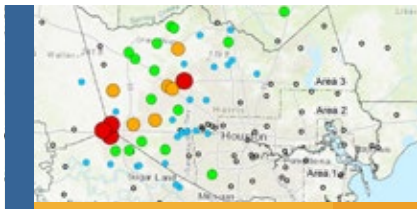
WHCRWA

2022 EDITION

PARTNERS IN PROGRESS

Surface Water Supply Project

4 The Surface Water Supply Project water pipeline is a joint project between the West Harris County Regional Water Authority and the North Fort Bend Water Authority carrying much-needed treated surface water from Lake Houston across almost 55 miles of Harris County to water users in the west.



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TROY ANTHONY
IN HIS OWN WORDS

Born in Houston, grew up in Houston and still call Houston home. I always loved math and science, but even after graduating high school I didn't have a clear career path in mind. That first summer, I went to work for an air conditioning company and after 3 months of climbing around hot attics covered in insulation, I told my mother "I'm going to college!"

I married my high school dream girl, Rhydonna, in 1993 at the age of 19 and we are currently in our 29th year with lots of memories together before and after children. If you like math, now you know my age. We started out in humble beginnings and lived in a travel trailer for two years while she finished her Sam Houston State University degree to become a teacher. After that, we moved back to Houston so that I could start to finish my 7-year, 4-year degree in Engineering at the University of Houston, if you know what I mean. Give me a break, I worked my way through college, and I still graduated with honors from the engineering program.

We have a beautiful baby boy and baby girl who are 16 Rylan and 14 Addison respectively. Yeah, it goes by that fast and I still delight in the times when

they couldn't talk. Not true, the conversations are getting more meaningful as they begin to realize college and the real world is approaching. I know they are strong, have unique personalities and will find their paths to success. And God willing, I will be there to help them along the way.

After graduating college in December of 1998 with a Civil Engineering degree, I bought a Jeep Wrangler and still have it today. I took a position at Lockwood, Andrews and Newnam (LAN) in 1999 working on the Surface and Accelerated Surface Water Transmission Program for the City of Houston. For five years these two programs are where I learned all things related to designing water distribution and obtained my Professional Engineering License. I managed engineering firms designing segments of the overall water main system and got a taste of construction management once the design projects were complete and under construction. Here's a jingle: Nothing you can do can turn me into "Tie Guy" and I've been doing construction management since. After a couple of years managing street reconstruction projects for the Downtown Management District, I received an opportunity to get in on the ground level with West

Harris County Regional Water Authority where I still work today. I pride myself in saying that in the last 18 years, not only have I been involved in every project installed in the WHCRWA service area, but I have crawled, hunch walked, or butt-skate-boarded through every one of the accessible water line projects. I sure am glad we are finally installing some 84-inch and 96-inch water mains.

I worked for LAN for approximately 22 years until recently, although it's been over a year, I became part owner of Project Surveillance, Inc (PSI). PSI is a local construction management firm that has been providing support to the Houston/Harris and surrounding area for over 30 years. The transition has been an amazing experience and a huge thanks to the advice and support from WHCRWA that helped and encouraged me through the process.

Interests include anything outdoors, hunting, fishing, hiking and the list goes on. I consider myself a loyal servant to my commitments whether it be career, family or pursuit of God. I'm constantly lacking, but seeking a deeper relationship with my Lord, Jesus Christ, how about you? My favorite verse is "As iron sharpens iron, so one person sharpens another." I believe relationships are the most important thing we can focus on in this short life and I couldn't have made it this far in life alone.

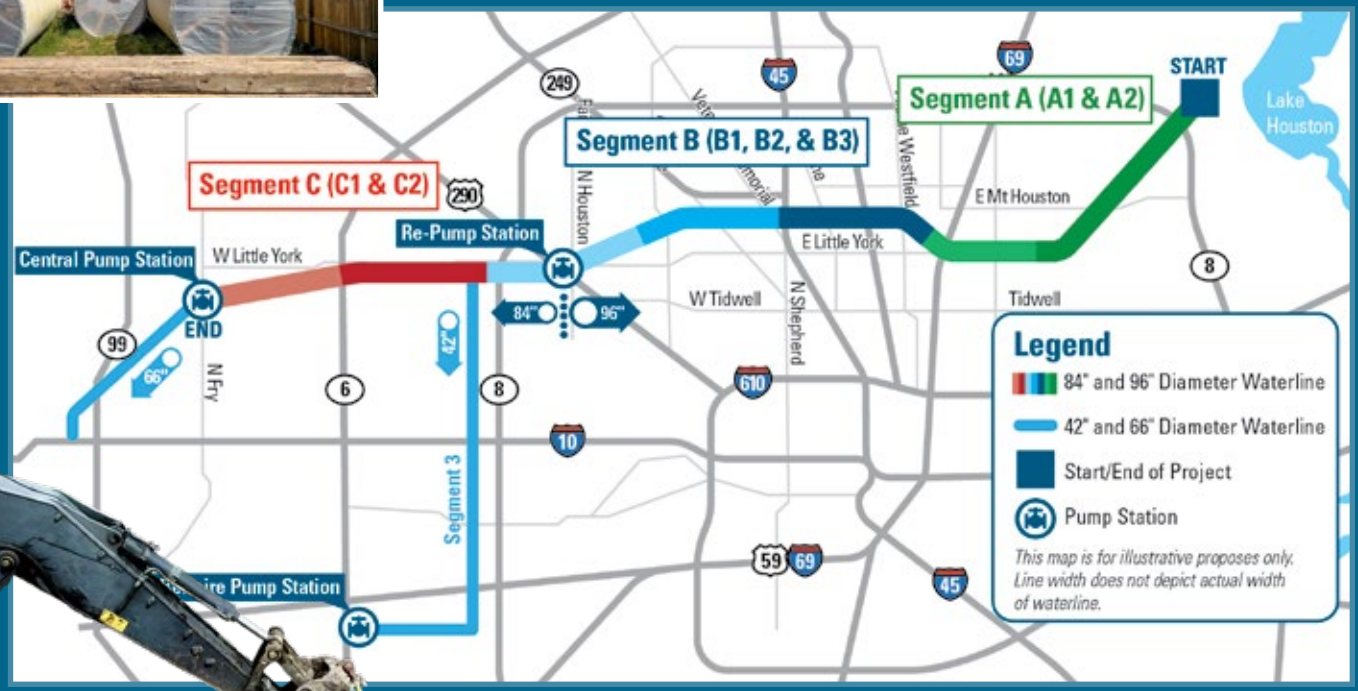
WHCRWA NFBWA

SURFACE WATER SUPPLY PROJECT

To meet the Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District's (FBSD) groundwater reduction requirements for 2025 and beyond, the West Harris County Regional Water Authority (WHCRWA) has partnered with the North Fort Bend Water Authority (NFBWA) to construct the Surface Water Supply Project. The Surface Water Supply Project is needed to conserve groundwater and reduce land subsidence. Land subsidence is the sinking of the land surface. Pumping large amounts of groundwater causes the ground to settle, lowering the elevation of the land. This project will help to reduce land subsidence and will meet the water needs of a rapidly growing population.

The Surface Water Supply Project water pipeline is a joint project between the WHCRWA and NFBWA carrying much-needed treated surface water from Lake Houston across almost 55 miles of Harris County to water users in the west. These transmission pipelines will vary in diameter from 42 inches to 96 inches, depending on the pipeline segment.

Once complete, surface water from Lake Houston will be supplied to retail water providers such as Municipal Utility Districts (MUDs), Public Utility Districts (PUDs), and Water Control and Improvement District (WCIDs).



Surface Water Supply Project Construction Update

Project construction began in 2020 and is expected to be completed by 2025. All construction will be completed in segments, and the waterline will be built one segment at a time. The tentative timelines for each segment are still under development and some construction schedules have not been finalized yet.

You can find updated timelines for construction at www.surfacewatersupplyproject.com. The construction for each segment will aim to minimize impacts to any given area for extensive amounts of time. Delivery of surface water to WHCRWA and NFBWA residents through this line is scheduled to begin in 2025.

Meadowglen Open Cut Seg 3-A4

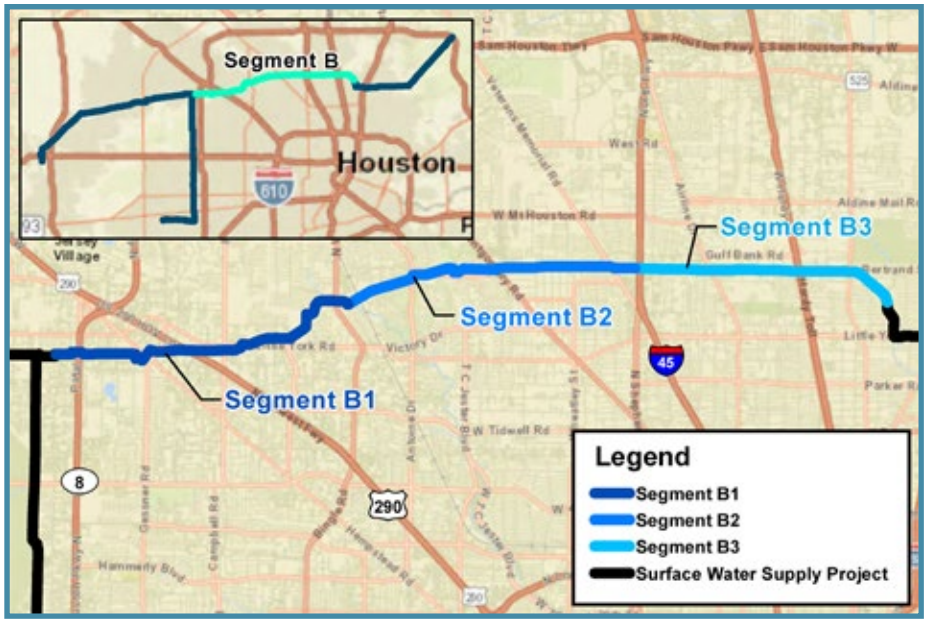
As construction moves along the project alignment, residents, business owners, and anyone traveling in the vicinity of the pipeline alignment may experience detours, access issues, and other construction activities associated with large-scale linear projects. To minimize these impacts, much of the pipeline will be installed within existing pipeline corridors. Public safety, ease of access, and well-marked detour information will be a priority throughout the delivery of the project.

