



Groundwater Reduction Plan Participant Meeting October 27, 2016





2016 Participant Meeting

- **Introductions**
- **FB Subsidence District Update**
- **GRP Implementation**
- **GRP Financial Update**
- **Questions & Answers**

Fort Bend Subsidence District

Robert Thompson
Deputy General Manager

2013 Regulatory Plan Key Elements

Regulatory Areas & Conversion Requirements

Area A

Reduce GW pumpage by 30% by 2014

Reduce GW pumpage by 60% by 2025

Exemptions: Ag. Irrigation, Livestock, and
TWD \leq 10.0 MGY until alternate water is
available

Richmond/Rosenberg Sub-Area:

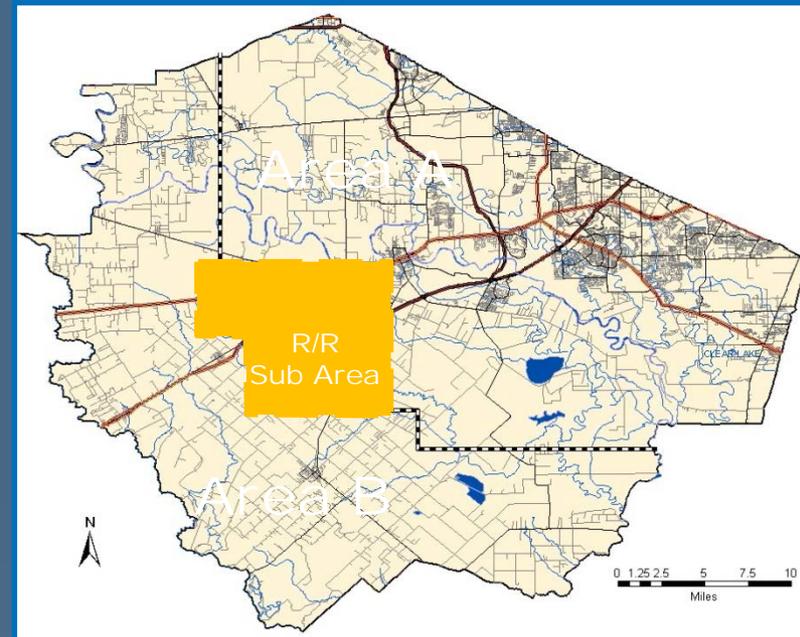
Reduce GW pumpage by 30% by 2016

Disincentive Fee currently set in 2013 at \$6.50
per 1000 gallons

Area B - No scheduled groundwater reductions at this time

FBSD will evaluate need for reduction requirements in future

Cannot transfer GW to Area A unless use dates back to before Sept. 24, 2003



Important Changes

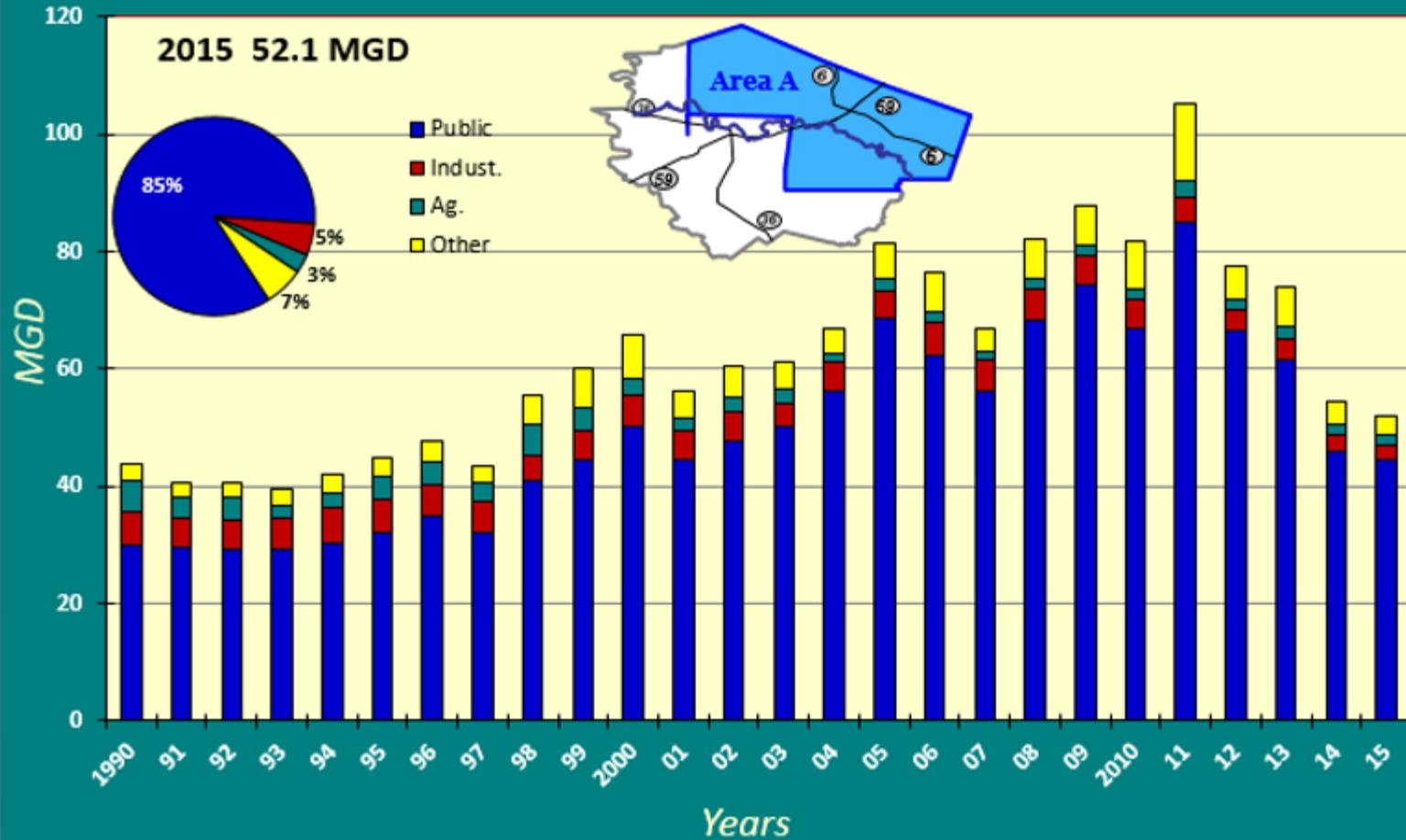
There have been no changes to the District Plan since it was adopted in 2013.

However, the FBSD Board adopted new Rules on July 22, 2015. There were three significant changes.

1. The one small-well exemption has been removed.
2. New wells for houses and/or irrigation for houses require permits if other water is available.
3. All wells are now required to be metered except for wells with an allocation of 1.0 MG or less.

