

## GBRA Kendall County Water and Wastewater Planning Study Schedule

### Project Meetings:

01/11/2010	Public Kickoff Meeting Boerne Community Center	
03/23/2010	First Advisory Committee Meeting Cibolo Nature Center	1:30 to 3:30 pm
05/27/2010	Second Advisory Committee Meeting Cibolo Nature Center	1:30 to 3:30 pm
07/01/2010	Mid-Point Public Meeting Boerne Community Center	5:30 to 7:30 pm
07/22/2010	Final Advisory Committee Meeting Greater Boerne Chamber of Commerce	1:30 to 3:30 pm
09/14/2010	Final Public Meeting Boerne Community Center	5:30 to 7:30 pm



# Managing Water Solutions for the Future

Regional Water/Wastewater  
Planning for Kendall County  
and Fair Oaks Ranch, Texas

Kickoff Meeting

January 11, 2010

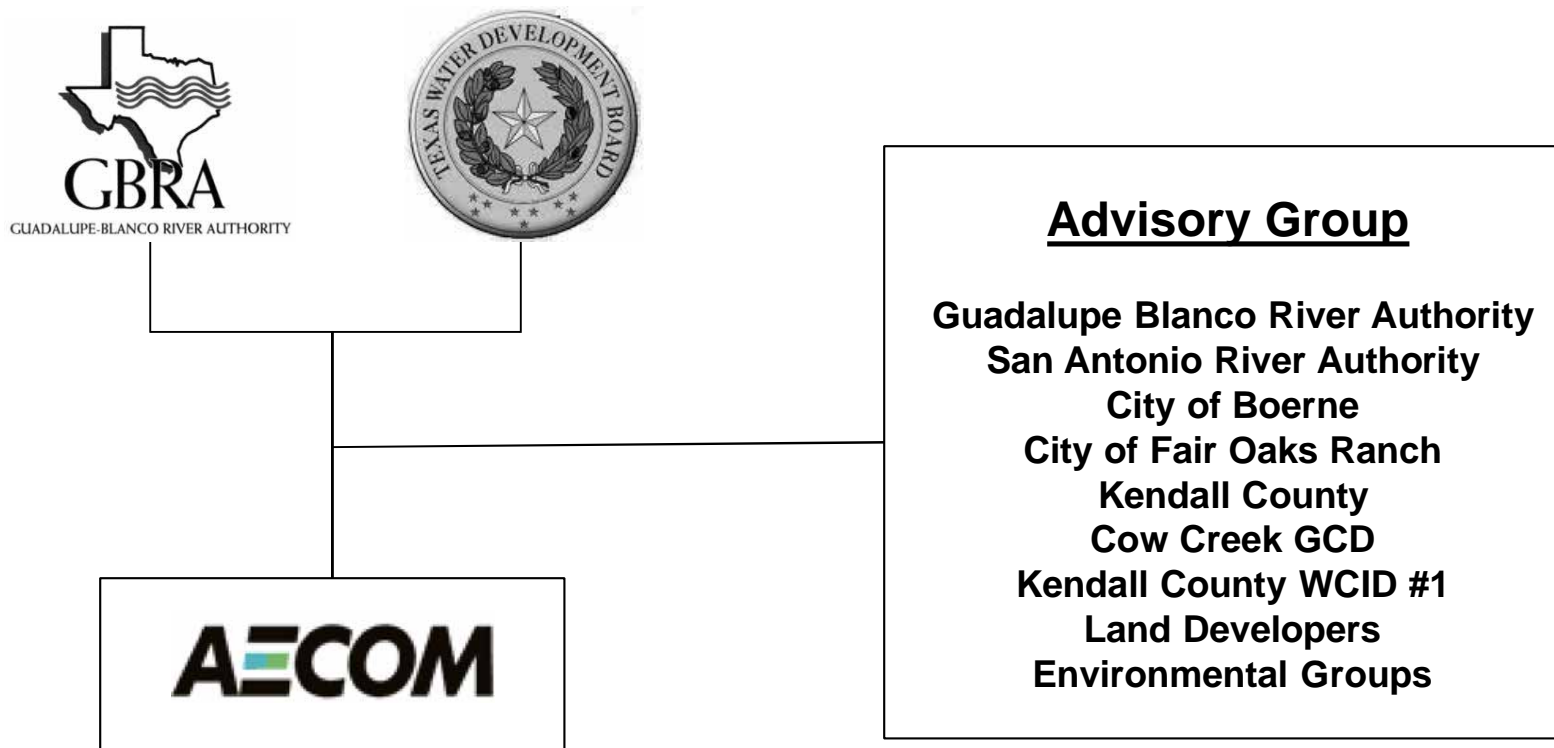
# Project Objective

*To provide the water supplies needed for future demands, through a thirty year planning period, while protecting the surface water quality and groundwater supplies in the area from adverse effects.*

# Planning Objectives

- Balanced management of water supply associated with development
- Focus on rural areas to identify and meet future needs

# Project Organization





# Scope of Work

# Tasks 1 – 3

## **Data Collection**

- **Accurate and Relevant Data**
- **Comprehensive GIS**

## **Public Participation**

- **Technical Support to Advisory Group**
- **Thorough Documentation**

## **Consensus Building**

- **Summary of Trends**
- **Specific Objectives**

# Task 4:

## Formulate Development Scenarios



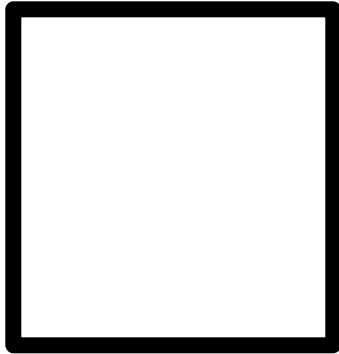


# Task 5: Analyze Surface Water and Groundwater Supply Options



# Task 6:

## Analyze Water Quality Options



# Task 7: Project Technical Plan



# Information Needed and Collected

- Permit limits for wastewater discharges
  - ✓ City of Boerne
  - ✓ Kendall County WCID #1
  - ✓ Cordillera Ranch and GBRA
