

Chapter 11: Maintenance

After the design, installation and successful use of a rainwater harvesting system, the roof-reliant landscaper's work is not over. In order to keep a cistern system functioning efficiently, routine inspection and maintenance are required on a regular basis.

It is important to note here that good documentation of the system is a tremendous aid to ongoing maintenance—whether that maintenance is to be done by the system's owner or performed by a hired professional. Make sure your roof-reliant landscaping file or notebook is filled with design renderings, calculations, schematic drawings, and photographs and/or illustrations of pipe slopes and other important below-ground components. You should also have "as built" documentation that shows how every part of the system fits together in the landscape. One of the best ways to document the system is to give every component a name, number and installation date, and have photographs taken to accompany a written narrative that describes each piece of the system and how it fits together as a whole. Your file should also contain the manufacturers' information and warranties for all system components.

Some professional rainwater harvesting system installers recommend a video-recorded walk-through and explanation of the entire system just after installation has been completed. This recorded walkthrough identifies all of the system components and their operation, including such details as switch and valve settings. The video documentation also shows how some of the basic system maintenance is performed, such as how filters are cleaned and how to drain pipes and hoses in preparation for winter season shutdown, or conversely, how to start up the system in the spring.

Also, when it comes to hiring an outside contractor to maintain your system, please note that (at the time of this writing) there are no licensing or inspection regulations established by the State of New Mexico, so make sure your contractor has credible references.

Basic System Maintenance

With all rainwater harvesting systems, the best maintenance is preventative maintenance. Many problems can be avoided by proper planning and careful installation.

But whether your system is simple or quite complicated and whether your cistern is above-ground or below-ground, basic maintenance procedures are required to ensure that your system functions properly.

Every system will have specific attributes that may present some unique maintenance issues. However, for the purposes of this manual, we will look at the four areas of a roof-reliant landscaping system (collection, conveyance, storage and distribution) and offer a guide to the basic maintenance issues that arise in each area.

Collection

Many problems that occur in rainwater harvesting systems concern the debris that collects in catchment areas, such as flat roofs, canales and gutters. Because these surfaces are flat or only slightly pitched, they naturally collect a variety of debris including leaves, bird droppings and windblown dirt and sand.

Maintenance for collection areas includes the following tasks:

- Conduct an inspection of all catchment surfaces each season. Remove any large debris.
- Clean out clogged canales and/or gutters. Remove all debris such as trapped leaves.
- Clean gutter screens.
- Inspect canales and/or gutters for signs of damage. Repair any leaks or cracks.

Conveyance

Debris is also troublesome for the conveyance system. Your seasonal maintenance checklist should include these tasks:

- Clean first-flush devices. If a "dead-end pipe" (see Figure 8-11) or similar device is used as a

first-flush filter, open the cap to drain any existing water and clean out the debris from the bottom of the pipe.

- Empty debris from roof-washers. If necessary, clean the filter with water and a soft bristle brush.
- Empty roof-washers immediately during cold weather to prevent the water from freezing and potentially damaging the unit.
- Check downspouts and remove any debris.
- Flush sediment from pipes with a high-pressure wash when necessary.
- Clean all filters. Inspect filters for any signs of wear or damage, and replace as necessary.

Storage

- If necessary, aboveground tanks should be cleaned at least once a year (when the tank is closest to being empty). For small tanks, drain the tank and use a wet/dry vacuum. An enzyme solution (for algae control) can be used to clarify the water.
- Check fittings for damage. (Aboveground tanks and their related hardware are more susceptible to freeze damage. To avoid freeze damage, invest in brass fittings and/or leave valves open during colder months when the system is not in use.)
- Check the cistern vent to make sure it is screened to keep out rodents. Small animals can sometimes get into vents, effectively clogging the system and preventing the vent from doing its job.
- If a substantial amount of sediment has accumulated on the bottom of the tank, remove the sediment.
- Long-term maintenance may include washing and disinfecting the storage tank.
- Check overflow pipes for signs of mice and other pests.

Distribution

- Inspect all distribution lines each season. Look for evidence of cracks and leaks. Repair or replace any damaged lines.
- Run water through all distribution piping (underground lines, drip tubing, etc.) to test for sufficient water pressure.

- Inspect all water-delivery devices, such as drip emitters. Clean and/or replace any clogged emitters.
- Clean and maintain filters, including drip filters.
- Make sure all emitters and water-delivery devices are placed properly to water plants' root zones. Move the emitters to expand the area of water delivery as plants grow.
- Prior to winter shutdown, disconnect the pump housing and drain the pump (provided the pump does not have a heat source). Disconnect and drain the inline pump (if applicable). If you have a complex system, contact a professional to winterize your system.

The goal of any rooftop rainwater harvesting system is maximum efficiency. Your system should be physically inspected throughout the watering season. Watch for any inefficiencies, such as leaks, water pooling, signs of abnormal wear or erosion, missing drip emitters, etc.

Remember, too, that your roof-reliant landscaping system can add to the resale value of your property, so make sure your system documentation is in order and kept up to date. Note any changes made to your system in the master documentation files and/or "as built" files.