Project team members are committed to communicating proactively with your community. For more information about construction in your area, please visit: www.surfacewatersupplyproject.com/construction.

Segment A

Segment A: Segment A1 and A2 is currently in the final design phase is anticipated to be bid in early 2022. Construction is anticipated to begin by mid-year of 2022.

Segment B



Segment B: Segment B is divided into three segments, Segment B1, B2 and B3. The contracts for all three segments were awarded in February 2022.

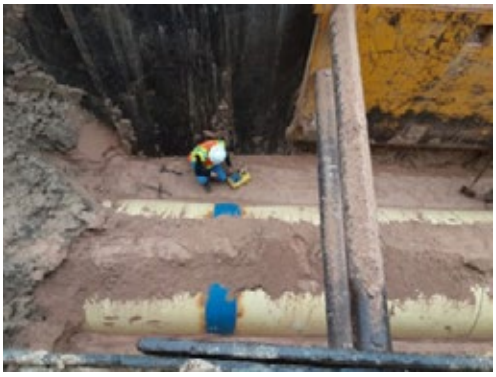
Segment C

Segment C: Segment C has been divided into two segments, C-1 and C-2, for construction. Construction of these segments began in early 2021 and up-to-date construction information is available online at www.surfacewatersupplyproject.com.

Segment C2 Construction Photos 10-2021

Handling Pipe within Concord Bridge

Installing Joint Wrappers



Testing Embedment on Waterline

Segment 3

Segment 3 is divided in six segments. Segments 3-A1, 3-A2 and 3-A3 have been awarded. Segment 3-A2 began construction in late fall of 2021. Segment 3-A4 is complete and Segment 3-A5 and 3-B1 are obtaining environmental clearance prior to finalizing design.

Segment 3-A4 Construction Photos

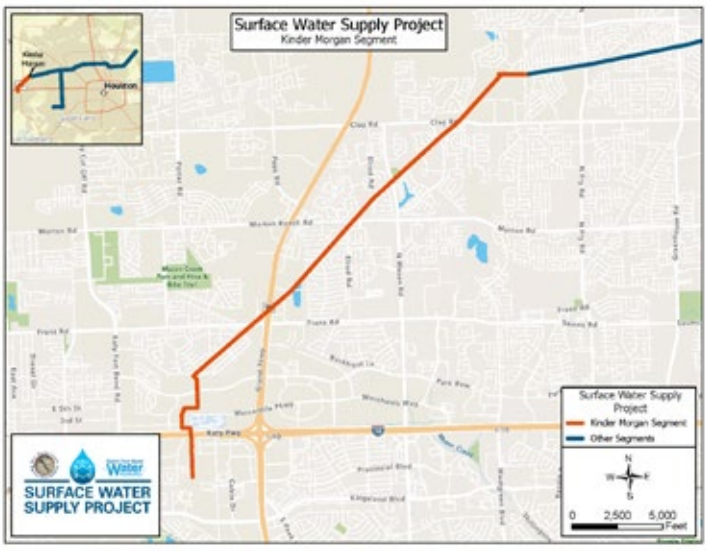
Meadowglen Pit

Meadowglen Pit Overhead

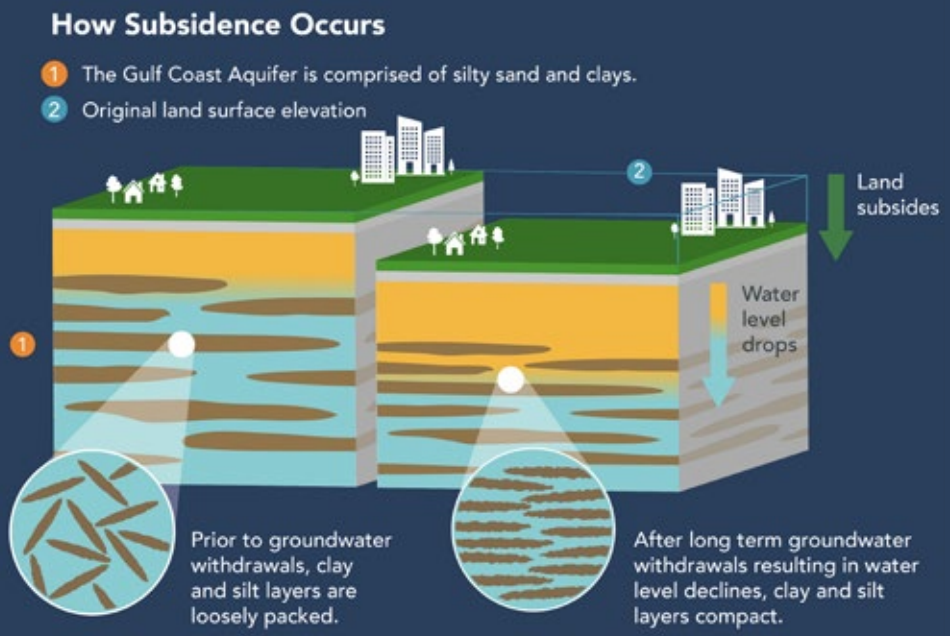
Westchase Trail Repair

Kinder Morgan Segment

The Kinder Morgan Segment is a 66-inch welded steel water line running along a Kinder Morgan Pipeline corridor. The project was divided into six projects for construction. Kinder Morgan projects are anticipated to follow later in the year.



HARRIS-GALVESTON SUBSIDENCE DISTRICT



If Subsidence Is Left Unchecked

The only way to stop subsidence? Curb groundwater use.

Kelsey Seeker, Communications Specialist, Harris-Galveston Subsidence District

The Harris-Galveston Subsidence District is a regulatory agency that works with regional water authorities and government entities to mitigate the risk of subsidence and provides key data and insights that help drive alternative water infrastructure projects.

Subsidence, the sinking of land, is caused by excessive groundwater withdrawal which results in the lowering of the aquifer water level (an indication of depressurization of the aquifer) that causes the aquifers to compact. This compaction is seen at the surface as subsidence and can cause damage to roads, infrastructure and contribute to flooding.

Every year, the District collects and publishes data that examines aquifer water levels, groundwater usage, and subsidence rates in Harris and Galveston counties.

The annual rates of subsidence observed in Regulatory Areas One and Two are generally stable since both areas have reached their full regulatory conversion level (1990 and 1995, respectively). This level is set by the District based on reasonable regulations informed by research and data. The Chicot/Evangeline aquifer water levels have risen up to 242 feet from their historic benchmarks.

Based on the data from the District's GPS network, areas in northwest/west Harris County are still facing higher subsidence rates until that conversion process is completed. Subsidence rates are generally above 0.5 centimeters (cm) per year

Reviewing documents at a Subsidence Monitoring GPS Station

throughout Regulatory Area Three where the West Harris County Regional Water Authority is located.

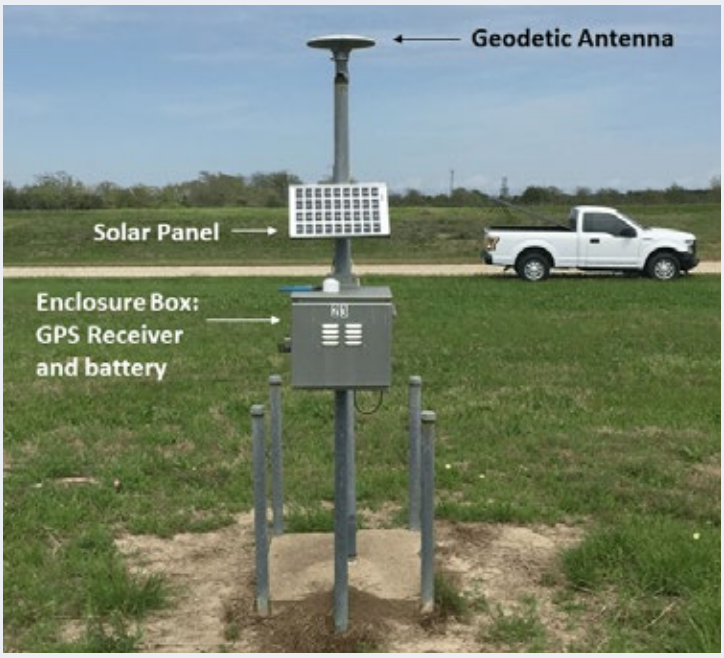
If regulations and the conversion process had not been implemented in Area 1 and 2, the subsidence rates could have exceeded 2.0 cm per year and approximately one foot of subsidence or more every 15 years.

