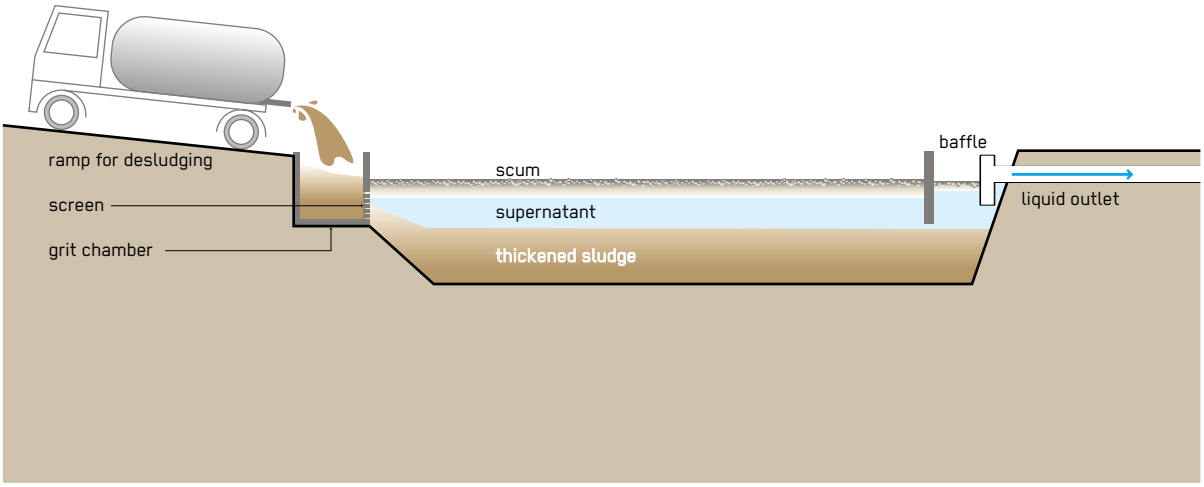
Sedimentation and Thickening Ponds

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response * Stabilisation ** Recovery	Household * Neighbourhood ** City	Household Shared ** Public	Solid / liquid separation of faecal sludge, Sludge stabilisation
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
*** High	** Medium	● Sludge	● Sludge, ● Effluent



Sedimentation or Thickening Ponds or tanks are settling ponds that allow sludge to thicken and dewater. The effluent is removed and treated, while the thickened sludge can be further treated in a subsequent technology.

Faecal sludge is not a uniform product and, therefore, its treatment must be specific to the characteristics of the sludge. Sludge which is rich in organics and has not undergone significant degradation is difficult to dewater. Conversely, sludge that has undergone significant anaerobic degradation is more easily dewatered. In order to be properly dried, fresh sludge, which is rich in organic matter (e.g. latrine or public toilet sludge), must first be stabilised, which can be done through anaerobic degradation in Sedimentation/Thickening Ponds. The same type of pond can be used to thicken sludge which is already partially stabilised, e.g. originating from Septic Tanks **(S.13)**. The degradation process may hinder the settling of sludge because the gases produced bubble up and re-suspend the solids. As the sludge settles and digests, the supernatant must be decanted and treated separately. The thickened sludge can then be dried or co-composted **(T.9–T.11)**.

Design Considerations: Two tanks/ponds operating in parallel are required; one can be loaded, while the other is resting. To achieve maximum efficiency, loading and resting periods should not exceed four to five weeks, although much longer cycles are common. When a four-week loading and four-week resting cycle is used, total solids can be increased to 14 % (depending on the initial concentration). Beyond that, the quality of the supernatant may start decreasing, while sludge does not thicken further. It is also possible to have shorter cycles, for example 1 week, in order to get a sludge that is less thickened but easier to pump. The lower part of the pond is where accumulation and thickening, and thus natural compaction, takes place. The height of this zone must be estimated

based on the quantity of solids to be received during the whole duration of loading and the desired final concentration. The height of the supernatant zone is typically 1 m. For an optimal design, it is recommended to test the settling capacity of the sludge beforehand. As in a Settler **(T.1)**, the settling surface and the design of the inlet and outlet baffles are important in order to stabilise the hydraulic flow and optimise settling. The zone reserved for scum depends on the storage duration and is typically around 0.5 m. It is important that each zone's height is well estimated in order to avoid sludge leaving the pond together with the supernatant. Access for maintenance is necessary and depends on the method planned for sludge removal.

Materials: This is standard civil engineering work, requiring digging and concrete. Key items are the sludge removal equipment.

Applicability: Sedimentation and Thickening Ponds are appropriate for sludge stabilisation (for example when there is fresh sludge), and/or thickening. Sludge can be thickened when difficult to dry in the raw state (for example because it is less concentrated), and/or because the climate is not conducive to open air drying, (due to high humidity or a long rainy season). Both the thickened sludge and the supernatant need further treatment, for example in drying beds or waste stabilisation ponds respectively. If a wastewater treatment plant is nearby and is able to absorb the supernatant, it can be treated there. Sedimentation and Thickening Ponds are most appropriate where there is inexpensive, available space located far from homes and businesses.

Operation and Maintenance: A trained staff member for operation and maintenance is required. The maintenance is not intensive. The discharging area must be maintained and kept clean to reduce the potential of disease transmission and nuisance (flies and odours). Solid waste that is discharged along with the sludge must be removed from the screen at the inlet of the ponds **(PRE)**. The thickened sludge must be mechanically removed (with a front-end loader or other specialised equipment) after it has sufficiently thickened; alternatively, it can be pumped if it is still sufficiently liquid. It is essential to plan for sludge removal and allocate financial resources for it.

Health and Safety: Both incoming and thickened sludge are pathogenic. Workers should be equipped with proper personal protective equipment (boots, gloves, and clothing).

Costs: Considering the land required, the construction costs and the need for sludge removal equipment, the capital costs are medium. The operating costs are low, with the major expense being the regular sludge removal.

Social Considerations: The Sedimentation and Thickening Pond may cause a nuisance for nearby residents due to bad odours and the presence of flies. It should be located away from residential areas.

Strengths and Weaknesses:

⊕ The thickened sludge is easier to further treat, to handle and less prone to splashing and spraying
⊕ Can be built and repaired with locally available materials
⊕ No electrical energy is required if there is no pump

⊖ Odours and flies are normally noticeable
⊖ Long storage times
⊖ Important mechanical means and know-how needed for sludge management
⊖ Effluent and sludge require further treatment

→ **References and further reading material for this technology can be found on page 194**