New homes are already mandated to have low-flow toilets. However, dual-flush toilets use less water than low-flow toilets and have more flushing power.

What is a dual-flush toilet?

- Dual-flush toilets have two buttons: full flush and half flush.
- Full flush uses 1.6 gallons per flush (solid) and half flush uses 0.8 gallons per flush (liquid).

This makes the average flush only 1 gallon!

- A single rubber washer replaces the traditional flapper valve, the cause of most toilet problems. The dual-flush mechanism slides out for easy replacement.
- The toilet has a quiet, no-noise siphon jet.
- Bowl wash keeps the unit cleaner, reducing the need for cleaning chemicals.
- A 4-inch trap helps prevent clogs. In other toilets, traps may be as small as 1.5 inches.

Dual-flush toilets can easily be installed or retrofitted in your house.

- Toilets come in a variety of models, one to fit every budget.
- Most models can be connected to a drain hole centered either 10 inches or 12 inches from the wall. Older homes often have holes 10 inches from the wall; today, 12 inches is the standard.
- The fill valve is a standard brand. Any hardware store could probably supply a replacement.
- You can buy dual-flush toilets at several locations in the Dallas/Fort Worth area.
Native and adaptive plants require less water, pesticides, fertilizers, and maintenance. Once established, they do not need to be watered as frequently, and they usually will survive a dry period with little or no watering.

To establish and maintain a healthy landscape that conserves water, consider using the following water efficient landscaping principles:

- Get a soil analysis — Collect soil samples from various areas of your yard and have it analyzed by Texas A&M AgriLife Extension. Call your local county Extension office for submittal form, sample bag and instructions. This analysis will tell you the soil type, fertility and pH of your soil. This information will help you decide which plants will work best in your yard and what is the best fertilizer analysis and amount.

- Plan your landscape — Evaluate the conditions in your yard, such as sunny and shady areas, how you will use sections of the yard and how large you want mature plants to grow.

- Choose the proper plants — Determine each plant’s need for sun, shade, soil and water, and its tolerance for cold or salt. Match the plant’s needs to the appropriate spot in your landscape.

- Use turf grass wisely — Grass is often the biggest water user in your yard. Save grass for areas where children or pets will play. In other areas, consider shrubs, perennials, or groundcover.

- Irrigate effectively — Group landscape plants that have similar water requirements together in areas separate from the lawn. Use the most water-efficient sprinklers for each area. Zones of inground irrigation systems should be separate for turf and non-turf areas. Use appropriate matching spray heads throughout the zone. Less frequent, but heavier lawn watering encourages a deeper root system to withstand dryer weather. Drip irrigation is 90 percent efficient. Use drip irrigation in all non-turf areas.

- Mulch — Using mulch helps retain soil moisture and moderates temperature. Mulching also helps to control weeds that compete with plants for water. Spread 2 to 4 inches of mulch, such as wood chips, pine straw or leaves, around shrubs, trees, groundcover and flowerbeds.

- Maintain your yard — Remove only one third of the grass length at each mowing. Mow weekly during growing season. Leave grass clippings on the lawn to provide free fertilizer, and help lawns grow greener and denser without causing thatch (grass clipping) buildup. Keep the mower blade sharp and mow when the grass is dry.
Rainwater harvesting is an innovative approach of capturing free water. You can save money by collecting and storing rainwater to irrigate your trees, shrubs, flower beds, house plants and containers. A quick and easy way to do this is by constructing a rain barrel.