However, this assumes there would be no population changes or new development in the area. Data has shown that as population and groundwater

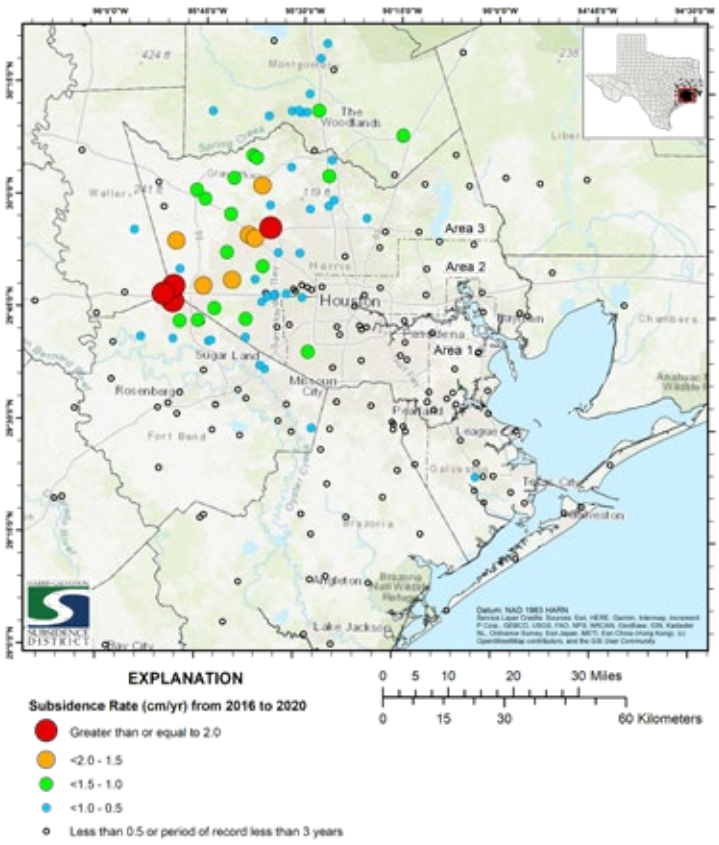
use increases, so do subsidence rates. The potential rate of subsidence could have been much greater, along with its effects like infrastructure damages and increased flooding.

In addition to constantly monitoring subsidence rates, the District regularly invests in additional research such as an upcoming study on flooding impacts related to subsidence in the Spring Creek watershed, which borders Harris and Montgomery Counties.

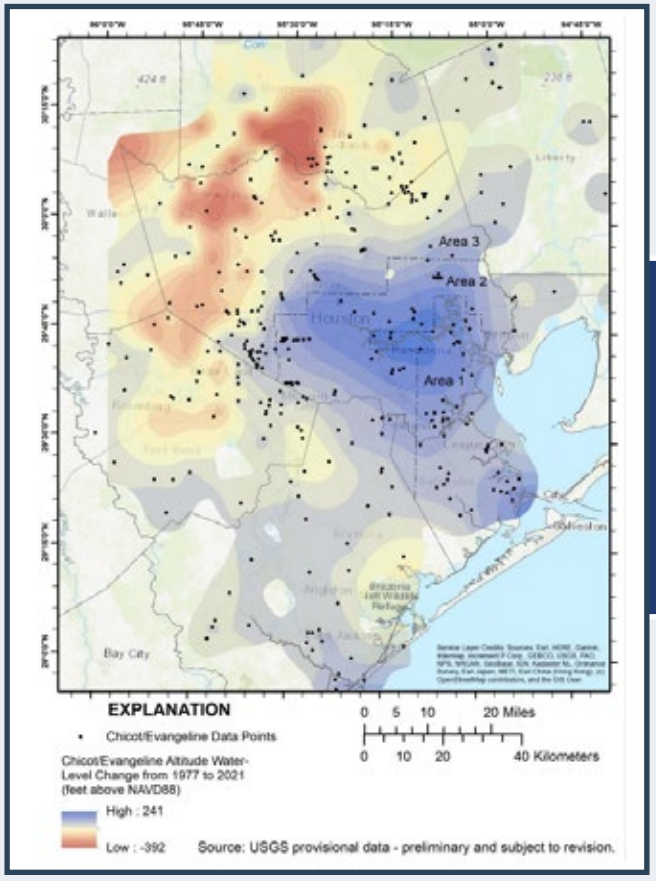
Ensuring the longevity of alternative water resources is necessary for the region's growth and resiliency. Investing in alternative water infrastructure – like the WHCRWA is doing – will protect communities from subsidence in the decades to come.



Example of a Permanent GPS Station



Visit HGSD's interactive map showing subsidence rates in Harris, County and surrounding areas.
whcrwa.net/subsidence-rates

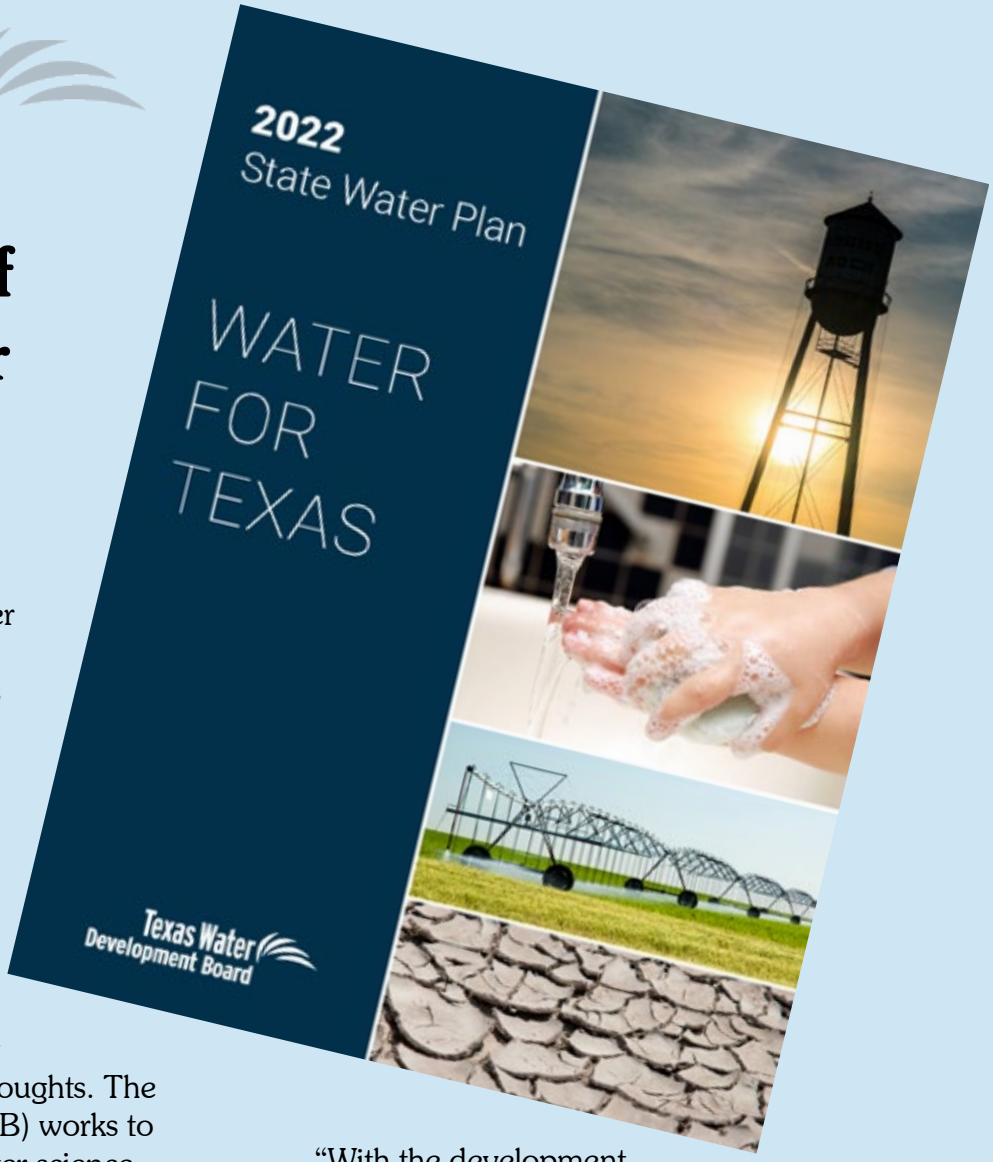


Aquifer water levels have risen in areas with reasonable groundwater regulation and declined where groundwater is the primary source of water. This map depicts water level changes since 1977.

For more information visit hgsubsidence.org.

Texas Water Development Board

The Evolution of Statewide Water Strategies



The 2022 State Water Plan marks a quarter century of Texas' regional water planning process and the fifth state water plan based on the work of hundreds of water planning stakeholders. The state's water planning process is founded on extensive data and science and guided by a state framework that requires the 16 regional water planning groups to address all their water supply needs.

