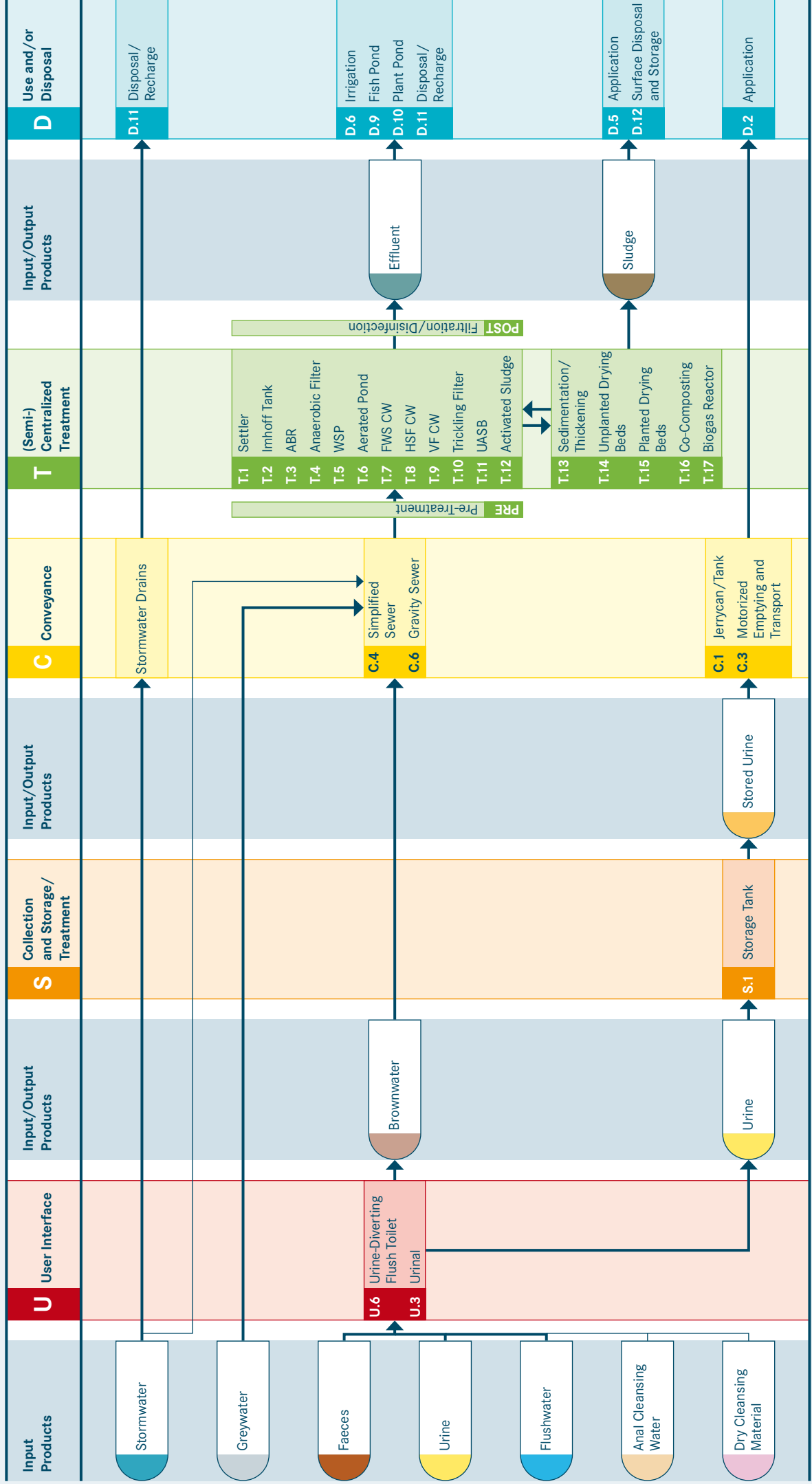
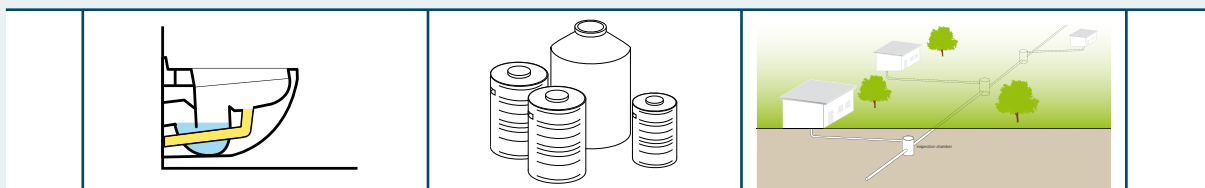