Groundwater Withdrawals

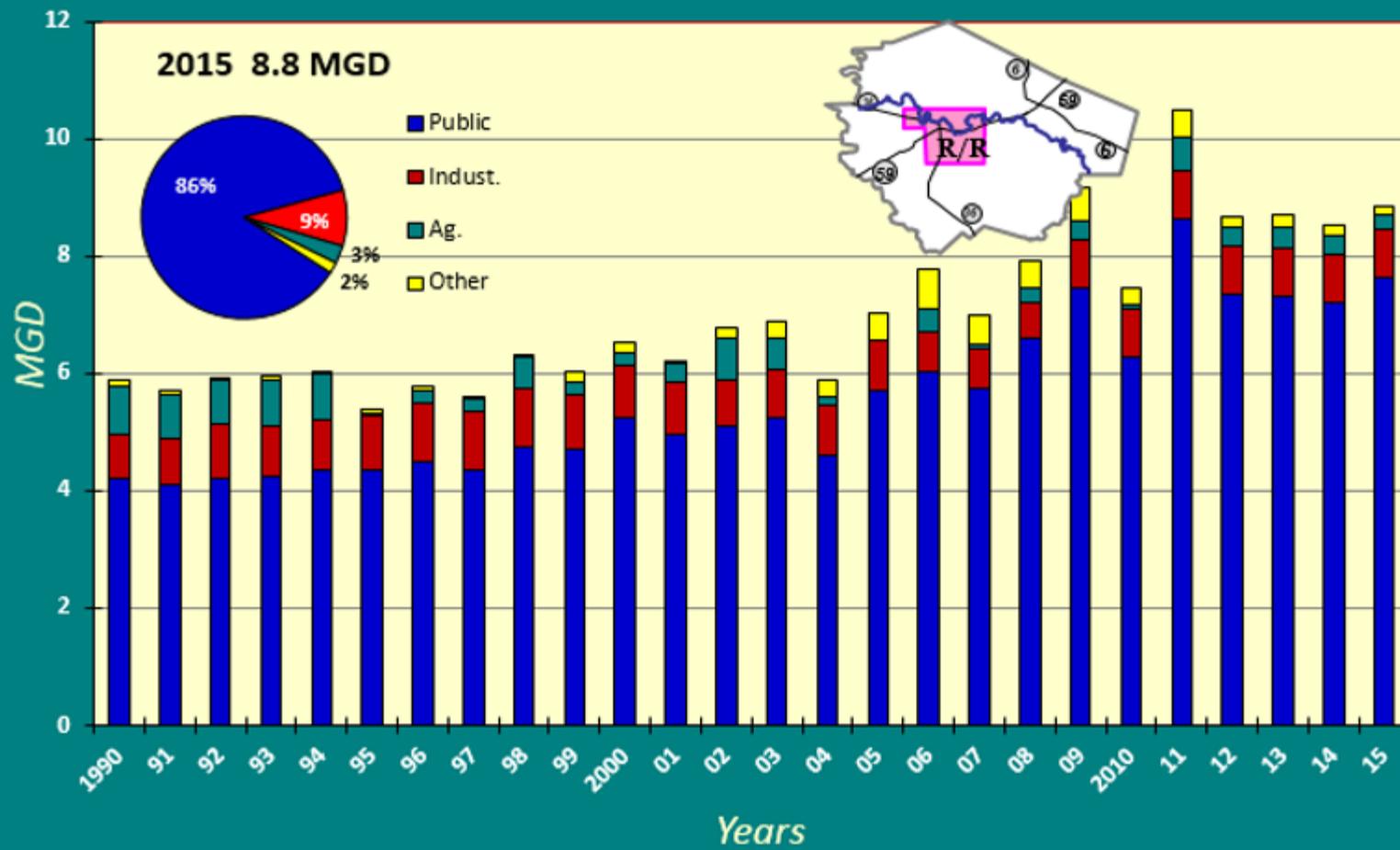
Grouped by Use - Regulatory Area A





Groundwater Withdrawals

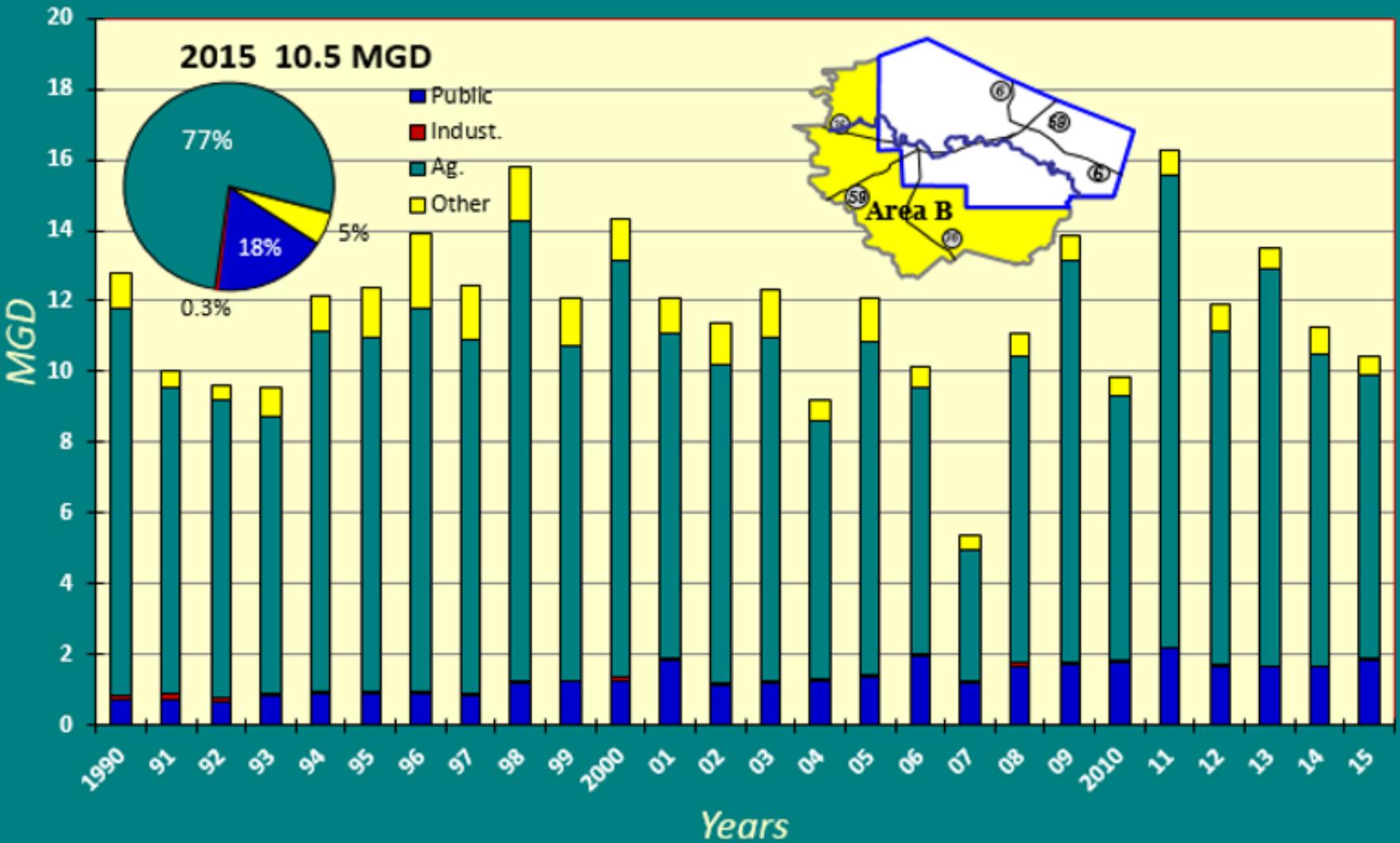
Grouped By Use - Sub-Area R/R





Groundwater Withdrawals

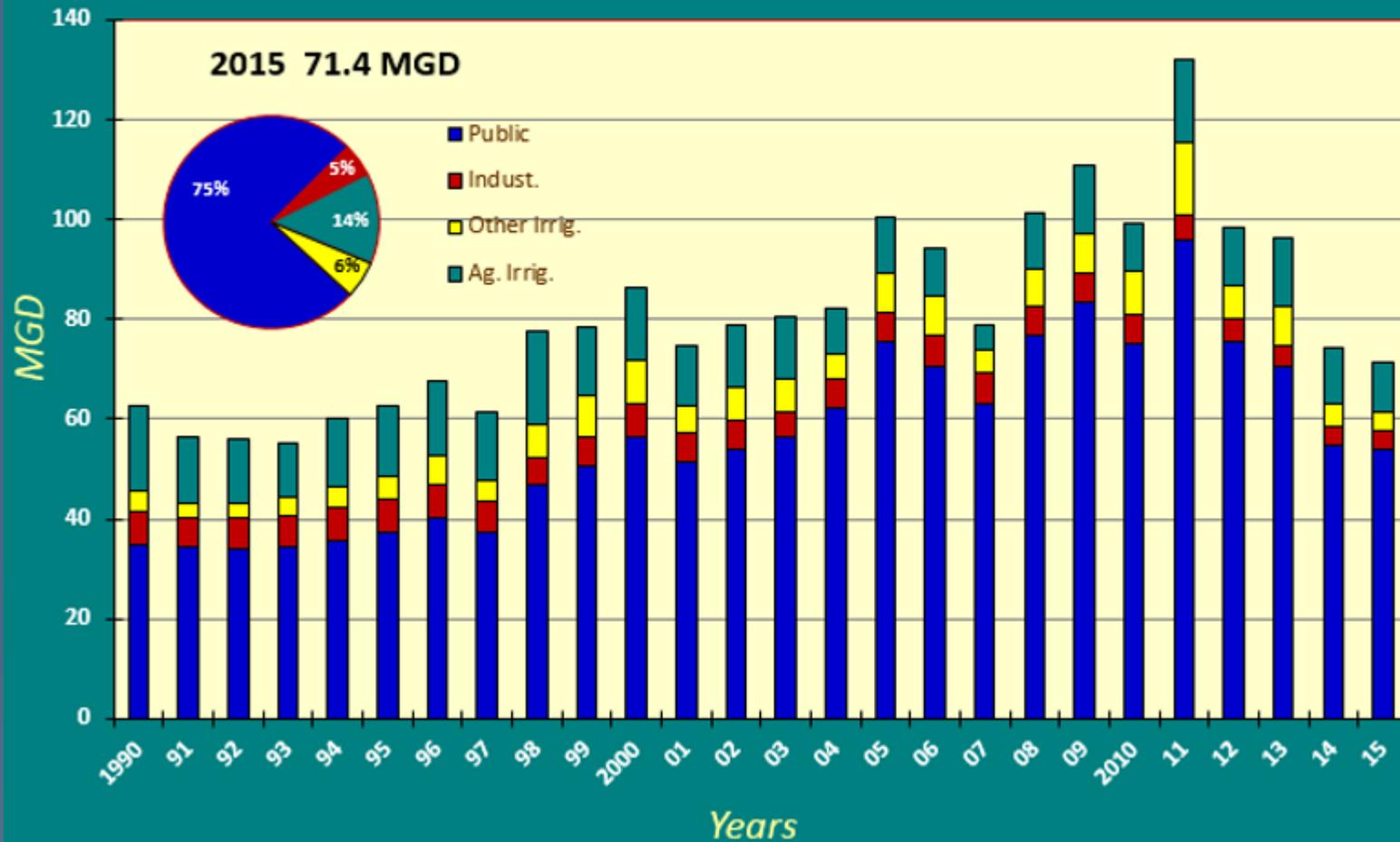
Grouped by Use - Regulatory Area B