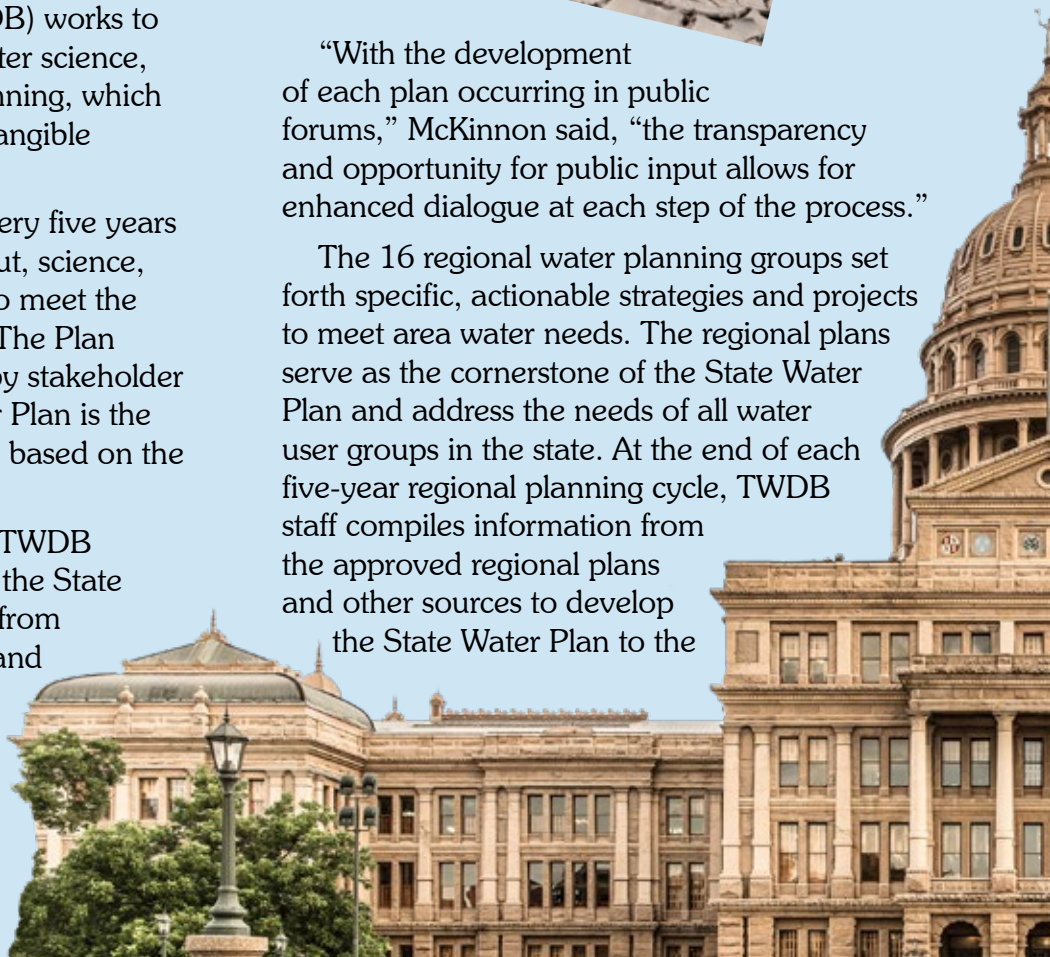
This plan sets forth thousands of specific, actionable strategies and projects—costs and sponsors included—that clearly demonstrate how Texas will be able to withstand future droughts. The Texas Water Development Board (TWDB) works to continually improve data collection, water science, and other tools in support of better planning, which ultimately result in water projects with tangible benefits for the state.

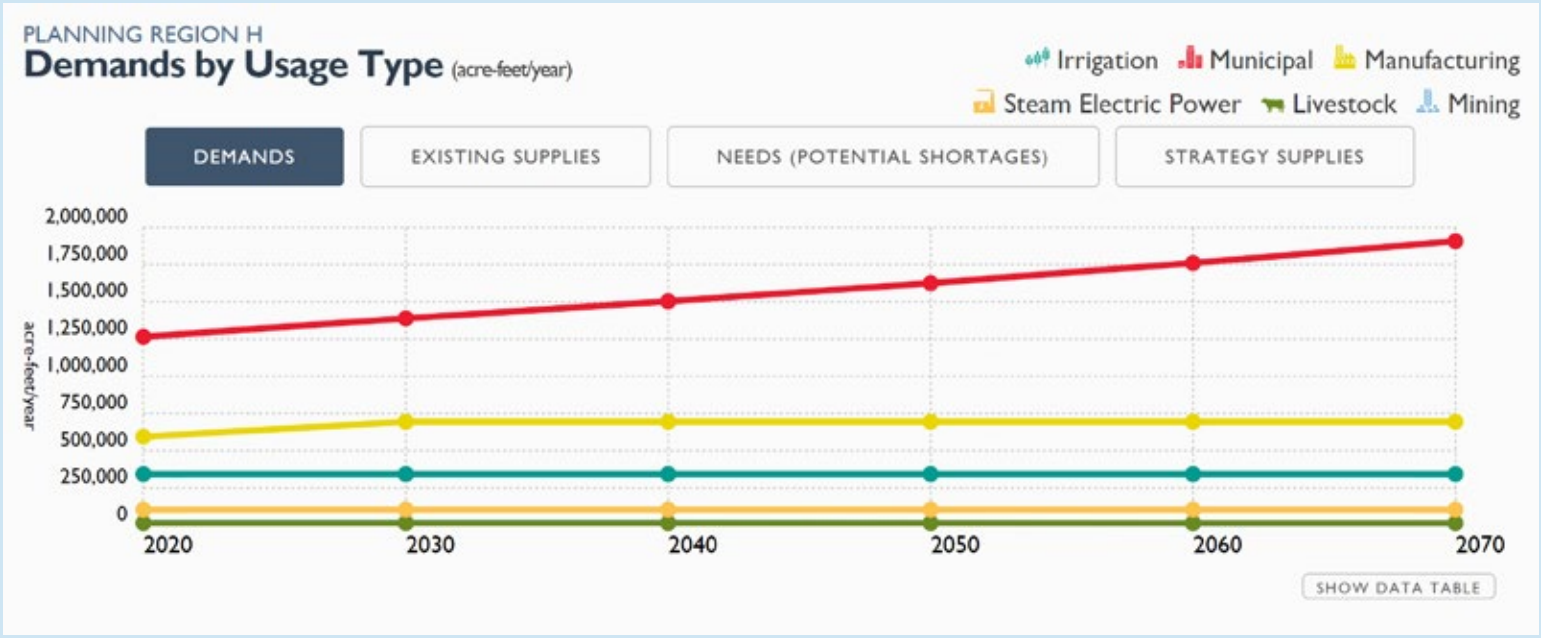
The State Water Plan is produced every five years by the TWDB and integrates public input, science, and local water plans to secure a plan to meet the anticipated state's water supply needs. The Plan reflects a bottom-up process informed by stakeholder and public input. The 2022 State Water Plan is the eleventh such effort and is the fifth plan based on the regional water planning process.

According to Temple McKinnon, the TWDB director of Water Supply and Planning, the State Water Plan is built upon the latest data from the entities that manage water sources and implement water-related projects. In addition, regional water planning group meeting are open to the public, and comments are welcome during the public comment period.

"With the development of each plan occurring in public forums," McKinnon said, "the transparency and opportunity for public input allows for enhanced dialogue at each step of the process."

The 16 regional water planning groups set forth specific, actionable strategies and projects to meet area water needs. The regional plans serve as the cornerstone of the State Water Plan and address the needs of all water user groups in the state. At the end of each five-year regional planning cycle, TWDB staff compiles information from the approved regional plans and other sources to develop the State Water Plan to the





agency's board of directors for adoption. The final plan is then submitted to the Governor, Lieutenant Governor, Speaker of the House, and the Texas Legislature.

What's New With the 2022 State Water Plan?

The latest Plan looks very different from the first Texas Water Plan in its presentation of information. This one reflects an innovative and nationally recognized process based on the work of regional planning groups, local water plans and the input of Texans, and makes this latest guide to state water policy accessible in ways that were unavailable a quarter of a century ago.

The latest Plan has evolved from a narrative document to a framework supported by standard data and supporting technology that makes the information more accessible. In addition to sharing the entire plan online, along with a list of recommended water management strategies and many more documents, the TWDB also makes information from the Plan available online via the interactive State Water Plan (iSWP). McKinnon says that the iSWP visualizes the information to make it much more consumable and accessible to decision-makers and the communities they serve.

Information can be viewed at the regional, county, and individual utility or water user group levels. Graphs, figures, tables, and maps make the data easier to navigate. In addition, many of the pages are interactive and allow click overs to show more details and other navigation aids.

McKinnon hopes that enhanced accessibility to State Water Plan information will increase public awareness and engagement in the water-planning process and facilitate dialogue about water supply issues.

For more information about the Interactive State Water Plan, visit

https://texasstatewaterplan.org

Portions of this article are provided by TWDB's texaswaternewsroom.org.

THE RISING COST OF WATER

Created by the Texas Legislature in 2001 to comply with groundwater reduction as mandated by the Harris Galveston Subsidence District (HGSD), the WHCRWA is committed to securing a long-term supply of quality drinking water as well as promoting water conservation.

The HGSD Conversion Requirements included;

- Reducing groundwater pumpage 30 percent by 2010 (accomplished);
- 60 percent by 2025; and
- 80 percent by 2035.

It is therefore necessary to find and secure an alternative supply of water instead of getting all our water from groundwater wells.

The WHCRWA has four major components of water supply/infrastructure projects which include the Luce Bayou Interbasin Project (now complete), the Northeast Water Purification Plant Expansion Project, the Surface Water Supply Project, and internal distribution lines connecting to local MUDs.

Following the flow of water, the Luce Bayou Interbasin Transfer Project – which includes a pump station, 3 miles of twin 96" pipelines and a series of canals totaling 23 miles will move up to 500 million gallons of water each day from the Trinity River into Lake Houston.

The Northeast Water Purification Plant Expansion Project (NEWPP) on Lake Houston, well along in construction, will increase the City of Houston's 80 million gallons per day plant capacity to treat an additional 320 million gallons of water each day.

Some of the treated water will then flow through the Surface Water Supply Project (SWSP) pipeline to west Harris County. The SWSP will deliver 150 million gallons of water each day through massive waterlines from the NEWPP, delivering a portion to the WHCRWA and the other portion to our partner,

the North Fort Bend Water Authority (NFBWA). The SWSP project, started in 2020, involves the construction of two massive pump stations to assist in moving the water along 55 miles of pipeline.

The final step is to deliver the water from the pump stations within our boundaries to the individual MUDs through internal distribution lines.

