

WDK

Wayne D. Kant P.E. Consulting Engineer
133 Mohawk Avenue, Scotia, New York, 12302
(518) 381-6888, ShermanSpanner@albany.net
N.Y.S. License # 070962

Remediation of failed Raised Engineered On-site System Woodridge Manor Trailer Park Broadalbin, N.Y.

Background:

Woodridge trailer park is located in a rural area of up-state N.Y. in the Town of Broadalbin. During the 1980's failing standard absorption systems lead to the installation of several large raised bed systems each serving a cluster of trailers. The native soil is a mixture of medium sand, silt and some gravel. Extensive percolation tests have yielded stabilized rates of between 5:00 and 30:00 min/inch within the same formation. Seasonal high groundwater levels range from 6" to more than 60" in an area of approximately 30 acres.

Failed System Description:

The system referenced in this report is located near the main entrance to Woodridge Manor and services 5 single-width trailer homes. Sewage is collected through a 4" pipe and is conveyed to a single compartment 1000-gallon concrete septic tank. The total daily flow to this system is estimated a 700 gpd, extrapolated from the metered park average of 140 gpd/trailer. From the septic tank the clarified effluent flows through an abandoned d-box and then into a 750-gallon dual siphon-dosing tank. At one time the siphons would have alternated dosing two parallel disposal areas consisting of 6 x 80' conventional laterals each. The laterals were installed in a large raised bed of medium sand measuring 140' x 100' x 4' depth. Total lateral length is 960 linear feet. The calculated soil application rate, based on a basal area of 6205 sq.ft. And a flow of 700 gpd is .3 gallons/sq.ft. /day.

The condition of the system when this engineer first observed it this spring (2001) was that it was in gross failure with surfacing and ponding of raw effluent. The owner frequently had problems mowing the grass on the raised area and had to fence off a 15' diameter area where dark effluent surfaced. The dosing siphons had long since failed and effluent was flowing by gravity out of the dosing tank through two overflow channels.

Proposed Remediation:

The conventional solution to this failure would have been to dig out the old system, dispose of the old material and create a new-engineered system. Based on my

experience this would have cost \$15,000.00 to \$20,000.00. Representatives of Knight Treatment Systems (KTS) instead proposed to remediate the existing raised bed through the use of a microbial inoculator/generator called the "Pirana".

The Pirana system is a proprietary device; composed of a reactor module, 40 watt positive displacement air pump and an inoculant that is inserted into the reactor module. The reactor is lowered into an existing septic tank, hooked up to the compressor and inoculated. The Pirana unit generates beneficial bacteria using the waste stream as a food source. After a period of time the beneficial bacteria flow into the clogged laterals and gradually un-clog the system by consuming the bio-film. KTS claims that if within 60 days there is not a measurable increase in system function that a full refund will be given for equipment purchased and the site will be restored to the pre-Pirana condition. The total cost to install the Pirana unit at Woodridge was under \$4000.00.

Installation and Monitoring:

On June 27, 2001 KTS technicians arrive at 9:00 A.M. to install a Pirana in the failed system. By 12:00 noon the Pirana was installed in the tank and running.

In order to determine the precise failure mode, we excavated several test holes in the disposal area. We first dug between the laterals and found clean sand to below the bottom of the adjacent lateral. As we dug closer to the lateral we encounter blackened sand, which is indicative of bio-fouling. Bio-fouling occurs when slime forming bacteria multiply in the interstitial spaces between sand particles and render the sand layer impervious to water flow.

Upon breaching the bio-fouled sand layer a dramatic sidewall collapse ensued as the hydrostatic pressure in the trenches blew out the trench wall, filling our hole with effluent.

We next installed several monitoring wells in the raised bed to determine static water levels both between and inside the absorption trenches. At days end the static water level was at surface level in the trench monitoring well and non-detectable between trenches (laterals).

Results:

Over the next three weeks, the site was regularly monitored for mechanical function, condition of the raised bed, effluent characteristics and levels.

The first dramatic observation (after 4 days) was formation of thick flocks of white bacterial colonies in the dosing tank. This was concurrent with a disappearance of all black sludge and slime in the tank. Water levels in the monitoring well stayed constant for the first 18 days. There was however a marked change in the color and quantity of the effluent at the surfacing point with a gradual change from black and green to gray. It also became noticeably less damp over the entire surface of the raised area.

Between the 18th and 21st days of operation the water level in the trench area dropped from grade to 12” below grade and the surfacing halted. This system now is considered “not failing” as defined by the NYS Department of Health.

As of 7-30-01 the water levels in the trench area have dropped to 15” below grade and the fence surrounding the area previously surfacing effluent has been removed. The area is dry and has been reseeded. It is my professional opinion that the failure has been remediated. I will continue to monitor the system for at least one year to assess the long-term operation of the Pirana and to determine if the biofilm (clogging) can be completely removed through non-invasive biological methods.

Addendums:

9-5-01 Water level in trench area was observed at 18” below surface with no evidence of recent surfacing. Replacement (plastic) dosing siphons are scheduled to be installed. Grass is growing in area where surfacing used to occur and the area can be mowed.