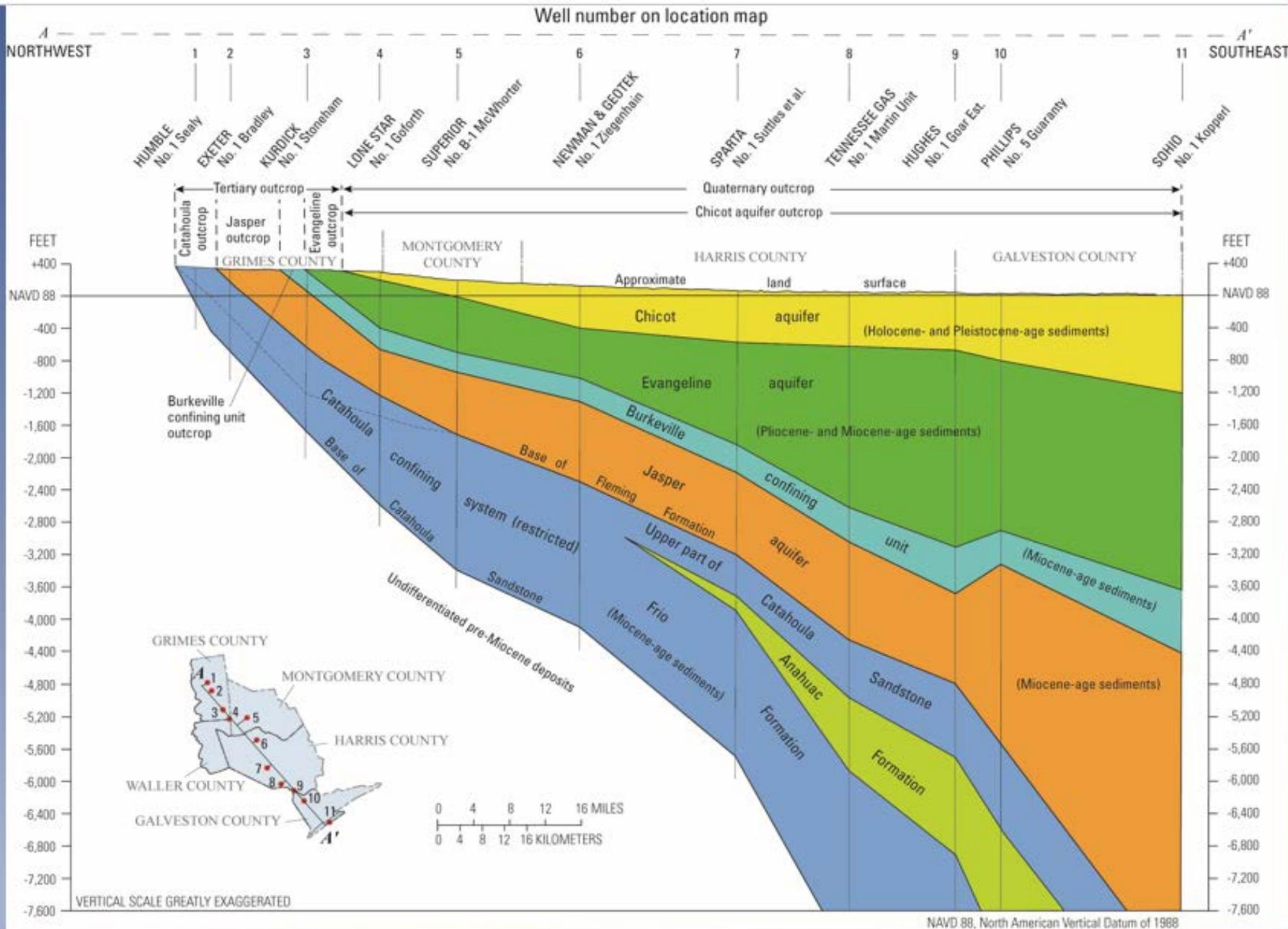




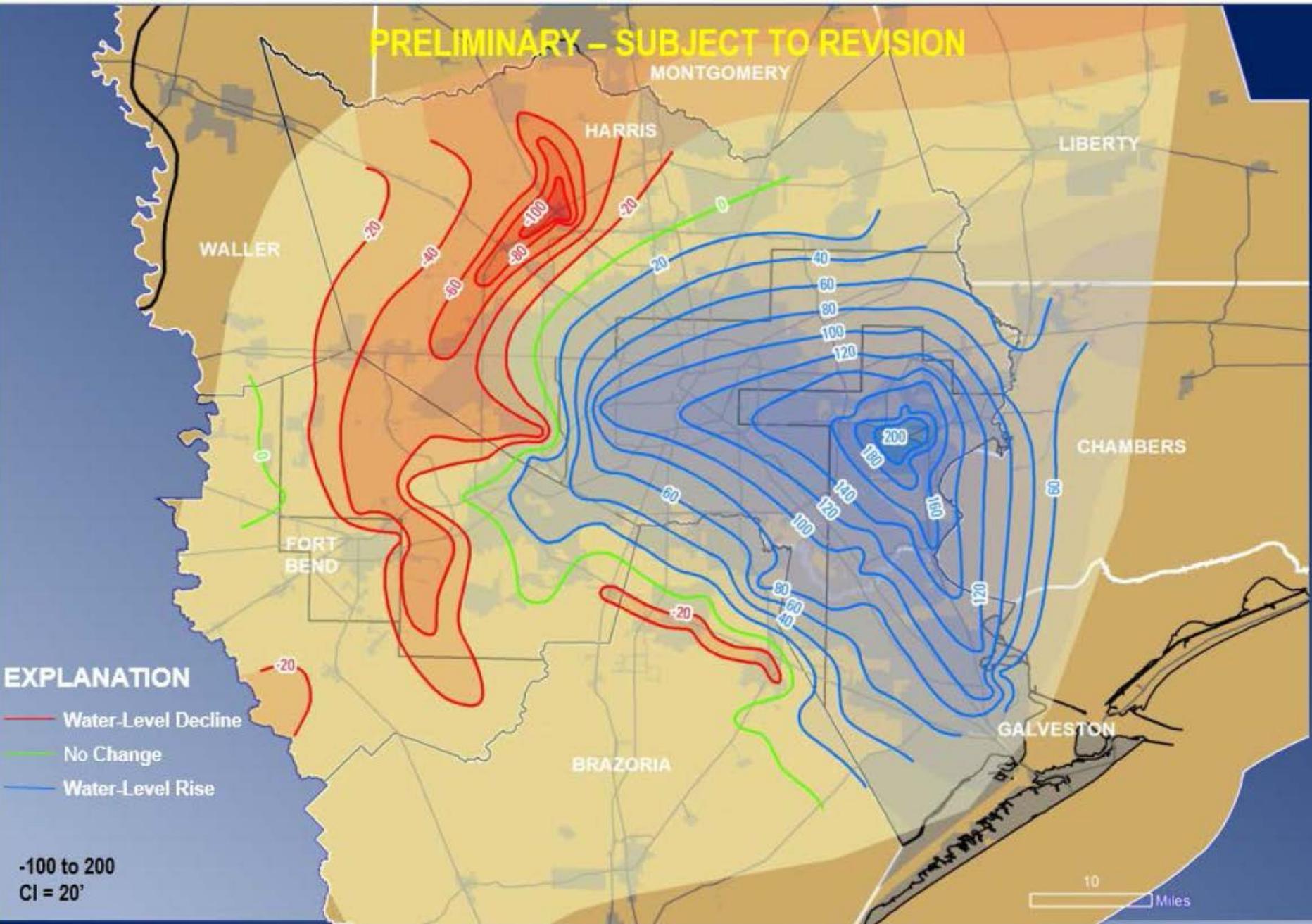
Groundwater Withdrawals

Grouped By Use - Entire District





PRELIMINARY – SUBJECT TO REVISION



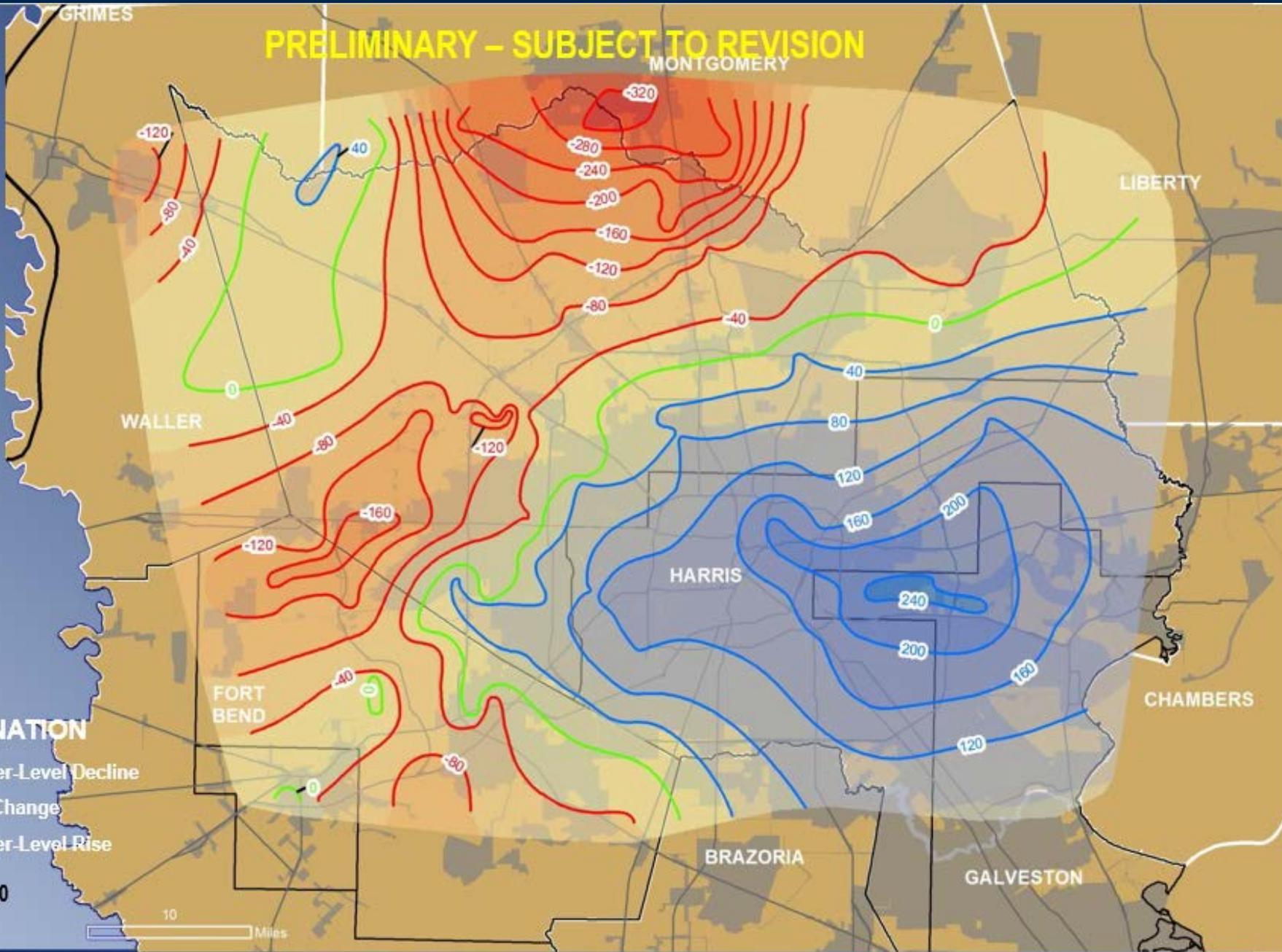
EXPLANATION

- Water-Level Decline
- No Change
- Water-Level Rise

-100 to 200
CI = 20'

