

RAINWATER HARVESTING

MYTH #1

I heard that
rainwater
harvesting is
ILLEGAL!



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**The State of Texas has laws that
encourage rainwater harvesting!**

Texas Tax Code §151.355 exempts
rainwater harvesting equipment and
supplies from state sales tax.

Texas Property Code prevents a homeowner's
association from prohibiting the use of
rainwater harvesting systems
(Texas Property Code §202.007).

MYTH #2

It doesn't rain
enough here.



MYTH #2

It doesn't rain
enough here.

Canyon has an average
annual precipitation of

19 inches!

How much rainwater can I catch?

$$\begin{array}{ccccccc} \text{Catchment} & & \text{Rainfall} & & & & \\ \text{Area} & & \text{Depth} & & & & \\ (\text{ft}^2) & \times & (\text{inches}) & \times & & & \\ & & & & & & 0.623 \\ & & & & & & (\text{conversion} \\ & & & & & & \text{factor}) \end{array}$$

0.623 is how many gallons of water it takes to cover one square foot of space in one inch of water.

How much rainwater can I catch?

$$2,000 \text{ ft}^2 \times 1 \text{ inch} \times 0.623$$

1,246
gallons

How much rainwater can I catch annually?

$$2,000 \text{ ft}^2 \times 19 \text{ in} \times 0.623$$

23,674
gallons

Why should I collect rainwater?

You can offset your use of limited groundwater or municipal water supplies.

Rainwater is valued for its purity and softness.

- Near neutral pH
- Low in minerals, salts and chlorine
- Can have added nitrogen

Better manage stormwater runoff and flooding.

Rainwater Uses

- Outdoor irrigation
- Livestock
- Wildlife “guzzlers”
- Farm use: cleaning equipment and mixing with fertilizers/pesticides
- Fire protection
- Indoor use
 - Non-potable: Flushing toilets
 - Potable: Extensive treatment needed



How do I collect rainwater?

