

# This presentation premiered at WaterSmart Innovations

[watersmartinnovations.com](http://watersmartinnovations.com)



# Smart Irrigation Controllers:

**“From Dumb and Dumber to  
Smart and Smarter.”**

October 10, 2008

**Director of Public Works  
Gary R. Hartwell, P.E.  
Frisco, Texas**



# Location

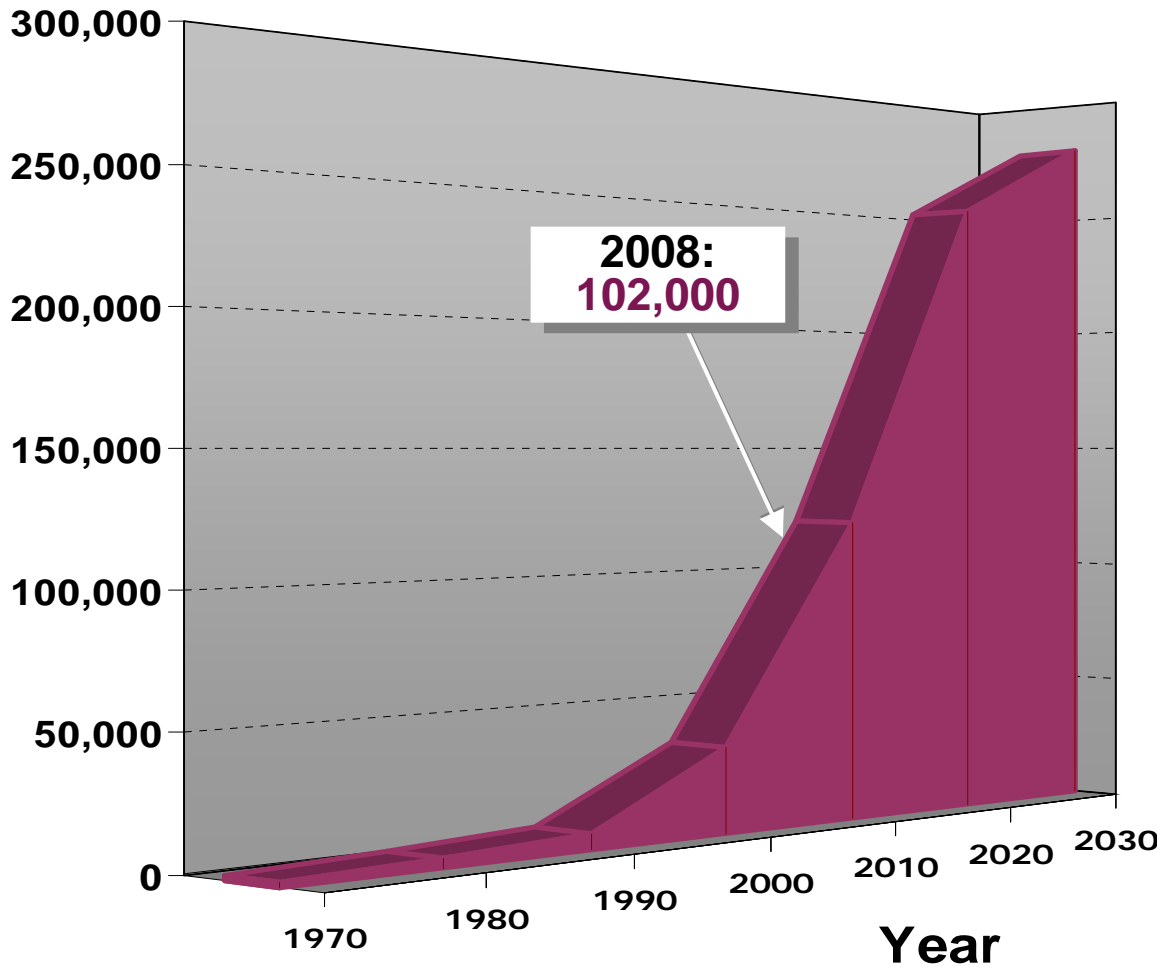


## FRISCO, TEXAS

- Denton and Collin County
- 70 square miles
- 25 miles northeast of the Dallas-Fort Worth International Airport