10 Miles

PRELIMINARY – SUBJECT TO REVISION



EXPLANATION

- Water-Level Decline
- No Change
- Water-Level Rise

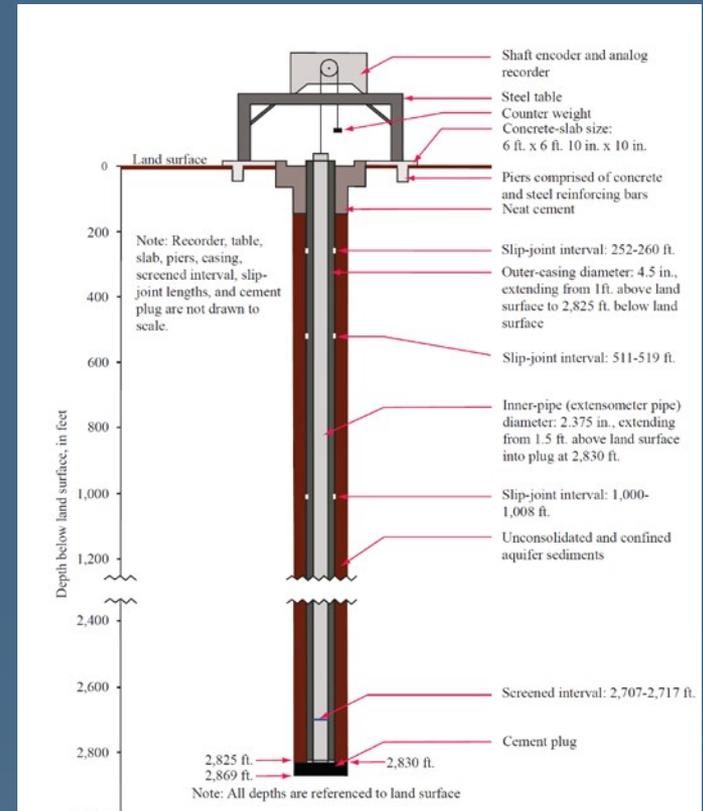
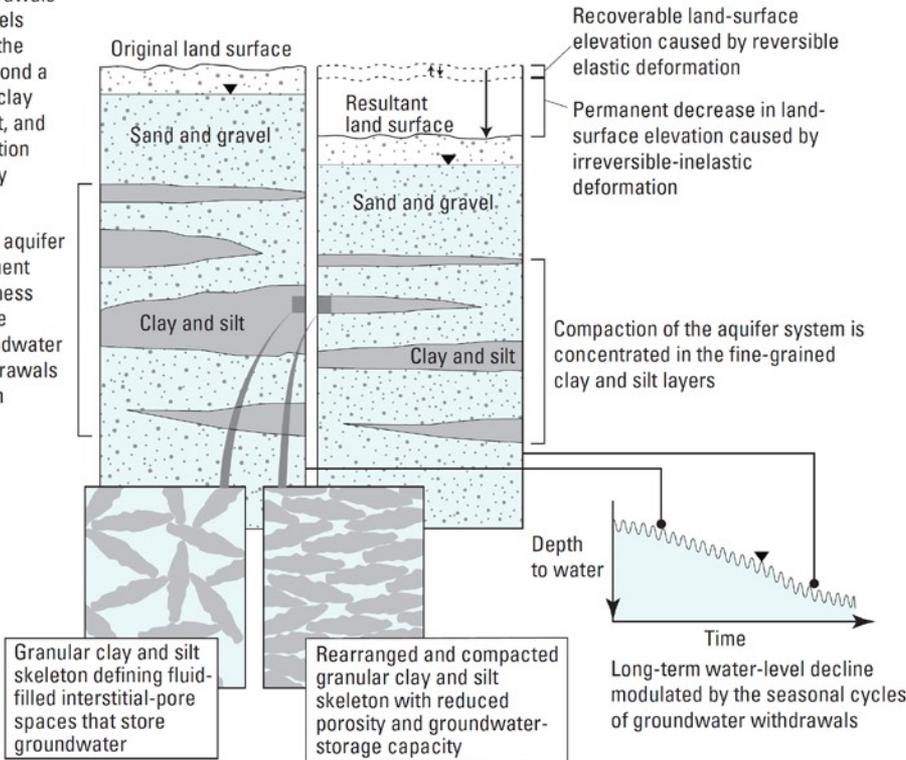
-320 to 240
Cl = 40'



Compaction Mechanics and Method of Measurement

When long-term withdrawals lower groundwater levels and raise pressure on the clay and silt layers beyond a threshold amount, the clay and silt layers compact, and the land-surface elevation decreases permanently

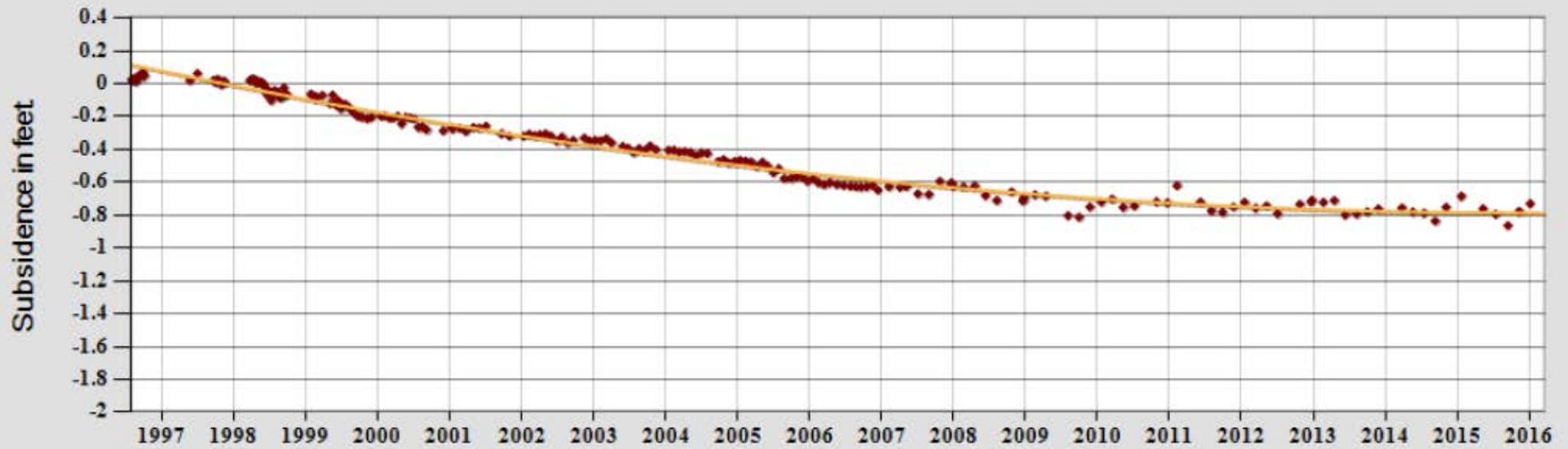
Initial aquifer sediment thickness before groundwater withdrawals began



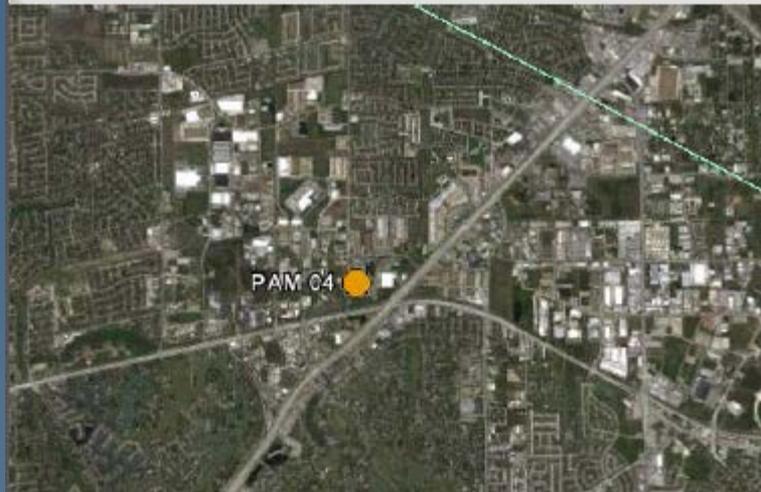
FBSD Subsidence Monitor Site – PAM 04 – Sugar Land

