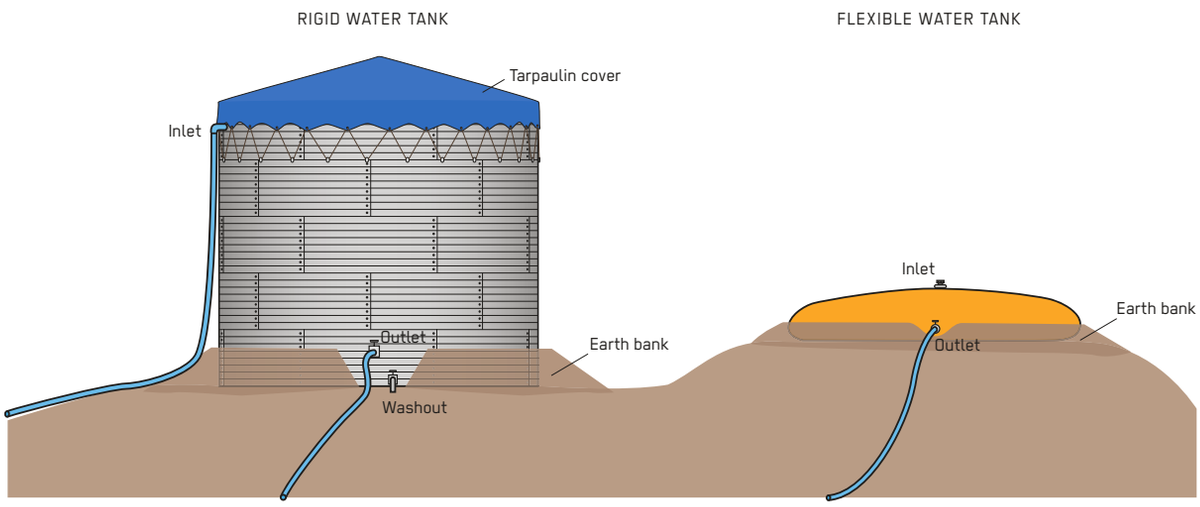
Water Storage Tank (Transportable)

Response Phase	Application Level	Management Level	Objectives / Key Features
** Acute Response ** Stabilisation * Recovery	* Household ** Neighbourhood * City	* Household ** Shared ** Public	Water storage buffer
Local Availability	**Technical Complexity**	**Maturity Level**	
** Medium	** Medium	*** High	



A Water Storage Tank holds large volumes of water, usually balancing supply and demand of drinking water before distribution. Transportable Water Storage Tanks (flexible or demountable rigid) can be assembled rapidly when needed. They are mainly used at the onset of an emergency to enable immediate water distribution and may also form a part of the water distribution system in the medium term.

Flexible and demountable rigid transportable Water Storage Tanks compensate for disparities between the inflow of water from the source and water demand to be satisfied by distribution. They facilitate the quick establishment of water storage capacity in areas where this is not present or insufficient.

Design Considerations: The different types of transportable/flexible and demountable rigid Water Storage Tanks include bladder/pillow tanks, onion tanks and tanks made of a curved corrugated steel outer shell with a butyl rubber liner. Bladder tanks are typically used for treated water and come in transportable versions that can be mounted on trucks. Onion tanks are often used for storage or treatment of surface water (e.g. at water treatment plants using coagulation and flocculation) and are easier to clean than bladder tanks. Tanks made with a curved corrugated steel outer shell with a butyl rubber liner are relatively easy to install using prefabricated parts, are robust and often continue to be used after the emergency. They are used either as storage for treated water or for treatment processes (e.g. the flocculation and sedimentation stage of an upflow clarifier).

The tank used should withstand local climatic and geological conditions. In colder climates where the air temperature will drop below freezing for part of the year, tanks may have to be insulated to prevent water from freezing. This

can be achieved by placing tanks in (heated) buildings, constructing a (wooden) frame filled with sawdust around the tanks, creating 'duvets' for insulation (sewing plastic sheeting and filling with glass fibre), insulating using polystyrene boards, sinking tanks into the ground or lifting tanks off the ground and using sheeting to envelope the elevated construction to prevent cold wind reaching the underside. Moreover, the weight of snow on the roof of the tank should be considered.
In an optimal situation, Water Storage Tanks are sized based on the needs of the target population, the rate of supply and the fluctuation in user demand (see also D.6). In the acute response phase, the water demand will most likely be higher than supply, and therefore it is important that water collection from the tanks is regulated in collaboration with the users. Inlets and outlets must have screens to prevent insect breeding, and measures to reduce siltation and facilitate maintenance and cleaning must also be considered. For example, a drain and valve must be installed for cleaning, and for tanks intended for rainwater collection, a first-flush mechanism can be installed to reduce the amount of silt entering the tank. When using rigid tanks (e.g. a curved corrugated steel tank), a screened ventilation pipe is required to prevent excess pressure or vacuum build up when the tank is being filled or emptied, in addition to the screened overflow pipe.

Materials: Materials required include the storage tank itself and sometimes a stand structure (e.g. a mound or sandbags forming a wall infilled with soil, or oil drums filled with sand) along with pipes with valve controls. The advantages of these storage tanks are that they are quick to transport and set up. They can be made of food-grade PVC-coated fabric, rigid polyvinyl chloride, thermoplastic polyurethane, urethane fabric, polymers, low density polyethylen, and nitrile rubber. They should be UV-resistant, and the materials used should be suitable for chlorinated drinking water.

Applicability: Water Storage Tanks can be used in all phases of an emergency. In the acute phase, transportable Water Storage Tanks are often used, mainly because they can be set up quickly to give sufficient water flow. In the stabilisation and recovery phases, these types of tank tend to get replaced with larger, more permanent tanks that may have a more complex structure **(see also D.6)**.

Operation and Maintenance: O&M tasks include tank cleaning and opening/closing valves to prevent them from sticking. The amount of sediment to clean depends on the source (e.g. water from a spring is more likely to arrive with silt) and involves draining the tank using drain pipe/valve, washing out the inside and carrying out any necessary repairs to the structure. Shock chlorination (at a rate of 50 mg/L) can also be carried out for disinfection. Since transportable tanks are typically used for only a few months, they should be cleaned (chlorinated, flushed with clean water and dried) and stored properly after use so that they are instantly operational again for future emergency use.

Health and Safety: Larger Water Storage Tanks should be located at a safe distance from housing of the affected population to prevent damage in case of a leak or burst tank. The design needs to minimise insect breeding. Most flexible tanks must be erected on a flat level surface or they will be unstable leading to a higher risk of accidents.

Costs: Capital costs for storage tanks vary a lot depending on the type of tank and related structures. Transportable Water Storage Tanks are relatively cheap (about 100 USD/m^3). Ongoing running costs are also low, especially where gravity **(see S.7)** is used to distribute water.

Social and Environmental Considerations: Social considerations related to the use of storage tanks are limited, as these are merely physical structures present in a community that have only limited interactions with their surroundings. Transportable Water Storage Tanks should be maintained properly so that they can be used multiple times and should be disposed of safely once no longer usable.

Strengths and Weaknesses:

⊕ Balances inflow with peak demand
⊕ Has low ongoing costs
⊕ Easy to transport

⊖ Can fail if badly constructed or designed
⊖ Has significant capital cost
⊖ Does not often use locally available materials so needs to be imported
⊖ Is only a temporary solution
⊖ Needs a considerable plot of land that is elevated and reasonably levelled

→ **References and further reading material for this technology can be found on page 220**