Rainwater collection and storage

This management advice sheet should be used as guidance for the operation and maintenance (O&M) of a rainwater collection and storage system.

Guidance for typical O&M activities is provided in Table 1 with suggested frequencies for each activity. To protect water quality, these activities are important for maintaining the rainwater collection system in a good working condition. Table 2 lists potential issues associated with a rainwater collection system and provides basic corrective actions to consider for each potential issue.

I. OPERATION AND MAINTENANCE

For non-professionally run systems, O&M can normally be carried out by the users of the system, or by a caretaker. Larger repairs may require skilled labour, which may be provided by local craftspeople. With individual rainwater collection systems, O&M is typically arranged by the users themselves.

Ensuring the integrity of the rainwater collection and storage system is important to ensure the risk from environmental contamination entering the storage tank is minimized. Where a system needs cleaning or maintenance work, standard operating procedures should be followed to ensure contaminants are not introduced into the storage tank during the work.

Where there is no first flush system, the first portion of rainwater should be manually diverted away from the storage tank, as this water is typically of lesser quality (e.g. containing dust, vegetation, insects, animal excrement etc.). Collected rainwater should be safely stored and handled, and ideally disinfected prior to consumption (e.g. chlorination, boiling, solar disinfection or any other suitable household water treatment option). For more guidance on household-level practices, refer to the sanitary inspection package "Household practices".

Table 1. Operation and maintenance schedule guidance[a]

Frequency	Activity
Daily	• Inspect and clean the water collection area and storage tank, checking for any obvious signs of leakage or contamination. • Ensure the outlet/tap and overflow pipe are clean and functioning. • Ensure protective screens are in good condition. • If present, ensure the inspection port lid is in place, locked, and in good condition.
Weekly	• Inspect, clean and check functionality of the filter box. • Inspect, clean and check functionality of the first flush system. • Inspect and clean gutters.
Annually	• Perform detailed inspections of the roof, guttering and storage tank (and tank support base) for obvious signs of damage or failure. • Check sediment levels within the storage tank and if necessary, drain, clean and disinfect[c] the tank (e.g. batch chlorine disinfection).
As the need arises[b]	• Clean and repair the roof and guttering. • Assist with maintenance tasks (e.g. tap/outlet). • Drain the first flush system if manual draining is required. • Monitor water use and yield (e.g. during periods of drought). • Remove vegetation that is overhanging the roof. • Monitor activities in the surrounding area that may result in airborne contamination. • Clear the soakaway or drainage channel.

Notes:

1. The suggested frequencies in Table 1 represent a minimum requirement and may need to be increased depending on the local context. A suitable timetable should be made for each site.
2. Only persons with relevant training/skills should undertake the activities in Table 1. Care should be taken when handling disinfection products or undertaking any activity at an elevated height (e.g. inspection or maintenance of the catchment area etc.).
3. For guidance on appropriate frequencies for monitoring (e.g. sanitary inspections and water quality testing), refer to *Guidelines for drinking-water quality, 2nd edition: Volume 3 - Surveillance and control of community supplies* (WHO, 1997).

II. ISSUES AND REMEDIAL ACTIONS

Table 2. Common issues associated with rainwater collection systems and suggested remedial actions

Each issue in Table 2 is linked to a corresponding question in the *Rainwater collection and storage* inspection form (e.g. issue 1 below is linked to question 1 in the sanitary inspection form).