**Material List**
1. Large garbage can or 55 gallon food grade poly barrel
2. 3/4 inch outdoor faucet or hose bib
3. 3/4 inch female threaded PVC pipe adapter
4. Roll window screen/insect fabric
5. Tube of pipe goop or silicone sealer or Teflon tape
6. 4 or 6) Cinder blocks to keep barrel off the ground

Optional: For overflow, 2 inch elbow and adapter and 2 foot 2 inches of PVC pipe

**Tools**
- Jig Saw, Jab Saw or Dry Wall Saw
- Power Drill
- 1 inch Spade Bit or Hole Saw/cutter
- 2 inch Hole Saw
- Scissors to cut window screen/insect fabric
- 2 Pipe Wrenches or channel locks
- Screw Driver or drill screw driver bit
- Hack Saw or PVC Pipe Cutter
- Tape Measure
- Level

**Barrel Preparation**
1. Use a recycled food grade opaque container (the 55 gallon blue barrels are available at Russell Feed Stores and Marshall Grain) or a heavy garbage can. Clean the container.
2. Close to the bottom, drill or cut a 1 inch hole for the faucet.
3. Apply silicone sealer or pipe goop to faucet threading (around the outside).
4. Screw the faucet thread into the barrel and attach the faucet using the 3/4 inch female PVC adapter. This may require 2 people, one holding the adapter on the inside of the barrel and one on the outside holding the faucet. Use Teflon tape, pipe goop or silicone caulk on the faucet threads.
5. Near the top of the side of the barrel, cut a 2 inch hole. Cover the 2 inch hole with window screen secured with pipe goop or silicone sealer. This screen will keep mosquitoes and other insects out of the barrel. OR use the 2 inch elbow, adapters, and 2 inch PVC pipe to create a down spout.
6. Cut a 6 inch hole in the lid of the garbage can or barrel lid. Use the drill to create a hole large enough for the saw blade.
7. Cover the 6 inch hole in the lid with window screen secured with pipe goop and screws. If the rain barrel is going to sit under a roof valley, place the window screen over the entire top of the barrel and secure with a strap.
8. Level the soil where the barrel will stand.
9. Place cinder blocks and check level again. Water is heavy. The slightest lean may mean a falling barrel. Gravity is needed to run the water. If the area where you want to use the water is higher than the barrel, use more cinder blocks to raise the barrel.
10. Cut the downspout so water will go directly into the barrel. Use downspout gutter elbow (or 2) to better direct the water into the barrel opening. Or use flexible downspout to direct water into barrel. Use screws and silicone sealer at each attachment.
11. Attach the garden hose to the faucet. If you want to use a garden hose and drip irrigation, attach a 2-faucet manifold to the faucet.

Rain Barrel Location
Locate the rain barrel near a rain gutter downspout or where a roof valley shreds a large amount of water and on the side of the house where you want to use the rainwater for irrigation or hand watering.

Optional:
If you want more than one rain barrel connect the barrels using 2 inch PVC pipe and male and female adapters. Have the water go into the first rain barrel. Use the over flow hole to attach the pipe to the second rain barrel. Have an overflow opening on the second rain barrel. Or to increase the water pressure, make the attachment at the bottom of the barrels so the barrels will fill up at the same time and empty at the same time which increases the pressure.

Optional Overflow:
Manifold with two hose attachments with shutoffs to direct overflow from barrel
(1) 3 ½ foot length of 2 inch PVC pipe
(1) 2 inch PVC elbow with threads to stick through barrel
(1) 2 inch female PVC pipe adapter to attach elbow
(1) 2 inch slip elbow for bottom of downspout

Rain Barrel Maintenance
Every few months check your gutters, downspout and screen to make sure all debris is cleared. At least once a year, empty and wash out your barrel. Regularly check the seal around the faucet and apply more silicone sealer if you have any leaks.

For more information on water conservation and efficiency practices for your home and landscape as well as information on larger rainwater collection systems visit the Texas AgriLife Ex-
One of the easiest ways to use stored rainwater is for landscaping. In many communities, 30 to 50 percent of the total water is used for landscape irrigation. If that demand for a limited natural resource can be reduced, everyone benefits. Rainwater harvesting is an innovative approach to capture free water.

Rainwater is good for plants because it is free of salts and other minerals that harm root growth. As rainwater percolates into the soil, it forces salts down and away from root zones, allowing roots to grow better and making plants more drought tolerant.