# Population



YEAR	POPULATION
1970	1,845
1980	3,420
1990	6,138
2000	33,714
2008	102,000
2010	120,036
2020	275,000
2030	280,132

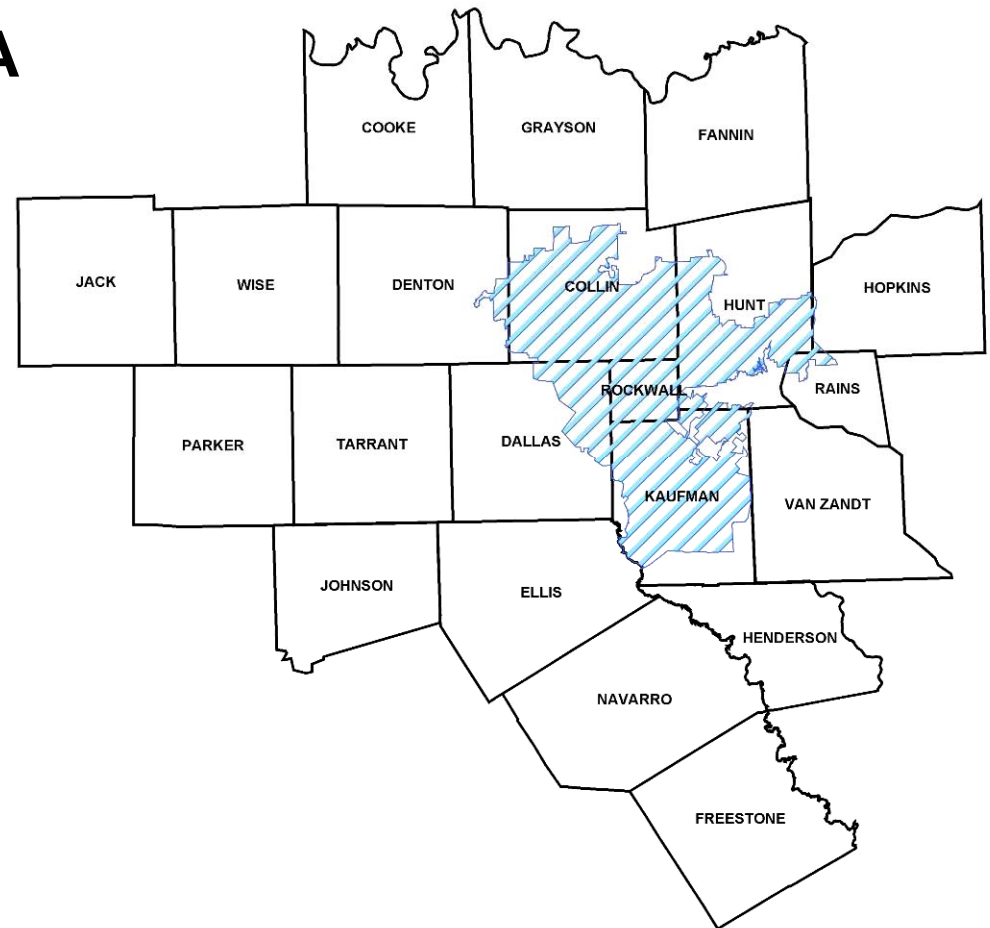


# North Texas Municipal Water District

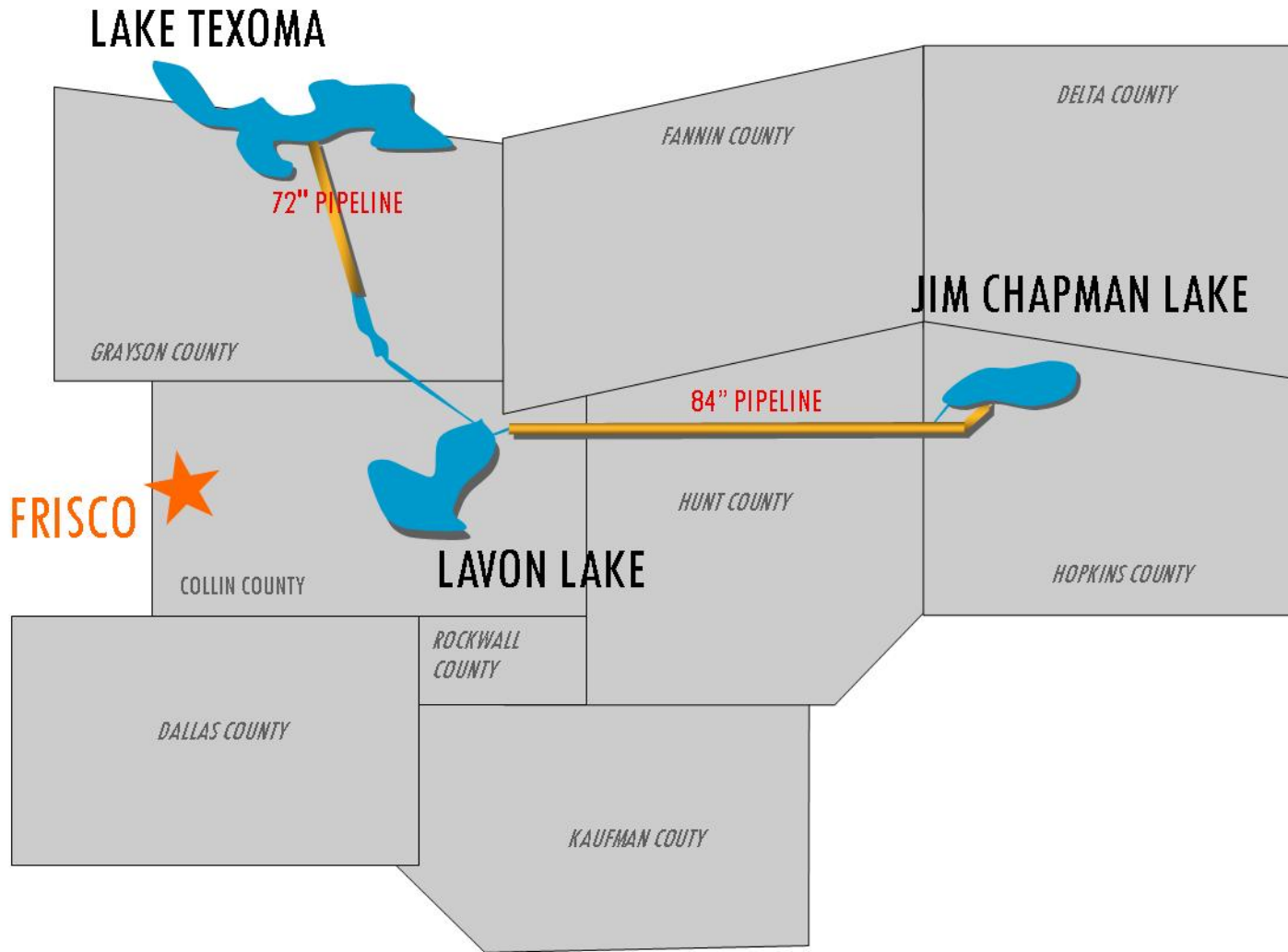
## TREATED SERVICE AREA

- 1.6 million people
- 49 Customer Cities, Towns, and Water Supply Corporations
- 13 Member Cities

<b>Allen</b>	<b>Plano</b>
<b>Farmersville</b>	<b>Princeton</b>
<b>Forney</b>	<b>Richardson</b>
<b>Frisco</b>	<b>Rockwall</b>
<b>Garland</b>	<b>Royse City</b>
<b>McKinney</b>	<b>Wylie</b>
<b>Mesquite</b>	



