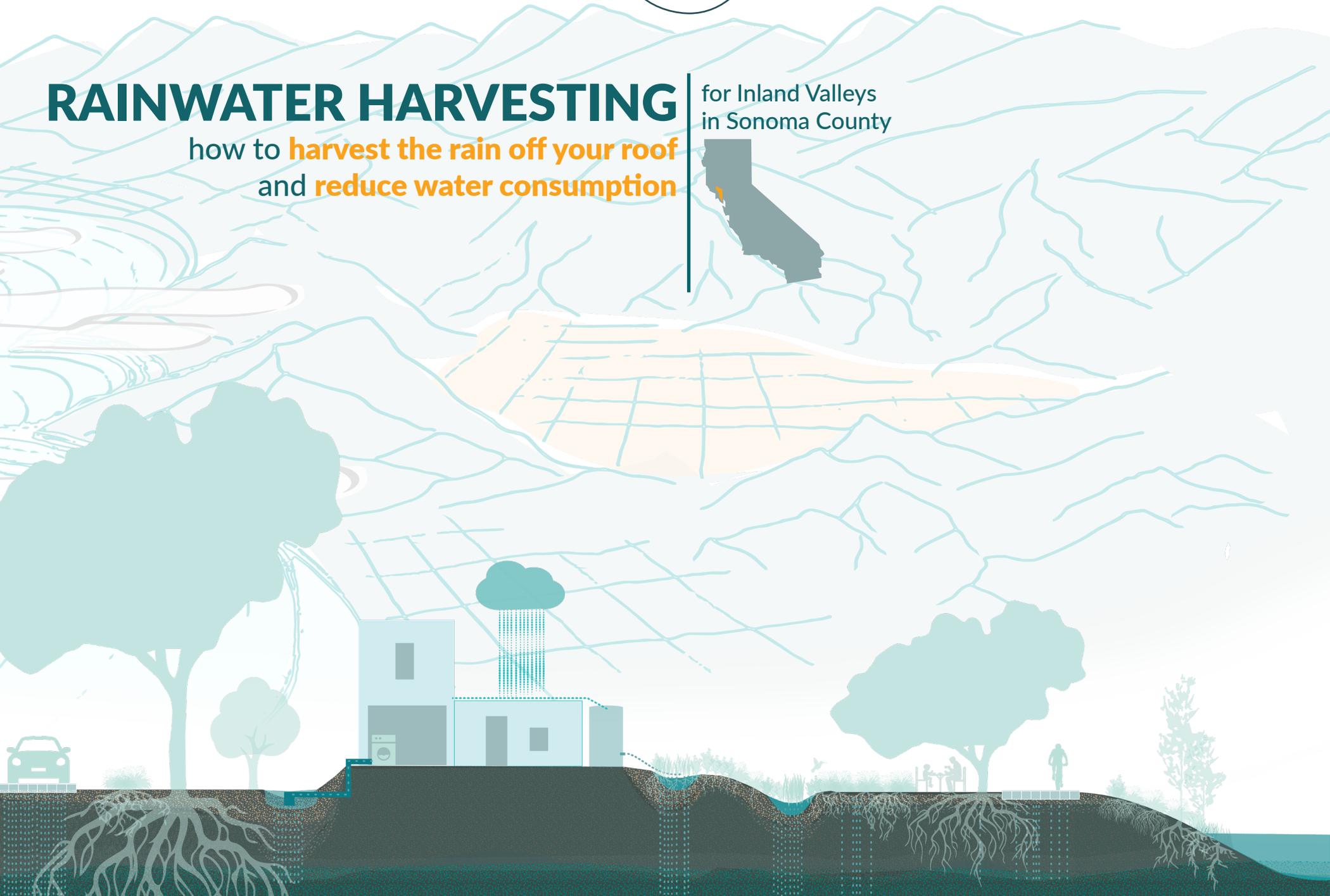




RAINWATER HARVESTING

how to **harvest the rain off your roof**
and **reduce water consumption**

for Inland Valleys
