

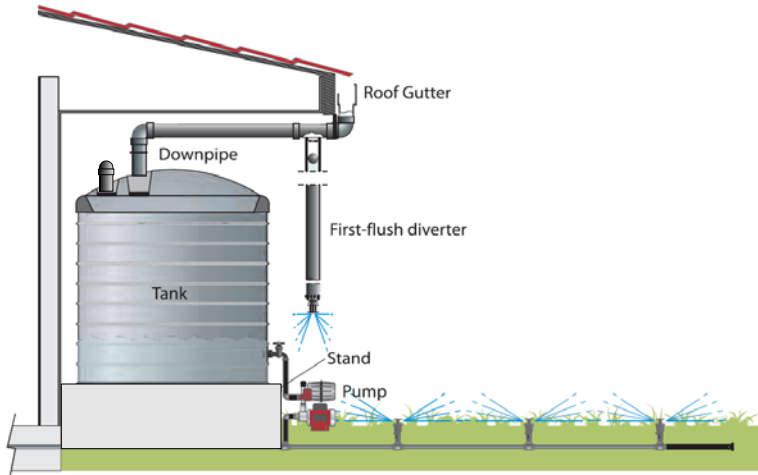


Rainwater Harvesting & Storage Systems

Handout No: 36
Revised: 9/29/09

Rainwater Harvesting

Rainwater harvesting is the capture, diversion and storage of rainwater for use in landscaping and other purposes. Collection of rainwater is usually from rooftops which is stored in catchment storage tanks. Stored water can be used for nonpotable purposes such as irrigating landscaping, washing cars or possibly even flushing toilets. Rainwater harvesting systems can range from a simple barrel at the bottom of a downspout to multiple large tanks with pumps and controls.



Rainwater Harvesting System Limitations

Most rainwater harvesting systems are used exclusively for landscaping irrigation purposes. A building permit is usually required for the installation of large storage tanks, distribution systems, pumps and backflow prevention devices associated with a rainwater harvesting system. A building permit is always required if the rainwater storage and distribution system is proposed for use inside of a building. Currently, the State of California has not adopted rainwater harvesting standards for use in buildings. Section 601.1 of the California Plumbing Code requires that plumbing fixtures including toilets, urinals washing machines and floor drains, be connected to an “adequate supply of potable running water” unless the City determines that it is not necessary for safety or sanitation reasons. Given that there are cities within the United States and other countries that have safely allowed the use



of rainwater for fixtures such as toilets, urinals, washing machines and trap primers in floor drains, the City of Sonoma Building Department will review and determine the acceptability of such requests on a case-by-case basis when designed by a licensed California Mechanical Engineer that specializes in plumbing or rainwater systems. The installation of a rainwater system within a building requires separate and identifiable piping systems for both the nonpotable rainwater system and the potable City water system to prevent contamination between them.

Requirements for Rainwater Harvesting and Storage Systems

Zoning. Rainwater storage barrels are containers with a volume of 80 gallons or less. Larger storage tanks are considered structures for the purposes of determining City zoning and setback requirements. The following enumerates some of the City's zoning requirements:

Setbacks for Residential Uses.



- A rainwater storage barrel with a volume of 80 gallons or less may be placed below downspouts around a building without considering front, side or rear yard building setback requirements. *[Planning Department Interpretation]*
- Rainwater storage tanks that do not exceed 8 feet in height above finished grade and do not exceed 120 square feet in area may be placed immediately adjacent to a side or rear property line. *[Sonoma Municipal Code Section 19.50.080.C.2.b.]*
- Rainwater storage tanks not exceeding 9 feet in height above grade that are separated from other buildings on the property by a 6 foot wide or more open yard may be placed as close as 5 feet to a side or rear property line. *[Sonoma Municipal Code Section 19.50.080.C.5. and 19.50.080.C.2.a.]*
- Aboveground storage tanks are prohibited in required front and street-side setbacks, and in designated creek setback areas. *[Sonoma Municipal Code Section 19.50.080.C.3.]*
- Aboveground rainwater storage tanks not meeting the above requirements must comply with the building setback requirements set forth in the Article III of the City's Development Code for the zoning district in which it is located. *[Sonoma Municipal Code Section 19.40.110.A.1]*

Setback and Design Review Requirements for Nonresidential Uses.

