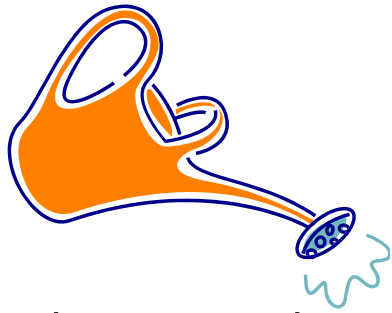


Cistern Maintenance Guide



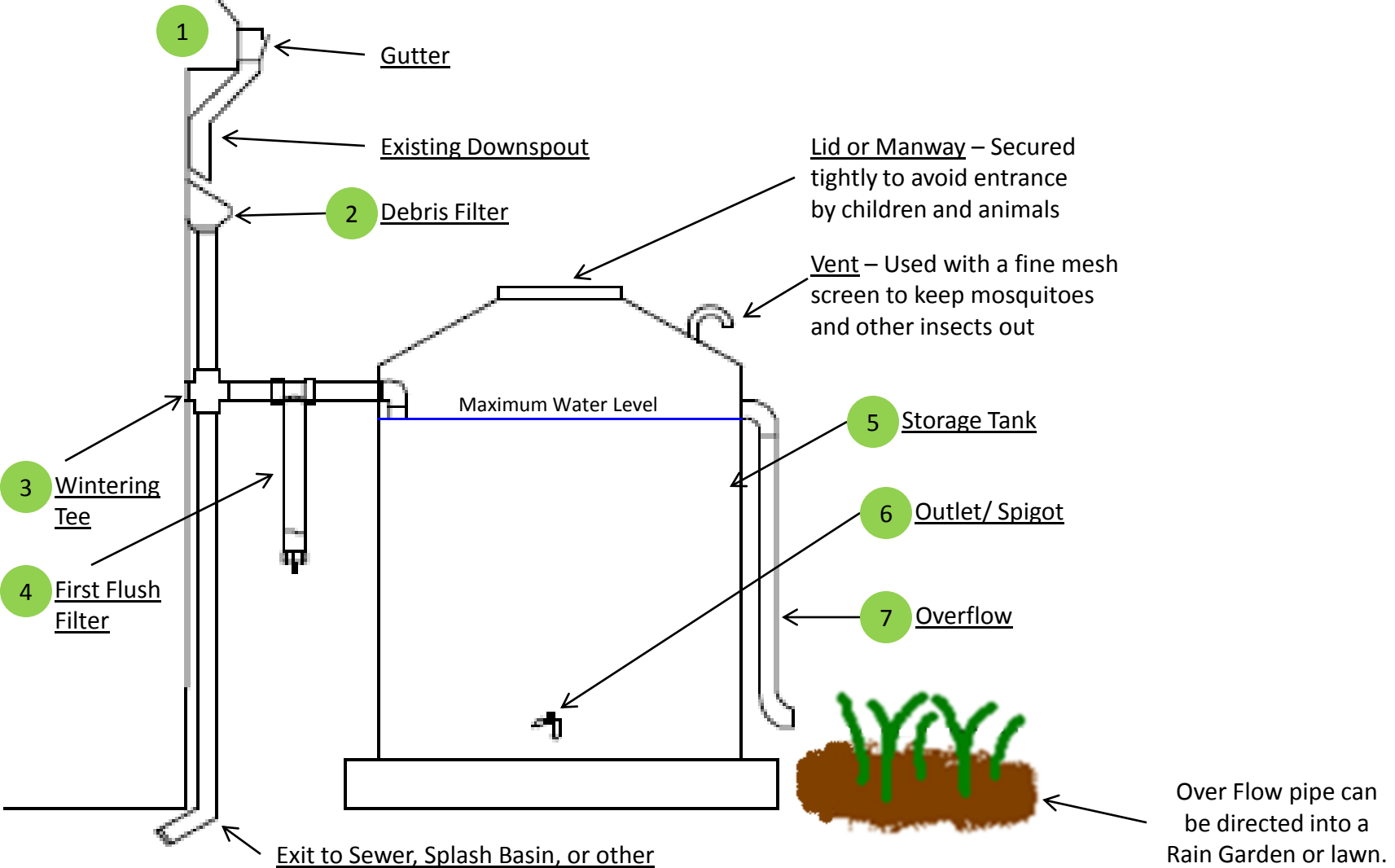


Congratulations!

