

Rain water system

Description

The rainwater system consists of the water catchment, prefilter and rainpipes, storage, divider, slow sand filter, clean water tank, pressure pump and the water tower.

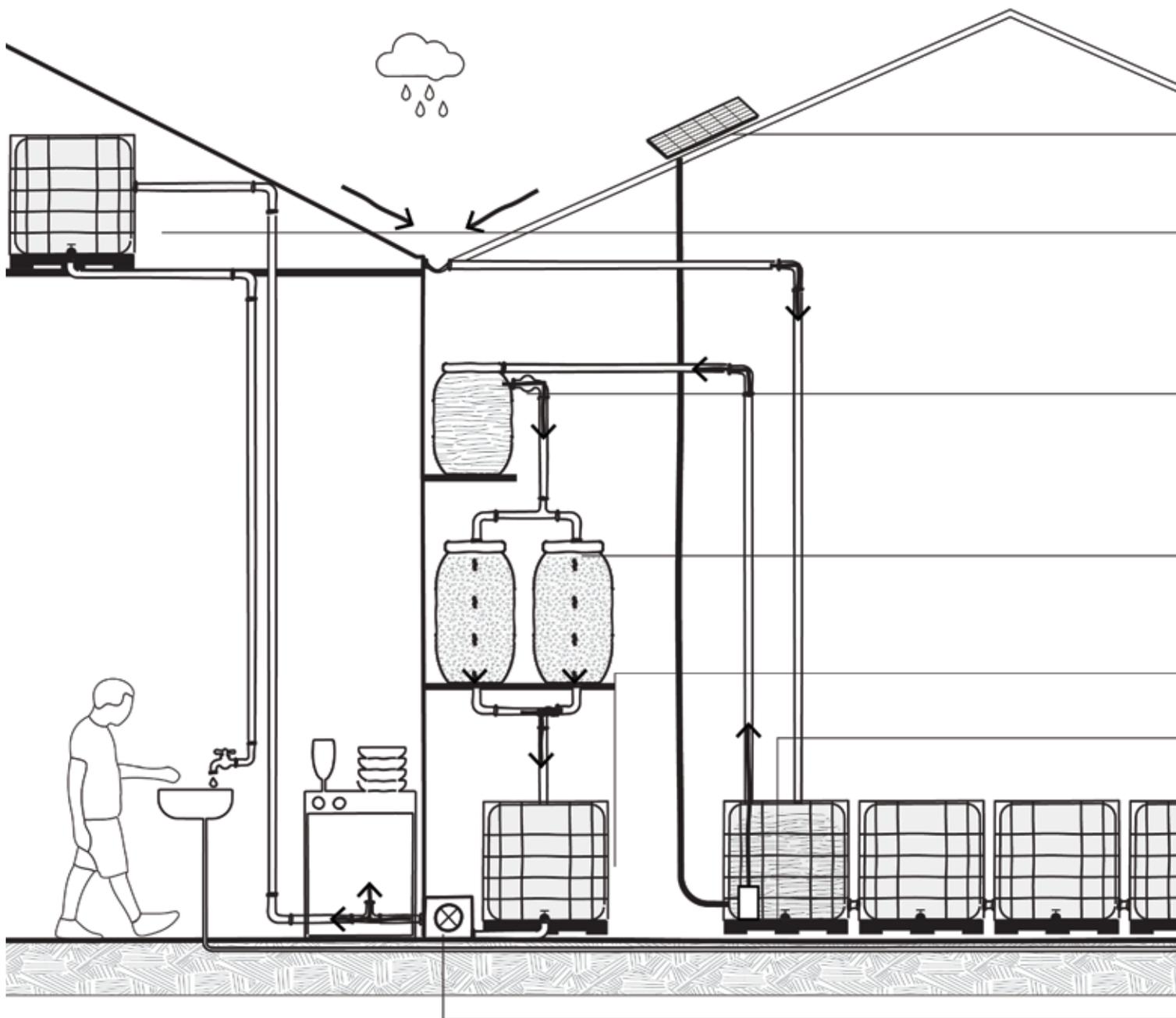
The water catchment for our 5x1000 liter storage is about 150m² of roof surface. A 10 mm rain event with this surface thus yields 1500 liters. Four rainy days will therefore fill up the storage completely. In our community, the restaurant uses 200 to 400 liters of water per operating day.

A small solar pump is continuously pumping water from the storage to the divider, a little tank which is placed at a height of 2 meters, from which water is transported down to the sand filter. A tap regulates the input to the filter. The rest of the water from the divider is sent back to the storage tank (and a small quantity goes to the greywater filter). The water that is sent back is thus circulating, and will prevent "dead zones" in the storage tanks.

The slow sand filter purifies the water, takes out dust and microbes, and slightly re-mineralises the water. The quality produced is sufficient for washing and personal hygiene, but not officially for drinking. The height of the sand column needs to be greater than 50 cm in order to function properly. The intake quantity should be slightly more than "dripping". We have made two barrels that together produce about 200 liters a day of clean water.