# NTMWD Water Supply Reservoirs





# More about Frisco



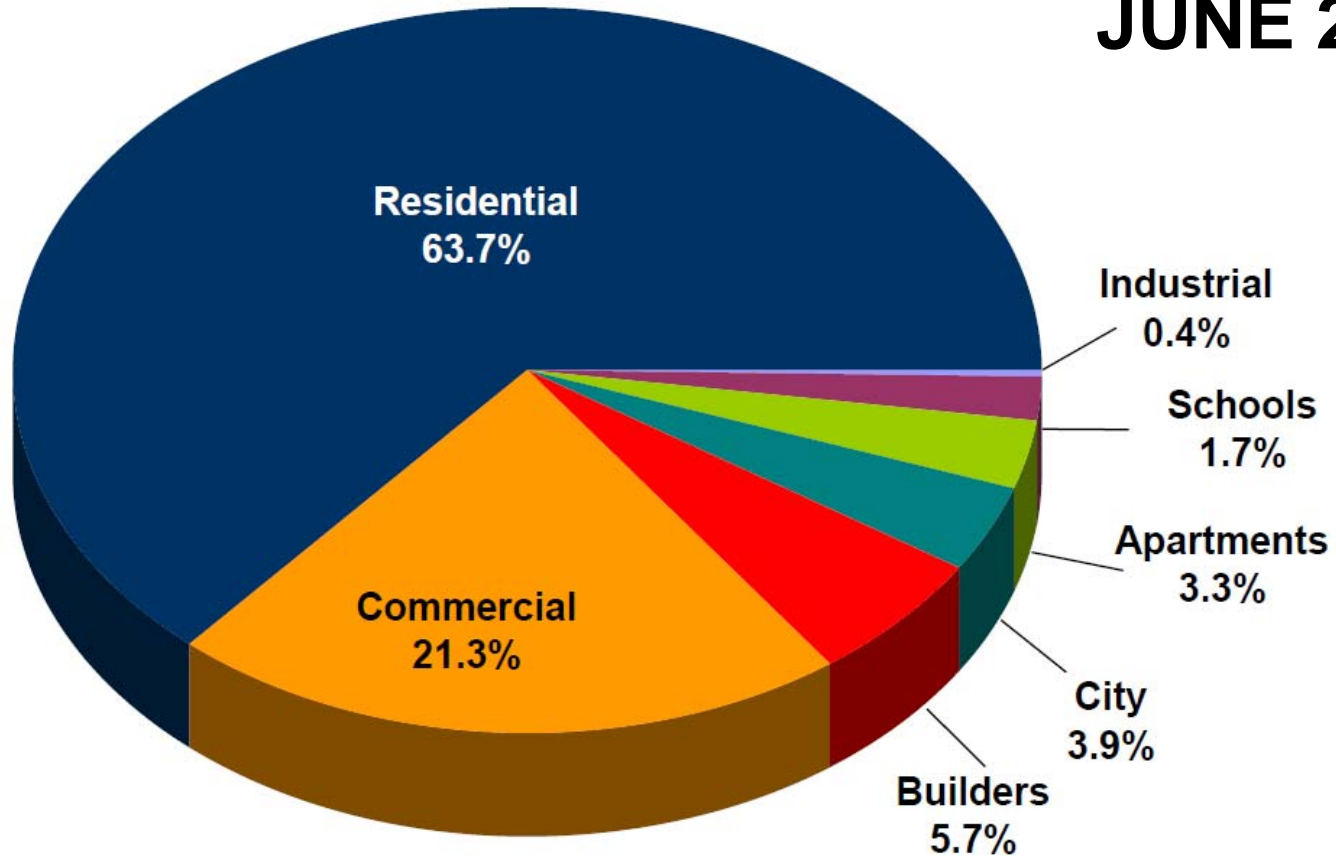
## UNIQUE CHARACTERISTICS

- Rapid Growth
- Water Usage
- Water System Expansions
- Irrigation Systems



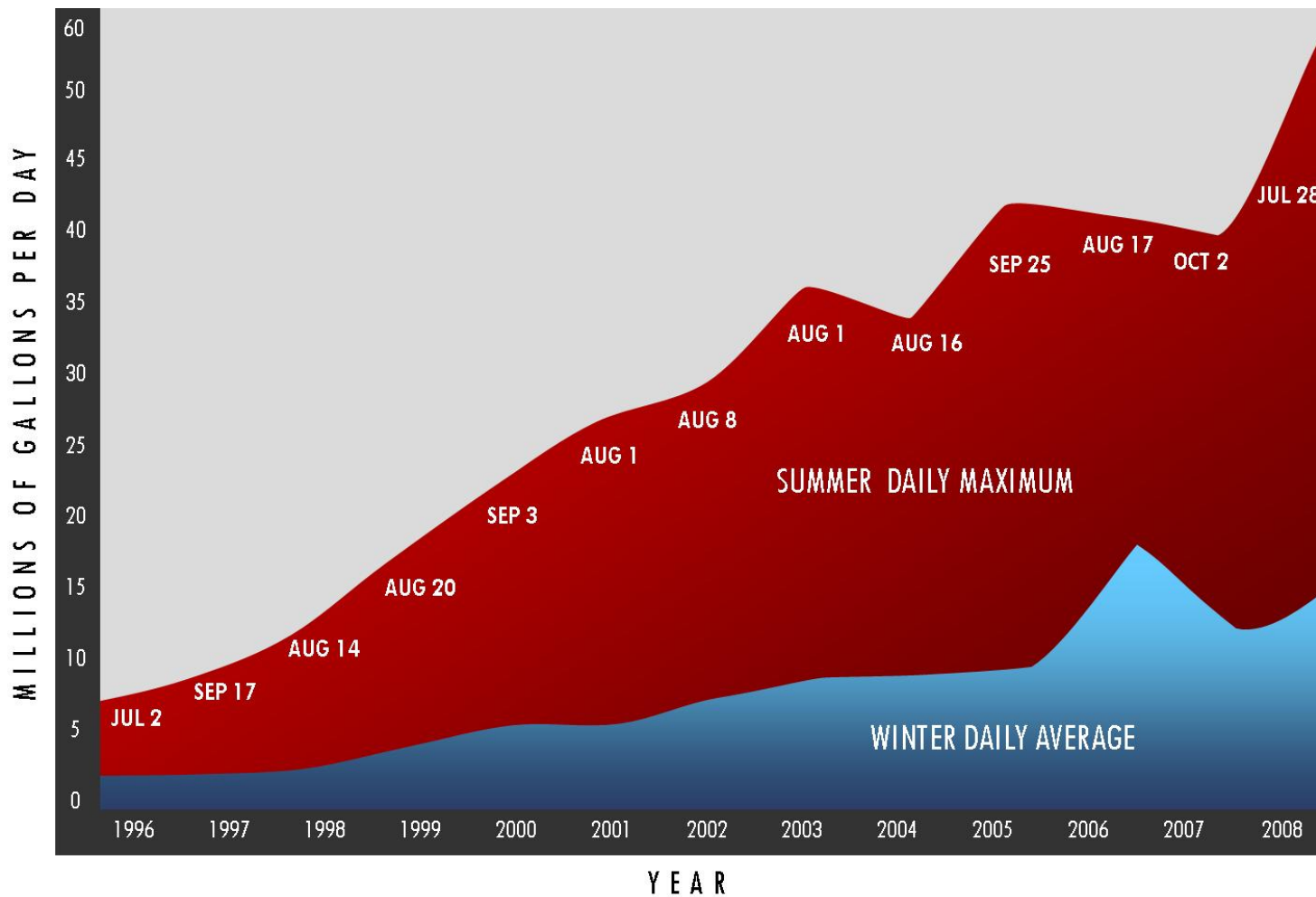
# Water Usage by Category

**JUNE 2008**

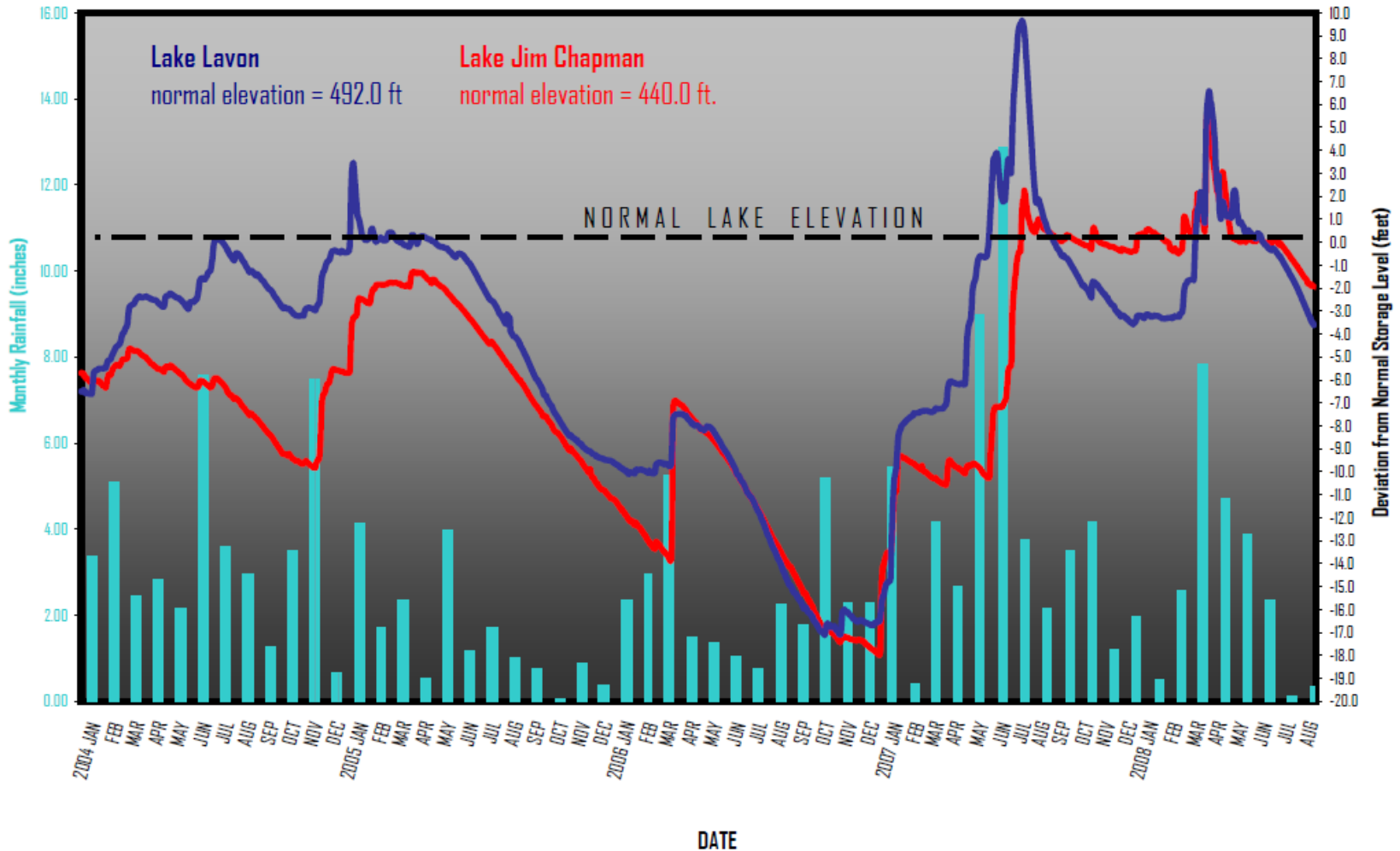




# Summer/Winter Usage



# Lake Level Status





## **Boat Ramp**

**Loading and  
Unloading Only**

**No Wake Zone  
Idle Speed Only**

**Flotation Devices  
Required**

**No Swimming  
or Wading**