So, how does the WHCRWA pay for these projects?

The Authority does not charge a property tax, and therefore we must charge sufficient rates to cover the debt service payments for bonds sold to pay for projects, as well as our operating costs. We have relied on the services of an independent rate analyst to calculate the Authority's water rates needed to pay our share of all the conversion projects. Just such a rate analysis was completed at the end of 2021 and confirmed that our rates continue to match up with our cost projections.

The WHCRWA Board of Directors is committed to keeping the cost of water as low as possible and to keeping any rate increases reasonable and consistent with this commitment.

The WHCRWA Board of Directors has approved a rate increase effective January 1, 2022 of $0.25 per 1,000 gallons of surface water delivered (from $3.85/1,000 gal. to $4.10/1,000 gal.) and for well water pumped (from $3.45/1,000 gal. to $3.70/1,000 gal.).

For additional information about the conversion projects, costs, and related issues, please visit our WATER U, West Campus online at wateru.whcrwa.com.

Coastal Water Authority Celebrates the completion of the Luce Bayou Interbasin Transfer Project

5 Acre Pump station

500 MILLION Gallons a day

3 MILES Dual 96" Pipeline

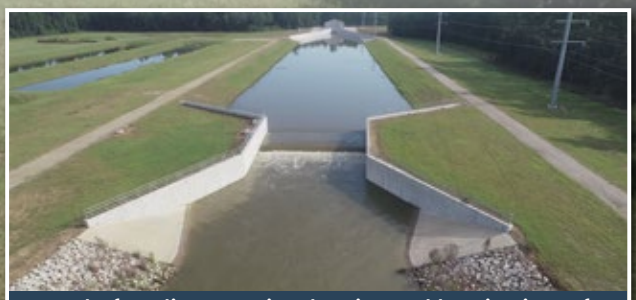
23 Miles of Canals

Capers Ridge Intake & Pump Station on Trinity River

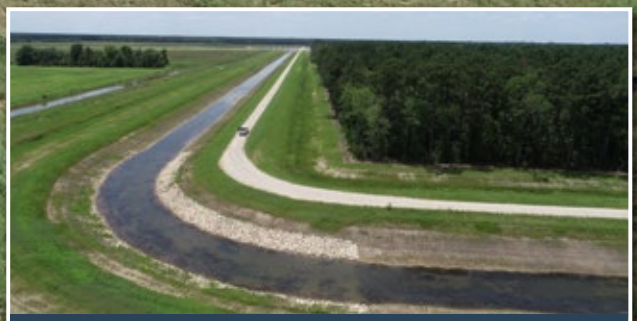
Capers Ridge Intake & Pump Station on Trinity River

Pigging Removal Station and discharge for dual 96" pipelines into the sedimentation basin

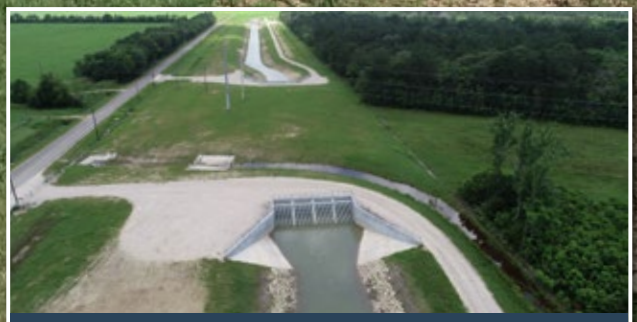
Watch CWA's video commemorating the completion of the Luce Bayou Interbasin Transfer Project
whcrwa.net/cwa-lbitp



End of sedimentation basin and beginning of Luce Bayou Canal System.



A small portion of the Luce Bayou Canal System



Siphon under pipeline corridor Luce Bayou Canal

Outfall of Luce Bayou Canal into Lake Houston

The 2022 Rising Cost of Water Brochure is now available for districts in The Authority.

Districts in The Authority can order printed copies of the brochure for free by visiting whcrwa.com/order-form

WATER
wateru.whcrwa.com
U

WATER U is a virtual classroom that features FREE "courses" on critical water issues that affect utility districts and residents in WHCRWA. WATER U allows participants to dive into the topics that interest them the most.

wateru.whcrwa.com

QUICK FACTS ABOUT LAKE HOUSTON'S WATER INTAKE PUMP STATION

Area water providers have come together to finance a major expansion of the Northeast Water Purification Plant, providing fresh drinking water and meeting the mandate to reduce our area's dependence on groundwater.

The expansion will more than triple the plant's output of fresh drinking water and help meet the mandate to reduce our area's dependence on groundwater.

A key aspect of the project includes the design and construction of a new intake pump station located approximately 1000 feet from the shore of Lake Houston. The intake station includes underwater screens, pumping, and conveyance to withdraw water from the lake and then deliver it to the treatment facility.

The pump station is connected by a bridge with dual 108" Raw Water Pipelines running on each side of the bridge.

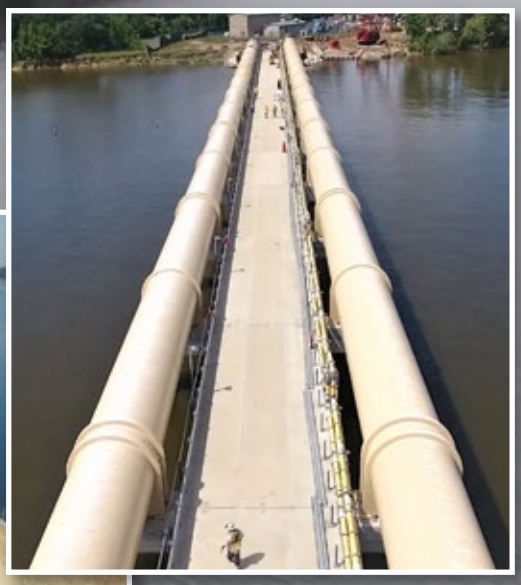
Constructed 1,000 feet off the shoreline, the intake pump station is supported by 192 – 30" Diameter piles.

Lake Houston water is particularly difficult to treat because the lake is shallow. The new intake will alleviate some of the water quality challenges by withdrawing from a slightly deeper depth than the existing intake.

The intake pump station building is 195 feet long and 105 feet wide. The platform on which the intake pump station building sits is 247 feet long and 122 feet wide. The bridge from the shoreline to the intake pump station platform is approximately 1000 feet long and 40 feet wide.

Largest (108") Magnetic Flowmeters installed in world to date

Six (6) – 1000 HP pumps are installed for a firm pumping capacity of 320 Million Gallons per Day (MGD) with room to add an additional 4 pumps for a firm pumping capacity of 560 MGD



Photos courtesy of DEC Houston

Harvesting Rainwater, an Old Idea with a New Following

Collecting rainwater for use during dry months in rain barrels or other depositories is an ancient and traditional practice. Historical records show that rainwater was collected in simple clay containers as far back as 2,000 years ago in Thailand, and throughout other areas of the world after that. With the rising price of water and periodic drought restrictions, today more and more homeowners are harvesting rainwater to save money and help protect this precious natural resource.

Rain barrels can certainly be part of our long-term water supply. Just look outside your window the next time it rains and imagine all the water that's running down your driveway being put to beneficial use in your home and garden!

Why Harvest Rainwater with Rain Barrels?

With an average annual rainfall of 50 inches per year characteristic of the upper Gulf Coast, 1000 square foot of roof surface has the potential to collect over 31,000 gallons of water each year. If this amount could be collected with 100 percent efficiency, it would fill a 50-gallon rain barrel over 600 times and could supply 25% of the annual water use for the average U.S. family. It quickly becomes apparent that even a small rain harvest system attached to a section of a larger roof can collect significant amounts of water. Several rain barrels strategically placed around the home or business can easily provide supplemental water for flowerbeds, small gardens, or hand watering.

Depending on the size of your house and the amount of rainfall in your area, you can collect a substantial amount of rainwater with a simple system. This extra water can have a significant impact on your water bill. The use of rainwater combined with the domestic use of grey water can further increase your savings.

Rainwater stored in rain barrels has many applications, including watering landscapes and gardens. Rainwater can sometimes be used for drinking but requires special treatment with a filtration system. Note that many cities require the filtration system for drinking water to be certified and the water has to be tested on a regular basis. A filtration system is not necessary for landscapes or containers, it can be used directly from rain barrel to garden.

If you're harvesting rainwater with rain barrels to use for watering your flower beds, the rainwater can help to improve the health of your plants, lawns, and trees. Rain is naturally soft water and devoid of minerals, chlorine, fluoride, and other chemicals. For this reason, plants respond very well to rainwater. After all, it's what plants in the wild thrive on!

Rainwater from Rain Barrels Makes Your Garden Smile

Keep your roof clean of debris and potential contaminants to maximize purity. The material

your roof is made of is also important in how much contamination the water will carry. The chemicals and hard water can produce an imbalance in the soil of your garden. Chemical fertilizers, fungicides, pesticides, and drought can also disrupt the balance and harmony of the soil. This imbalance causes trees and plants to weaken and makes them more susceptible to disease. Trees and plants have an efficient immune system; however, that allows them to fend off diseases and other invaders as long as they have a healthy soil environment.

When you look at your yardscape, visualize it as a vast interconnected community of trees, plants and tiny critters that live in the soil, all interacting and affecting each other. Thus, the type of water you use will affect the health of this intricate community.

And speaking of community, one of the best reasons to start harvesting rainwater with rain barrels is that if you teach and encourage others to do the same, you will help to spread the culture of rainwater collection and in turn help your larger community and the environment.