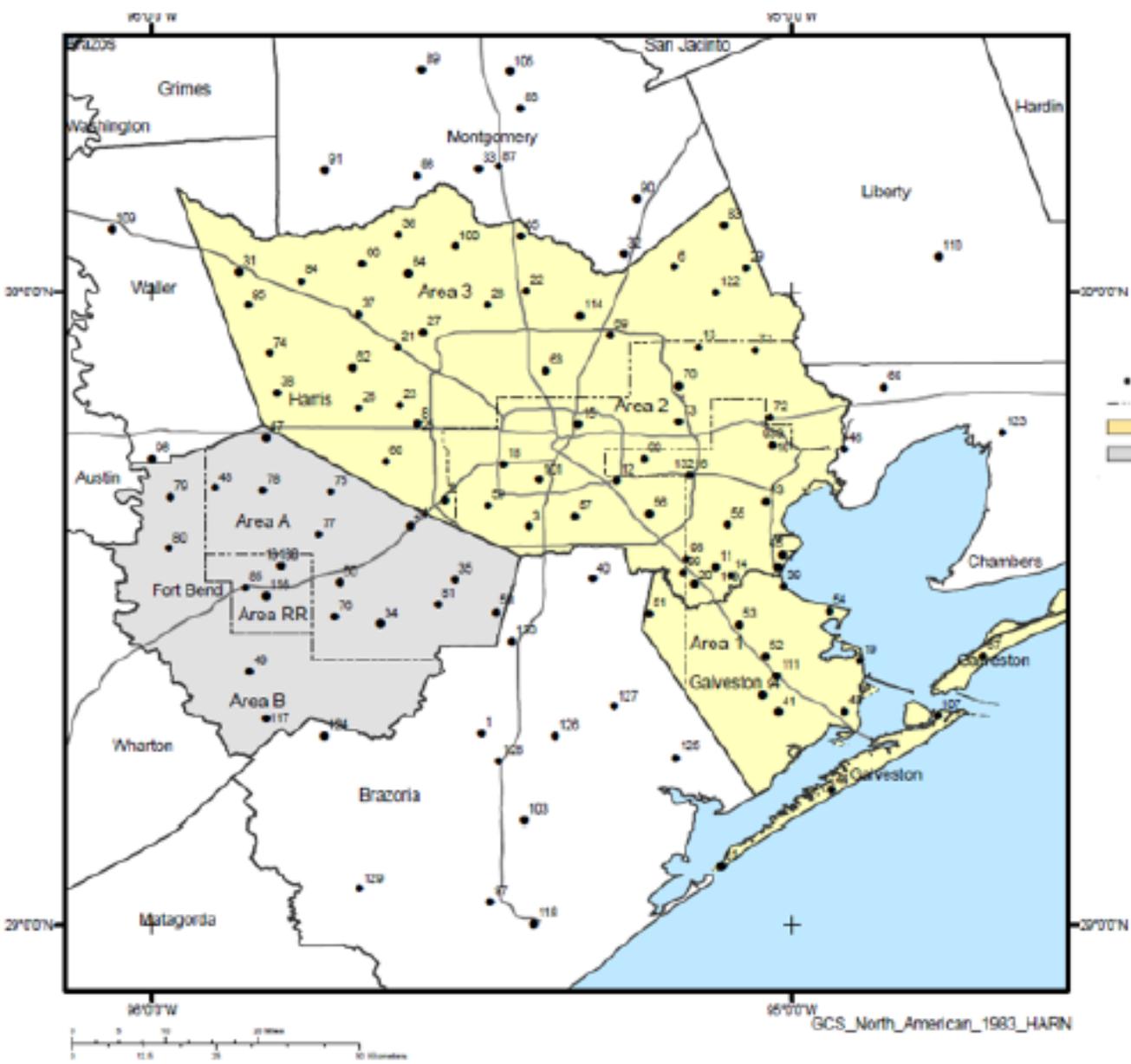
Fort Bend Subsidence District - PAM 04

Subsidence Observations



• Data Points — Regression Line



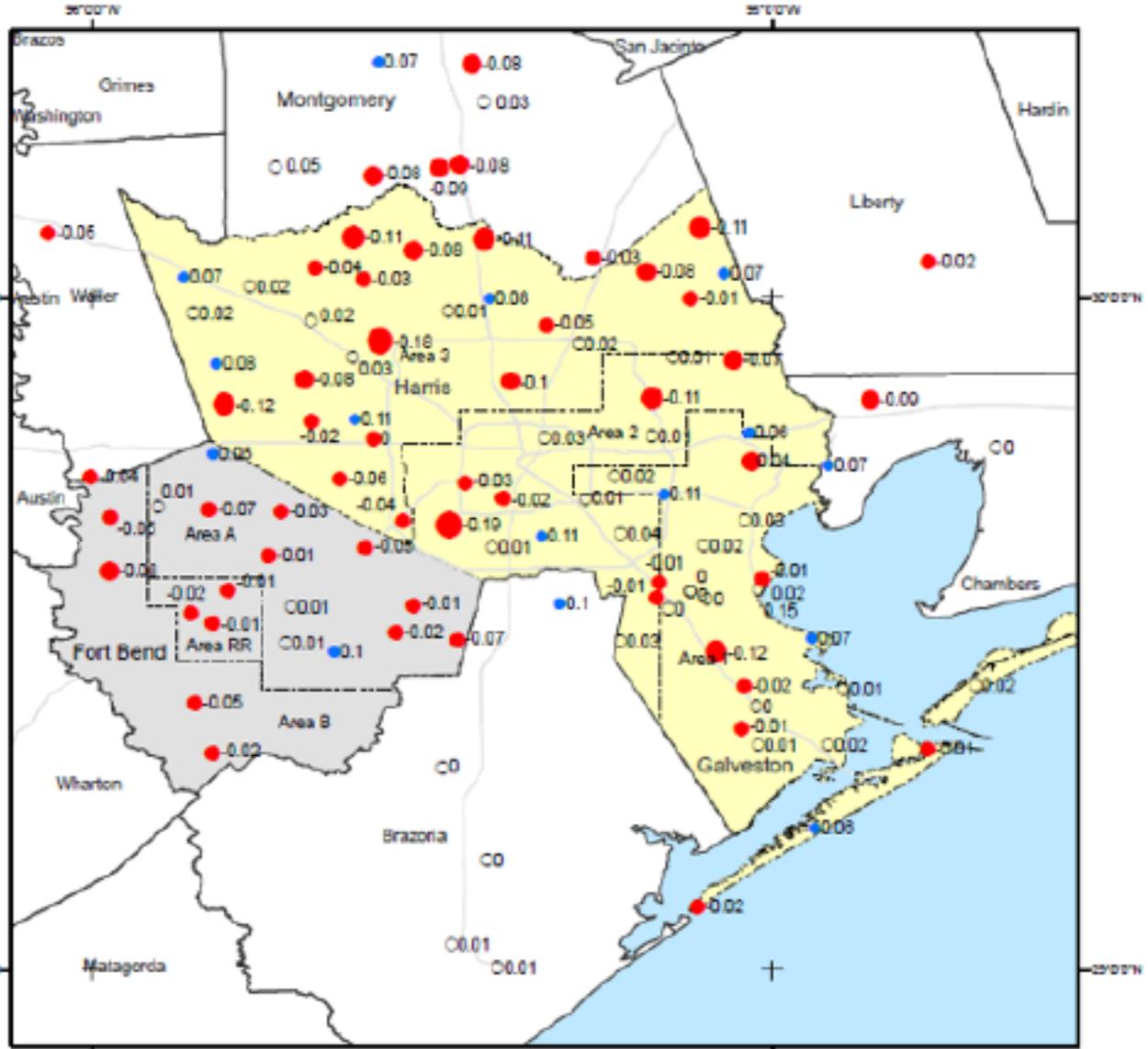


EXPLANATION

- Subsidence Monitoring Sites and Extensometers
- - - Regulatory Area Boundary
- Harris-Galveston Subsidence District
- Fort Bend Subsidence District

Active Harris-Galveston Subsidence District and Fort Bend Subsidence District monitoring network, U.S. Geological Survey Extensometers, and National Geodetic Survey Continuously Operating Reference Stations, Harris and adjacent counties, Texas, 2015.