**Lake Lavon - ELEVATION 496.72**





**Lake Lavon - ELEVATION 475.05**





**Lake Lavon - ELEVATION 496.72**





**Lake Lavon - ELEVATION 475.05**



**Lake Lavon - ELEVATION 496.72**





**Lake Lavon - ELEVATION 475.05**







06/20/2006 06:36





07/27/2006 08:22



08/23/2006 03:34





08/17/2006 12:56



07/30/2006 11:02







10/09/2006 08:09



# Evapotranspiration



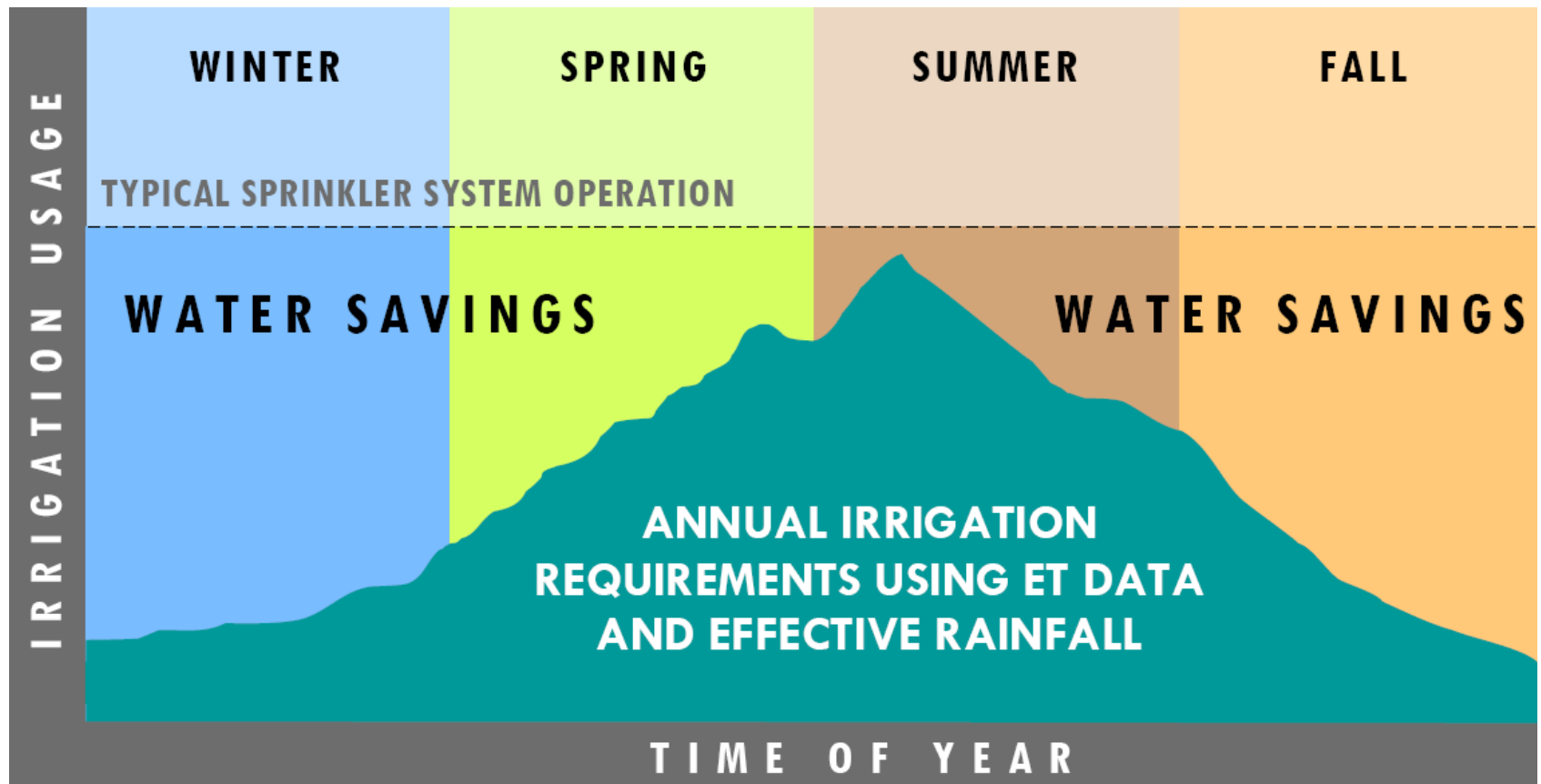
It's the amount of moisture absorbed into the atmosphere through evaporation from the soil and transpiration from plant surfaces.