Types of Rainwater Harvesting Systems

There are many possible configurations and degrees of complexity to a rainwater catchment system. Costs vary considerably as well, ranging anywhere from a few dollars to thousands of dollars.

Your best bet is to review the options available to find out what's in your price range and what's a realistic set-up for your home. Perhaps the simplest use of rainwater if you are on a budget or have space restrictions is to put a rain barrel under one of the gutter downspouts and use the water on indoor plants. The plants will appreciate the soft water. Remember that the barrel should always be covered between uses.

A slightly more sophisticated system might be to use several barrels connected together near the bottom with pvc pipes or hose. A small pump can be used in one of the barrels to pump the water to your garden. In this case, all the barrels will drain simultaneously.

Bigger and more complex systems may use gravity to feed water from gutters to a larger cistern, which pumps water to the landscape. Some online gardening sites sell cisterns and other more complex rainwater harvesting equipment.

Whatever you decide, all systems should use covered barrels or cisterns that keep the water from collecting debris and contaminants, with some kind of filter to keep out silt and leaves. Filters can range from a funnel with mesh at the bottom that is covered by gravel, to a rainwater washing apparatus.

Rain Barrel Placement

There are two primary considerations in placing a rain barrel. Where is the water going to come off the roof and where is the collected water going to be used? Although water can be transferred through pipes to any downhill location by gravity, complex arrangements of collection plumbing require complex maintenance. The simplest arrangement is to locate a storage barrel close to or directly beneath a gutter downspout and within a short hose's reach of the flowerbed or garden.

An additional consideration is elevation. Because rain barrels distribute water passively through gravity flow, the higher the barrel, the stronger the flow. Raising the barrel even six to twelve inches from the ground on a sturdy support not only creates water pressure for distribution, but it also makes the outflow at the bottom of the barrel more accessible for buckets, watering cans, or a hose connection.

Water Quality

Rainwater is naturally soft and contains no water treatment chemicals. It is ideal for landscape use, and no special treatment is required to clean the water for outside use. Because the water is not chlorinated and because of the Gulf Coast's moderate climate, it is important to follow some basic maintenance guidelines to keep the barrel clean and water free of insects and algae.

A primary concern is keeping the gutter and downspout clear of debris that could enter the barrel or cause water to back up in the gutter. One solution is to install a roof washer in the downspout that diverts the initial flow of water with accompanying debris and that then redirects the clean water flow into the barrel. If gutters are kept reasonably clear, a simpler solution is to install screens between the gutter and downspout and on the barrel's inlet. The screen will require cleaning periodically, but it also serves as a barrier to mosquitoes and other insects.

Good sanitary practices for managing rain barrels include using the water regularly instead of storing it for long periods. Check screens to ensure that the barrel doesn't become a mosquito breeding zone. If mosquitoes persist, add a product containing Bacillus thurengiensis (Bt) to the barrel. The nontoxic bacteria are delivered in a solid granule or disk that is placed directly in water. Mosquito larvae are killed when they consume the bacteria, but the Bt bacteria are harmless to plants and other animals. Wash the barrel out thoroughly once a year to prevent odor-causing bacteria and algae that can thrive in accumulated organic debris.

In the southern regions of Texas, heat is a bigger concern than freezing temperatures in managing rain barrels. Nearly year-round moderate temperatures can encourage algae growth and accumulate a lot of heat in a barrel sitting in full sun. Selecting a location that is shaded for at least part of the day moderates water temperatures. The plastic material in a rain barrel is also susceptible to UV radiation and may discolor after several years, but cracking has not been a problem.

Some manufacturers recommend that barrels be drained and protected during the winter in extremely cold climates to preserve their appearance. However, in moderate climates a rain barrel will not be damaged by periodic freezes. Plastic rain barrels vented by large, screened openings do not build pressure from expanding ice, and they can be left outside throughout the winter. Further, disconnecting a rain barrel system in the wintertime would reduce the rainwater harvest significantly.

Maintenance Concerns

Any catchment area will pick up some contamination from leaves, bird droppings, dust, and other natural causes. Some roofs, such as old tar and gravel or old asbestos shingle roofs create too much contamination for rainwater harvesting. Treated cedar shakes are also not recommended for water harvesting.

The type of gutter system you have is also important, as many may have lead soldering or lead-based paints. Additionally, if you live in an area that produces heavy industrial pollution, your rainwater itself may contain some undesirable contaminants.

Make sure there is some way to cover the barrel with a screen or a top. Standing water is also where mosquitoes breed best. As the West Nile virus and other diseases are important concerns, take appropriate measures to deter mosquitoes from breeding in your rain barrels. It only takes about ten days for mosquitoes to breed. Use a fine screen over the top of the barrel so the mosquitoes can't reach the water in the first place.

The type of barrel you use is also important. Make sure it's a food-grade container that was made to hold liquid. Don't cut corners and simply use a trashcan because a common trashcan will not withstand the pressure of the water for long.

Rain Barrel Safety

A full, 50-gallon rain barrel weighs approximately 400 pounds. It is essential to place the barrel out of main traffic pathways, and to secure it against tipping or blowing over when empty. Whether the barrel is raised on a platform or placed directly on the ground, the surface must be firm enough to support the barrel and a full load of water.

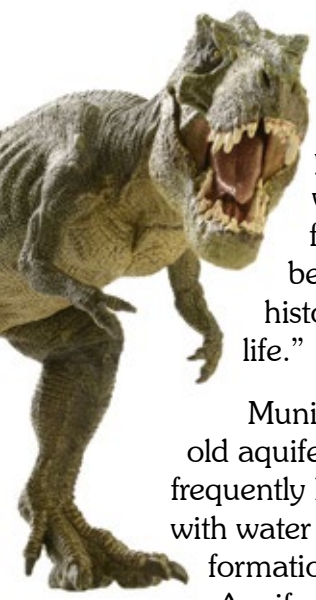
Many barrel designs have a sealed lid with a small opening. Even heavy-duty trash barrels can be modified for water collection merely by installing a screened top. However, barrels with large-screened openings must be secured against access by curious children. A head-first drowning can occur in a five-gallon bucket, and an adventurous child could fall into an open or lightly screened barrel.

Water's taste reflects its journey to the tap...

By Chantal Cough-Schulze, Texas Water Resources Institute Managing Editor Texas Water Journal - Reprinted from CONSERVATION MATTERS, August 18, 2021

A new place can sometimes be so unlike home that even something fundamental, like the taste of tap water, seems different. But it's not just perception; water really does taste different in different places. Though the flavor differences can be jarring at first, it doesn't necessarily mean there is anything to be concerned about.

Water's flavor reflects the journey the water took to get to you, said Lucas Gregory, Ph.D.,Texas Water Resources Institute's assistant director.



"We've got the same water here today that we had when time began. So in theory, we're drinking water that is billions of years old," Gregory said. "The way water tastes is basically a function of what that water has been exposed to in its more recent history and over the course of its life."

Municipal drinking water drawn from old aquifers composed mostly of sand frequently has a salty taste. This is the case with water drawn up from the Simsboro formation, part of the Carizzo-Wilcox Aquifer. The Carizzo-Wilcox Aquifer, which stretches diagonally across a large swath of Texas, supplies drinking water for many other parts of Texas.

"The water has been down there hanging out for a long time, basically, and there are some residual salts in those sands," Gregory said. "That's why the water has a salty taste."

Elsewhere in Texas, local water's flavor has different origins.

Heavily treated surface water sometimes has a mild chlorine taste, especially if you live closer to the point of treatment. Groundwater that has naturally occurring hydrogen sulfide in it, such as near shallow oil fields, smells like rotten eggs, while groundwater with a higher iron content has a slightly metallic taste. Naturally occurring algae and decaying organic matter can give surface water a musty, earthy smell, and traveling through calcium-heavy limestone can give water a sweet aftertaste.

Even the water treatment process itself can cause tastes or odors, said AC Barnett, senior regional technical manager at Inframark Water & Infrastructure Services.

"Disinfected water may retain a faint bleachy odor, for example. Water which resides in pipes for long periods of time through lack of use can develop a stale taste or odor in dead ends on the delivery system," Barnett said.

The water that both Gregory and Barnett grew up drinking in East Texas, meanwhile, had more iron in it. Gregory said the more iron-heavy water also changed the appearance of things it touched over time.

"If the water sits in a fixture that's white, such as the bathtub, you'll get an orange ring where the water sits," he said. "And if you make a pitcher of iced tea, it's nice and brown colored at first, but if it sits for a day, it turns black, though it tastes the same."

Setting the standards

While there are situations where the chemicals in tap water can cause health problems, water having

a noticeable taste or smell does not necessarily mean the water is unsafe. The US Environmental Protection Agency (EPA) sets drinking water standards to keep contaminants below a safe level. All public drinking water systems are required to meet those standards.

"Those standards are there to protect human health," Gregory said. "The science behind them puts those numbers at an acceptable level for the general populace."

The EPA creates both primary and secondary drinking water regulations. Primary drinking water regulations relate to potential health concerns and require that some contaminants be kept below a certain level. Secondary drinking water regulations, meanwhile, relate to cosmetic or aesthetic effects that aren't harmful to human health, like water discoloration or a metallic flavor.

Primary drinking water regulations are legally enforceable, while secondary drinking water regulations are not. Some contaminants, like copper, are subject to both primary and secondary drinking water regulations: one level at which they are unhealthy, and one level at which they can be a nuisance but are not dangerous

Traveling from treatment to tap

To meet primary drinking water standards — and secondary standards where possible — public water systems treat their water in a number of different ways.

"The treatment process depends on the source you're dealing with. The dirtier the initial water, the more you have to do to it in the treatment process," Gregory said. "Each step in the process has its own influence on water quality."