Welcome to the wonderful world of rain water harvesting! Rain water harvested from your cistern can be used for watering gardens, flushing toilets, washing cars, and plenty of other non-potable uses. Not only will the use of rainwater for these functions save you lots of money, rainwater has great qualities, such as its natural pH balance and high oxygen concentration, that will greatly benefit your plants.



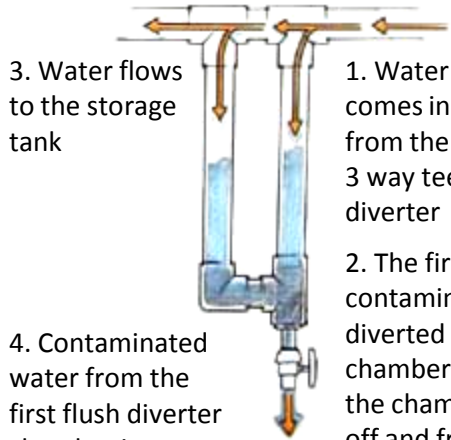
How does it work?



- 1 Rain water falls on the roof and flows into the gutter and existing downspout
- 2 The debris filter captures rooftop debris such as leaves and twigs
- 3 The wintering tee diverts the water into the cistern system and keeps it from continuing out to the sewer, splash basin or street.
- 4 The water is then directed into the first flush filter. This is a containment area for the first few gallons of water, which contain rooftop debris and contaminants that were not captured by the debris filter. This acts as a filtering system by separating the dirty water from the cleaner water
- 5 The cleaner water then flows into the storage tank
- 6 Water can be retrieved from the tank through the spigot or the outlet can be connected to a hose or a pump.
- 7 Once the tank is full, water will exit the tank through the overflow. The overflow pipe should direct the water to a permeable surface such as a lawn or a rain garden. It can also be directed back to where it would have originally been piped underground.