Several factors such as temperature, relative humidity, wind speed, and solar radiation affect evapotranspiration values.

**Don't Forget About Effective Rainfall!**



# Theory of ET



# Texas Historical ETo

(inches/month)

CITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
ABILENE	2.08	2.57	4.14	5.48	6.47	7.65	8.36	7.46	5.48	4.21	2.67	2.08	58.65
AMARILLO	1.84	2.27	3.73	5.06	5.89	7.51	8.08	7.29	5.61	4.05	2.4	1.78	58.65
AUSTIN	2.27	2.72	4.34	5.27	6.39	7.15	7.22	7.25	5.57	4.38	2.74	2.21	57.51
BROWNSVILLE	2.65	3.03	4.48	5.17	6.03	6.32	6.68	6.65	5.21	4.34	3.01	2.59	56.16
COLLEGE STATION	2.20	2.71	4.22	5.2	6.25	6.89	7.1	6.85	5.6	4.3	2.8	2.2	56.32
CORPUS CHRISTI	2.42	2.95	4.28	5.17	5.95	6.43	6.68	6.65	5.21	4.34	3.01	2.59	55.68
DALLAS/FT. WORTH	2.00	2.46	3.96	5.14	6.21	7.06	7.40	7.25	5.49	4.19	2.59	2.10	55.85
DEL RIO	2.47	3.01	4.76	6.01	6.98	7.41	7.57	7.41	5.77	4.35	2.91	2.36	61.01
EL PASO	2.74	3.53	6.07	8.19	9.83	11.12	9.19	8.94	7.69	5.89	3.58	2.49	79.26
GALVESTON	2.2	2.6	4.1	5.0	6.11	6.6	6.2	6.0	5.5	4.2	2.8	2.3	53.61
HOUSTON	2.36	2.83	4.32	5.01	6.11	6.57	6.52	6.08	5.57	4.28	2.9	2.35	54.91
LUBBOCK	2.35	2.63	4.41	5.53	6.93	7.73	7.63	7.2	5.54	4.19	2.61	2.33	59.08
MIDLAND	2.2	2.78	4.46	5.91	7.21	8.2	9.23	8.62	6.95	4.31	2.78	2.16	64.81
PORT ARTHUR	2.25	2.63	3.95	5.09	6.12	6.6	5.81	5.61	5.46	4.18	2.76	2.23	52.69
SAN ANGELO	2.88	3.13	5.31	7.01	8.48	9.16	9.29	8.49	6.60	5.08	3.37	2.54	71.34
SAN ANTONIO	2.42	2.9	4.42	5.47	6.47	6.97	7.31	6.99	5.64	4.44	2.85	2.36	59.93
UVALDE	2.44	2.95	4.62	5.85	6.7	7.21	7.5	7.31	5.7	4.4	2.89	2.36	59.93
VICTORIA	2.35	2.87	4.29	5.77	6.39	6.7	6.92	6.7	5.36	4.41	2.93	2.33	57.02
WACO	2.13	2.62	4.03	5.31	6.45	7.15	7.40	7.5	5.7	4.41	2.7	2.17	54.05
WICHITA FALLS	1.94	2.46	4.07	5.50	6.7	7.54	7.97	7.72	5.79	4.3	2.62	1.95	58.56

# 2007 Turf Irrigation Requirements

## Frisco Area

MONTH	ET <sub>o</sub> (INCHES)	TURF COEFFICIENT	GROWTH FACTOR	ACTUAL RAINFALL (INCHES)	IRRIGATION REQUIREMENT WITH EFFECTIVE RAINFALL (INCHES)
JAN	1.69	0.6	1.0	7.0	0.00
FEB	3.01	0.6	1.0	1.8	0.91
MAR	4.21	0.6	1.0	5.0	0.03
APR	4.69	0.6	1.0	5.3	0.16
MAY	4.86	0.6	1.0	10.3	0.00
JUN	5.76	0.6	1.0	13.8	0.00
JUL	5.17	0.6	1.0	9.9	0.00
AUG	6.67	0.6	1.0	3.3	2.35
SEP	4.18	0.6	1.0	1.0	2.01
OCT	3.87	0.6	1.0	6.0	0.00
NOV	3.11	0.6	1.0	2.5	0.63
DEC	2.18	0.6	1.0	2.2	0.22
TOTAL	49.40	0.6	1.0	68.1	6.31



# Smart Irrigation Controller Program

## PART 1:

Frisco ET Weather Station



## PART 2:

ET Retrofit (\$100 Rebate Program)



## PART 3:

ET Controllers for New Homes





# Smart Irrigation Controller Program

## Part 1:

# Weather Station

We link our data to the Texas A&M Irrigation Technology Center (ITC).

The ITC computes our weather information to produce irrigation recommendations and provide weekly e-mails to Frisco residents.

This information is also provided on the city website.





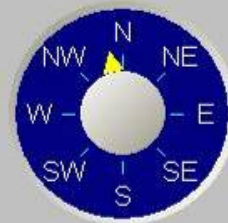
# Frisco Weather Data

## Teel (Under Construction)

12/12/2007 4:00:00 PM

Rain Fall Last Hour	0.00 "	
Rain Fall Yesterday	0.00 "	

## Weather Data



12/12/2007 4:00:00 PM

Air Temp Avg	37.3 °F
Air Temp Max	37.6 °F
Air Temp Min	37.0 °F
Yesterday's Air Temp Max	67.7 °F
Yesterday's Air Temp Min	40.8 °F
RH Max	93.2 %
RH Min	90.4 %
Yesterday's RH Max	98.1 %
Yesterday's RH Min	88.4 %
Wind Speed Avg.	8.7 MPH
Wind Speed Max	13.5 MPH
Wind Speed Min	4.3 MPH
Solar Radiation	0.1 mJ/m2

## Eldorado

12/12/2007 4:00:00 PM

Rain Fall Last Hour	0.03 "
Rain Fall Yesterday	0.39 "

## Timber Ridge

12/12/2007 4:00:00 PM

Rain Fall Last Hour	0.11 "
Rain Fall Yesterday	0.57 "

## Hillcrest

12/12/2007 4:00:00 PM

Rain Fall Last Hour	0.03 "
Rain Fall Yesterday	0.49 "

# TexasET Network



A Project of the Irrigation Technology Center

Irrigation District Program

School of Irrigation

Te

**TexasET** contains weather information, current and average evapotranspiration data, and irrigation watering recommendations.

