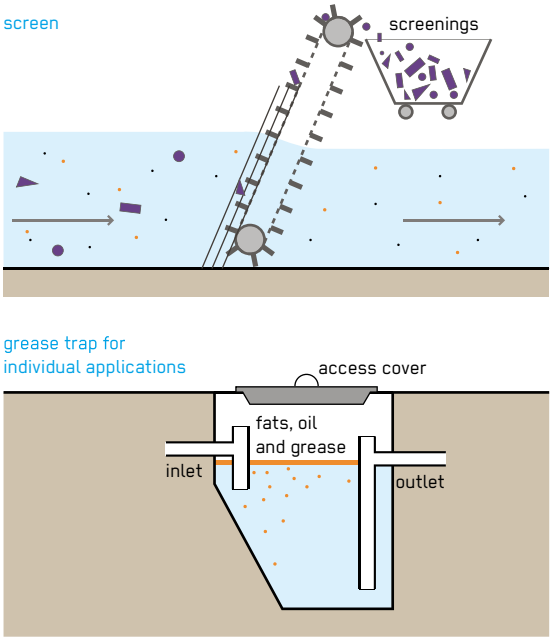
Pre-Treatment Technologies

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response * Stabilisation ** Recovery	* Household ** Neighbourhood ** City	* Household * Shared ** Public	Ensuring durability and proper functioning of subsequent systems
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
* Little	** Medium	● Blackwater, ● Greywater, ● Sludge	● Blackwater, ● Greywater, ● Sludge, ● Pre-Treatment Products



Pre-Treatment is the preliminary removal of wastewater or sludge components, such as oil, grease, and solid material. Sequenced before a conveyance or (semi-) centralised treatment technology or pump, Pre-Treatment units can prevent the accumulation of solids and minimise subsequent blockages, help reduce abrasion of mechanical parts and extend the life of sanitation infrastructure.

Oil, grease, sand and suspended solids can impair transport and/or treatment efficiency through clogging and wear. It is therefore crucial to prevent these from entering the system and early removal of this material that does enter the system is essential for its durability. Preventive measures at individual level (source control) and along conveyance systems are important. For example, sewer inspection chambers should always be closed with manhole covers to prevent extraneous material from entering the sewer. Pre-Treatment Technologies are generally installed at the point where wastewater enters a treatment plant or leaves larger institutions. These technologies use physical removal mechanisms, such as screening, flotation, settling and filtration.

Design Considerations: Screen Screening aims to prevent coarse solid waste, such as plastics and other trash, from entering a sewer or treatment plant. Solids are usually trapped by inclined screens or bar racks. Spacing between the bars is usually 1.5 to 4 cm, depending on cleaning patterns. Screens can be cleaned by hand or mechanically raked. The latter allows for a more frequent solids removal and, correspondingly, a smaller design.
Grease Trap These trap oil and grease for easy collection and removal. Grease traps are chambers made of either brickwork, concrete or plastic, with an odour-tight cover. Baffles or tees at the inlet and outlet prevent turbulence at the water surface and separate floating components from effluent. A grease trap can either be located directly under the household sinks, or, for larger amounts of oil

and grease, a grease interceptor can be installed outdoors. If designed large enough, grease traps can also remove grit and other settleable solids through sedimentation, similar to Septic Tanks **(S.13)**.

Grit Chamber Where subsequent treatment steps could be hindered or damaged by sand in the wastewater, grit chambers or sand traps allow for the removal of such heavy inorganic materials by settling them out. There are three general types of grit chambers: horizontal-flow, aerated, and vortex chambers. All of these designs allow heavy grit particles to settle out, while lighter, principally organic particles remain in suspension.

Materials: Screens, grease traps and grit chambers can all be built with locally available materials, such as concrete and metal bars. The last two are also available as prefabricated units, or can be made out of prefabricated containers. For automatic screens electricity is required. Tools to de-scum, desludge and to remove solid waste are needed, including personal protective equipment for the workers performing these tasks.

Applicability: Grease traps should be applied where considerable amounts of oil and grease are discharged (e.g. restaurants, cantines). Grease removal is especially important where there is an immediate risk of clogging, e.g. greywater treatment in Constructed Wetlands **(T.6)**. Screening is essential to prevent solid wastes from entering sewer systems and treatment plants. Trash traps, e.g., mesh boxes, can be applied at strategic locations such as market drains. A grit chamber is especially recommended where roads are not paved and/or stormwater may enter the sewer system, and in sandy environments.

Operation and Maintenance: Pre-Treatment products separated from wastewater or sludge should be removed regularly, with a frequency depending on the accumulation rate. For screens, removal should be done at least every day. An under-the-sink grease trap must be cleaned often (once a week to once a month), whereas a larger grease interceptor is designed to be pumped out every 6–12 months. As for grit chambers, special care should be taken after rainfall. If maintenance is too infrequent, strong odours can result from the degradation of accumulated material. Insufficiently maintained pre-treatment units can eventually lead to the failure of downstream elements of a sanitation system (especially through clogging). The Pre-Treatment products should be disposed of as solid waste in an environmentally sound way. If no solid waste management infrastructure **(X.8)** exists, the solid wastes should be buried.

Health and Safety: People involved in Pre-Treatment may come into contact with pathogens or toxic substances; therefore, adequate protection with proper personal equipment, i.e. boots and gloves, is essential, as is safe disposal to prevent the local population from coming into contact with the solid wastes.

Costs: The capital and operating costs of Pre-Treatment Technologies are relatively low. The costs of a constant electrical supply have to be considered for automated types of screens. All technologies require regular descumming and desludging and therefore require trained workers.

Social Considerations: Removal of solids and grease from Pre-Treatment Technologies is not pleasant and, if households or community members are responsible for doing this, it may not be done regularly. Hiring professionals for this may be the most efficient option but can be costly. Behavioural and technical source control measures at the household or building level can reduce pollution loads and keep Pre-Treatment requirements low. For example, solid waste and cooking oil should be collected separately and not disposed of in sanitation systems. Equipping sinks and showers with appropriate screens, filters and water seals can prevent solids from entering the system.

Strengths and Weaknesses:

- ⊕ Relatively low capital and operating costs
- ⊕ Reduced risk of impairing subsequent conveyance and/or treatment technologies
- ⊕ Higher lifetime and durability of sanitation hardware

- ⊖ Frequent maintenance required
- ⊖ Removal of solids and grease is unpleasant
- ⊖ Safe disposal must be planned

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