First Flush Filter Types

Roof Washer Diverter



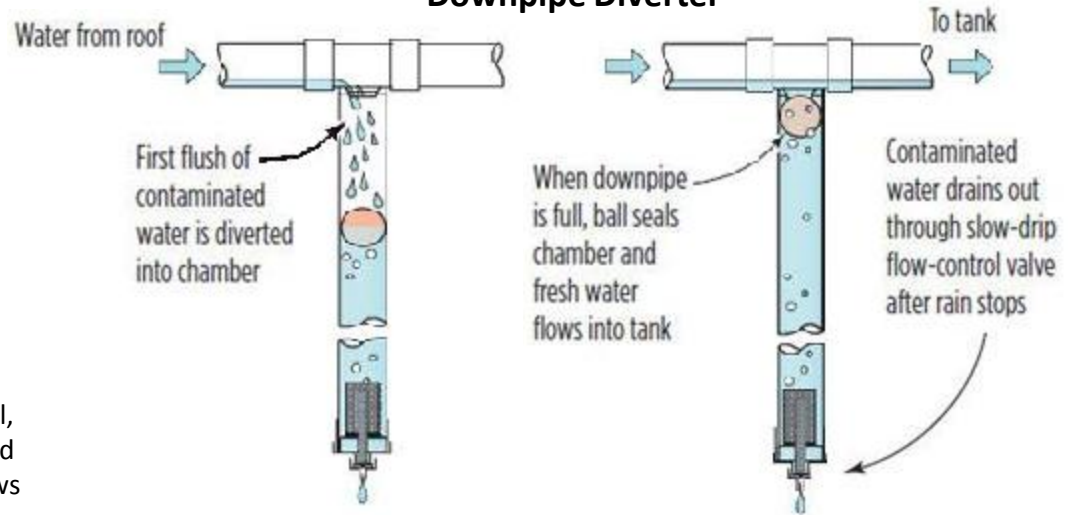
3. Water flows to the storage tank

1. Water comes in from the 3 way tee diverter

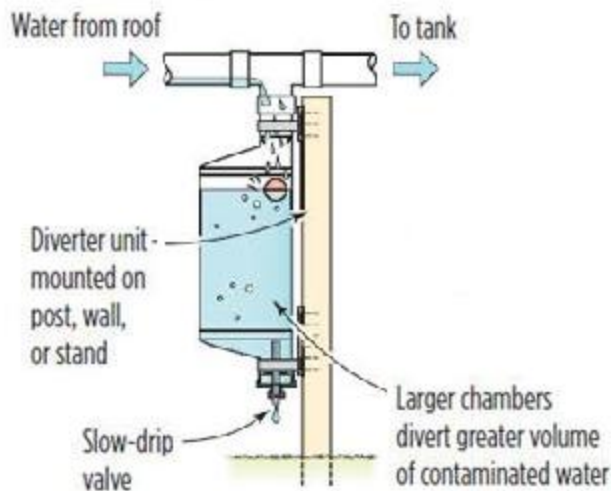
2. The first flush of contaminated water is diverted into these chambers. Once it is full, the chambers are sealed off and fresh water flows to the tank.

4. Contaminated water from the first flush diverter chamber is drained out after each rainfall event

Downpipe Diverter



Mounted Diverter

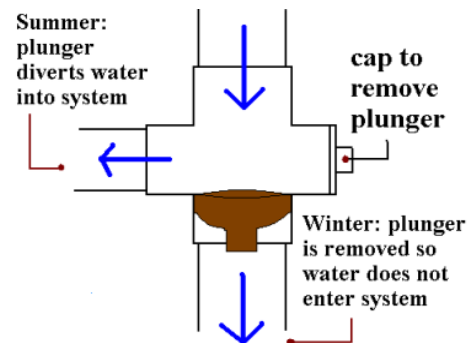


Diverter unit - mounted on post, wall, or stand

Slow-drip valve

Larger chambers divert greater volume of contaminated water

Wintering Tee or 3-Way tee Diverter



Summer: plunger diverts water into system

cap to remove plunger

Winter: plunger is removed so water does not enter system



Routine/Weekly Visual Inspections and Maintenance



- Check for leaks, clogs and other obstructions
- Check for holes and vent openings where animals, insects and rodents may enter
- Repair leaks with sealant
- Drain the first flush diverter/ roof washer after every rainfall event



Monthly to Quarterly Inspection and Maintenance



- Check roof and roof catchments to make sure no particulate matter or other parts of the roof are entering the gutter and downspout directed into the cistern
- Keep the roof, gutters and leader inlets clear of debris
- Inspect the first flush filter and all of its attachments, make any necessary replacements
- Inspect cistern cover, screen, overflow pipe, sediment trap and other accessories. Make any necessary replacements

- Filter media from sand and gravel cistern filters must be cleaned to prevent clogging by partially removing the top layer of filter media and replacing it with a new one
- Flush the cistern to remove sediment



Winterizing in the Fall is Crucial!



- The plunger in the winterizing tee/3-way tee must be taken out so that water does not enter the cistern system during the winter.
- Drain ALL of the water out of the ENTIRE system including the storage tank, roof washer, pipes etc. **If water freezes in the system it will break!**
- **Winterizing steps:**
 - Drain all of the old water from the cistern system and remove the plunger from the winterizing tee
 - Open the main valve of storage tank and open the valve on roof washer. Valves should remain open all winter to keep water from freezing in system
 - Disconnect the leaders from system and re-route. The leaders of the cistern system refer to the series of pipes that lead to the tank. This includes the pipe that connects the downspout, the winterizing tee and the roof washer system.



Rebooting In the



- Re-direct roof water from the drain pipe back into tank storage system by replacing the plunger into the winter tee
- Reconnect the leaders to system and close all of the valves
- Clean any winter debris from gutters, leader inlets and roof
- Repair any and all leaks
- Thoroughly clean the tank