Drinking water that comes from surface water generally requires more treatment, said Shankar Chellam, Ph.D., who is a professor in Texas A&M University's Zachry Department of Civil and Environmental Engineering.

"Surface water has microorganisms, particles, organic matter, inorganic compounds, lots of things that cause problems with human health," Chellam said. "They all need to be removed from the drinking water supply prior to human consumption."

For surface water, the treatment process begins with adding a coagulant, such as iron or aluminum salts. The coagulant helps particles in the water come together, making them large and heavy enough to settle out of the water in a sedimentation basin.

Once the heavier particles have settled out, the water is sent through a filter that removes any leftover smaller particles. Finally, the water is disinfected. Chlorine is the most common disinfectant used in the United States, but chloramine, ozone and ultraviolet light are also used. Because chlorine is both a helpful disinfectant and a contaminant in certain quantities, the EPA maintains standards for using it at a safe level.

Chellam said that the disinfectant is added not only to inactivate microorganisms but also to protect the water from contamination in the distribution system. Having enough disinfectant in the system helps tackle problems that could crop up between the water treatment plant and the point of use.

For groundwater-sourced drinking water, the treatment process is simpler because the ground acts as a natural filter.

"Groundwater is relatively easy — you drill the well and put in the pipeline. That's the minimum," Gregory said.

"Groundwater-sourced public drinking water systems still have to meet the same drinking water standards, so if for some reason they aren't able to meet that standard with just raw water, they're going to treat it. In most situations where you have a public supplier, they're going to disinfect."

Understanding your unique situation

Even if drinking water is coming from a public water system, Gregory said it's worth being aware of any changes in your tap water. After water is piped as far as the water meter, its quality is out of the public system's hands.

"The city is only required to deliver that water quality to the meter. Once it's past that meter, it's up to the homeowner," Gregory said.

He said that homeowners should therefore be aware of what is in their homes and whether their water has changed.

The rotten egg smell of hydrogen sulfide, for example, can sometimes signal a problem. Though the smell can be a result of naturally occurring bacteria in groundwater, Barnett said it can also signify that a chemical reaction is happening inside a water heater.

"If the smell is detected when only the hot water tap is used, draining the hot water heater on a periodic basis can solve the issue," Barnett said.

"If you have a major concern about your water quality and its impact on you, then the only failsafe way to figure that out is to take a sample of water from the point where you get your drinking water and get it tested," Gregory said.

For the most part, the public water system can provide answers. Every year, public water systems publish publicly available water quality reports that can help explain local water's flavor. The reports can be easily downloaded from public water systems' websites.

For questions not answered by the water quality report, Gregory said the public water system may be able to help with tracking down more information.

"If you've got questions beyond the water quality report, they may not have an answer for you, but they should be able to sleuth out the answers you might want," he said.

Public water quality reports can also be used to help make individual decisions, such as for people with compromised immune systems or specific medical concerns, such as high blood pressure.

"If you are immunocompromised or have some extenuating health circumstance and you suspect that your water may be an issue, I would take that report to your doctor and say, 'Hey, this is the water I'm drinking. Is this something to be concerned about?'" Gregory said.

But for most people, Gregory said that tap water — with all of its regionally unique flavors — is considered safe to drink per current EPA standards. Notable exceptions do occur, such as in the widely-publicized issues with Flint, Michigan's water system and other instances of safety standards not being met, but in general EPA standards are designed to ensure broad public safety. And for those who don't like the flavor or smell or want an added layer of purification, adding a filter at the point of use can help.

"The water meets all the required standards, and public water systems do a great job of delivering high quality water. But if you have a big issue with the taste, then putting in a filter can help," Gregory said. "It all boils down to preference. That's the biggest factor in the equation — what do you consider good?"

Washing vehicles at home is a huge water-waster and storm water polluter

If washing and polishing your own set of wheels is your idea of fun, at least be environmentally-friendly by minimizing pollution and using water efficiently. Control your water usage by turning the hose off and on only as you need it and pull your car onto the lawn or any other permeable surface to help filter out pollutants from the runoff.

A standard 5/8 inch garden hose running at 50 lbs. per square inch (PSI), uses about 12 gallons of water each minute…that's about 120 gallons in just ten minutes of washing -- and you haven't even finished the wheels! More likely it will take double, or triple that amount of time to get the car clean enough to suit you. Using an automatic hose shutoff nozzle so the water does not flow continuously, can save as much as 70 gallons!

Remember that the water running off your vehicle can contain lots of pollutants – like soap and detergent, mud, rubber and grease. If these substances enter the storm water system, they will eventually find their way into our creeks, rivers, and streams where much of our drinking water comes from today.

Luckily, we now have viable alternatives to this old-fashioned approach to cleaning our vehicles. Consider going to a commercial car wash. The U.S. Clean Water Act requires professional car washes to pipe their dirty water to water treatment facilities or into state-approved drainage facilities. Automatic and self-serve car washes also use water efficient equipment such as computer-controlled systems and high-pressure nozzles and pumps, allowing them to clean cars thoroughly while conserving water. A second choice is to find a do-it-yourself facility that also uses much less water and retains the runoff.

As with everything else…when it comes to washing your vehicle…Remember to

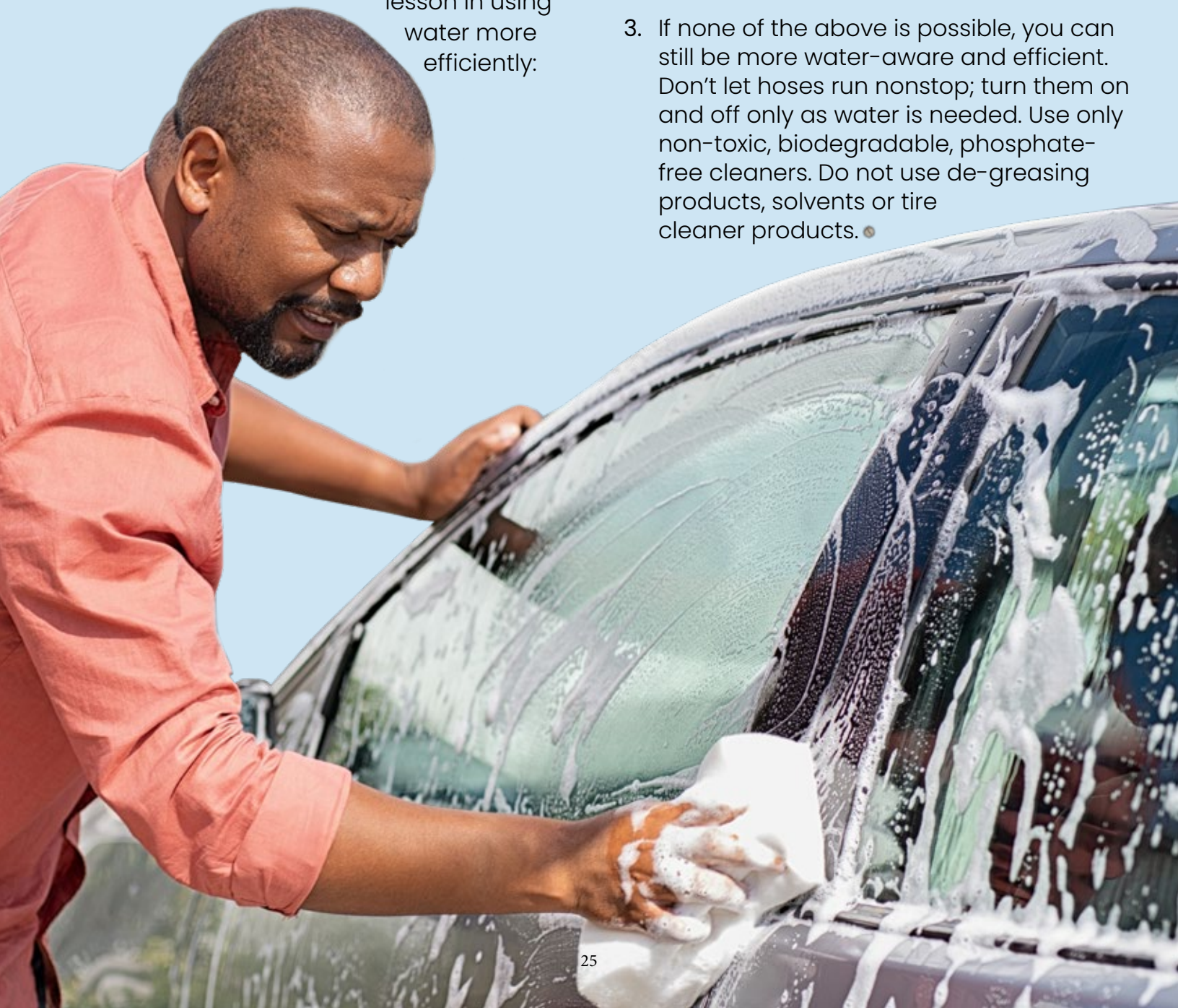
REDUCE REUSE AND RECYCLE.

Planning a Charity Car Wash?

