Roediger

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Aqseptence Group

Vacuum Sewer System Shoshong, Botswana

Project Report

Situation

The Village of Shoshong is located on the edge of the famous Kalahari Desert in Southern Africa. The village has a population of over 15 000 PE and it was decided by the state to develop a health and sanitation project for the whole village including fresh water supply and waste water discharge. To improve the hygienic conditions and to reduce the soil pollution most of the old pit latrines shall be omitted and replaced by water borne toilet system. The originally designed gravity sewer system would have required more than 100 km of deep gravity sewers and over 20 flushing vessels, which should use more than 100 000 liters of fresh water to clean the sewers against dry sedimentation and blockages every week. Due to the expected difficulties in installation, water scarcity and costs in operation, an alternative sustainable solution was demanded by the local consultant.

Solution

To reduce installation and maintenance costs, it was decided to build a Roediger Vacuum Sewer System for at least 50 % of the project area (8000 PE). More than 55 km of small diameter vacuum sewers in a depth of average 1-1.5 meters were easily laid at reduced trenching. In this way local labor could be occupied instead of using heavy trenching machinery. After a construction time of only 7 months, the vacuum sewer system went into operation. As the village area is flat and the distances between the houses to be connected are quite large the Roediger Vacuum Sewer System was the appropriate solution. Thus 10 lifting stations were obsolete and the additional flush vessels, too. The economic and ecological advantages are evident.

Specials

Shoshong was the first Vacuum Sewer System in Africa. For this reason the Authority decided to continue building a conventional gravity system for approx. 50 % of the village. The other 50 % have been equipped with a vacuum system for comparison. The vacuum system is operated successfully by locally educated staff. The electricity costs for the whole system are less than 4 €/day, there is no dry-sewer problem and the volume of saved flushing water is very significant.

Technical Data

Connected PE: 8000
Vacuum Pipeline Network: 55 km
House Connections: 550 Collection Chambers with Vacuum Valve Units 2.5”
Commissioning: September 2003

Vacuum Station 1:
Vessel: 2 x 7 m3 steel vacuum tank vertically installed, buried in the ground
Vacuum Pumps: 3 pcs,
Suction Capacity: 5.5 kW, 250m3 per hr each
Discharge Pumps: 2 pcs
Pump Capacity: 5.9 kW each
Biofilter: round, diameter 3 m

Vacuum Station 2:
Vessel: 2 x 7m3 steel vacuum tank vertically installed, buried in the ground
Vacuum Pumps: 3 pcs
Suction Capacity: 5.5 kW, 250m3 per hr each
Discharge Pumps: 2 pcs
Pump Capacity: 7.4 kW each
Biofilter: rectangular, approx. 6 m2

Operating Statistics after 2 years: approx. 2 hrs each vacuum pump, approx. 3 minutes each discharge pump.

Roediger Collection Chamber under construction with the gravity inlet from a group of houses

Inspection pipe cover instead of manholes for the vacuum collection pipe underground

1 of 2 Vacuum Stations with Biofiltre and Genset (front)

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