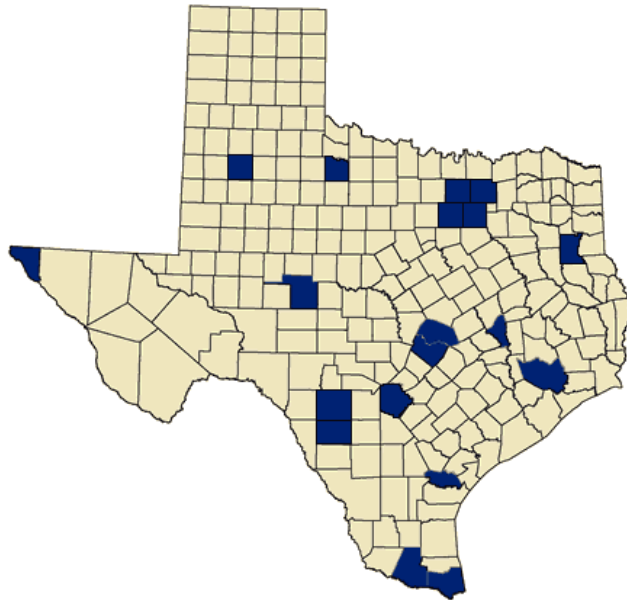
**Current Stations:**

Select a Station ...

**Historic Stations:**

Select a Station ...

You may either select the station nearest you from the drop down menu above, click on the station on the map below, or login with your profile. For more information on why you should create a profile click [here](#).



# TexasET Network



A Project of the Irrigation Technology Center

Irrigation District Program

School of Irrigation

TexasET

Select Station

You may either select the station nearest you from the drop down menu above or click on the station on the map below

The Metroplex





# TexasET Network



# TexasET Network

Home Watering



Turf/Landscape Irrigation



Crop Irrigation



## Frisco Weather Station

### Timber Ridge Elevated Tank

Date	ETo PET (in)	Tmax (F)	Tmin (F)	RHmin (%)	Solar (MJm2)	Rain (in)	Wind 4am (mph)	Wind 4pm (mph)
2008-02-26	0.14	51	40	22	17.48	0.00	9.58	12.02
2008-02-27	0.12	63	30	22	18.17	0.00	0.00	5.83
2008-02-28	0.23	71	46	29	17.87	0.00	0.21	19.29
2008-02-29	0.13	72	55	45	11.50	0.00	8.07	2.84
2008-03-01	0.15	77	49	45	13.56	0.00	0.00	9.06
2008-03-02	0.14	71	61	59	3.68	0.04	14.48	11.12
2008-03-03	0.08	70	33	72	1.60	0.63	5.55	8.93
2008-03-04	0.13	58	35	27	19.97	0.10	3.92	2.08
2008-03-05	0.18	67	44	22	18.77	0.00	6.30	4.47
2008-03-06	0.08	50	33	51	1.30	0.94	11.21	11.62
2008-03-07	0.12	51	32	25	19.88	0.00	4.50	4.67
2008-03-08	0.11	51	25	23	20.17	0.00	2.95	2.35
2008-03-09	0.12	70	42	39	14.47	0.31	4.11	1.69
2008-03-10	0.07	62	49	62	8.01	0.30	9.07	1.66
<b>14 Day Summary</b>	<b>1.80</b>	<b>63</b>	<b>41</b>	<b>39</b>	<b>13.32</b>	<b>2.32</b>	<b>5.71</b>	<b>6.97</b>

Note: Reported are the average hourly values, not the absolute highs and lows.

[3 day summary](#) | [5 day summary](#) | [7 day summary](#) | [other day range](#)





# TexasET Network

Home Watering



Turf/Landscape Irrigation



Crop Irrigation



## Frisco Weather Station

Timber Ridge Elevated tank

[Show Weather Data](#)

### Select Turf Growth Conditions (Step 1)

1. Sunlight Exposure	<input type="text" value="Full Sun"/>
2. Turf Type	<input type="text" value="St. Augustine"/>
<b>Water Requirement for Turf Type (14 Days)</b>	<input type="text" value="1.08"/> (in)

### Precipitation Parameters (Step 2)

3. Effective Rainfall	<input type="text" value="2"/> (in)
<b>Irrigation Requirement (Water Req. - Rainfall)</b>	<input type="text" value="0"/> (in)

### Calculate Watering Run Time (Step 3)

4. Sprinkler Precipitation Rate	<input type="text" value="1.25"/> (in/hr)
Total Run Time	<input type="text" value="0"/> (min)
Irrigations/Week	<input type="text" value="1"/> (count)
Run Time/Irrigation	<input type="text" value="0"/> (min)



# Approved List of Controllers

## WEATHER-BASED



**Irritrol**  
SYSTEMS



**TORO**



**RAIN BIRD**



**ETwater**



**WM**  
Weathermatic



**Hunter**  
The Irrigation Innovators

## SOIL MOISTURE-BASED



**BASE-LINE**



**Acclima**  
Closed Loop Irrigation Systems

**FRISCO**

# Smart Irrigation Controller Program

## Part 2:

# Retro-fit/Rebate

- Install a controller from the city's approved list.
- Register the controller with the Public Works Department.
- Receive programming assistance.
- Credit \$100 rebate on water bill.
- Display a designated yard sign.
- Provide a watering day exemption.



**FRISCO** ET CONTROLLER REGISTRATION/REBATE FORM

District Registration for Rebate     District Registration for Rebate

**CUSTOMER INFORMATION**

FIRST NAME: \_\_\_\_\_ LAST NAME: \_\_\_\_\_  
 BILLING ADDRESS: \_\_\_\_\_ CITY: \_\_\_\_\_ ZIP: \_\_\_\_\_  
 ET CONTROLLER ADDRESS (if different): \_\_\_\_\_ ZIP: \_\_\_\_\_  
 PHONE (Home): \_\_\_\_\_ PHONE (Work): \_\_\_\_\_  
 EMAIL: \_\_\_\_\_  
 WATER ACCOUNT NUMBER: \_\_\_\_\_

**ET CONTROLLER INFORMATION**

MAKE/MODEL: \_\_\_\_\_ MODEL: \_\_\_\_\_ # OF ZONES: \_\_\_\_\_  
 ON SITE WEATHER STATION: YES / NO WEATHER BASE SUBSCRIPTION: YES / NO  
 DATE PURCHASED: \_\_\_\_\_ DATE INSTALLED: \_\_\_\_\_

**INSTALLER INFORMATION**

COMPANY NAME: \_\_\_\_\_ PHONE: \_\_\_\_\_  
 INSTALLER NAME: \_\_\_\_\_ REGISTRATION LICENSE NUMBER: \_\_\_\_\_

**FOR FRISCO PUBLIC WORKS USE ONLY**

Completed Application with Water Audit fee.  
 Receipt of Installation.  
 \$100 Credit Applied to City of Frisco ET Controller Program.  
 Member City Subscription Receipt if Applicable.