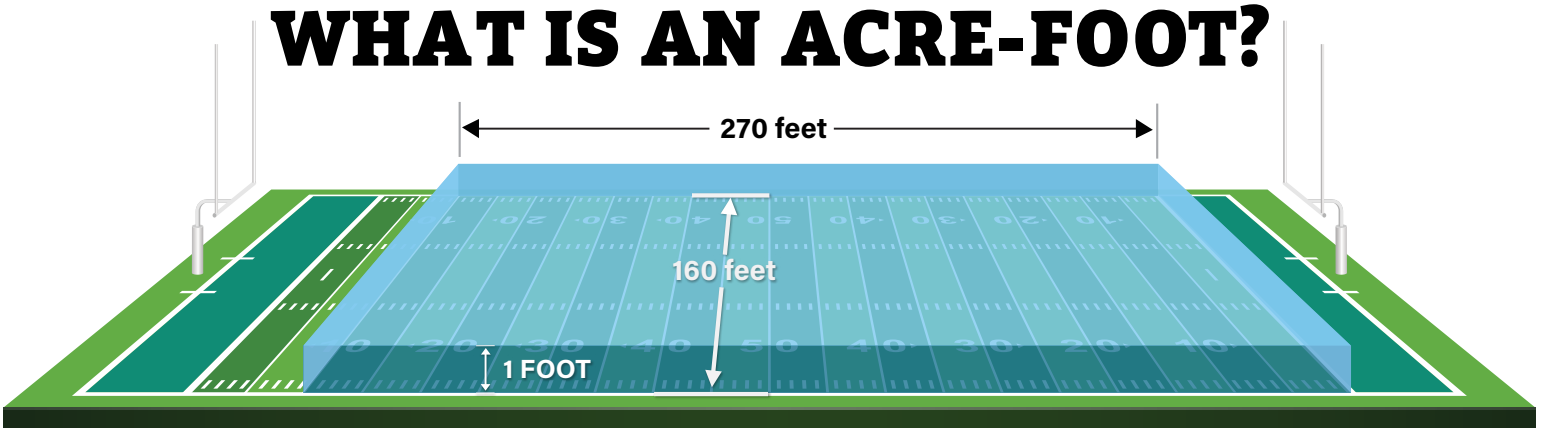
On any given weekend groups of folks raising funds for local events can be seen jumping up and down waving "CAR WASH "signs at shopping center parking lots. Their enthusiasm is hard to resist, but unfortunately these "charity" events waste thousands of gallons of water and send pollutants into the storm drains, too.

Here are some suggestions that will help raise money, but also give the sponsors a positive lesson in using water more efficiently:

1. Hold the event at a commercial car wash. Most local businesses look for ways to support local groups. The kids can still jump up and down with signs to get cars to come in, but the business can do the work and give back a percentage of the sales.
2. Conduct the carwash on a permeable surface. Ball fields or gravel areas can significantly minimize the runoff and pollution from the event.
3. If none of the above is possible, you can still be more water-aware and efficient. Don't let hoses run nonstop; turn them on and off only as water is needed. Use only non-toxic, biodegradable, phosphate-free cleaners. Do not use de-greasing products, solvents or tire cleaner products.



WHAT IS AN ACRE-FOOT?



An acre foot of water equals about 326,000 gallons, or enough to flood a football field 1-foot deep. (Who knew a football field is roughly the size of an acre?) An acre foot is a common way to measure water volume and usage. As a rule of thumb in U.S. water management, one acre-foot is the planned annual water usage of a suburban family household.

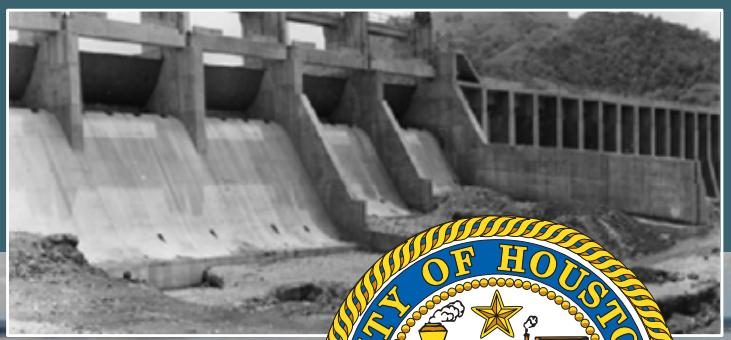
Here are some more interesting facts about acre measurements. The word "acre" comes from the Old English word "aecer" or in German, "acker", and in Latin "ager". An acre is 43,560 Square Feet, but do you know why? For additional information about this method of measurement, visit wateru.whcrwa.com.

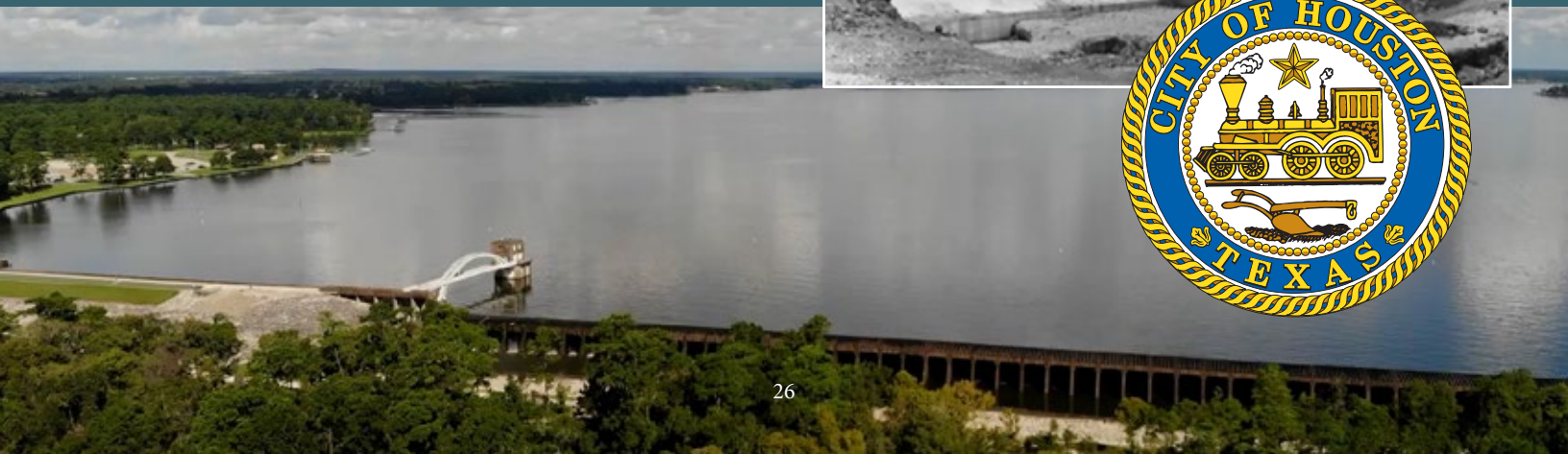
DID YOU KNOW?

In the 1930's, Houston's Mayor, Richard Henry Fonville, foresaw the value of surface water and purchased the Northeast Harris County property now known as Lake Houston with a personal check. Twenty years later, the San Jacinto River was dammed and Lake Houston was constructed.

Richard Fonville
City of Houston Mayor
1937 - 1938

The City of Houston owns 100% of the surface water in Lake Houston, a supply fundamental to controlling subsidence in the future.





EXPERT ADVICE

From Jesse Engerbretson, Licensed Irrigator, LI15123 - BP11837

As the weather becomes cooler, it's time to adjust your sprinkler's controller so that your plants and turf are not overwatered. Overwatering can cause flooding and mud throughout lawns.

When temperatures cool down, grass can redirect its energy from photosynthesis to growing deeper roots. Deeper roots make for a stronger plant that needs less water and survives in rough conditions. Give your grass an end-of-season protection boost with lawn nutrients and a nice deep watering.

Next spring, when the weather warms up, it's time to do a seasonal check up to make sure your sprinkler system is functioning properly and efficiently. Sprinkler timers should be set according to the plant material they are watering, preferably set to run multiple short cycles to promote deep root growth.

Consider upgrading to a Wi-Fi controller. Wi-Fi controllers allow you to control your watering from an app on any device. These "smart" timers automatically adjust your watering schedule based on weather conditions, watering only when needed. A Wi-Fi controller can be tailored to the specific needs of your property to deliver the right amount of water, reduce the chances of under/overwatering and minimize runoff. A smart way to conserve water and save money!

Licensed irrigator Jesse Engebretson has been serving the Houston, Katy and Cypress areas since 2004. LI15123 - BP11837

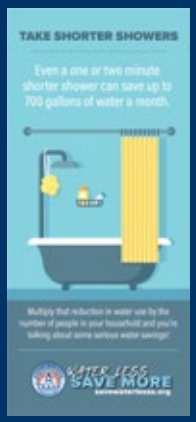
It is 'when' and 'how' you water... not how much

Introducing the Cycle and Soak method. This method of irrigation applies water slowly so the soil actually absorbs all that is applied. Instead of running each sprinkler zone for 15 or 20 minutes each, run each zone only the amount of time that the soil can absorb the water (which means not running off onto the sidewalk or street). Depending on the slope of the yard, this could vary widely from zone to zone. You will have to visually test the zone run times to see when the water begins torun off.

Once you have determined the maximum amount of water each zone can take before runoff, split the total irrigation time into two or three parts. This involves irrigating the zone, shutting it off to allow time for the water to soak in and then watering a similar time to complete the process. Schedule the run times about one hour apart until the soil is moistened to a depth of 6-8 inches. Virtually all sprinkler system controllers can be programmed to automatically run the Cycle and Soak method. You'll know that the lawn has been successfully watered during your test when about an hour after watering, you can push a soil probe (or a very long screwdriver) into the soil. It will slide easily through wet soil but will be impossible to push through dry clay. The landscape has been successfully watered when the probe easily slides to a depth of 6 – 8 inches.

By using the Cycle and Soak method, the plant's root system will reach for moisture deep within the ground and be well protected from the summer heat. It reduces the need to water frequently.

Don't forget the great billing inserts available for FREE to districts in the WHCRWA



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