in Sonoma County



1

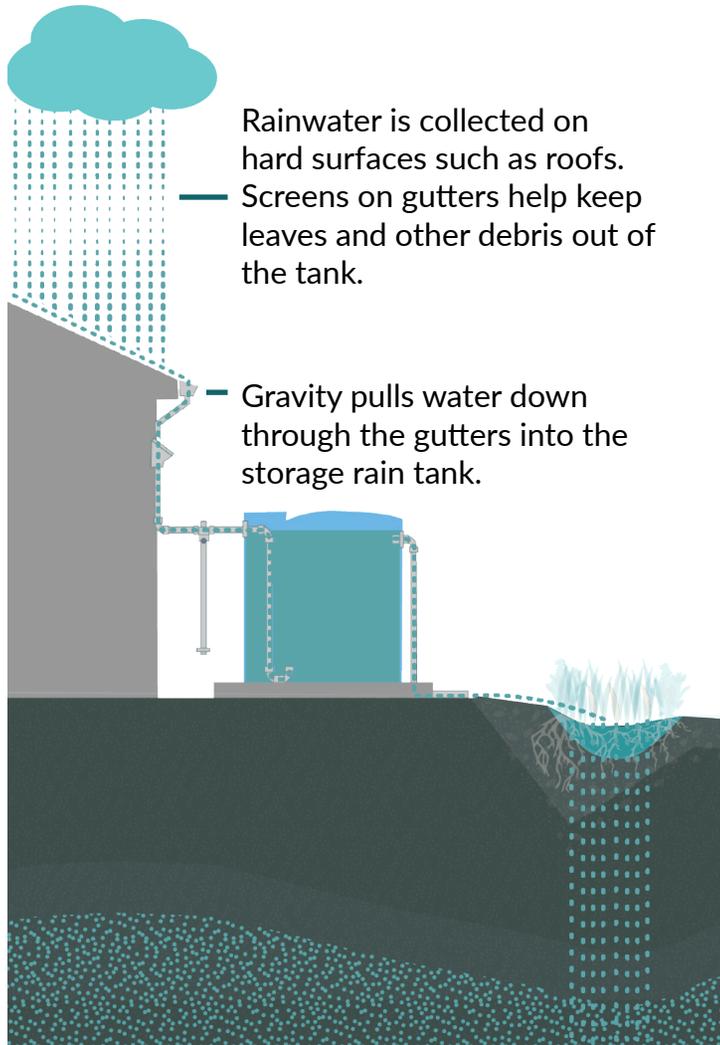
RAINWATER HARVESTING

What is Rainwater Harvesting?

What is the Rainwater Harvesting and Reuse Cycle?