Passive rainwater harvesting in front yard of Lubbock home

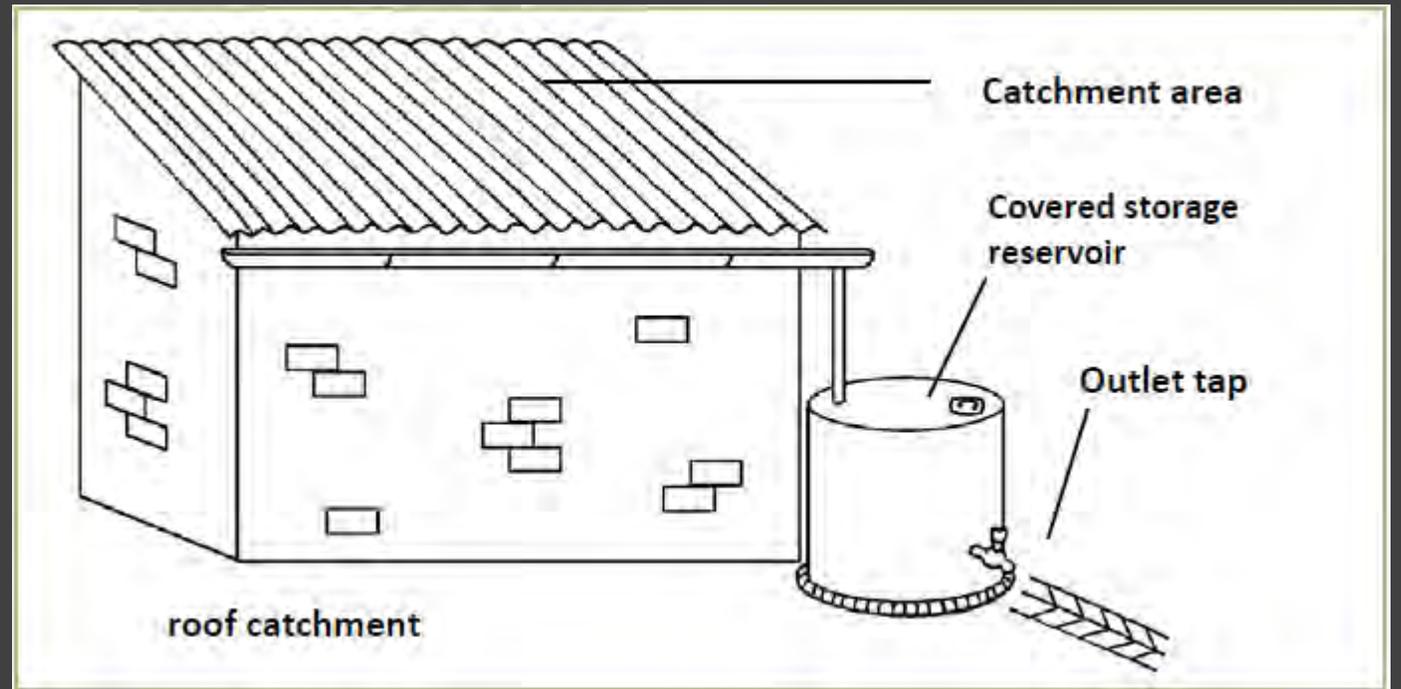


Large rainwater catchment barrels on South Plains College campus



Active System Components

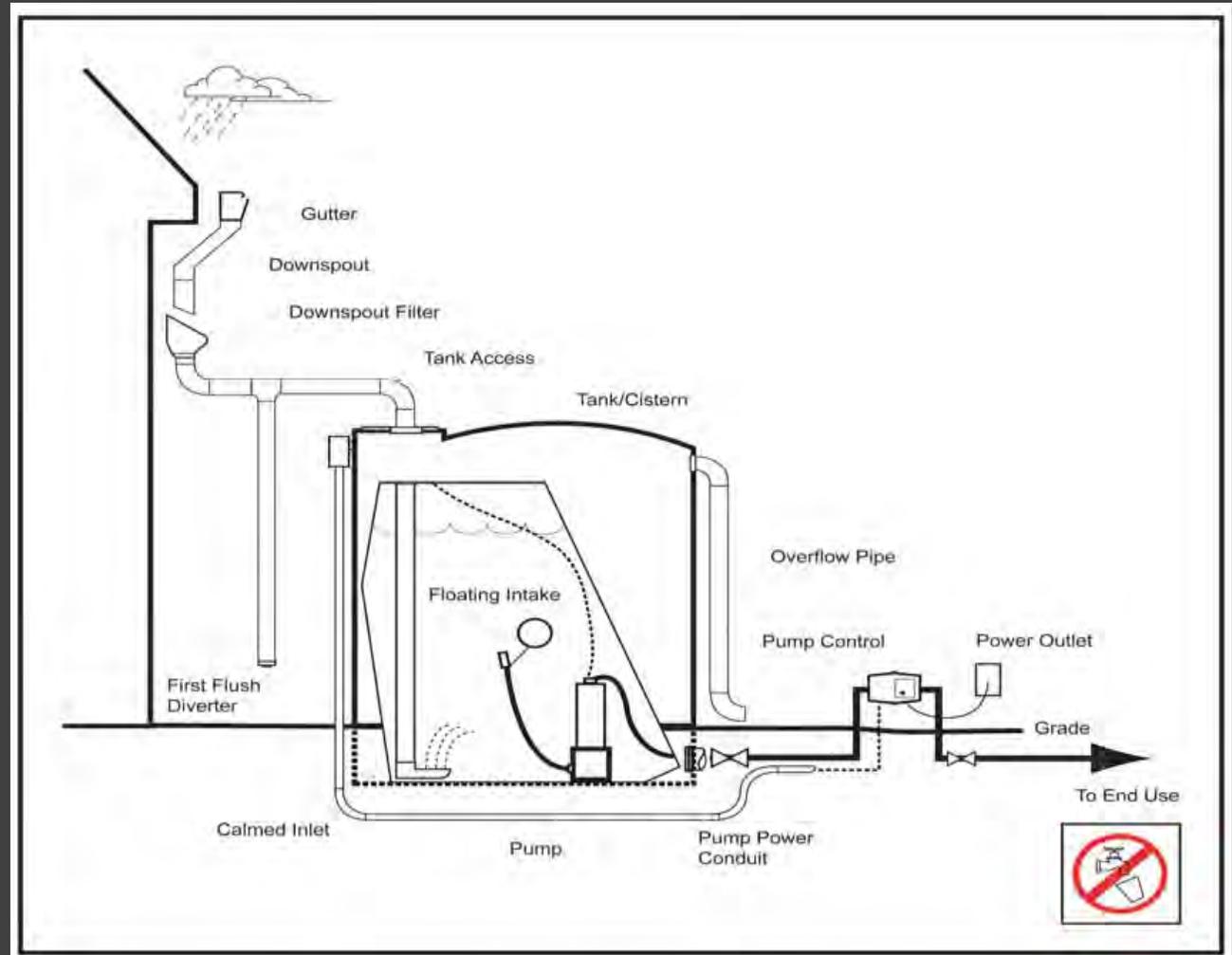
- Catchment area
- Conveyance system (gutters, downspouts)
- Storage
- Outlet



Active System Components



Advanced Active Systems



Catchment area

House, shed and barn roofs are most common catchment areas.