I certify that this ET Controller was purchased and installed at the address listed above. I have attached the necessary documents for registration and/or rebate and understand that the watering day exemption applies only to the address effective until I have paid the \$100 registration fee and the City of Frisco has received the ET Controller for proper setting and operation. I understand that the installation of an approved ET Controller does not guarantee a reduction in my water bill or my water usage. I agree to display a small yard sign visible from the street to indicate the use of an ET Controller, understand that the sign belongs to the city and may be removed for maintenance. The purchase of additional maintenance may be necessary to meet minimum ET Controller requirements. The City of Frisco may deem any application that does not meet program requirements and reserves the right to alter this program at anytime.

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

**POINTS OF REFERENCE**

<b>FRISCO PUBLIC WORKS</b> www.friscotexas.gov/water 13300 Research Road Frisco, TX 75034 publicworks@friscotexas.gov 972-292-5800	<b>MELOY EMADIAZAR</b> Water Education Coordinator meadiazar@friscotexas.gov 972-292-5814	<b>MIKE BARTH</b> Irrigation Specialist mbarth@friscotexas.gov 972-292-5844	<b>DARELL BAGLEY</b> Mr. Landscape Architect dbagley@friscotexas.gov 972-292-0352
---	--	--	--

**CITY-APPROVED ET CONTROLLERS**

Model Name	ET Controller	Manufacturer	ET Water Controller	Weather	Weather	ET Station	Weather	Weather
Weather Station Weather Station	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Weather Station Weather Station								
Weather Station Weather Station								
Number of Zones	Up to 16 zones	10/20/30/40/50/60/70/80/90/100/120/150/180/200/250/300/350/400/450/500/550/600/650/700/750/800/850/900/950/1000/1100/1200/1300/1400/1500/1600/1700/1800/1900/2000/2100/2200/2300/2400/2500/2600/2700/2800/2900/3000/3100/3200/3300/3400/3500/3600/3700/3800/3900/4000/4100/4200/4300/4400/4500/4600/4700/4800/4900/5000/5100/5200/5300/5400/5500/5600/5700/5800/5900/6000/6100/6200/6300/6400/6500/6600/6700/6800/6900/7000/7100/7200/7300/7400/7500/7600/7700/7800/7900/8000/8100/8200/8300/8400/8500/8600/8700/8800/8900/9000/9100/9200/9300/9400/9500/9600/9700/9800/9900/10000	Smart Controller 1000	\$19.99	\$19.99	\$19.99	\$19.99	\$19.99
Controller Type	Weather	Weather	Weather	Weather	Weather	Weather	Weather	Weather
Controlled	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

For more information about ET controller registration visit the program website: [www.friscotexas.gov/water](http://www.friscotexas.gov/water)



# Smart Irrigation Controller Program

## Part 3:

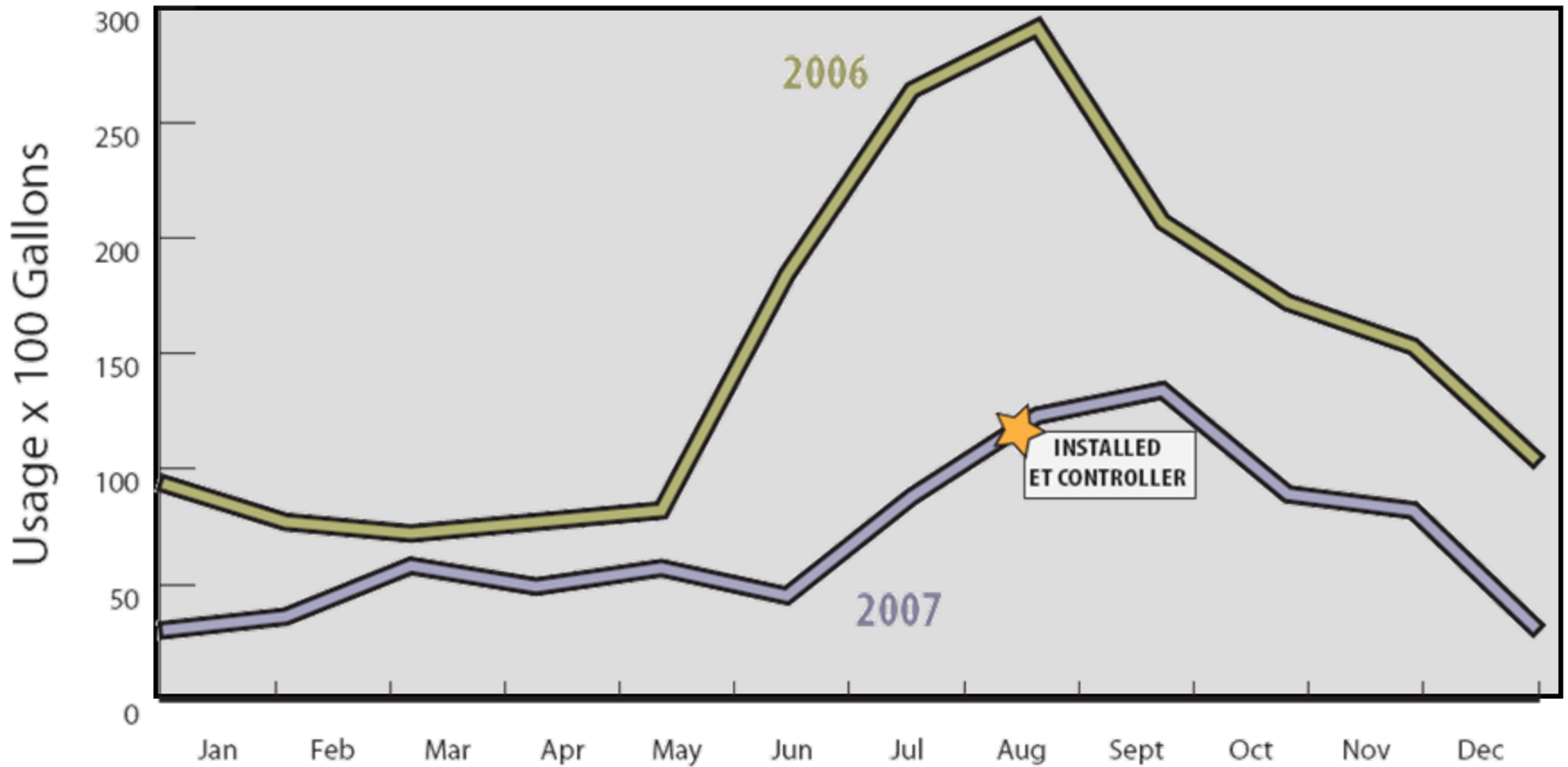
# New Homes

New residential sprinkler systems in Frisco are required to include smart irrigation technology.