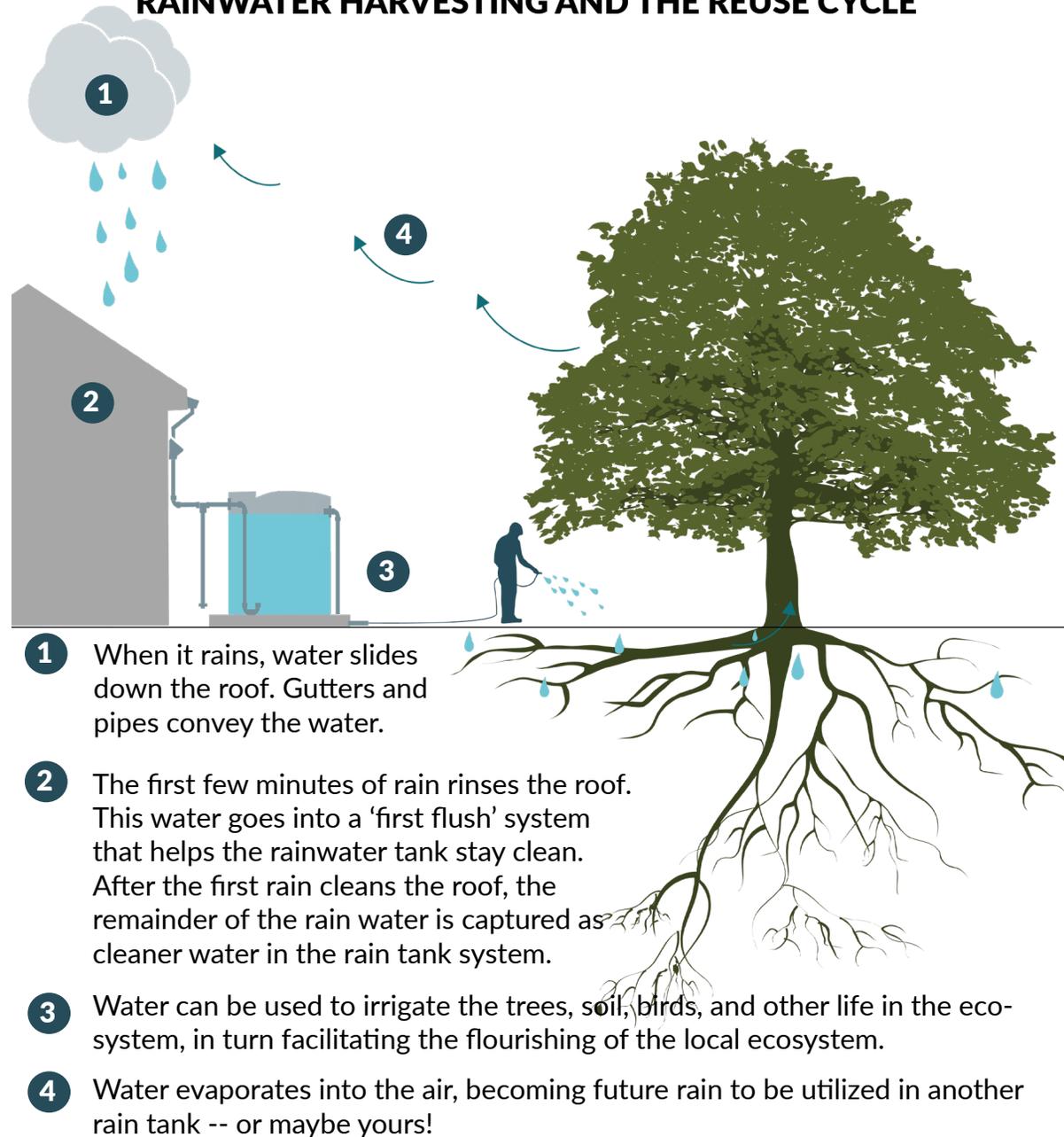


RAINWATER HARVESTING



Overflow can be directed to rain gardens where the water can infiltrate and recharge aquifers.

RAINWATER HARVESTING AND THE REUSE CYCLE



2

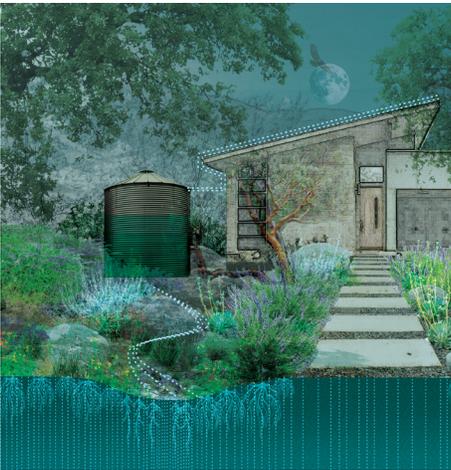
RAINWATER HARVESTING

What are rain tanks, what do they look like, and what are their impacts?

WHAT ARE RAIN TANKS?



A landscape before a rain tank.



A landscape after a rain tank and during a storm.

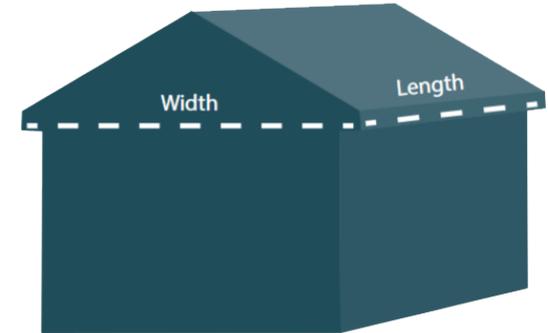
Rain tanks are storage tanks which collect rain off a roof to reuse for irrigation or other non-potable uses. Capturing and using the water off your roof saves valuable water resources, reduces flood risk, and increases fire resiliency.



