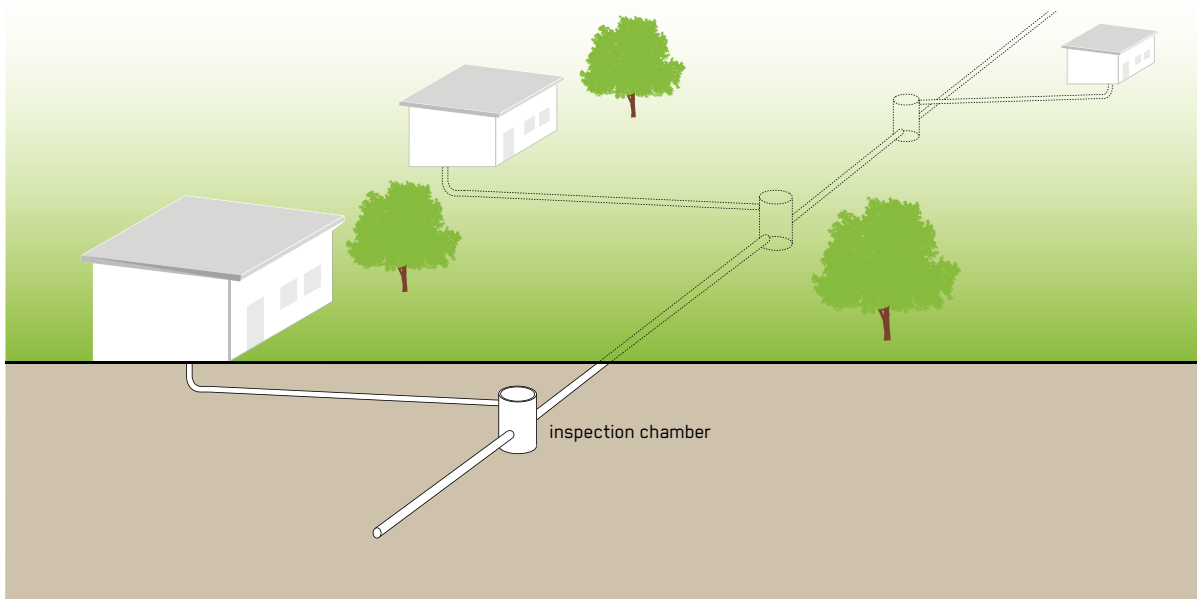


Simplified Sewer

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response * Stabilisation ** Recovery	Household ** Neighbourhood * City	* Household ** Shared ** Public	Conveyance of wastewater
Space Required	Technical Complexity	Inputs / Outputs	
** Medium	** Medium	● Blackwater, ● Greywater, ● Effluent	



A Simplified Sewer is a sewerage network constructed using small diameter pipes laid at a shallower depth and at a flatter gradient than Conventional Gravity Sewers (C.4). The Simplified Sewer allows for a more flexible design at lower costs. It can be implemented at neighbourhood level.

Conceptually, a Simplified Sewer (also known as a communal sewer) is the same as a Conventional Gravity Sewer, but with less conservative design standards and with design features that are more adaptable to local situations. Rather than laying the pipes under central roads, they are usually laid under walkways, where they are not subjected to heavy traffic loads. This allows pipes to be laid shallower and thus less excavation is required and fewer and shorter pipes are needed.

Design Considerations: In contrast to Conventional Gravity Sewers that are designed to ensure a minimum self-cleansing velocity, the design of Simplified Sewers is based on a minimum tractive tension of 1 N/m^2 (1 Pa) at peak flow. The minimum peak flow should be 1.5 L/s and a minimum sewer diameter of 100 mm is required. A gradient of 0.5% is usually sufficient. For example, a 100 mm diameter sewer laid at a gradient of 1 m in 200 m can serve around 2,800 users with a wastewater flow of around 60 L/person/day. The depth at which the sewers should be laid depends mainly on the amount of traffic on the ground above. Below sidewalks, covers of 40 to 65 cm are typical. The simplified design can also be applied to sewer mains; they can also be laid at a shallow depth, provided they are not placed underneath roads. At each junction or change in direction, simple inspection chambers (or cleanouts) are sufficient, instead of expensive manholes. Inspection boxes are also used at each house connection. Where kitchen greywater contains an appreciable

amount of oil and grease, the installation of grease traps is recommended to prevent clogging. Greywater should be discharged into the sewer to ensure an adequate wastewater flow, but stormwater connections should be discouraged. However, in practice it is difficult to exclude all stormwater flows, especially where there is no alternative for stormwater drainage. The design of the sewers (and treatment plant) should, therefore, account for the extra flow that may result from stormwater inflow.

Materials: PVC pipes are recommended for the Simplified Sewer. Inspection chambers can be constructed using bricks with mortared cover to avoid the influx of unwanted products, such as stormwater, soil or grit. Plastic junction boxes can be pre-fabricated. Concrete should not be used in simplified sewerage, as it will corrode quickly.

Applicability: Simplified Sewers can be installed in almost all types of settlements but are particularly appropriate in dense urban areas and camps where space for on-site systems is limited. They are also useful for the emergency repair of a damaged existing system or for rapid expansion, to meet the needs of a sudden population growth. They should be considered as an option where there is sufficient population density (minimum 150 people per hectare) and a reliable water supply (at least 60 L/person/day). If well-constructed and maintained, Simplified Sewers are a safe and hygienic means of transporting wastewater. Users must be well trained regarding health risks associated with removing blockages and maintaining inspection chambers.

Operation and Maintenance: Trained and responsible users are essential to ensure that the flow is undisturbed and to avoid clogging caused by trash and other solids. Occasional flushing of pipes is recommended to avoid blockages. Blockages can usually be removed by opening the cleanouts and forcing a rigid wire through the pipe. Inspection chambers must be periodically emptied to prevent grit overflowing into the system. Successful

operation requires clearly defined responsibilities between service provider and users. Private contractors or user committees can be hired to do the maintenance.

Costs: Simplified Sewerage is between 20 and 50% less expensive than Conventional Gravity Sewerage. Household connections are expensive and often not budgeted for when planning sewers. For Simplified Sewers, household connections include the last 1–10 meters of pipe, excavation, an inspection chamber and other on-site sanitary installations. A Simplified Sewer requires skilled technicians available at any time for operation and maintenance including replacement of pipes, removal of blockages and monitoring inspection chambers.

Software Considerations: Simplified Sewers require correct use by users. A common challenge encountered are blockages of the sewer caused by solid waste being put into the system. User training, in combination with solid waste management (X.8) can help to overcome this challenge.

Strengths and Weaknesses:

- ⊕ Can be laid at a shallower depth and flatter gradient than Conventional Sewers
- ⊕ Lower capital costs than Conventional Sewers; low operating costs
- ⊕ Can be extended as a community grows
- ⊕ Greywater can be managed concurrently with blackwater
- ⊖ Requires repairs and removals of blockages more frequently than a Conventional Sewer
- ⊖ Requires expert design and construction
- ⊖ Leakages pose a risk of wastewater exfiltration and groundwater infiltration and are difficult to identify

→ **References and further reading material for this technology can be found on page 193**