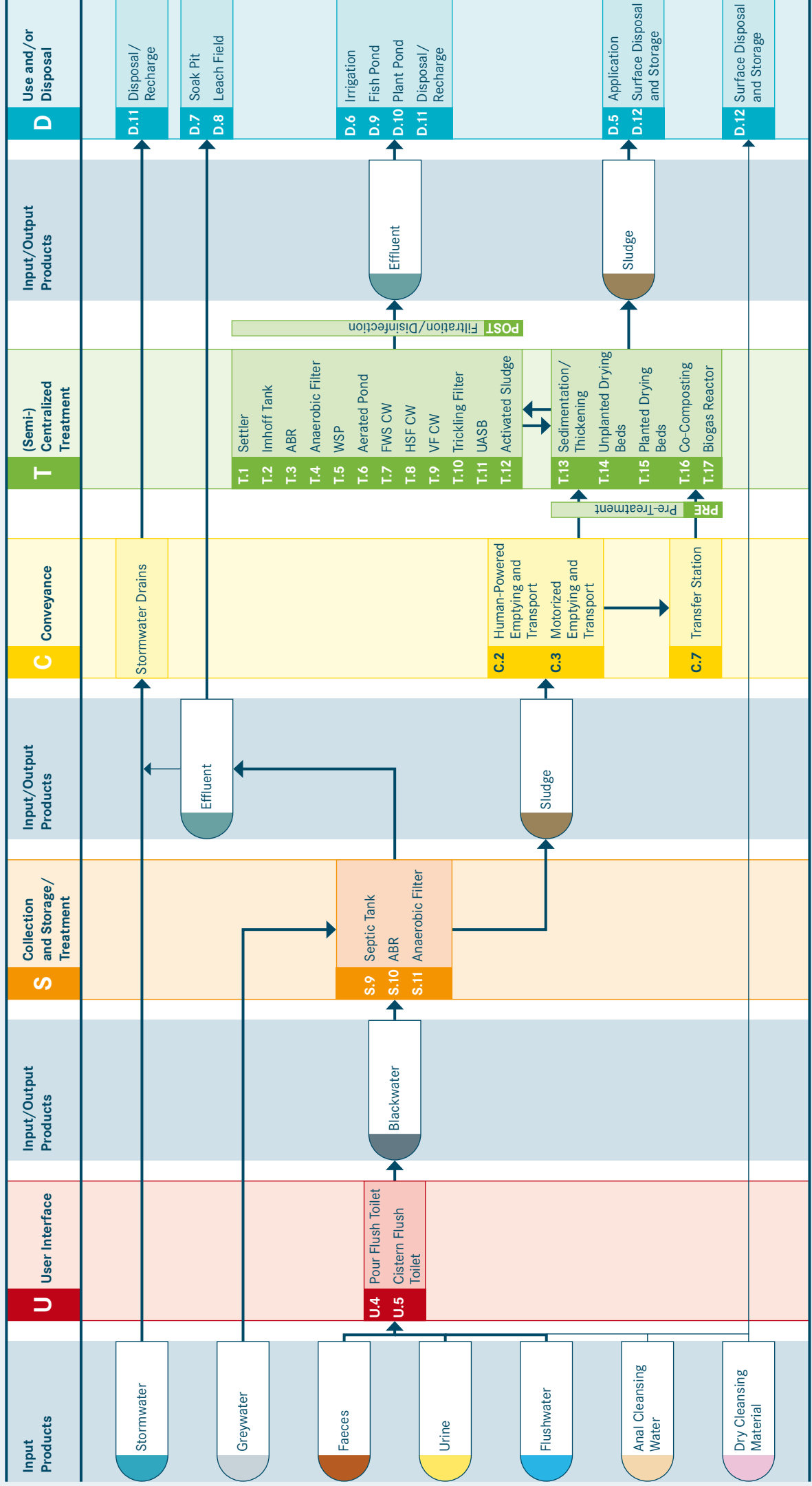
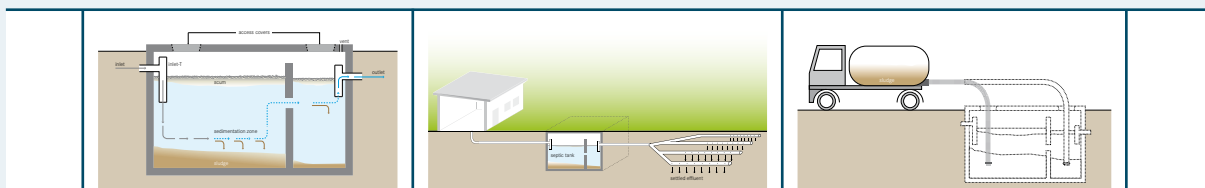