What is rainwater harvesting?
Rainwater harvesting captures, diverts and stores rainwater for later use. Rainwater can supply water for household, landscape, wildlife and agricultural uses. It can even be used for drinking, with proper treatment. But the easiest way to use stored rainwater is for landscaping. Harvesting rainwater for use in the home landscape:

- Saves you money by reducing your water bills.
- Reduces demand on the municipal water supply.
- Makes efficient use of a valuable resource.
- Reduces flooding, erosion and contamination of surface water with sediments, fertilizers and pesticides in rainfall run-off.

Why harvest rainwater?

- Promotes self-sufficiency and an appreciation for water resources
- Promotes water conservation providing a “new” water resource
- Saves energy requiring only a small pump or gravity flow to create water pressure in household pipes or landscaping hoses
- Rainwater often has a nitrogen content which provides a slight fertilizing effect on and landscapes.
- Local erosion and flooding from impervious cover associated with buildings is lessened as a portion of local rainfall is diverted into collection tanks with less polluted stormwater to manage.
- Rainwater is one of the purest sources of water available. Its quality almost always exceeds that of surface or groundwater.

Did you know?
A house with a 1,000 square foot roof could “harvest” 600 gallons of rainwater from a one-inch rainfall.
Install a rain/freeze sensor on your irrigation system!

Rain/Freeze sensors prevent your automatic sprinkler system from watering during a rain or freeze and can potentially save more than 500 gallons a day during rainy conditions.

A rain sensor keeps the irrigation system from starting or continuing after rainfall quantities of 1/8", 1/4", 1/2", 3/4", or 1". This is called the reset rate. The reset rate refers to the amount of time it takes the rain sensor to dry out sufficiently for the sprinkler system to be allowed to come back on. The time that it takes the rain sensor to reset for normal sprinkler operation after the rain has stopped is determined by weather conditions (wind, sunlight, humidity, etc.). These conditions will determine how fast the hygroscopic discs dry out, and since the landscape is also experiencing the same conditions, their respective drying rates will parallel each other.

There is an adjustment capability on the rain sensor that will slow down the reset rate. This adjustment can compensate for an overly sunny or shady installation location or peculiar soil conditions. It is suggested to set your sensor to 1/8". The temperature at which the freeze sensor is activated is 37°F ±2° (3°C ±1°) and is not adjustable. The placement of your rain/freeze sensor is very important. Please consider the following to insure that your equipment is most effective.

- Mount the rain sensor to a gutter or roof eve where it will be exposed to direct, unobstructed rainfall (but away from sprinkler spray).
- Mount as close as possible to the timer. This will cause the wire run to be shorter, which minimizes the possibility of wire breaks.
- Mount in the highest possible position where rain can fall directly upon the rain sensor.
- Refrain from mounting the rain sensor on a very sunny, southeastern end of a building as it may cause the rain sensor to dry out sooner than desired. Similarly, mounting on the northern end of a building with constant shade may keep the rain sensor from drying soon enough.

By installing a rain/freeze sensor you will not only prevent your automatic sprinkler system form running while its raining, potentially causing excessive runoff from your property but will also prevent your plants from receiving excessive amounts of water.

Better yet it will save you money and conserve our precious natural resource.
Many water conservation methods can be accomplished by modifying just a few everyday habits and using inexpensive upgrades to technologies in your home landscape.

**Landscape Watering:**
- Water your landscape early in the morning (before 10:00am) or late in the evening (after 6:00pm). If you water in the heat of the day, most of your water is lost to evaporation.
- Do not over water your lawn. During the summer months, only apply one inch of water on your lawn every 7 days. Doing this, will encourage a deep root system and a healthier lawn. Also, during the winter months reduce your watering frequency to once every 15 to 20 days.
- Remember, rain water counts. If it rains, you do not have to water your lawn. To better track rainfall, buy a rain gauge.
- Water your landscape by hand or run sprinklers in manual mode.
- If you have an automatic sprinkler system, adjust the heads to water the landscape and not the pavement, and be sure to check your system regularly for leaks or misdirected spray heads.
- Install and maintain rain/freeze sensors.
- If possible, replace overhead sprayers with soaker hoses or drip irrigation.