After the 30 day exemption for new landscaping, residents can register their smart controller for continued technical support and assistance.



# ET Homeowner: 2006 vs. 2007 Water Usage



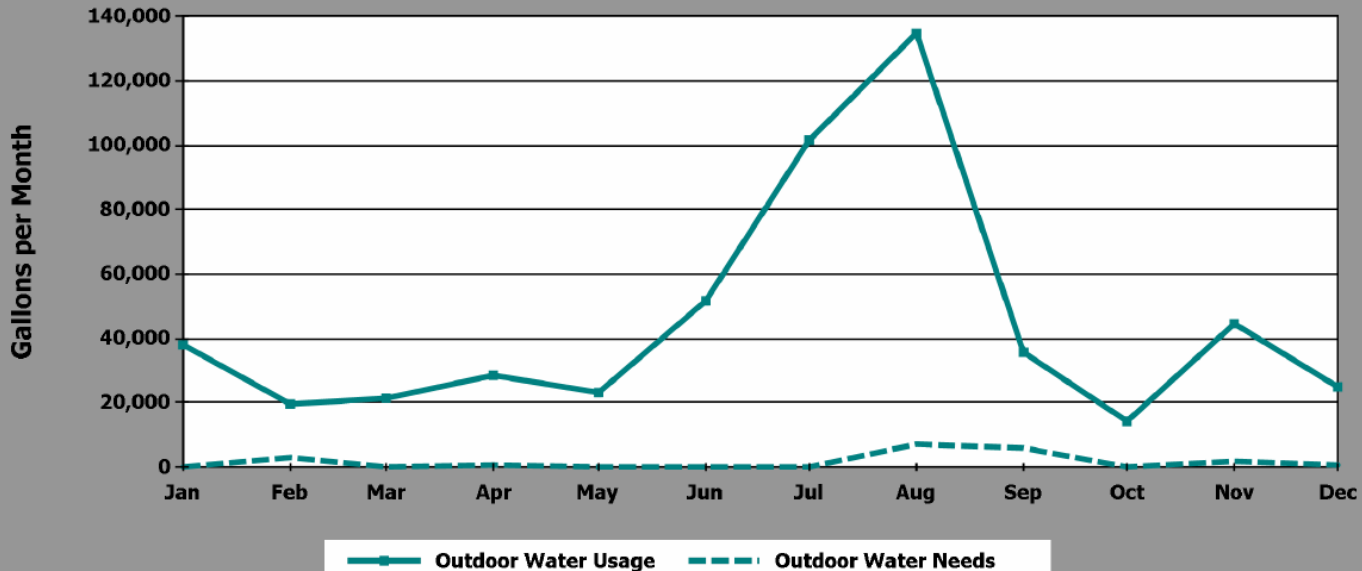


# Dumb Controller

Property	
Address:	15152 MOUNTAIN VIEW LANE
Estimated Irrigated Area (square feet)	4,814
Estimated Indoor Usage (gallons per month)	12,000

Total Proposed Savings	
Total Excess Outdoor Usage (gallons)	519,463
Water Cost (\$/1000 gal)	\$2.98
<b>Total Potential Savings</b>	<b>\$1,548.00</b>

Your Property's Outdoor Water Usage vs. Outdoor Water Needs

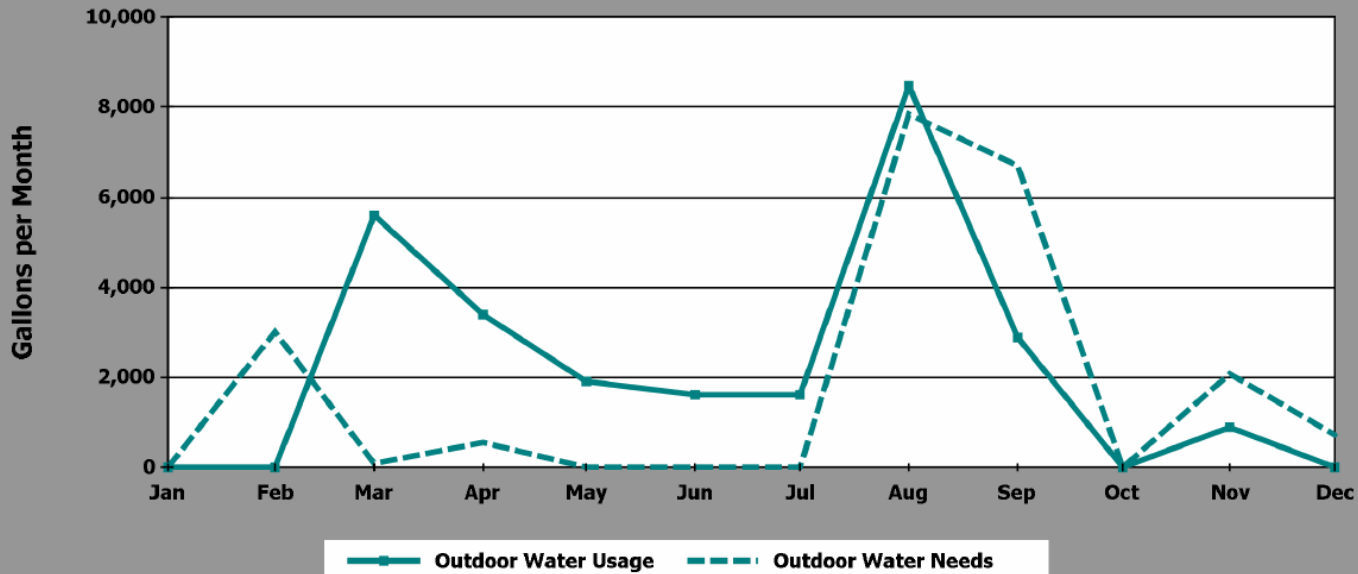


# Smart Controller

Property	
Address:	8560 SHAKESPEARE LANE
Estimated Irrigated Area (square feet)	5,377
Estimated Indoor Usage (gallons per month)	8,000

Total Proposed Savings	
Total Excess Outdoor Usage (gallons)	14,133
Water Cost (\$/1000 gal)	\$2.98
<b>Total Potential Savings</b>	<b>\$42.12</b>

Your Property's Outdoor Water Usage vs. Outdoor Water Needs



# Smart Controller Landscape





**GOT GRASS?**



**Pictures Taken 7/21/08**



**Watering Days: July 7 then July 24, 2008**





# Program Success



- **Encourage or Mandate Installation**
- **Develop an Approved List**
- **Provide Free City Inspection/Programming**
- **Provide On-Going User Support**
- **Public Education**
- **Promote the Program**



**The Discussion Goes On!**

# **Water Conversation**

**Gary R. Hartwell, P.E.**

**[ghartwell@friscotexas.gov](mailto:ghartwell@friscotexas.gov)**

**972-292-5800**