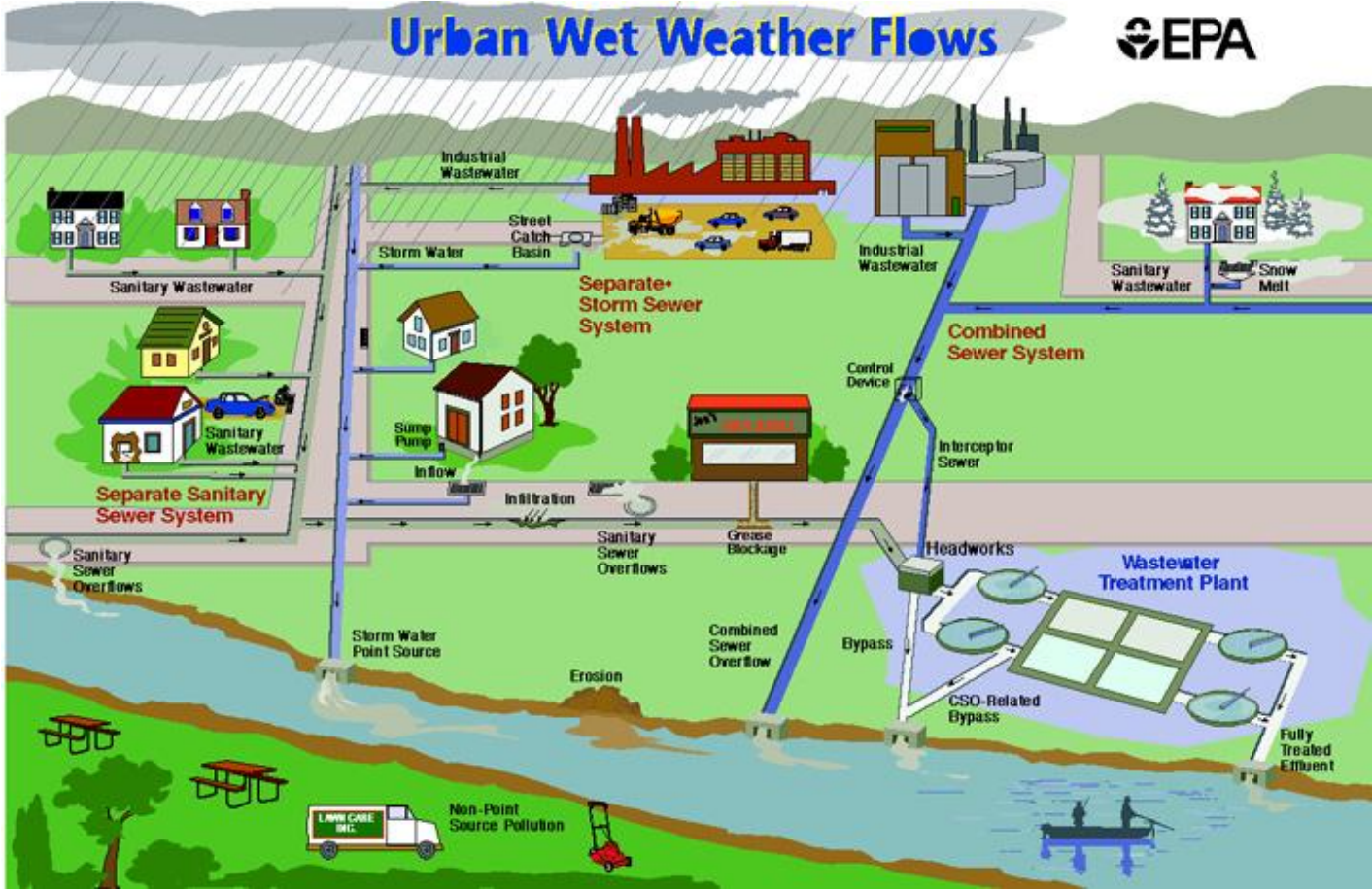
Do not drink the water collected from the cistern as there is most likely contamination from harmful bacteria. For water to meet drinking water standards it must be treated extensively.

A warning sticker or sign should be placed on the tank to avoid the possibility of anyone mistakenly drinking the water.

Sources

- <http://www.earthsystemsnw.com/cisternsfaq.html>
- GROWN NYC, RAINWATER HARVESTING 101, 2008
- <http://www.esf.edu/ere/endreny/GICalculator/CisternsIntro.html>
- <http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1167363901303&ssbinary=true>
- <http://www.nachi.org/cisterns.htm>
- http://www.twdb.state.tx.us/publications/reports/rainwaterharvestingmanual_3rdedition.pdf
- <http://nynjbaykeeper.org/stop-combined-sewer-overflows-in-nj-2013/>