Sanitation System 6: Blackwater Treatment System with Infiltration



System 6: Blackwater Treatment System with Infiltration



This is a water-based system that requires a flush toilet and a Collection and Storage/Treatment technology that is appropriate for receiving large quantities of water. Inputs to the system can include Faeces, Urine, Flushwater, Anal Cleansing Water, Dry Cleansing Materials and Greywater. There are two User Interface technologies that can be used for this system: a Pour Flush Toilet (U.4) or a Cistern Flush Toilet (U.5). A Urinal (U.3) could additionally be used. The User Interface is directly connected to a Collection and Storage/Treatment technology for the Blackwater that is generated: either a Septic Tank (S.9), an Anaerobic Baffled Reactor (ABR, S.10), or an Anaerobic Filter (S.11) may be used. The anaerobic processes reduce the organic and pathogen load, but the Effluent is still not suitable for direct use. Greywater should be treated along with Blackwater in the same Collection and Storage/Treatment technology, but if there is a need for water recovery, it can be treated separately (this is not shown on the system template). Effluent generated from the Collection and Storage/Treatment can be directly diverted to the ground for Use and/or Disposal through a Soak Pit (D.7) or a Leach Field (D.8). Although it is not recommended, the Effluent can also be discharged into the Stormwater drainage network for Water Disposal/Groundwater Recharge (D.11). This should only be considered if the quality of the Effluent is high and if there is no capacity for onsite infiltration or transportation offsite.

The Sludge that is generated from the Collection and Storage/Treatment technology must be removed and transported for further treatment. The Conveyance technologies that can be used include Human-Powered (C.2) or Motorized Emptying and Transport (C.3). As the Sludge is highly pathogenic prior to treatment, human contact and direct agricultural application should be avoided. The Sludge that is removed should be transported to a dedicated Sludge treatment facility (T.13-T.17). In the event that such a facility is not easily accessible, the Sludge can be discharged to a Transfer Station (C.7). From the Transfer Station it will then be transported to the treatment facility by a motorized vehicle (C.3).

A technology selection tree for Sludge treatment plants is provided in Strande et al., 2014 (see Sector Develop-

ment Tools, p. 9). (Semi-) Centralized Treatment technologies (T.1-T.17) produce both Effluent and Sludge, which may require further treatment prior to Use and/or Disposal. For example, Effluent from a Sludge treatment facility could be co-treated with wastewater in Waste Stabilization Ponds (T.5) or Constructed Wetlands (T.7-T.9).

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 in areas where desludging services are available and affordable and where there is an appropriate way to dispose of the Sludge. For the infiltration technologies to work there must be sufficient available space and the soil must have a suitable capacity to absorb the Effluent. If this is not the case, refer to System 7 (Blackwater Treatment System with Effluent Transport). This system can be adapted for use in colder climates, even where there is ground frost. The system requires a constant source of water.

This water-based system is suitable for Anal Cleansing Water inputs, and, since the solids are settled and digested onsite, easily degradable Dry Cleansing Materials can also be used. However, rigid or non-degradable materials (e.g., leaves, rags) could clog the system and cause problems with emptying and, therefore, should not be used. In cases when Dry Cleansing Materials are collected separately from the flush toilets, they should be disposed of in an appropriate way (e.g., Surface Disposal, D.12).

The capital investment for this system is considerable (excavation and installation of an onsite storage and infiltration technology), but the costs can be shared by several households if the system is designed for a larger number of users.

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