**Landscaping:**
- Use native and adapted plants that are more suited to the climate in which we live. Native
- Plants use less water, fertilizer, and pesticides.
- To water shrub beds, ground cover gardens and trees use a drip irrigation system and soaker hoses that apply water to the roots where it does the most good.
- To hold moisture and limit weed growth, keep a 3 to 4 inch layer of organic mulch on flower beds, around trees, shrubs and ground covers.
- Plant during the fall or early spring when water requirements are lowest.
- Taller grass blades holds moisture and slows down evaporation so cut your grass at a higher setting and leave the clippings on the ground, as they will return nutrients to the soil.
- Before fertilizing your lawn, conduct a soil test. The wrong amount and type of fertilizer can increase water usage.

**Pool:**
- Install a pool cover to reduce evaporation.
- Fill your pool manually.

**Cleaning:**
- Sweep your sidewalk or driveway, do not hose it down.
- Wash your car on the lawn and use a bucket instead of a hose, or better yet, use a commercial car wash that uses recycled water.
- Bathe your pets outdoors in an area that needs to be watered.
IRRIGATION CHECK-UP

A landscape is kept healthy and beautiful with efficient irrigation practices. Irrigation problems damage a landscape by creating too dry and/or too wet areas and result in water loss and high cost. An irrigation check-up will identify problems with the system, sprinklers and help you estimate how long to run each station or zone.

In many communities during the summer, 30 to 50 percent of the total water used is used for landscape irrigation. To save water resources and money, apply water to a landscape as efficiently as possible. Check the irrigation system at least twice a season for problems.

**Step 1.** If you have the original irrigation system design, make a copy so you can make notes on it. If you do not have the original design, you may find it useful to sketch the irrigation layout and number of sprinkler heads in each station. Number the heads on the sketch so you can make notes about each head.

**Step 2.** Run each station and observe each sprinkler head to see if the sprinkler head is running and distributing water properly. Note which sprinkler heads are working correctly and which require attention.

Look for these problems:

- Sprinkler heads spraying water onto the sidewalk, driveway, or road
- Sprinkler heads missing, not operating, with reduced water flow or poor distribution pattern
- Sprinkler heads broken, gushing water out the top or not popping up
- Sprinkler heads no longer straight up and down
- Sprinkler heads that cause a cloud of mist
- Grass, shrubbery or tree blocking distribution pattern
- Dry landscape areas
- Possible causes: low system water pressure, a plugged nozzle or wind
- Irrigation heads installed too far apart or not in a recommended square or triangle pattern

...can like a rain gauge with markings for \( \frac{1}{2} \), \( \frac{3}{4} \), and 1”.

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Step 3. Repair all problems yourself or hire a licensed irrigator. Most repairs require cleaning out a sprinkler head. Once all repairs are made, you are ready to run the system and time how long each station should run.

Step 4. Check for uniform distribution. Collect several empty, straight sided cans, such as cat food or tuna fish cans. Use a minimum of 3 cans per sprinkler head. 5 cans per station are even better. Mark the inside of each can like a rain gauge with markings for \( \frac{1}{2} \), \( \frac{3}{4} \), and 1”.

Step 5. Place cans throughout one irrigation station. Step 6. Run the first station on for 15 minutes.
Step 7. Write down how much water is in each can. The ideal irrigation system distributes water uniformly in the area and therefore each catch can should have the same amount of water.

Step 8. Repeat these procedures for each station.

Step 9. Estimate the amount of water your landscape requires: Variables include the amount of sunlight, type of plants, type of soil, time of year and amount of precipitation.

