**SUBTERRA PROCESS**

The "Subterra" process is based entirely on natural processes. The pre-treatment of sewage takes place in a conventional septic tank. Secondary treatment takes place in a vertical flow biological filter. The conceptual drawing below shows the components of a typical small installation. Drawings with more detail of a typical Subterra natural filter are attached B.

- Pre-treatment in a multi-chamber septic tank;
- Buffer tank to attenuate peaks in demand if necessary (the drawing below shows the buffer tank combined with the septic tank);
- Pump installation and transportation pipe to transport water from the buffer tank to the Subterra beds;
- The Subterra beds.

The irrigation pipe material was specifically developed for this purpose and is manufactured in Europe under license from Joachim Krüger Pflanzenwanzen GmbH. The pipe is flexible but very tough. The pipe is perforated in order to spray water into the beds. The perforations only open when the pipe is pressurized to approximately 2 to 3 bar. The pipe's diameter increases from 12mm to approximately 20mm when pressurized. This movement ensures that plant roots do not enter and block the pipe system.

As mentioned above, the bed consists of different layers of sand, substrates and gravel and is planted mainly with Buddleja. The root system of the plants, i.e., the rhizomes ensures aeration of the soil. Soil aeration results from the oxygen inflow via the vascular system of the roots and the loosening of the soil by root development. This ensures the hydraulic flow-through on a long-term basis.

A layer of microorganisms forms on the roots and substrates. The grading of the substrate is specified in order to ensure large surface areas for microorganisms to grow. Comparing the specific surface areas of this technology with any of the package plants shows the massive advantage of the Subterra natural filters with thousands of square meters of surface area per cubic meter of substrate.

Nitifiers and de-nitifiers break down organic components to such an extent that even benzoils and phenols are decomposed.

The purified water is collected in a simple subsurface drainage pipe system, from where it flows to a control tank, where it can be monitored and tested. After that it is discharged to a river, pond or reused for irrigation or secondary water cycle purposes. As the readbed has a dry surface and is entirely covered by gravel it has no smell. Seasonal fluctuations have minimal effect on this process and therefore satisfactory quality of effluent is also guaranteed during peak periods.

The mechanical pre-purification of wastewater, before it enters the Subterra beds takes place in a multi-chambered pit. The minimum size is 6m³, but it ultimately depends on the number of connected households. The subsequent transport of wastewater to the Subterra bed is brought about by a pressure pipe system.
Feasibility Study

Calculation of design parameters:

- Dimensions of site: 350 hectares
- Footprint of building: 2065 sqm
- Number of floors: 1
- Total construction area of building: 2065 sqm
- Rentable area: 950 sqm
- Parking required: 1.25 per accommodation unit (25 units) - 31.25 bays
- Landscaping area: 124 sqm

Net income Agricultural activities: R 1,200,000.00
Total gross income: R 1,653,861.26
Less: Non-recoverable expenses: R 750,000.00
Total gross income before allowance for vacancies: R 903,861.26
Total gross income after allowance for vacancies of 35.00%: R 587,509.82

(a) Yield (Return on total capital expend., year 1): R 587,509.82 / R 14,322,767.77 = 4.10%

(b) Development Profit:

Sales price: R 587,509.82
Less: Total capital expenditure: R 6,025,741.72
Profit: R 8,297,026.05

Estimate of total capital expenditure:

- Restaurant: 177 sqm @ R 4,100.00 = R 725,700.00
- Shops: 174 sqm @ R 3,000.00 = R 522,000.00
- Landscaping: 124 sqm @ R 800.00 = R 99,120.00
- Agriculture: 336 sqm @ R 2,300.00 = R 772,800.00
- Accommodation: 882 sqm @ R 3,100.00 = R 2,734,200.00
- Infrastructure: 3500 m @ R 80.00/m = R 280,000.00
- Central facilities: 496 sqm @ R 4,000.00 = R 1,984,000.00
- Total construction area = R 7,117,820.00

Escalation:

- Pre-contract period escalation factor: 6 months @ 0.50% p.m. = 0.05%
- Building cost at start of construction: R 7,117,820.00
- Construction period escalation factor: 9 months @ 0.60% p.m. = 0.568
- Total escalation during construction period: R 4,164,114.11

Estimated total escalated building cost: R 11,495,468.71

Professional fees: 14.00% = R 1,609,365.82
Developer's fee: R 70,000.00
Marketing fee: R 50,000.00
EIA: R 120,000.00

Sundry Fees:
- Legal fees: R 13,000.00
- Rates & taxes: R 1,000.00
- Plan approval fees: R 18,000.00
- Letting fees: R 57,000.00

Total cost excl land, cost of capital: R 13,433,834.32

Interim interest (cost of capital):
- Land: 9.00% @ R 460,526.32 for 15 months = R 54,619.62
- Construction period: 9.00% @ R 13,433,834.32 for 9 months = R 373,787.52
- Total project cost: R 14,322,767.77

Estimated net annual income:

<table>
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<tr>
<th>Area</th>
<th>Number</th>
<th>esc. Factor</th>
<th>R/sqm or bay</th>
<th>months</th>
<th>annual income</th>
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Ma & Pa

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