- A rainwater storage barrel with a volume of 80 gallons or less may be placed below downspouts around a building without considering front, side or rear yard building setback requirements. *[Planning Department Interpretation]*
- Rainwater storage tanks not meeting the above requirements must comply with the building setback requirements set forth in the Article III of the City's Development Code for the zoning district in which it is located. *[Sonoma Municipal Code Section 19.40.110.A.1]*
- Aboveground rainwater storage tanks for nonresidential uses are prohibited in required front and street-side setbacks, and in designated creek setback areas. *[Sonoma Municipal Code Section 19.40.110.A.3, 19.40.110.E. and 19.40.020.D.2]*
- Design Review Approval is required for aboveground rainwater storage tanks for which a building permit is required. *[Sonoma Municipal Code Section 19.54.080.B.2]*
- Design Review Approval is required for rainwater storage tanks located in public view. *[Sonoma Municipal Code Section 19.54.080.B.2]* EXCEPTION: Design Review Approval will not be required for single rainwater storage barrels with a volume of 80 gallons or less and placed below downspouts around a building. *[Planning Department Interpretation]*



Permits. A City building permit is required for rainwater harvesting and storage systems under any of the following circumstances:

- If the property is connected to the City’s water system and the total combined stored water capacity for the rainwater system exceeds 500 gallons. *[Installation and inspection of a cross-connection control device near the City water meter is required in accordance with Sonoma Municipal Code Section 13.20.030. and City Standard Plan #213]*
- If the storage tank is not supported directly by the ground or concrete slab or is supported by a raised platform or other structure. *[1997 Uniform Administrative Code – 301.2.1]*
- If the size of a water storage tank exceeds 5,000 gallons or the ratio of height to width of the tank exceeds 2:1. *[1997 Uniform Administrative Code – 301.2.1]*
- If electrical pumps, electrical valves or electrical controllers are installed, unless they are cord and plug connected or operate at less than 25 volts and not capable of supplying more than 50 watts. *[1997 Uniform Administrative Code – 301.2.3]*
- If any portion of the rainwater harvesting system is proposed to be used or located inside of a building or for supplying toilets, urinals, trap primers or washing machines. *[2007 California Plumbing Code 601.1]*
- If the rainwater storage tank will be installed below or partially below grade. *[2007 California Building Code Appendix J103.1.]*



Other Requirements and Considerations for Rainwater Harvesting Systems.

- Untreated rainwater may contain contaminants and is considered nonpotable water. Non potable water piping must be exposed to view and must be marked every 20 feet with a yellow identification band and labeled “CAUTION: NONPOTABLE WATER, DO NOT DRINK.” Discharge outlets must be exposed to view and must be labeled with the international symbol for nonpotable water and the words “CAUTION: NONPOTABLE WATER, DO NOT DRINK.” *[2007 California Plumbing Code 603.4.11 and 601.2.2]*
- Rainwater harvesting systems may not be directly connected to other potable water sources such as the City supplied domestic water system or a well serving the home or business. *[2007 California Plumbing Code 602.4]*



- For above-ground water storage tanks exceeding 5,000 gallons or if the ratio of height to width of a tank exceeds 2:1, an engineered pad base and adequate anchorage system must be provided. *[2007 California Building Code Chapter 16 and Section 1604.1]*
 - Rainwater storage tanks installed below grade must be adequately tied down and anchored to prevent lifting caused by groundwater.
 - Rainwater storage tanks must be provided with pressure relief mechanisms and tank overflows to prevent tank pressure build-up and to provide an overflow route should the tanks fill to capacity.
 - The rainwater harvesting system should be designed as an integrated solution incorporating collection, contaminant removal, pumping, control and reticulation. Rainwater tanks should be well sealed, maintainable and be provided with first-flush devices and filters to keep out leaves and other contaminants. Inlet and overflow screens should be provided to prevent access of mosquitoes and other insects and vermin. Provisions should be made for periodically draining and cleaning the rainwater storage tanks of siltation and other contaminants.
-
- It is important that a rainwater harvesting system be designed to prevent growth of algae and other organisms in the system. Good aeration and circulation of water, no sunlight on water and keeping leaves and organic matter in the water to a minimum will help to reduce the growth of algae.
 - The rainwater harvesting system should be properly sized. Variables such as available capture area, storage availability, spring-time average rainfall and usage requirements must be considered to properly design a system.
 - For automated irrigation and distribution systems, consideration should be given to providing makeup water to the tank from sources other than rainwater (i.e. City or well water).

Rainwater Harvesting Resources

- San Francisco Public Utilities Commission Web Site:
http://sfwater.org/mto_main.cfm/mc_id/14/msc_id/361/mto_id/559
- American Rainwater Catchment Systems Association:
<http://www.arcsa.org/>

For further questions, please contact the City of Sonoma Building Department at 707-938-3681.