Ground/Roof level | 30% |
| c. Finishing and Commissioning | 5% |
| d. Retention (6 months) | 5% |

d. Exclusions

- i. Geotechnical survey
- ii. Quarry License (if applicable)
- iii. Importing of Quarry material (G3/G4 etc.)

4 Optional Systems, Units and Services

- a. Animal and human drinking water rehabilitation and safeguarding
- b. Infrastructure
- c. Roads and Storm Water Drainage
- d. Maintenance contract for Water rehabilitation and Sewage Plant operations
- e. Demolishing

5 Conclusion

- a. We trust you to find this in order and are looking forward to be of service.
- b. Please contact directly should additional information be required.