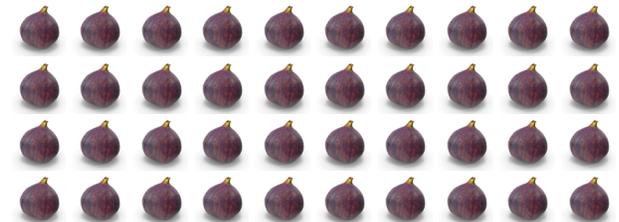
Polyethylene tanks are the most common, affordable, and come in a variety of shapes, sizes and color options. They also are available in potable grade to ensure safer water quality.

CALCULATE THE IMPACT!

$$\begin{matrix} \text{roof} \\ \text{footprint} \\ \text{sq ft} \end{matrix} \times 0.6 = \begin{matrix} \text{GALLONS} \\ \text{per inch} \\ \text{of rainfall} \end{matrix}$$



Add the gallons per inch of rainfall in the equation above (illustration) with how much rain your region received in a drought, or average year to see how much potential you have to harvest the rain off your roof. A typical California home can harvest enough rainwater to irrigate up to 40 fruit trees, or 12,800 gallons per year!



3

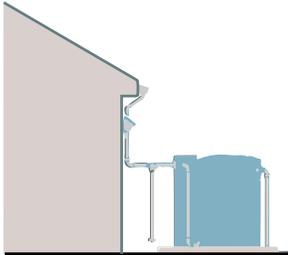
RAINWATER HARVESTING

How to choose your rain tank, how to site it on your property, and other important considerations & resources

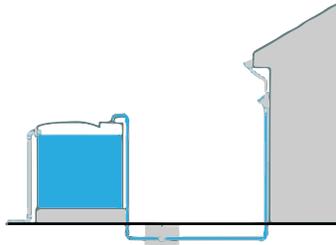


DRY VS WET CONVEYANCE

1) A dry conveyance system fully drains collected rainwater using gravity and slope. These systems work best when the tank location is closer to its collection roof.



2) A wet conveyance system enables a rain tank to be further from the building. In a wet system, pipes dip below the gutter or raintank inlet prior to entering tank.



Dry conveyance system example

Source: <https://www.ul.com/services/certification-rainwater-catchment-systems-and-products>



Wet conveyance system example

Source: <https://www.watercache.com/rainwater/residential>

ADDITIONAL RESOURCES

[The Water Harvester: An Invitation to Abundance \(documentary\)](#)

[Harvesting Rainwater for Drylands and Beyond](#)

[WaterCache: Rainwater Harvesting 101](#)

[American Rainwater Catchment Systems Association](#)

[Daily Acts Rain Tanks and Barrels](#)

DO NOT

- ❌ DO NOT use fine sand for a base of tank. It will wash away & make the tank unstable.
- ❌ DO NOT attempt to install yourself if you cannot. Call a local professional to evaluate & install.

DO

- ✅ DO ensure your tank is sited at highest point on the property that it can fill from roof drainage.
- ✅ DO allow for overflow to a rain garden: When the tank is full, water will find a way out.
- ✅ DO be creative with tank sizes & shapes: Tanks are made in multiple shapes and sizes to help create fences, walls, or to fit even under decks.
- ✅ DO install tank(s) on a compacted & level footing: Tanks with height-to-width ratios greater than 2-1 must be mounted to a structure.
- ✅ DO put multiple tanks together: tanks may be plumbed together in the event that a site cannot accommodate a single, larger tank.
- ✅ DO identify your water needs: How much water do you need? Harvested rainwater can be used for irrigation, car washing, livestock watering, toilet flushing, laundry & fire suppression.
- ✅ DO locate tanks close to the rainwater source and destination: Identify a location close to the source (downspouts) & close to the irrigation destination (plants). Ensure a setback of 3 feet from any buildings & not blocking windows.

4

RAINWATER HARVESTING

Step-by-step instructions for DIY rain tank installation, and construction notes for professionals



1. Feasibility & Design

- ✓ Identify your rainwater source and size tanks:

How many square feet is your roof/catchment area? (Hint: use google earth to measure) In the city of Petaluma, it rains approximately 26.8 inches in an average year. For a 2,000 square foot roof that equates to about 33,000 Gallons!

Since space and monetary constraints can limit tank size, one approach to sizing a tank is to base it on a typical heavy rain storm.