Issue		Remedial actions to consider
1	There are visible contaminants (e.g. vegetation, animal waste) on the roof or guttering channels which may be washed into the storage tank during rainfall events.	• Inspect and clean the roof and guttering channels routinely to prevent potential sources of contamination from entering the water storage tank.
2	The roof or guttering channels are inadequately sloped, resulting in the ponding of stagnant water which may subsequently introduce contaminants to the storage tank.	• Inspect the roof and guttering channels for signs of ponding and adjust their angles of incline to encourage complete drainage towards the storage tank.
3	There is vegetation or structures overhanging the roof catchment area that could attract animals which may contaminate the roof catchment with faecal material. Fallen foliage may also block gutters and filters.	• Remove any overhanging vegetation. • Additional efforts should be made to deter birds or other animals from the roof catchment area, overhanging telephone/electrical wires, or structures such as balconies.
4	The filter box at the storage tank inlet is missing, or if present, it is damaged, clogged and/or unclean, which may cause a blockage/overflow, as well as increase the risk of contaminating the storage tank.	• If the filter box is missing, consult the relevant local craftspeople regarding installation. • If the filter box is present but it is damaged, temporarily cover it with a suitable mesh or gauze to prevent debris from entering the storage tank until it can be fixed or replaced. • If the filter box is present but it is clogged or unclean, remove the material and clean the unit.
5	The first flush system is missing, allowing the first flush of rainwater to enter the storage tank, which may constitute a risk to water quality. Or, if the system is present, it is damaged, clogged and/or unclean, which may cause a blockage/overflow, as well as increase the risk of contaminating the storage tank.	• If the first flush system is missing, consult the relevant local craftspeople regarding installation. Operate a temporary first flush system whereby the first flush of rainwater is manually diverted by the user. This should be undertaken until the system has been installed. • If the first flush system is present but it is damaged or inadequate to prevent contamination from entering the water storage tank, operate a manual first flush in the interim until the system has been fixed. • If the first flush system is present but it is clogged or unclean, manually drain and clean the unit.
6	The inside of the storage tank contains visible signs of contamination (e.g. animals/animal waste, sediment accumulation), which constitutes a risk to water quality.	• If animals or their waste are present, consider what immediate actions should be taken to minimize the risk to health (e.g. if the risk posed is significant, advise users to seek an alternative safe water source or routinely disinfect the water at the point of use). • Drain, clean and disinfect the storage tank. • Consider appropriate measures to minimize the risk of contamination entering the storage tank from this source in the future (e.g. cover the tank, strengthen the fencing/barrier, frequent sediment removal).
7	There is a point of entry to the storage tank that is inadequately covered or sealed to prevent contaminants (e.g. vermin) or light from entering the tank.	• If there is an inadequately covered or sealed point of entry to the storage tank, provide a temporary seal (e.g. opaque, impermeable plastic sheeting) to minimize contamination or light entering the storage tank. • Repair or replace the component or tank.

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Table 2 Common issues associated with rainwater collection systems and suggested remedial actions (continued)

Issue		Remedial actions to consider
8	The storage tank tap is leaking or otherwise defective, which may increase the risk to water quality by providing a route for contaminants to enter the tank.	• Repair the existing tap, where possible. • In cases where the existing tap cannot be repaired, replace it with a new tap.
9	The overflow pipe is not covered with a screen (e.g. with a mesh or gauze), allowing vermin to potentially enter the storage tank.	• Where the overflow pipe is uncovered, cover the pipe with a vermin-proof screen (e.g. gauze or mesh).
10	There is stagnant water in the water collection area, which increases the likelihood of contaminants entering the storage tank and/or contaminating collection containers.	• If there is no means for water to drain away from the area, install a drainage system (e.g. soakaway, drainage channel) to divert spilt water away from the collection area. • If a drainage system is present but not functioning correctly, consider if maintenance (e.g. repair, cleaning) or upgrading is required.
11	The fencing or barrier around the storage tank is missing or inadequate to prevent animals from damaging or contaminating the collection area.	• If a fence or barrier is missing, construct a suitable fence/barrier to prevent animals from accessing the collection area (or to prevent unauthorized access if relevant). • If a fence/barrier is present but inadequate to prevent contamination, repair or replace the fence/barrier to ensure it can prevent animals from accessing the collection area.
12	Signs of other sources of pollution can be seen within the water collection area (e.g. animals, rubbish, human settlement, open defecation, fuel storage), which may constitute a serious risk to water quality.	• Where practical, remove the source of pollution (e.g. clean-up animal excrement, remove rubbish etc.). • Consider what actions may be appropriate to eliminate the source of pollution (e.g. exclusion of animals).
13	There is local activity (e.g. industry or agriculture) that could contaminate the roof catchment area.	• Consider what immediate actions should be taken to minimize the risk to public health (e.g. suspend rainwater harvesting until the activity has ceased). • Consider appropriate steps to eliminate the hazard in the longer-term.

a. For more details see: Brikké, F. and Bredero, M. (2003). *Linking technology choice with operation and maintenance in the context of community water supply and sanitation: A reference document for planners and project staff* (WHO, Geneva).

b. See Table 2 for potential issues that could trigger these activities.

c. Guidance for disinfecting storage tanks may be found in *Technical notes on drinking-water, sanitation and hygiene in emergencies: Cleaning and disinfecting water storage tanks and tankers* (WHO/WEDC, 2013).

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