



Planning Ahead

Careful preparation ensures success for rainwater harvesting & treatment systems

By Eddie Van Giesen

Congratulations! You have added rainwater harvesting systems to your product and service offerings.

This places you uniquely among your peers—rainwater harvesting is a rapidly growing niche market.

Before you install a system, there are several important questions to consider:

- Do you know exactly what you are getting into?
- Is the system conceived as a whole, or a collection of parts?
- Will you purchase the components from multiple vendors, or from a single source?
- What does the “entire system” include?

The answers to these questions may not be apparent at the outset of a project, but you will need to find them in

Rainwater storage tanks may be above or below ground, and can be made of a variety of materials.

order to perform a successful installation.

Rainwater harvesting systems are showing up in increasing numbers, especially when the end use is an indoor non-potable application, such as toilet flushing or cooling tower makeup. Many water quality professionals are first-timers at installing rainwater systems; they face a number of new challenges.

It is fundamental that the customer understands what he or she is buying, how it works in concept and, most importantly, where the scope of work begins and ends.

My goal is to offer information that can put you ahead of the game, and save you headaches, money and time.

Defining a System

There is no universally agreed-upon definition of a rainwater harvesting system. Rain is natural precipitation that has not previously been put to use. Rainwater is water that

has flowed across a roof surface. Do not confuse rainwater with greywater, which is wastewater derived from sink and shower drains. Greywater requires higher levels of treatment and processing than rainwater collected from clean roof surfaces. For the purposes of this article, we will deal with roof-collected rainwater. The terms “cistern” and “tank” are used interchangeably.

A considerable amount of time is involved when interpreting (from plans and specifications) what the rainwater system entails, especially on a commercial project. For some, it is only the pumping component. For others, a rainwater system is the filtration/treatment portion. Or, it may refer to the prefiltration and storage aspects, with the pumps, controls and related electronics left to others.

The first step in any rainwater harvesting project is to define the system. For the purpose of this article, I will define a rainwater system as all of the elements from the inlet prefilter to the pressurized outlet leading to the final application.

The primary elements of a rainwater harvesting system are:

- Collection surface, roof drains and piping: Stored water quality is largely determined by the collection surface. Once rain hits a surface, it may pick up contaminants and transport them to the storage vessel.
- Inlet prefilter: This device excludes larger debris from the cistern. It may consist of multiple units or a single manifolded unit upstream of the tank.
- Storage vessel: The tank (above or below ground) may be constructed of varying materials such as fiberglass, plastic, concrete, metal or a flexible liner. The tank can be either part of the structure of the building or a separate, self-contained unit.
- Pressurized pumping, treatment and filtration systems: These are components needed for pressurizing and treating the water to a level suitable for the application: controls, pumps, filters, disinfecting devices, alarms, etc.
- Peripheral elements: Pumps, solenoid valves, three-way valves, expansion tanks, etc., may require separate feeds, conduits and disconnects.

A rainwater harvesting system is a collection of components, big and small, that must work in harmony if it is to be a permanent part of a building’s infrastructure.

Details Before Design

Locating the rainwater system in the plans and specs of a project may not be obvious. Look for a flow schematic and a written sequence of operations in the plumbing sheets. All plumbing and electrical connections in and out of the rainwater system should be clearly visible—i.e., pumps,



Depending on the end use of the rainwater, varying treatment technologies may be required.

remote valves, tanks, etc.

This diagram should portray the system’s scope and design intent. It should be an easy-to-interpret picture of how the rainwater flows through the entire system, from collection surface to end use.

Identify all applicable storm risers, piping to the final applications, overflows and floor drains. A request for information sent out early in the process goes a long way.

Look for the specification detailing the rainwater system. Although all pertinent information should be referenced here, that is often not the case. Check for additional references in the specs that impact the material selection and bypass strategies. Understand what is designed, and your scope of work.

Rainwater harvesting and treatment system designers with no prior experience in this area frequently “reinvent the wheel” during the design phase and are prone to designing systems that may not be optimal. It is important to have a clear understanding of what constitutes the whole system. The omission of certain elements in a design, even when outside the scope of your bid, may significantly impact the system’s performance. For example, if there is no inlet prefilter, the water quality in the cistern may be severely compromised. Take the time to note these omissions and have them documented.

Much of the information provided to you during the submittal process may be new. Review the submittal documents and ask questions. If you are soliciting bids from

single-source providers, confirm that the proposal closely matches the plans and specs.

A Complete System

When the system is conceived as a whole and purchased from one vendor, there will be less finger pointing. If you go this route, purchase the system from a reliable manufacturer that provides startup, owner training, warranty and aftercare. Finding a system provider with the knowledge, expertise, experience and longevity in the business is probably your best insurance against failure, especially when installing your first system. Due to the relatively young age of the rainwater harvesting and treatment industry, designs may lack consistency and exhibit a wide degree of variation.