Rain capture volume = Roof area(sq_ft) * rainfall (ft) * runoff coefficient * 7.48 (conversion to gallons)

Example: Size a tank for the following situation
Catchment area (roof) = 1,000 sq ft
10-year 24 hour storm ~ 4" inches (.33 ft)
Standard Runoff Coefficient = .9 (assumes 10% loss of from splashing, etc.)

1000 Sq_ft * .33ft * .9 * 7.48 gallons
= 2,222 gallons per storm

To capture a storm of this size, the tank volume should meet or exceed about 2,500 gallons.

Systems under 5,000 gallons without cross connections do not require a permit.

- ✓ Identify your water needs: How much water do you need? Harvested rainwater can be used for irrigation, car washing, livestock watering, toilet flushing, laundry and fire suppression.
- ✓ Locate tanks close to the rainwater source and destination: Identify a location close to the source (downspouts) and close to the irrigation destination (plants). Ensure a setback of 3 feet from any buildings and not blocking windows.

- ✓ Make sure water flows downhill: Check that your rainwater tank site is situated so that it can fill, supply plants and overflow all by gravity to a desired location.
- ✓ Allow for overflow to a rain garden: When tank is full, water will find a way out. Design a rain garden downslope for rainwater overflow to empty into.
- ✓ Install tank(s) on compacted and level footing: Tanks with height to width ratio greater than 2-1 must be mounted to a structure that is approved for your local seismic code.

- ✓ Multiple tanks together: Tanks may be plumbed together to fit on a site where one larger tank would not.

2. Build It!

- ✓ Hire a professional if you intend to install a large-scale, complicated system or to check correct installation of a small, simple system.
- ✓ Abide by building codes: Ensure that all gutters, roof drains, and associated piping complies with relevant California & County building codes.
- ✓ Over-size conveyance and tanks by 20%+ to accommodate for climate shifts and regional storm intensity.
- ✓ Include a First Flush Diverter: The first wash of rainwater may contain leaves, dust, bird droppings, and other debris. Keeping this part of the rainwater flow out of your rain tank helps keep the tank and supply clean.
- ✓ Ensure that the overflow route is at least as big as the inflow: Your tank may overflow in an uncontrolled way if not sized appropriately. This can cause erosion and/or flooding.



- ✓ Install spigot or tank outlet 4" above the bottom of tank: This prevents sediment from entering the supply.
- ✓ Paint all installed, exposed PVC pipe: UV rays will break down exposed PVC material.
- ✓ Label rain water pipes and spigots: Use "DO NOT DRINK" label shown below and access points to the tank should be marked with "Danger - Confined Space".
- ✓ Install proper filtration on the supply-end of your rainwater system:
 - a. A gravity-fed hose may not require any filtration.
 - b. Sub-surface drip-line should have a simple sediment filter.
 - c. Rainwater pumped through sprinkler systems must be treated with mechanical and UV disinfection.
- ✓ Make-up water from potable supply: If you want to keep your tank harvesting system running even if rainwater levels get low, check your local codes for either make up water air gaps or double backflow preventer connections prior to designing.

- ✓ If a pump is required:
 - a. Use an on-demand pressure pump to convey rainwater.
 - b. Ensure the pump is approved by a listing agency and that it is sized sufficiently for the use.
 - c. Consider installing potable make-up water in the event that rainwater is not present.