Roofing type doesn't matter for nonpotable outdoor water uses.

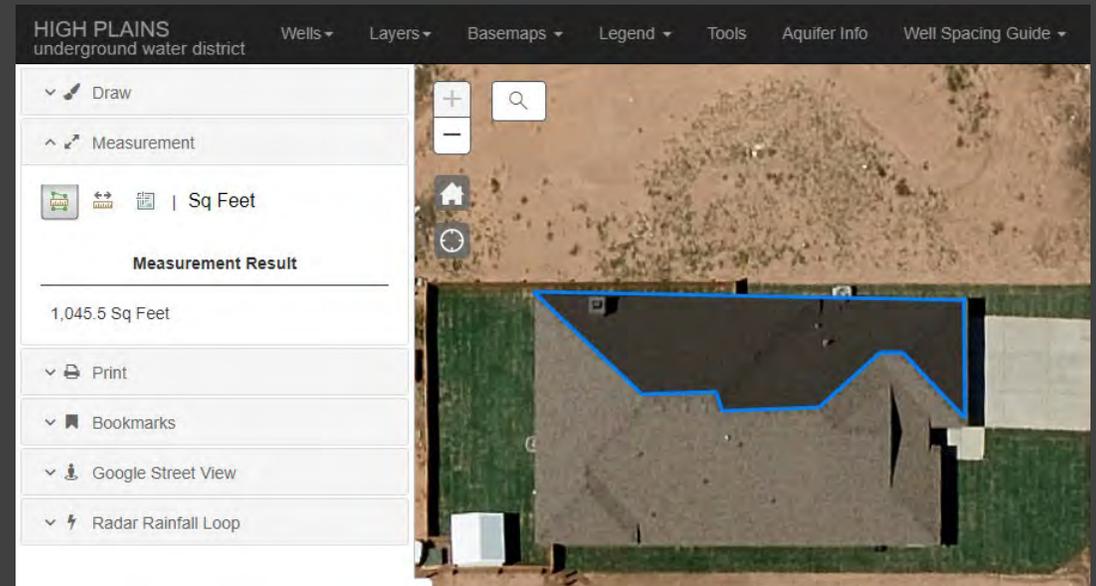
You can also divert water that falls on concrete driveways, parking lots and walk ways into underground tanks.



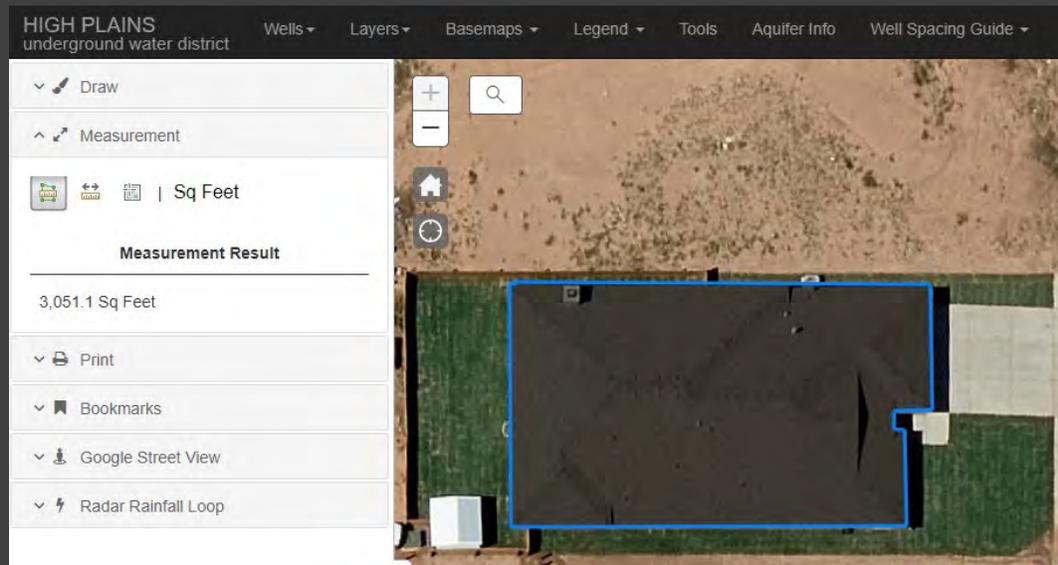
Catchment area

Map your roof:

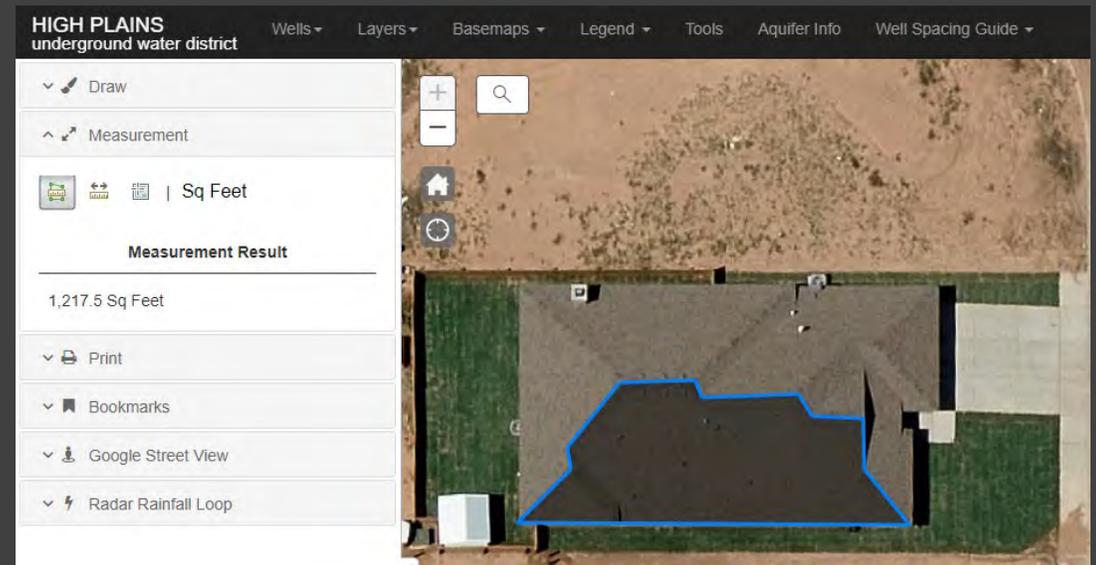
- Map.hpwd.org
- permadesign.com/calculator



North Roof Area: 1,045 ft²



Total Roof Area: 3,050 ft²



South Roof Area: 1,215 ft²

Conveyance System

Make sure gutters are sized and sloped appropriately.

- Large steep roofs will need larger diameter gutters to move water.

Make sure downspout to tank is stabilized and protected from wind and sun.

Gutter Price Estimator:
www.fixr.com/costs/install-gutters



What if I don't have gutters?



What if I don't have gutters?



Debris Filter

Gutter Guards



Downspout Filters



First Flush/Roof Wash

- Used to catch the accumulated debris from the catchment area before rainwater is allowed to enter the storage tank.
- First flush diverters should remove approximately 10 gallons of water per 1,000 square feet of catchment area.
- Drain first flush pipe away from building foundations.



First flush diverter fitted with drip emitter at Wolfforth City Library.

Screens



Use a very fine screen on all in and out openings.

Storage

System sizes can range from 10 gallons to thousands of gallons.

Different materials:

- Poly tanks
- Fiberglass
- Corrugated steel
- Galvanized tin
- Concrete tanks
- Underground tanks



Poly Tanks

Most cost-efficient

Choose darker tanks, as white tanks can encourage algae growth.

Most poly tanks are round, but some newer designs are slimmer and oval shaped.



Poly Tank Price Estimates

Size	Price
65 gallons	\$80-\$100
500 gallons	\$400
1,000 gallons	\$600
2,500 gallons	\$1,000
6,500 gallons	\$4,000
11,000 gallons	\$7,000

Fiberglass Tanks

Lightweight and long-lasting

More cost-effective for large
projects



Corrugated Steel and Galvanized Tin

Heavy duty

Aesthetically pleasing

Often includes an interior bladder for rainwater



Concrete Tanks

Above or below ground

Can be configured to many different sizes and even incorporated into building design elements



Underground Tanks

Great for cold climates

A pump is necessary.