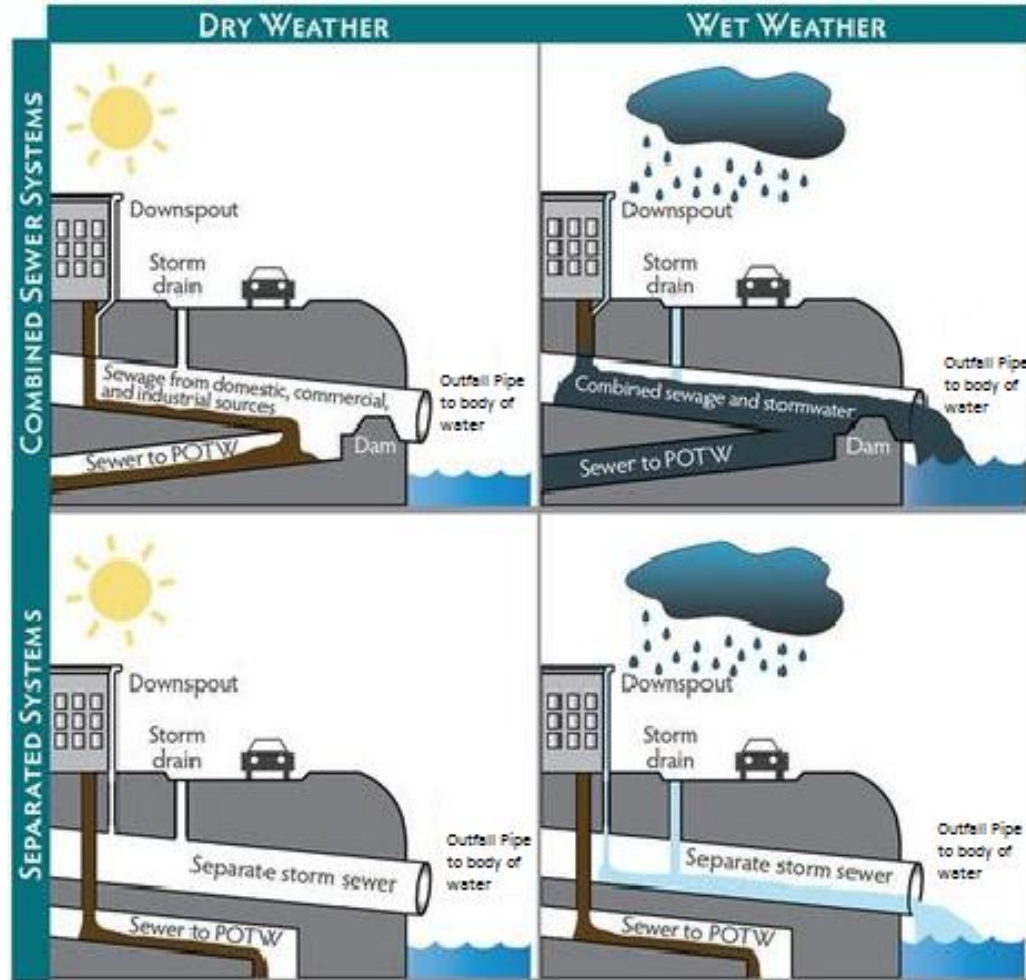
Rainwater harvesting also has great benefits to the environment. A great deal of water is conserved and the amount of water that enters the sewer system is reduced. If less water enters the storm sewer systems, less water is delivered to a treatment facility thus lowering the cost, energy, and resources associated with cleaning water.



Streams that receive this storm water are less likely to become eroded by high flow rates and polluted by the surface contaminants that the storm water picks up on its way there.

Unfortunately, every year 23 billion gallons of raw sewage are dumped into New Jersey's rivers due to combined sewer system overflows during periods of heavy rainfall. This is wastewater that has NOT made it to the treatment facility.

This wastewater consists of water from people's toilets and sinks, as well as untreated industrial waste and untreated stormwater runoff that has picked up animal waste, oil, pesticides, and other contaminants on its way to the sewer.



Reducing stormwater runoff greatly reduces the amount of polluted water entering our rivers and eventually the ocean.



Problem:

Insects, spiders, rodents, reptiles, and birds can crawl or fall into the water along with their waste products.



How to Avoid It:

All cistern openings should have a screen cover, and all vents should terminate in a downward position to prevent rodents, insects, and other things from entering.



