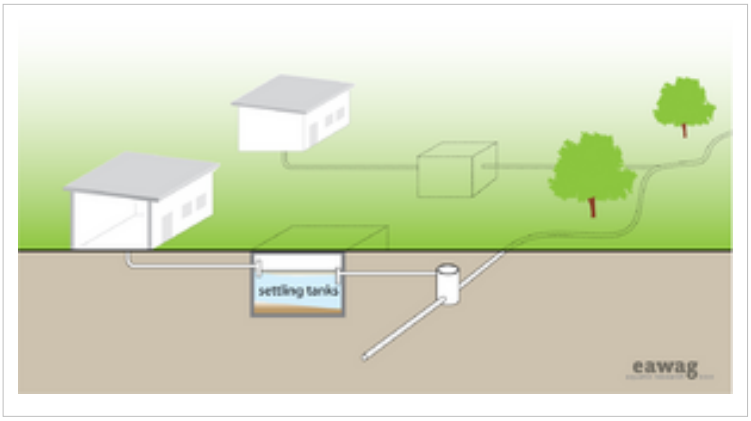
Solids-free_Sewer

Application level		Management level	
Household		Household	XX
Neighbourhood	XX	Shared	XX
City	X	Public	XX



Applicable to systems:	Languages / langues / idiomas
6	

Inputs: Effluent

Outputs: Effluent

A Solids-Free Sewer is a network of small diameter pipes that transports solids-free or pre-treated wastewater (such as Septic Tank or settling tank effluent) to a treatment facility for further treatment or to a discharge point. Solids-Free Sewers are also referred to as settled, small-bore, small-diameter, variable-grade gravity, or septic tank effluent gravity sewers.

A precondition for Solids-Free Sewer networks is efficient pre-treatment at the household level. The interceptor, septic or settling tank removes settleable particles that could clog small pipes. A grease trap should also be added. Because there is little risk of clogging, the sewers do not have to be self-cleaning (i.e. no minimum flow velocity) and can therefore be laid at shallow depths, can have fewer inspection points (manholes), can follow the topography more closely and have inflective gradients (i.e. negative slope). When the sewer roughly follows the ground contours, the flow in the sewer is allowed to vary between open channel flow and pressure (full-bore) flow. However, care should be taken with negative slopes as they may lead to surging above the ground level during peak flows. Inspection points should be provided at major connection points or when the size of the pipe changes.

Despite the possibility that some portions of the pipe can rise higher when going downstream, for the total pipe the downstream end of the sewer must be lower than the upstream end. When choosing a pipe diameter (at least 75mm), the depth of water in the pipe during peak flow within each section must be less than the diameter of the pipe. In sections where there is pressure flow, the invert of any interceptor tank outlet must higher than the hydraulic head within the sewer just prior to the point of connection otherwise the liquid will backflow into the tank. If this condition is not met, then either select the next larger pipe diameter for the sewer or increase the depth at which the sewer is laid.

Advantages	Disadvantages/limitations

- Greywater can be managed at the same time. - Can be built and repaired with locally available materials. - Construction can provide short-term employment to local labourers. - Capital costs are less than Conventional Gravity Sewers; low operating costs. - Can be extended as a community changes and grows.	- Requires expert design and construction supervision. - Requires repairs and removals of blockages more frequently than a Conventional Gravity Sewer. - Requires education and acceptance to be used correctly. - Effluent and sludge (from interceptors) requires secondary treatment and/or appropriate discharge. -High water consumption for excreta removal.

Adequacy

Solids-Free Sewers are appropriate for both full and partially filled flows. Although a constant supply of water is required, less water is needed compared to the Simple Sewer because self-cleansing velocities are not required.

Septic Tanks and Solids-Free Sewers can be built for new areas, or a Solids-Free Sewer can be connected to an existing primary treatment technology where local infiltration is inappropriate. A Solids-Free Sewer can be built for 20% to 50% less than Conventional Gravity Sewerage.

This technology must be connected to an appropriate (Semi-) Centralized Treatment technology that can receive the wastewater. It is appropriate for densely populated areas where there is no space for a Soak Pit or Leach Field. This type of sewer is best suited to urban and less appropriate in low-density or rural areas.

Health Aspects/Acceptance

This technology requires regular maintenance on the part of the users and is therefore, not as passive as Conventional Gravity Sewers. Users must assume some level of responsibility for the technology and accept that some potentially unpleasant maintenance may be required. Also, users should be aware that, because the system is community based, they may have to work with and/or coordinate maintenance activities with other users. The system will provide a high level of service and may offer a significant improvement to non-functioning Leach Fields.

Upgrading

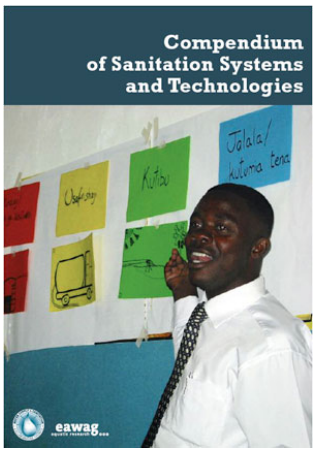
Solids-Free Sewers are good upgrading options for Leach Fields that have become clogged and/or saturated with time as well as for rapidly growing areas that would not accommodate more Septic Tanks with Leach Fields.

Maintenance

The septic/interceptor tank must be regularly maintained and desludged to insure optimal performance of the Solids-Free Sewer network. If the pre-treatment is efficient, the risk of clogging in the pipes is low, but some maintenance will be required periodically. The sewers should be flushed once a year as part of the regular maintenance regardless of their performance.

Acknowledgements

The material on this page was adapted from: Tilley, E. et al. (2008). Compendium of Sanitation Systems and Technologies [2], published by Sandec [3], the Department of Water and Sanitation in Developing Countries of Eawag [4], the Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland. The publication is available in English, French, and will be made available in Spanish. Available in the IRC Digital Library [5]



Download the Eawag Compendium of Sanitation Systems and Technologies! [1]

References and external links

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[1] http://www.eawag.ch/organisation/abteilungen/sandec/publikationen/compendium_e/index_EN
[2] http://www.eawag.ch/organisation/abteilungen/sandec/publikationen/publications_sesp/downloads_sesp/compendium_high.pdf
[3] http://www.eawag.ch/organisation/abteilungen/sandec/index_EN
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