FBSD Exhibit 13

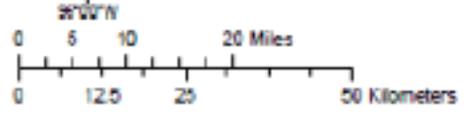


EXPLANATION

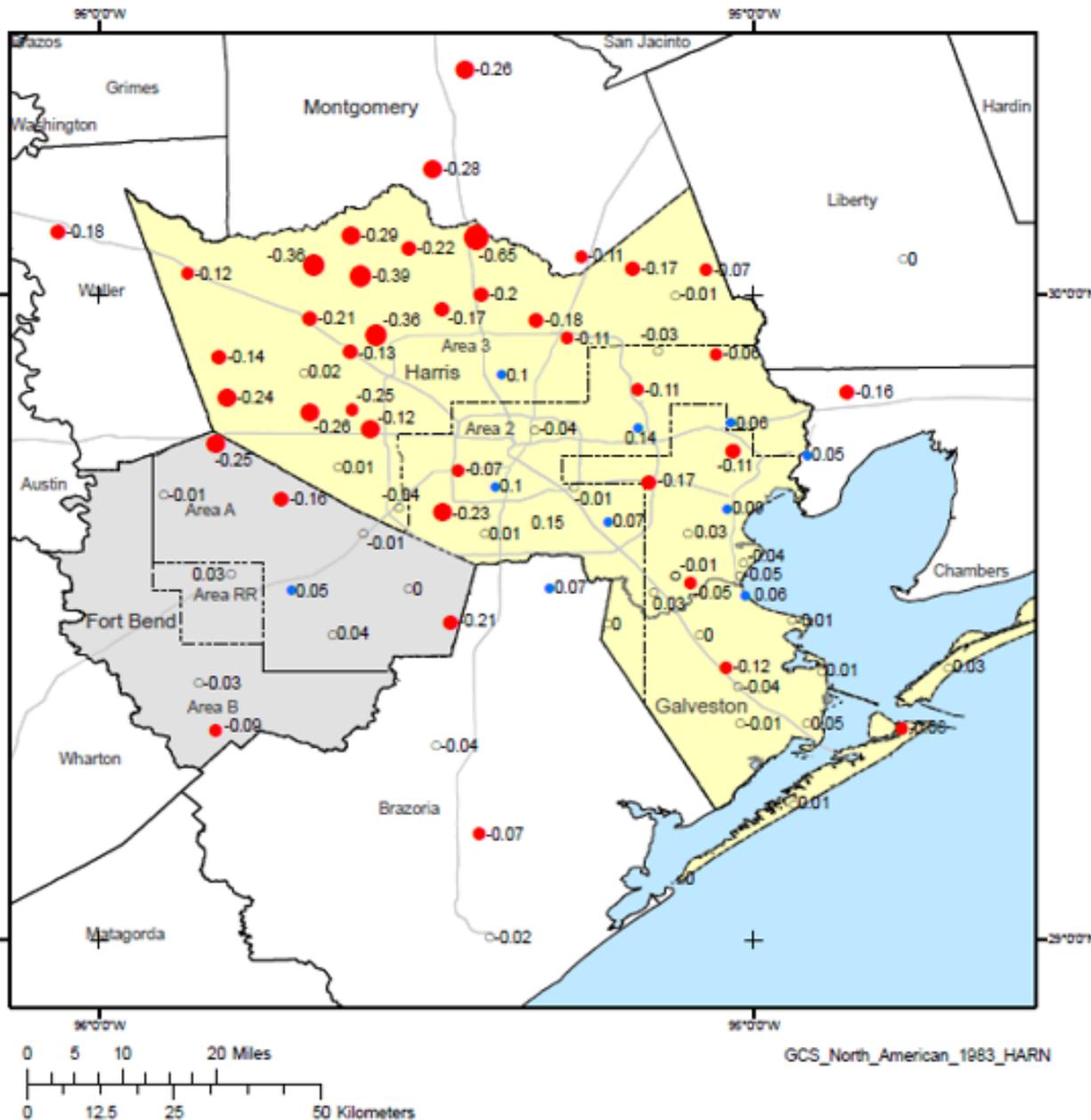
Ellipsoid change, in feet

- 0.05 to 0.12
- -0.00 to 0.05
- -0.06 to -0.00
- -0.10 to -0.07
- -0.16 to -0.10
- -0.186 to -0.17

Observed change in ellipsoid height, subsidence where negative and land-surface uplift where positive, at all active GPS, U.S. Geological Survey extensometers, and National Geodetic Survey Continuously Operating Reference Stations, Harris and adjacent counties, Texas, 2014-2015.



GCS_North_American_1983_HARN

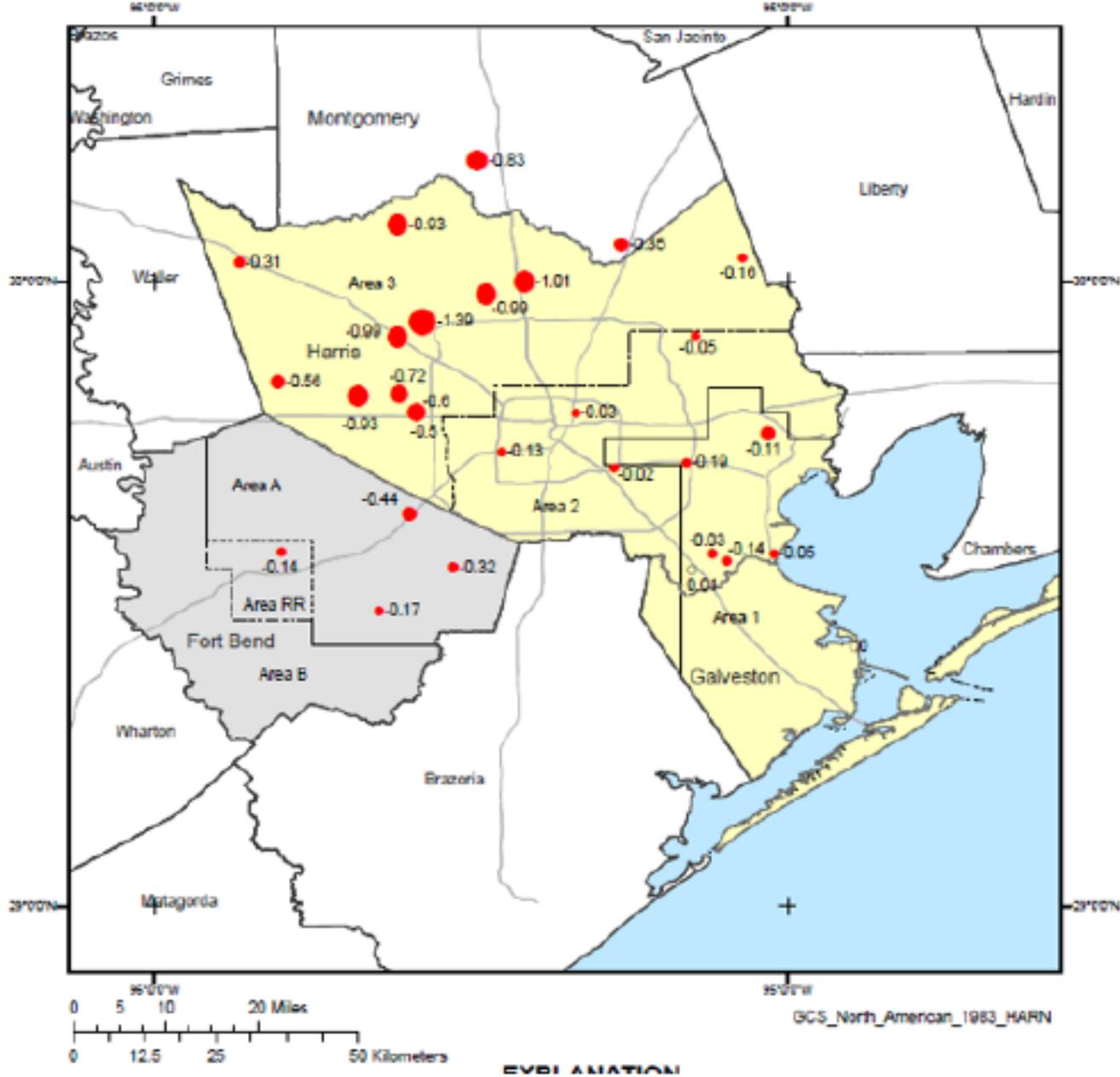


EXPLANATION

Ellipsoid change, in feet

- 0.05 to 0.15
- -0.04 to 0.05
- -0.12 to -0.05
- -0.22 to -0.12
- -0.34 to -0.22
- -0.63 to -0.35
- -0.65 to -0.64

Observed change in ellipsoid height, subsidence where negative and land-surface uplift where positive, at all active GPS, U.S. Geological Survey extensometers, and National Geodetic Survey Continuously Operating Reference Stations, Harris and adjacent counties, Texas, 2010-2015.



EXPLANATION
Ellipsoid Change, in feet

- -0.01 to 0.01
- -0.10 to -0.01
- -0.34 to -0.20
- -0.50 to -0.35
- -0.70 to -0.60
- -1.30 to -0.80
- -1.38

Observed change in ellipsoid height, subsidence where negative and land-surface uplift where positive, at all active GPS, U.S. Geological Survey extensometers, and National Geodetic Survey Continuously Operating Reference Stations, Harris and adjacent counties, Texas, 2000-2015.

PAMS Change Table

PAM Sites		First	Subsidence (feet)	
ID	Location	Observation	2015	Cumulative
04	Sugar Land	8/2/1996	-0.05	-0.73
10	Rosenberg	1/15/1999	-0.01	-0.17
14	Smithers' Lake	11/17/2000	0.10	-0.18
16	Kitty Hollow Park	11/9/2000	-0.01	-0.31
21	Pearland (B)	1/30/2002	0.10	-0.02
29	Katy	4/28/2007	0.05	-0.38
30	Fulshear	5/8/2007	0.01	0.01
31	Needville	5/8/2007	-0.05	-0.02
32	Greatwood	5/8/2007	0.01	0.04
40	Arcola	5/8/2007	-0.07	-0.24
41	610 Loop Southwest (H)	6/27/2007	-0.19	-0.21
42	Highway 6 at Bissonnet Road (H)	7/5/2007	-0.06	-0.11
57	South Cinco Ranch	2/19/2009	-0.03	-0.12
58	George Ranch	8/4/2010	0.01	-0.06
59	Pecan Grove	7/28/2010	-0.01	0.00
60	Fulshear at Gaston Road	2/8/2012	-0.07	-0.15
61	Simonton	2/16/2011	-0.05	-0.11
62	Orchard	2/16/2011	-0.08	-0.07
63	Missouri City at Brazos River Pump Inlet	6/7/2011	-0.02	-0.00
67	Rosenberg at Interstate 69	2/9/2011	-0.02	-0.03
78	South Waller (W)	5/2/2014	-0.04	-0.01

CORS Change Table

Cooperative CORS Sites		First	Subsidence (feet)	
ID	Location	Observation	2015	Cumulative
ANG5	US Coast Guard – Angleton (B)	1/1/2008	-0.00	-0.04
COH1	City of Houston – Southwest (H)	1/24/2007	0.03	-0.07
COH2	City of Houston – South (H)	1/24/2007	0.04	-0.02
DWI1	SMRTNT – Clute (B)	8/27/2009	0.01	-0.07
TXAG	TxDoT – Angleton (B)	1/23/2007	-0.00	-0.10
TXHE	TxDoT – Hempstead (W)	1/23/2007	-0.05	-0.27
TXRS	TxDoT – Rosenberg	5/15/2011	-0.01	-0.05
TXWH	TxDoT – Wharton (WH)	3/27/2010	-0.02	-0.02

Fort Bend Subsidence District

www.fbsubsidence.org



Groundwater Reduction Plan Implementation Update

Katie Clayton, P.E.
Water Resources Manager

GRP Participants

Public Water Systems

- 💧 FB MUD 106 (Greatwood)
- 💧 FB MUD 112 (New Territory)
- 💧 Plantation MUD (Tara Plantation)
- 💧 Royal Valley Utilities
- 💧 City of Sugar Land
 - 💧 Texas Dept. of Criminal Justice

Private Businesses

- 💧 Texas Par Golf
- 💧 River Pointe Golf
- 💧 WSG Sweetwater
- 💧 Schlumberger

Home Owner Assoc & Levee Dist

- 💧 Royal Lakes Estates HOA
- 💧 Avalon CAI
- 💧 Sugar Mill CAI
- 💧 Sugar Lakes HOA
- 💧 First Colony Comm Association
- 💧 New Territory Res. Comm Assoc.
- 💧 River Park HOA
- 💧 LID 17 (Telfair Levee Dist.)