3. Maintain Your System

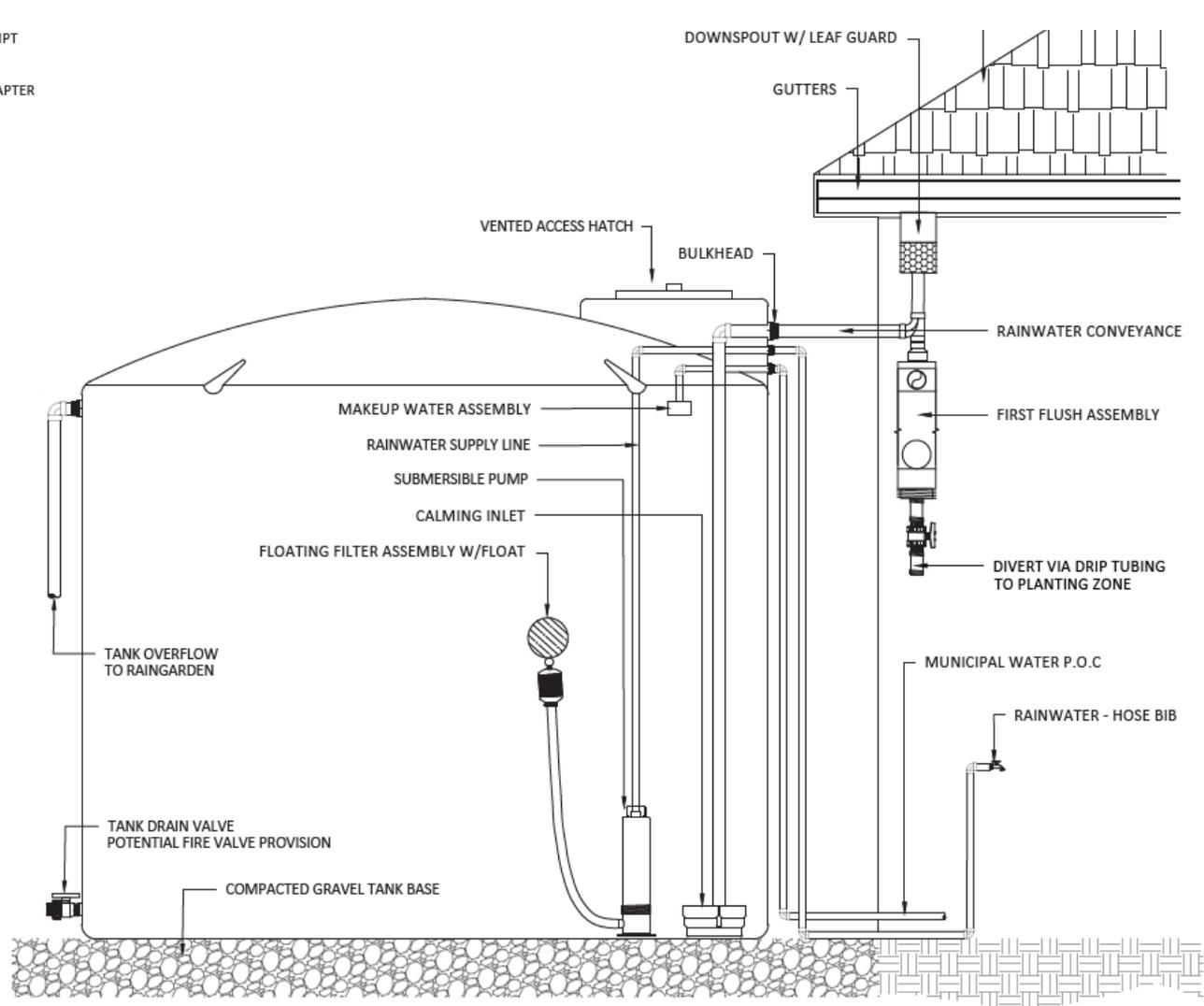
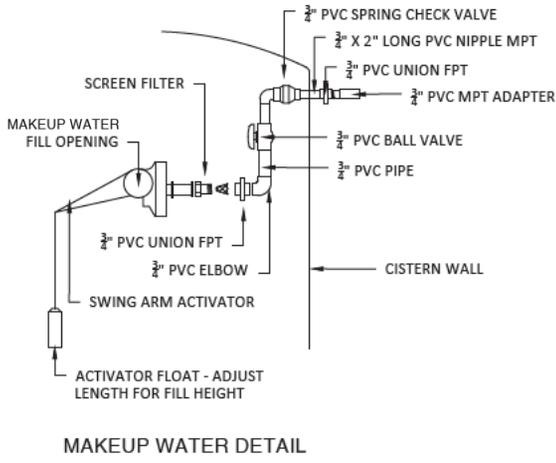
- ✓ Check your local code provisions for testing of potable water systems and storm drainage systems.
- ✓ Clean and inspect all inlets, outlets, filters and valves on the system.
- ✓ Drain first flush diverter of captured debris.
- ✓ Wet conveyance line systems should be drained after the rainy season.
- ✓ If you live in an area prone to freezing, ensure that your tank has adequate freeze protection.

5

RAINWATER HARVESTING

Rain Tank and Rainwater Harvesting Systems

Standard Construction Schematic for Contractors



TANK COMPONENT ELEVATION VIEW