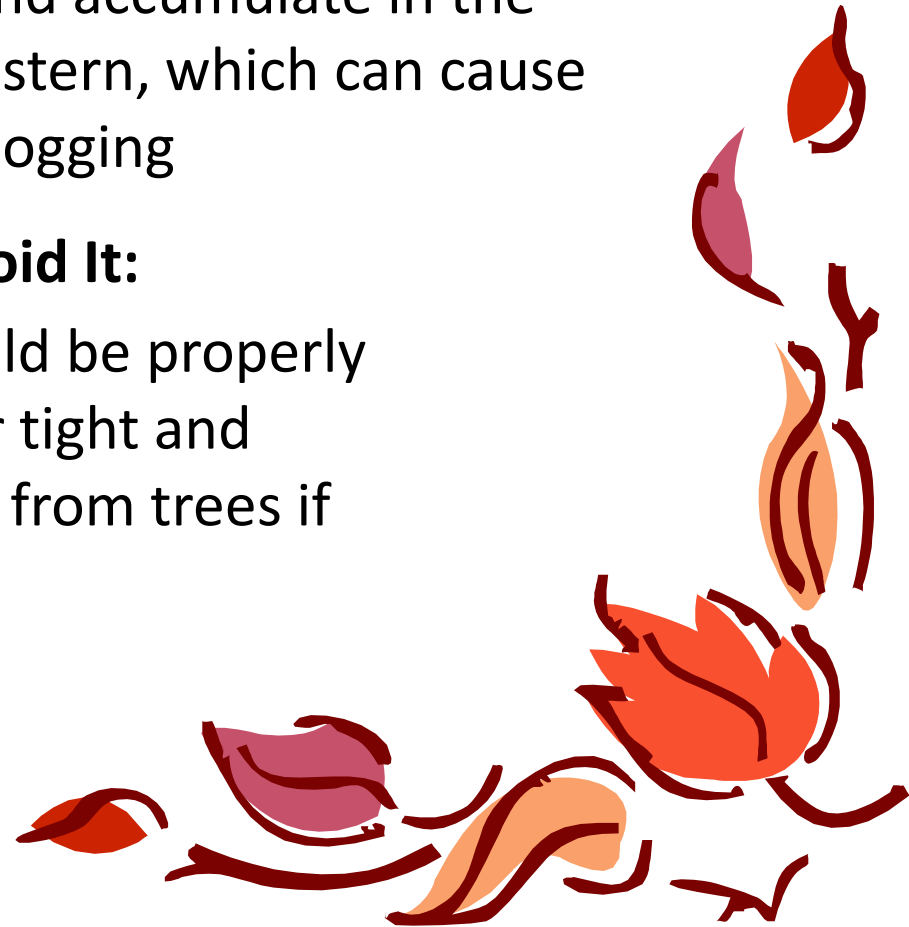


Problem:

Sediment, twigs and debris will often fall into and accumulate in the cistern, which can cause clogging

How to Avoid It:

Cisterns should be properly sealed, water tight and located away from trees if possible



Problem:

There are also potential internal contaminant sources such as corrosion of the metal tank and bacteria, mold and algae that can grow within the tank.



How to Avoid It:

The cistern should be cleaned and disinfected before it is used. After cleaning out any dirt and other debris accumulated during construction or maintenance, the interior should be scrubbed with a bleach-water solution then hosed down until the chlorine odor disappears.

Thoroughly clean the tank using the following steps:

- ❑ Provide sufficient ventilation by use of a fan or other appliance before entering the tank
- ❑ Enter the tank while take proper cautionary and safety measures
- ❑ Physically remove all debris from the bottom and sides of the tank
- ❑ Scrub the walls and floor with chlorine water solution using a stiff brush or power washer to remove any bacterial slime and mineral deposit
- ❑ Exit the cistern tank, then rinse the walls with a strong chlorine water solution of 1000 parts per million and let the water stand in the bottom of tank for at least 8 hours



- ❑ Circulate the chlorine solution throughout the distribution system and let stand for at least 8 hours as well
- ❑ Evacuate the rinse water and refill the tank with chlorinated water hauled in from a public water supply
- ❑ Re-calibrate the disinfection system and check how much of the disinfectant is lingering
 - Residuals from chlorine should be at least 0.2 ppm, iodine at least 0.5 ppm, and ozone at least 0.1 ppm
 - Homeowners are required to have a chemical test kit for monitoring their system
- ❑ Inspect, clean and/or replace all cistern accessories as needed