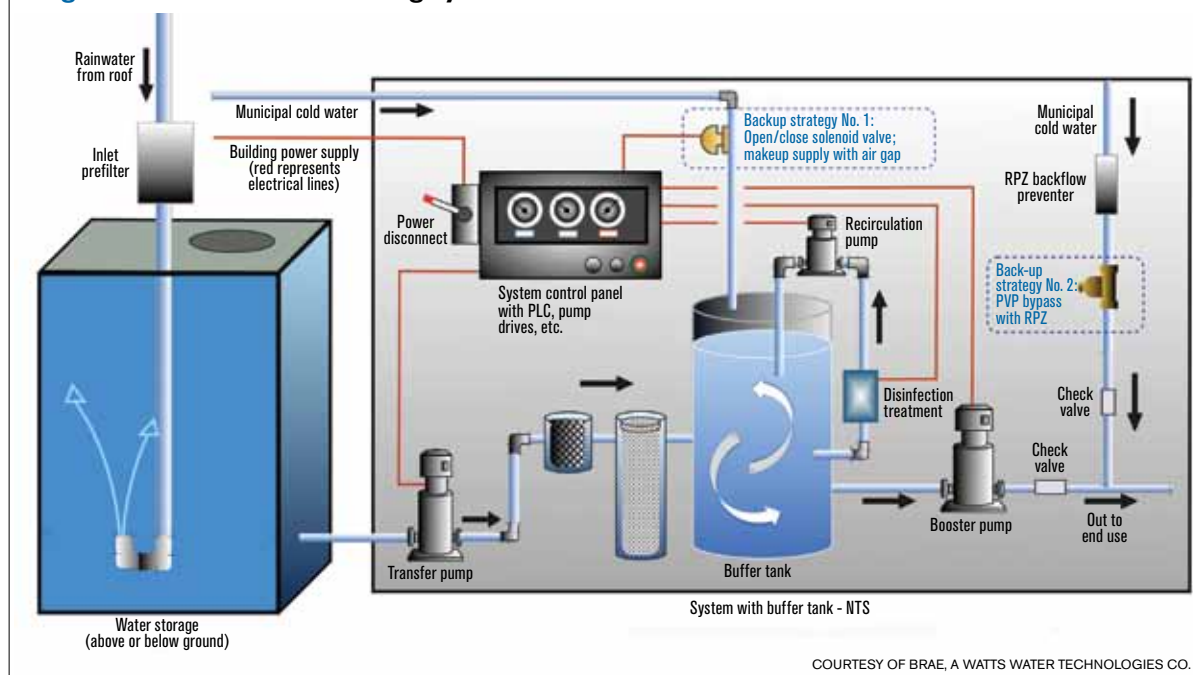
You also will want to know:

- Collection surface type and area: Rain running across a collection surface will transport pollutants to the tank—dissolved or suspended. Typical pollutants include grit, dust or bird droppings. Take caution—water from parking or driving surfaces typically contain oils, hydrocarbons and even salt. Take care before startup to begin with a clean tank.
- Flow and pressure requirements for the application: Unless the rainwater system manufacturer will be responsible for the plumbing design in the building, it needs to provide the output flow and pressure at the point of exiting the system. The designer needs to take into account the pressure losses in the building so enough pressure exists for the farthest fixture.

In many cases, the installer will deal with more than one trade on the jobsite and possibly more than one design engineer. Associated trades typically include electrical, controls/building automation, and site and roofing contractors. Coordination is key.

Note that you will need to know the voltage and amperage required for the entire system. Do not leave this to the last minute. Often, the control panel requires

Figure 1. Rainwater Harvesting System With Buffer Tank



more amperage than all the pumps combined. It is much more difficult to ask for an additional power feed after the fact.

Conduct regular meetings with all parties involved, including the system manufacturer. Develop a game plan with timetables and deadlines. More communication is better than less.

Although the main codes and standards developing organizations—the International Association of Plumbing and Mechanical Officials, International Code Council, American Society of Plumbing Engineers, etc.—have made strides in updating plumbing codes with provisions for rainwater harvesting, the learning curve has kept the industry from growing at a faster pace.

In some states, laws related to water rights prohibit the collection of rainwater from roofs. Despite this, rainwater collection throughout the U.S. and Canada encounters significantly fewer barriers today than just five years ago.

Rainwater collection systems are here to stay. Chances are you will see one soon. Developing expertise in this field will come with experience, but doing your homework ahead of your first rainwater job will put you ahead of the competition. **WQP**

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