- Turf areas in full sun on clay soil during the summer require about 1 inch of water every 5 to 7 days.
- Turf areas in full sun on sandy soil during the summer require about 1.5 inches of water every 5 to 7 days.
- Turf areas in full sun on clay soil during the winter require about 1 inch of water every 15 to 20 days.
- Turf areas in full sun on sandy soil during the winter require about 1.5 inches of water every 15 to 20 days.
- Shrub, groundcover and perennial areas require about half the amount of water turf areas require if you keep 2 to 4 inches of mulch covering the root area.
- Water plant containers and vegetable gardens as required.

Step 10. Do the math. You now know how many inches of water is applied to each station in 15 minutes. Set your controller according to how much time is necessary for each station to provide the estimated amount of water for the plants in that station. If you do not have an instruction manual for your controller, order one from the manufacturer either by telephone or on the internet.

Step 11. Change the irrigation schedule each season (Most controller have an A and B schedule):

- Spring: use 20% less than the average summer schedule or as needed because we receive so much rain in the spring.
- Fall: use 30% less than the average summer schedule or only as needed.
- Winter: turn off the controller and water only if there is no precipitation in a month.
Many water conservation methods can be accomplished by modifying just a few everyday habits and using inexpensive upgrades to fixtures in your home.

Laundry:
- If possible, replace older units with newer, high efficient models.
- By only washing full loads of laundry, you will conserve both water and energy.
- Use the water level setting if you washer is equipped with one.
- Rinse with cold water and only use hot water when necessary.

Kitchen:
- Install aerators in all home faucets, by doing this, you will be able to increase spray velocity while reducing splash, water and energy use.
- If you wash dishes by hand, do not let the water run while you rinse. Fill one sink with soapy water and the other with clean rinsing water.
- Soak your pots and pans instead of letting the water run while you scrap and scrub.
- Instead of using the garbage disposal, try composting your organic material instead.
- Scrap food off of dirty dishes instead of rinsing them. Newer models of dishwashers are able to handle some leftovers and pre-rinsing is not necessary.
- Only run your dishwasher when it has a full load in it.
- Do not use running water to thaw meat or other frozen foods. This not only is a waste of water, but it can increase the potential for a food borne illnesses. Instead, defrost them in the refrigerator overnight.
- Keep a pitcher of water in the refrigerator instead of running the tap every time you want a drink.
- Wash your produce in a partially filled pan instead of running the faucet and use the left over water to water your household plants.

Bathroom:
- Like aerators, by installing low flow showerheads, you will be able to conserve water and energy.
- Try and limit your showers time to 5 minutes.
- Baths use more water than showers so try not to fill the tub more than halfway, and plug the bathtub before turning the water on and then adjust for temperature.
- Turn the faucet off while you shave and brush your teeth.
- If your home has older toilets, replace them with newer more water efficient models, or consider using a dual flush toilet.
- Do not use your toilet as a trash can.
- Check your faucets and toilets for leaks.
What is ET?

ET or evapotranspiration is the loss of water from soil due to evaporation and from plants due to transpiration influenced by heat, humidity and wind. This is the amount that needs replacing when you irrigate your home landscape.

What is an ET controller?

An ET controller automatically adjusts the amount of water applied to your landscape based on weather conditions. The "smart" ET controller receives radio, pager or internet signals with evapotranspiration information, to replace only the moisture your landscape has lost to heat, humidity and wind. Non-smart controllers are set, or not, and seasonally adjusted by a person.

Why are ET controllers becoming popular?

Standard irrigation controllers require users to calculate complex irrigation schedules and adjust run-times with changing weather conditions. A “smart” ET controller will determine adjustments to the watering schedule based on weather conditions... and it can do so without human interaction.

When considering an ET controller, you should know:

- You still need to determine an appropriate schedule for each zone, just as you would for a standard irrigation controller.
- You may not save water. You can only save water if you wasted it before. ET controllers are no guarantee of water savings and savings will vary based on landscape type and the efficiency of your equipment.
- You cannot "set it and forget it." Your controller may still need updates and monitoring.
- It's not a "forever" solution. Leaks, stuck valves, under- and over-watering and other landscape problems can happen with any type of irrigation system.
- Some have monthly fees. Costs will vary with controller manufacturer and services.