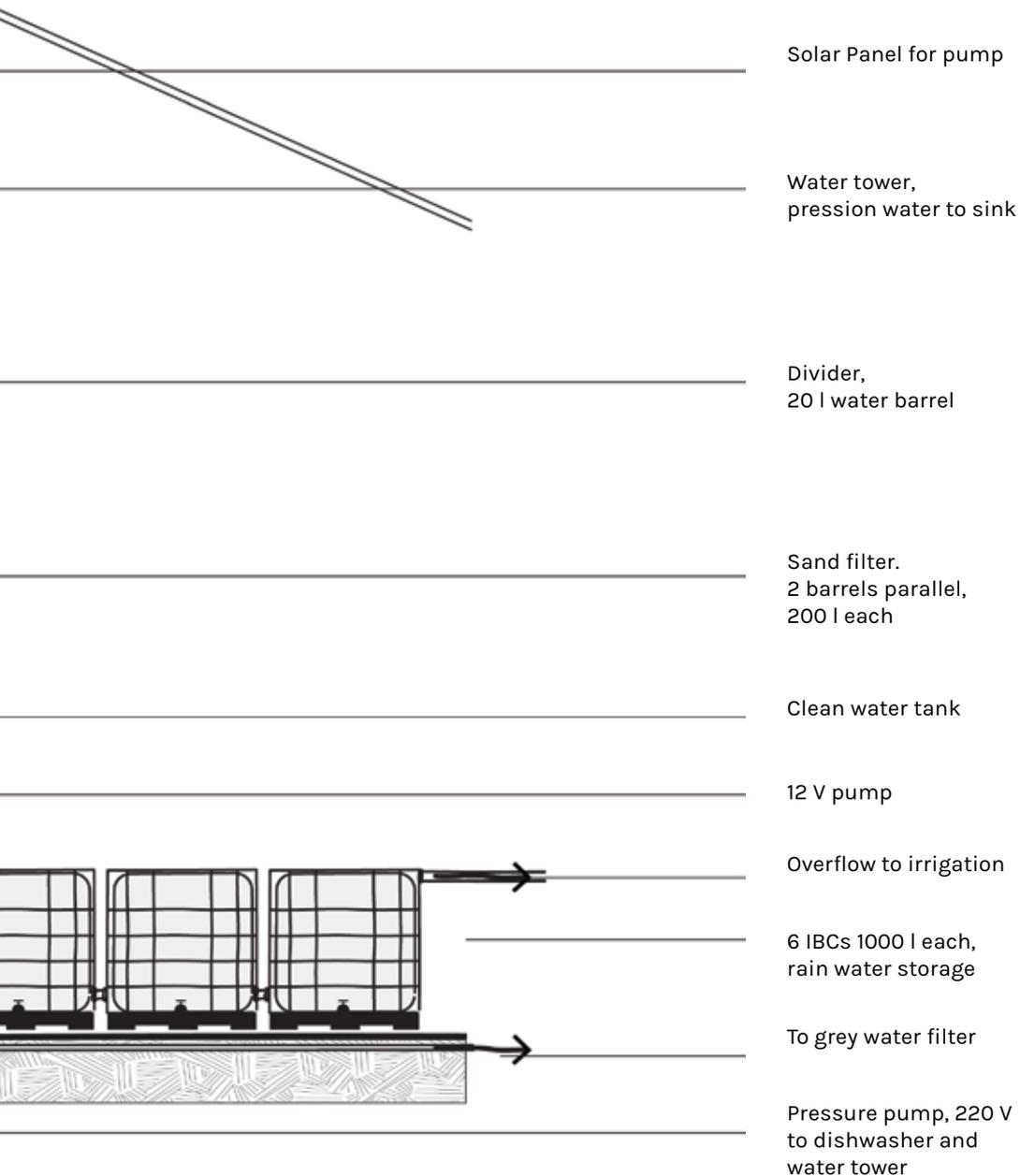
The clean water is then fed into the clean water tank, after which it is pressurised to the water network of the restaurant. The same pump can fill up the water tower (1000 liter tank sitting at a level of 3 meters high) with a "system switch" (either pressurize the network or pumping to the water tower). Normally, the network uses this gravity pressure, and pump pressure is used only when the restaurant kitchen is working.

Fig 3.26 Rain water collection system and filter integrated, Illustration by Alessandro Rosa



Materials and construction

- Around 24 m. Rain gutters
- Around 12 m. Rain pipes
- Debris filter
- 5 storage Intermediate Bulk Containers (IBCs), interconnected with tank connectors (25 mm)
- 20 watt/12 volt solar pump, 12 mm tube
- 12 volt limiter
- Min. 100 watt solar panel
- 25 liter barrel (divider)
- Clean water tank (IBC) + Water tower tank (Black IBC)
- Pressure pump (400 watt, 220V)
- 50 m. PE 25 mm tubes
- Plastic water taps for system switch



Construction

The level of difficulty of the construction is fair. There are however some important considerations for the safety of use.

1. Prevent algae:

algae can block pipes, and also feeds other unwanted biological activity. It can grow because of light exposure in the tanks and tubes. All IBCs need to be completely covered and insulated.

2. Prevent dead zones:

dead zones are areas of still water with low oxygen levels. Here, unwanted bacteria can develop.

3. Prevent high temperatures:

water in (black) tubes in particular can quickly raise in temperature. This can be dangerous considering the development of Legionella bacteria (>25C)

4. Prevent airlocks:

For a good flow of water, air locks should be prevented by installing the tubes without any vertical loops or u-shapes.

Fig 3.27 Divider, 20 l water barrel on top of a container
Fig 3.28 Sand filter. 2 barrels parallel, 200 l each
Fig 3.29 Pressure pump, 220 V
Fig 3.30 IBCs 1000 l each, rain water storage
Photos by Alessandro Rosa
Fig 3.31 Water collection on the pitch roof
Photo by Naiara Alava Aguirre



Fig 3.27



Fig 3.28



Fig 3.29



Fig 3.30

Fig 3.31