Sanitation System 9: Sewerage System with Urine Diversion



System 9: Sewerage System with Urine Diversion



This is a water-based system that requires a Urine-Diverting Flush Toilet (UDFT, U.6) and a sewer. The UDFT is a special User Interface that allows for the separate collection of Urine without water, although it uses water to flush Faeces. Inputs to the system can include Faeces, Urine, Flushwater, Anal Cleansing Water, Dry Cleansing Materials, Greywater and possibly Stormwater.

The main User Interface technology for this system is the UDFT (U.6). A Urinal (U.3) can be an additional installation for the effective collection of Urine. Brownwater and Urine are separated at the User Interface. Brownwater bypasses a Collection and Storage/Treatment technology and is conveyed directly to a (Semi-) Centralized Treatment facility using a Simplified (C.4) or a Conventional Gravity Sewer network (C.6). Greywater is also transported in the sewer and is not separately treated.

Stormwater could also be put into the Gravity Sewer network, although this would dilute the wastewater and require Stormwater overflows. Therefore, local retention and infiltration of Stormwater or a separate drainage system for rainwater are the recommended approaches.

Urine diverted at the User Interface is collected in a Storage Tank (S.1). Stored Urine can be handled easily and with little risk because it is nearly sterile. With its high nutrient content it can be used as a good liquid fertilizer. Stored Urine can be transported for Application in agriculture (D.2) either using Jerrycans or a Tank (C.1), or a Motorized Emptying and Transport technology (C.3) – the same way that bulk water or Sludge is transported to fields.

Brownwater is treated at a (Semi-) Centralized Treatment facility using a combination of the technologies T.1-T.12. The Sludge generated from these technologies must be further treated in a dedicated Sludge treatment facility (technologies T.13-T.17) prior to Use and/or Disposal. Options for the Use and/or Disposal of the treated Effluent include Irrigation (D.6), Fish Ponds (D.9), Floating Plant Ponds (D.10) or discharge to a water body (Water Disposal/Groundwater Recharge, D.11). After adequate treatment, Sludge can either be used in agriculture (D.5) or brought to a Storage/Disposal site (D.12).

Considerations This system is only appropriate when there is a need for the separated Urine and/or when there is a desire to limit water consumption by using a low-flush UDFT (although the system still requires a constant source of water). There may also be benefits to the treatment plant if it is normally overloaded; the reduced nutrient load (by removing the Urine) could optimize treatment. However, if the plant is currently underloaded (i.e., it has been overdesigned), then this system could further aggravate the problem. Depending on the type of sewers used, this system can be adapted for both dense urban and peri-urban areas. It is not well-suited to rural areas with low housing densities. Since the sewer network is (ideally) watertight, it is also applicable for areas with high groundwater tables.

Dry Cleansing Materials can be handled by the system or they can be collected and separately disposed of (e.g., Surface Disposal, D.12).

UDFTs are not common and the capital cost for this system can be very high. This is partly due to the fact that there is limited competition in the User Interface market and also because high quality workmanship is required for the dual plumbing system. Conventional Gravity Sewers require extensive excavation and installation which is expensive, whereas Simplified Sewers are generally less expensive if the site conditions permit a condominal design. Users may be required to pay user fees for the system and its maintenance. Depending on the sewer type and management structure (Simplified vs. Conventional, city-run vs. community-operated, Urine transport and Application) there will be varying degrees of operation or maintenance responsibilities for the homeowner.

This system is most appropriate when there is a high willingness and ability to pay for the capital investment and maintenance costs and where there is a pre-existing treatment facility that has the capacity to accept additional flow.

Guidelines for the safe use of Urine, Effluent and Sludge have been published by the World Health Organization (WHO) and are referenced on the relevant technology information sheets.