GRP Water Demand

Million Gallons per Day (MGD) Average Day

<i>FBSD Year</i>	<i>Demand</i>	<i>Conversion</i>	
		<i>Actual</i>	<i>Required</i>
2009-10	24.22	1.17	
2010-11	25.43	1.20	
2011-12	30.37	1.29	
2012-13	24.70	0.67	
2013-14	25.03	3.38	
2014-15	22.09	9.39	6.75 30%
2015-16	22.87	9.72	6.86 30%
2024	34.56		10.37 30%
2025	34.58		20.75 60%
Ultimate	36.45		21.87 60%

GRP Water Supply

- **Raw Surface Water**
 - **GRP long term conversion requirements:**
 - 9 MGD in 2014, 22 MGD in 2025
 - **Current Sources**
 - Oyster Creek Water Right
 - Gulf Coast Water Authority
 - Brazos River Authority
- **Reclaimed Water from WWTPs**
- **Groundwater**
 - Wells will supplement peak demands

Raw Water Supply

➤ Oyster Creek Water Right

- 16.3 MGD (on paper)
- During drought City will limit use to 4.89 MGD per Settlement Agreement with Gulf Coast Water Authority (GCWA)

Raw Water Supply

Gulf Coast Water Authority

➤ GCWA Water Supply Agreement:

- **10 MGD Take @ \$ 204.35 per million**
 - 2016 Rate \$ 192.47 per million
 - 2015 Rate \$ 141.82 per million
- **10 MGD Option @\$ 40.87 per million**
 - 2016 Rate \$ 38.49 per million
 - 2015 Rate \$ 23.69 per million

Raw Water Supply

Brazos River Authority (BRA)

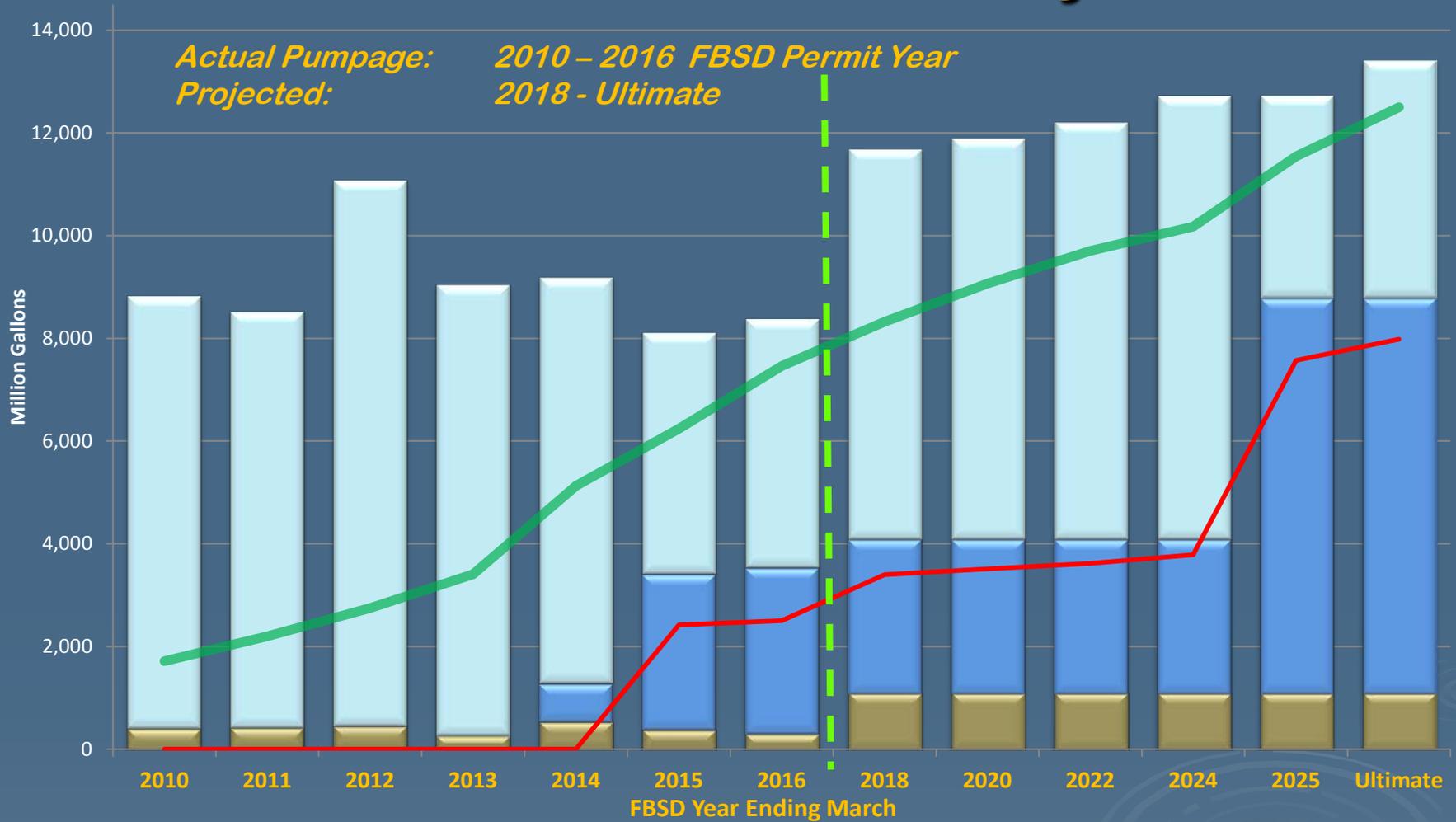
- 6,388 acre feet
- Stored Reservoir Water
- Considered backup water for times of drought
- 2017 Rate Increased to \$220.96 per million
 - 2016 Rate \$216.36 per million
 - 2015 Rate \$213.29 per million

GRP Implementation Strategy

Four Implementation Strategies

1. **Surface Water Treatment Plant**
 - 9 MGD until 2025 expansion to 20 MGD
2. **Raw Surface Water Pump Stations**
 - GRP assumes 2 MGD
3. **Water Reuse / Reclaimed**
 - WMP Projections assume 2 MGD
 - South WWTP
 - New Territory (West) WWTP
 - North WWTP
4. **Water Conservation**

GRP Conversion & Projection



■ Total Raw, Reclaimed, & 50% Reclaimed

■ Surface Water Treatment Plant

■ Groundwater Wells

— FBSD Required Conversion

— Cumulated Groundwater Credits

Source Data: 2012 Water Master Plan & GRP Annual Production; Projection assumes max. 3 MGD Raw & Reclaimed Production

GRP Implementation Strategy

1. Surface Water Treatment Plant

- Operational and Online November 2013
 - 9 MGD - Re-rated to 10.85 MGD
 - Re-rating provides operational flexibility
 - Expand to 22 MGD in 2025
- Over convert dense areas (City Potable Utility) – minimize transmission lines
- Surface water delivered to groundwater plants for distribution and blending to minimize changes in taste
- Peak water demands met from groundwater