Figure 11-1: Leaf and debris screens and other filters need to be cleaned regularly.

A Design Narrative

One of the best maintenance tools for a cistern system is a written description of the system's components and how the system works. This "design narrative" should be included in the permanent files and maintenance records of every roof-reliant landscaping system. Here is a sample design narrative:

This system harvests rainwater from the flat roof of the house and conveys it to a cistern. The water is moved from the roof on the south and west sides by downspouts connected to canals. On the north side of the home, rain chains are used for prevention of potential freezing problems. The harvested water is passed through a series of first-flush boxes along the conveyance line. A self-cleaning inlet filter receives and filters all of the conveyed rainwater at the northwest corner of the house. The debris particles are discharged to an overflow.

The filtered water is collected in a 300-gallon sump tank and automatically pumped to storage. The cistern system is a row of three tanks, each with a 2500-gallon capacity. These tanks were selected for shallow depth of bury to prevent potential problems with nearby shallow ground water.

The tanks are plumbed in parallel so that an inlet and outlet to any tank can be closed for service or cleaning while the remainder of the system continues in operation. Distribution to irrigation is provided by a 1/2 horsepower submersible pump to a master valve. From the master valve, water flows to a drip irrigation system.

Design Narrative Courtesy of *Earthwrights Designs*, Santa Fe, NM

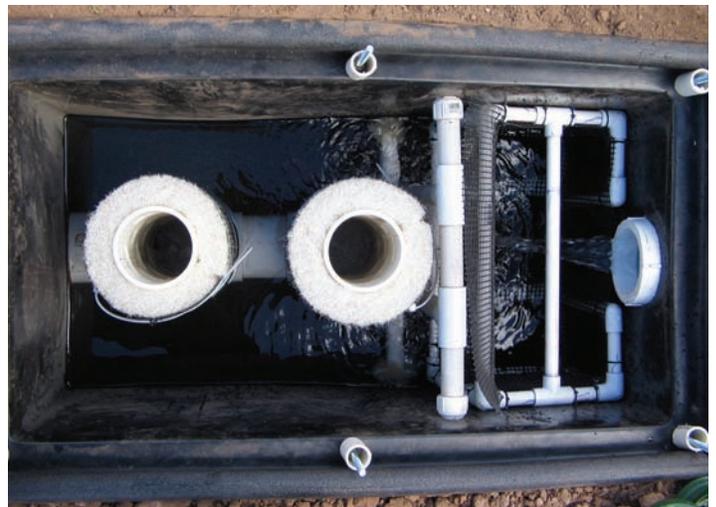


Figure 11-2: A good design narrative and an "as-built" manual will give an overview of the system and its components. Top: this purple valve box cover indicates the water in this system is nonpotable. Middle: a rainwater prefilter. Bottom: a pumphouse with drain pressure gauge and manifold.

Seasonal Maintenance Checklist

Spring

- Inspect collection surfaces and remove any debris
- Check gutters for damage. If heavy snowfall has pulled gutters away from roof, reattach. Repair leaks and cracks.
- Remove debris from canales and/or gutters.
- Clean gutter screens to remove trapped leaves, etc.
- Check downspouts. Make sure connections to gutters are sound. Remove any debris from downspouts.
- Clean first-flush filters. Drain water (if any) and remove sediment and debris.
- Clean and inspect all filters. Check for signs of damage. Repair or replace if necessary.
- Clean aboveground tanks if necessary.
- Check overflow pipe to make sure it is clear of debris and small animals.
- Check all pipes and fittings for leaks or damage. Repair and/or replace as necessary.
- Conduct a thorough preseason walk-through and inspection of the entire system.
- Check all distribution lines and water-delivery devices, including drip emitters, micro-sprayers, etc. Repair or replace if necessary.
- Run water through all distribution piping (underground lines, drip tubing, etc.) to test for sufficient water pressure. Repair any breaks in the lines.
- Ensure that all emitters and water-delivery devices are placed properly to water plant root zones. Move the emitters to expand the area of water delivery as the plants' dripline grows.

Summer

- Remove debris from canales and/or gutters.
- Clean gutter screens to remove trapped leaves and other debris.
- Clean first-flush filters. Drain water (if any) and remove sediment and debris.
- Flush sediment from pipes as necessary.
- Inspect and clean all filters.
- Check all distribution lines and water-delivery devices, including drip emitters, micro-sprayers, etc. Repair or replace if necessary.
- Ensure that all emitters and water-delivery devices are placed properly to water plant root zones. Move the emitters to expand the area of water delivery as the plants' dripline grows.

Fall/Winter

- Remove debris from canales and/or gutters.
- Clean gutter screens to remove trapped leaves and other debris.
- Drain roof washers at the first frost to prevent water from freezing inside the unit.
- Drain water from valves, vacuum breaker, irrigation pipes and tubing to prevent winter freeze.
- Conduct a thorough shutdown walk-through and inspection of the entire system.
- If you have a complex cistern system, contact a professional to conduct a winter shutdown.