Sanitation Technology Information Sheet

Wastewater Systems for NEW HOUSING DEVELOPMENTS

When building new housing projects, developers and engineers must plan for, design, and install infrastructure to support the community. This generally includes roads, drainage systems, dry utilities, as well as facilities for solid waste collection, water delivery, and wastewater collection and treatment.

Effective management of wastewater is not only critical for public health reasons, but it also adds value by maintaining higher standards of living for community residents. In most countries, providing wastewater treatment services is not just a good idea, it is the law!

1. Fully Piped Sewerage Systems

Many modern housing developments in urban areas use sewer pipes that are connected directly to the houses, eliminating the need for septic tanks. The sewage flows to a treatment plant where it is treated and then reused or disposed. On a large scale, these systems are generally the least expensive on a per-capita basis, and most effective for protecting public health. Human contact with the sewage is minimized when it is contained in sealed pipes from the house to the treatment plant. These systems generally use large-diameter pipes with manholes or sewer access points every 100 to 150 meters to allow for cleaning and maintenance. Where needed, pumps are installed to overcome gravity and deliver the sewage to the treatment plant.

The pipes can lead either to one large centralized treatment plant, or several smaller decentralized plants located throughout the community.

The disadvantage of fully piped sewerage systems is the relatively high cost of laying pipes from each house, and the ongoing maintenance of the pipes and the pumps. However, it is much cheaper to lay the pipes for a new housing development during construction rather than installing them after paved roads and sidewalks are in place.

Options for Wastewater Management

There are many options for sewage collection and wastewater treatment in new subdivisions and low-cost housing developments. These include:

1. Fully piped sewerage systems;
2. Septic tanks for each house;
3. Communal septic tanks for several houses;
4. On-site collection, treatment and disposal of the effluent coming from the septic tanks; and
5. Off-site collection, treatment and disposal.
2. Septic Tanks

For smaller developments, or housing projects in more rural areas, other alternatives should be considered. These include a combination of septic tanks with either on-site or off-site effluent collection, treatment and disposal systems.

Septic tanks are sealed tanks that perform the first stage, or primary treatment, of the sewage by settling and floatation. The heavier solids in sewage settle to the bottom of the tank as sludge, and the lighter fats, oils and grease float to the top to form scum. Effluent, or partially treated wastewater, flows out through the outlet pipe. The natural process of anaerobic digestion reduces the volume of the accumulated solids. Desludging should be done when the solids fill one third of the tank. Therefore, a program of regular desludging is needed for the septic tanks to operate properly. Also, the liquid effluent from the septic tank should be treated to kill harmful bacteria that cause disease, and to reduce odor and protect the environment and fisheries from pollution.

Since septic tanks are simple to install and relatively inexpensive, many developers design community wastewater systems with septic tanks on each lot. For small lots, it may be better to build communal septic tanks that are connected to several houses.

3. Communal Septic Tanks

In dense housing communities where the building lots are small, a communal septic tank can be connected to several houses. Communal septic tanks offer the following benefits:

- It may be less expensive to build one large tank rather than several smaller tanks;
- It is easier and more efficient to maintain and desludge one larger, centralized tank rather than several tanks scattered throughout a community; and
- Communal tanks can be located at sites that may be more suitable for tank construction (where the soils are suitable and the groundwater is lower).

However, developing communal wastewater systems requires cooperation from all residents and an agreement that the system will be used for the common good of all the residents. This agreement should be in place before construction.

4. On-Site Effluent Treatment and Disposal

In areas where soils are deep and of good quality and house lots are large, soils-based leaching systems or those that use sub-surface irrigation can be used to treat the effluent coming from each septic tank. The effluent flows through a long, perforated pipe, down through a gravel bed, and then into the soil.

Such systems must be designed to dispose of the effluent above the level of groundwater during the rainy season to protect drinking water sources.

5. Off-Site Effluent Treatment and Disposal

Simplified sewer systems use septic tanks to collect the solids, while the liquid effluent flows through small diameter sewer pipes to a treatment plant. Using septic tanks to remove the solids from the sewage allows for lower-cost networks of sewer pipes compared to fully piped sewerage systems that do not include septic tanks.