SWTP Implementation Strategy

Transmission Lines

Completed Projects

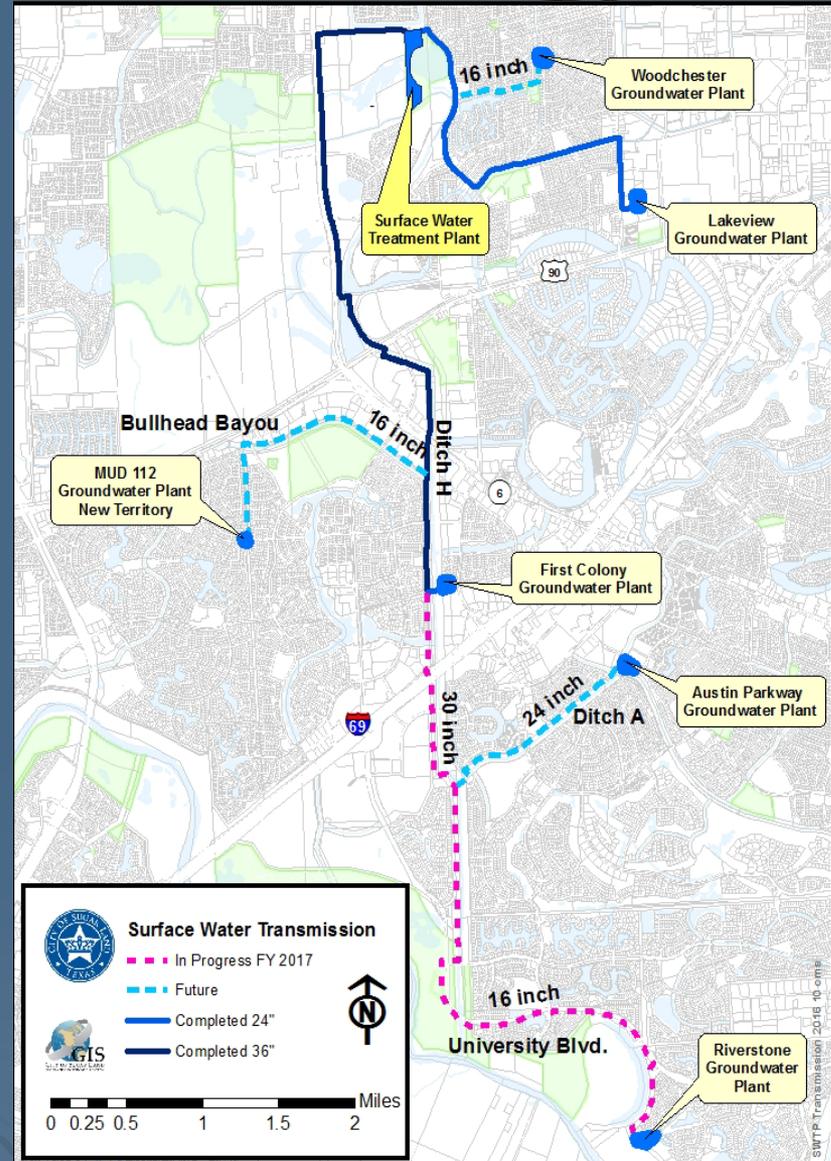
- Lakeview WP
- First Colony WP

Current Project

- Riverstone WP

Future Projects

- Austin Parkway WP
- New Territory WP
- Woodchester WP



GRP Implementation Strategy

2. Raw Surface Water Pump Stations

- Lake Pointe Irrigation
- Telfair Lake Filling
- Venetian Estates Lake Filling and Irrigation
- Sugar Lakes Pump Station

3. Water Reuse /Reclaimed

- South WWTP - *online September 2015*
- New Territory (West) WWTP
- North WWTP

4. Water Conservation

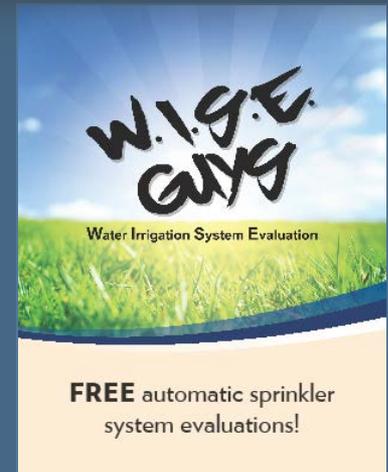
Water Conservation

➤ Goal:

- Reduce “wasteful” outdoor use
- Reduce peak demands
- Partnership & Education;
Not Restriction & Regulation

➤ Programs:

- Residential Irrigation System Evaluations
 - *Free* to Residents in the GRP Planning Area
- Water My Yard: watermyyard.org
 - FBSD & AgriLIFE Extension ET Network



Groundwater Credits Earned

1. Early Conversion

- Raw Water Projects
- Surface Water Treatment Plant (Nov.-Mar.)

2. Over Conversion

3. WaterWise Conservation Education

- Presentations to 4th - 5th Graders

- Total Credits as of March 2016: **7.46 billion gal**
60% conversion at Ultimate Demand for 8.5 months
- Value: Disincentive Fee \$ 6.50/1000 gal = **\$48.5 million**

GRP Projects

In Progress:

- Surface Water Transmission to Riverstone Water Plant

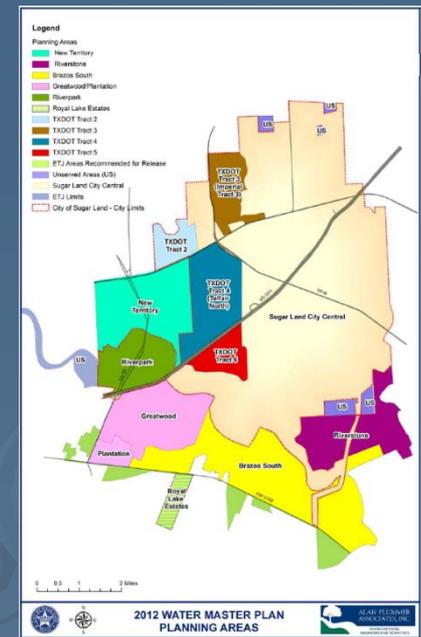
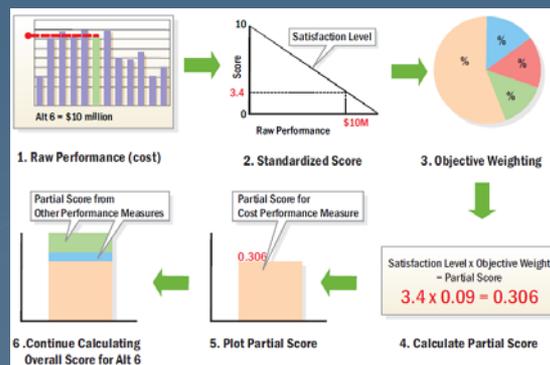
New

- Integrated Water Resource Plan

Integrated Water Resource Plan

- Incorporates the economics, reliability, equity, environment, and social aspects of water resource management
- Identify specific objectives for our community
- Outputs can include policy recommendations, management strategies, and capital projects

- 18 Month Timeline
- Council approval of Plan





Financial Update

Jennifer Brown
Director of Finance

GRP Philosophy

- **City Policy adopted in September 2002**
 - **We will Plan for the City and our ETJ.**
- **Separate GRP Fund Created, contains all Costs/Expenditures**
- **Costs of Surface Water Conversion Shared Equally among GRP Members**
- **Blended Rate for all Members**
- **All Participants Pay Based on Same Rates**
- **GRP Participants avoid disincentive fee of \$6.50 per 1,000 gallons**

Financial Capacity

- **Operations Funded in the Surface Water Fund**
 - **Enterprise Fund Separate from Water Utilities**
 - **Only Accounts for Surface Water Activities**
- **City sold 2011 CO's backed by GRP fees**
 - **More cost effective than revenue bonds**
 - **GRP Benefits from City's AAA bond rating**
 - **No bond coverage requirement**
- **No increase in GRP Rate anticipated for at least next 5 years**

Surface Water Fund

- **FY14 Begin SWTP Plant Operations Mid November**
- **Final GRP Rate Increase Implemented Jan 2014**
- **Plant Transitioned to Full City Operations in Summer 2014**

What Can Impact Rates

- **FBSD Regulations**
- **Future Expansions**
- **Dramatic Changes in Pumpage**
 - **Rainfall- High or Low**

Surface Water Fund

Prior Year Operating Results

	Revenues	Expenses	Net	GRP Rate
FY 08	\$4,864,709	\$2,636,519	\$2,228,190	\$0.25
FY 09	2,487,817	1,345,424	1,142,393	0.25
FY 10	4,379,854	1,984,577	2,395,278	0.60
FY 11	106,376,359	101,363,160	5,013,199	0.70
FY 12	9,996,039	10,320,727	-324,688	1.32
FY 13	13,149,299	7,047,527	6,101,772	1.50
FY14	13,473,739	14,396,372	-922,634	1.75
FY15	13,333,479	14,100,378	-766,900	1.75

Prior Year Capital Improvement Projects

Project Name	Funding
Newland Water Connection	\$ 443,732
Oyster Creek Raw Water Use	7,000
Non-Potable Water/ Pump Stations	503,623
Assets Purchased - WCID#1	49,561
Surf Wtr Transmission Ln	16,900,068
Surf Wtr Treatment Plant	81,935,521
Water Plant Upgrades	8,337,800
SCADA Comm. Conversion	385,000

Continued...

Prior Year Capital Improvement Projects

Project Name	Funding
SWTP OM Manual and SOP	417,830
SWTP Computerized Main.	473,479
SWTP CT Study/Tracer Test	75,000
SWTP Raw Monitoring Syst.	29,000
SWTP Membrane & LRV Test	155,000
Brooks Lake Wier/AMIL Gates	3,990,000
Dam 3 Flood Control Impr	88,800
Riverstone GWP Improvements	650,000
Transmission line to RSGWP	1,200,000
Total	\$ 115,641,414

Surface Water Fund

FY16 Estimates

Millions (\$)	FY16B	FY16E	Variance
Revenues	\$ 26.60	\$ 24.94	\$ -1.66
Expenses	26.60	26.10	0.50
Net Income	0.00	-1.16	-1.16

Surface Water Fund

5 Year Forecast

\$ Millions	FY17	FY18	FY19	FY20	FY21
Revenues	14.61	17.07	17.33	16.07	16.23
Expenses	15.52	14.93	15.03	15.16	15.30
Net Income	-0.91	2.14	2.30	0.91	0.93
End Balance	8.82	10.96	13.26	14.17	15.10

F16-21 Capital Projects

Project Name	FY16	FY17
Riverstone Water Plant Improvements	650,000	\$ 5,300,000
Riverstone Water Plant Connections	1,200,000	9,325,000
Total	\$ 1,850,000	\$ 14,625,000

Surface Water Comparative GRP Fees

Per 1,000 Gallons 2016 Rates	GRP Fee	Surface Water Fee
Sugar Land	\$1.75	\$1.88
<i>Comparative Rates:</i>		
Missouri City	1.65	2.12
West Harris County Water Authority	2.25	2.65
North Fort Bend Water Authority	2.75	3.10

Questions?