Extra engineering is needed to ensure tank stability.



Underground Tanks

Basin lined with nonpermeable plastic and reinforced with milk carton-like cells.

Can be configured into any design to fit specific needs

Great for catching water from parking lots



Multiple Tanks

Great for adding on to your current system

Use a manifold so barrels/tanks fill and drain evenly.



Outflow

Space spigot several inches off of bottom of tank to avoid disturbing sediment.

Can be gravity fed and fit with hose or soaker hose

- Raise barrel off ground to provide a little bit of water pressure.

Can include pump

- Electricity, solar, or gas/diesel
- Permanently installed vs. portable



Potable Use

Maintain all sediment, UV and other filters

Make sure you test at least once a year or when there is a change in appearance, smell, or taste.

Make sure you follow all local, state and federal laws.

- ARCSA/ASPE/ANSI 63: Rainwater Catchment System Standards



Overflow Pipe

Have place for water to overflow

- At least 10 feet from foundation of buildings

Perfect to flow into a passive rainwater harvesting system (rain garden)



Overflow at Samuel Jackson Inc. feeds a rain garden.



RAIN GARDENS

SLOW IT. FLOW IT. GROW IT.

Passive Rainwater Harvesting

Intercepting and storing precipitation directly in the soil rather than passing it through a storage tank first.

Collects the largest volume of rainwater at the lowest cost per gallon

Designs can help solve problems:

- Reducing flooding and erosion
- Help recharge groundwater
- Clean and naturally filter stormwater runoff
- Grow plants that provide shade, food, wood, windbreaks and visual screening



Catchment Basins

- Depression in the ground meant to collect rainwater
- Generally, basins are twice as long as they are wide, with the length along the contour of the land or along the slope.
- Aim for 4 to 8 inch depth.
- Plant inside basin or near the edges.



Berms

- Use as much of the soil taken from the basin as possible.
- Construct gentle side slopes so the garden blends into the surroundings.
- Compact the soil that forms the berm to create a sturdy barrier.
- Cover with vegetation or mulch to prevent erosion.



Mulch

Add a thick layer of mulch to planting area.

Use rocks to control erosion caused by fast flows.



Rain Garden Maintenance

Add additional irrigation
during dry periods.

Pull weeds.

Remove trash.



Rain Garden Maintenance

Cut back the plants in the spring.

Replenish mulch annually.

May need to be re-dig the basin or flush dirt out after 10-12 years.



What about *mosquitos*?

- If a rain garden has not fully drained after 72 hours, consider:
 - Incorporating several inches of compost or organic matter into the bottom of the basin.
 - Re-dig the basin so that it is shallower and wider.
- To prevent mosquito breeding in your rain barrels, ensure that all openings are covered with a fine screen.
- If mosquitos have invaded your barrel, toss a mosquito dunk in the water. This will not harm any plants irrigated with water from the barrel.

Examples

Panhandle Greenhouses

- 11900 S Washington St, Amarillo
- System built in 2012
- 36,000 gallon capacity
- 1 inch of rain= 10,000 gallons
- In 2018, they caught 106,000 gallons of rainwater.



Sharing Hope Ministry

- 2300 SW 7th Ave, Amarillo
- More than 12,000 gallons worth of storage
- Rainwater used in community garden



FirstBank Southwest

- Amarillo: Southwest 45th Avenue and Teckla Boulevard
- 36,000 square foot catchment area
- 26,600 gallons of storage
- Landscape irrigation
- 2019 TWDB Rain Catcher Award Winner



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HPWD Office

- Lubbock, TX
- 25x150 ft swale
- Approximately 8,000 sq ft parking lot
- Designed to catch 1 inch of rainfall (5,000 gallons!)



Lubbock Water Utilities Office

- 402 E Municipal Dr, Lubbock
- 1,500 gallon galvanized steel tank
- Wide array of drought-tolerant and native plants



South Plains College Garden

- Levelland, TX
- 5,000 gallon capacity
- Built for flood control and use in garden
- Transformation of poly to wood
- Equal water levels



Lubbock Homeowner

- 1,000 gallon capacity
- Built for landscape use
- Equipped with pump



Durham Ranch

- Abernathy, TX
- 18,450 catchment area from barns
- 6- 5,000 gallon tanks
- Gravity pipe system to cattle troughs
- Cost share funding through NRCS EQIP
- 2015 TWDB Texas Rain Catcher Award Winner



Martin Family Farms

- Terry County, TX
- 20,000 catchment area from barn
- 30,000 gallon capacity
- Water used in barn and for filling chemigation spray rigs
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Atmos Energy

- Lubbock: 66th and Milwaukee
- Catch rainwater and air conditioning condensate
 - 3,400 gallons of condensate is reclaimed every month.
- More than 25,000 sq ft of catchment
- 30,000 gallon tank
- Used to flush toilets indoors and irrigate landscape
- Building is LEED Certified



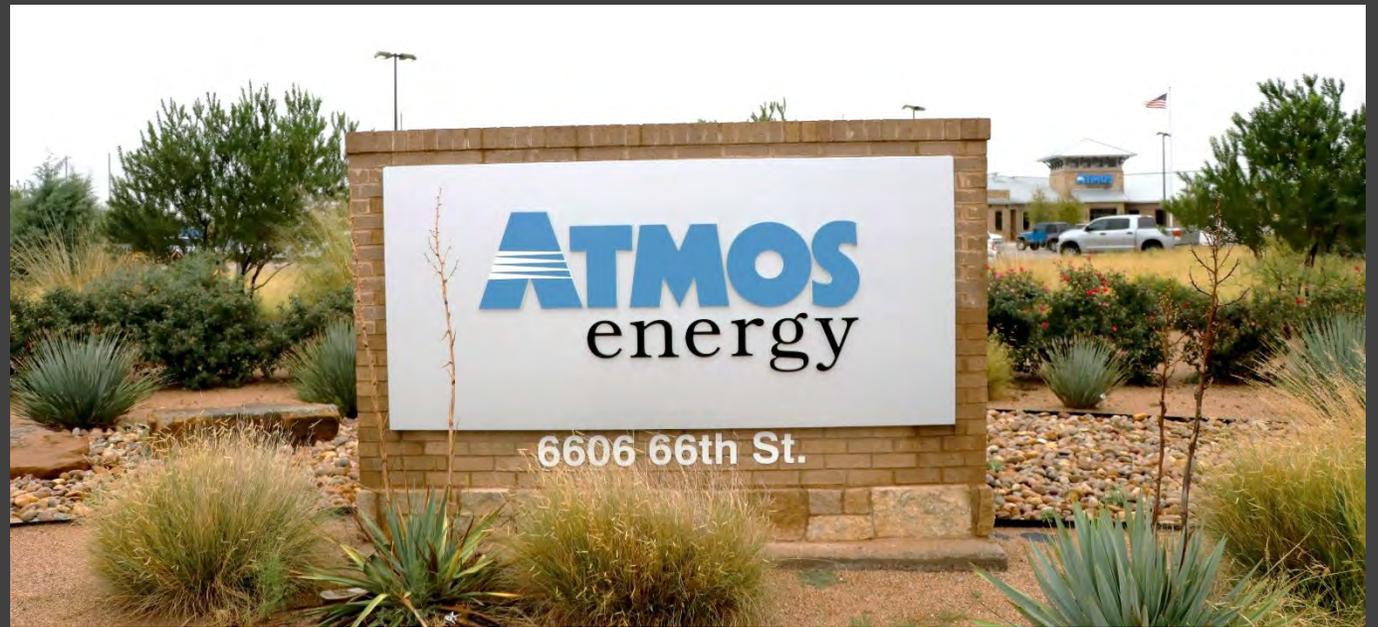
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Samuel Jackson Inc.

Lubbock cotton gin equipment manufacturer

48,000 sq ft of catchment area

90,000 gallons (6-15,000 gallon tanks)

Water is used indoors and to manufacture cotton ginning equipment

Overflow into rain garden

Haven't turned on wells in two years

2019 TWDB Blue Legacy Award Winner



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Wildlife Guzzlers



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Codes, Ordinances and Standards

Follow local, state and federal codes and ordinances.

- Texas Tax Code §151.355 exempts rainwater harvesting equipment and supplies from state sales tax.

ARCSA/ASPE/ANSI 63: Rainwater Catchment System Standards

Call before you dig!

Helpful Resources

High Plains Water District

hpwd.org/rainwaterharvesting

Texas A&M AgriLife Rainwater Harvesting

rainwaterharvesting.tamu.edu

American Rainwater Catchment Systems Association

arcsa.org

Rainwater Harvesting for Drylands and Beyond

<http://www.harvestingrainwater.com/>

Thank you!

KATHERINE DRURY

KATHERINE.DRURY@HPWD.ORG

806-762-0181