    - Needed: Lerin Hills, Tapatio Springs Service Company
- Development ordinances for onsite treatment facilities including septic tank systems
  - ✓ Kendall County Development Rules
- Any storm water ordinances
  - None located to date

## Information Needed and Collected (Continued)

- Watershed Protection Plans
  - ✓ None. Work in progress for Cibolo Creek.
- Any surface water supply, water quality or groundwater studies
  - ✓ Groundwater Studies on Cow Creek GCD Website.
  - ✓ Cibolo Creek Water Quality Report (Feb 2009).
- Water Utility Survey
  - Being Formulated
  - Expect to receive in the next week

## Information Needed and Collected (Continued)

- Population and Demand Projection
  - ✓ Population projection from Region L, Texas State Data Center
  - ✓ 2000 Census Block and Tract Data
  - Needed: Spatial distribution of Population. Location of Future Developments
- Planned public infrastructure development
  - ✓ Diamond K Development, Esperanza: Proposed 1,250 acre master-planned community located just east of Boerne, Texas.

## Information Needed and Collected (Continued)

- Drought Management Practices
  - Requesting feedback on recent drought experience
- Water Quality Data
  - TSS, CBOD, DO,  $\text{NH}_3$ , N, P, *E. coli*/Fecal Coliform
- Physical properties of Guadalupe River
  - ✓ Kendall County FIS Study (Outdated)
    - Reach length, bottom width, depth, Manning's n, temperature of Guadalupe River

## Information Needed and Collected (Continued)

- Publicly Available Data
  - ✓ River basins. Watersheds, HUCs (8 digit).
  - ✓ Major Roadways, Rivers, Reservoirs
  - ✓ Administrative Boundaries: Counties, Cities, GCDs, River Authorities, Water/Wastewater CCN
  - ✓ Major/ Minor Aquifers
  - ✓ USGS Landcover Data
  - ✓ Wastewater Outfalls
  - ✓ 2000 Census Block and Census Tract Data
  - ✓ 2009 Texas State Data Center TIGER/ Line Data





# Population Projection

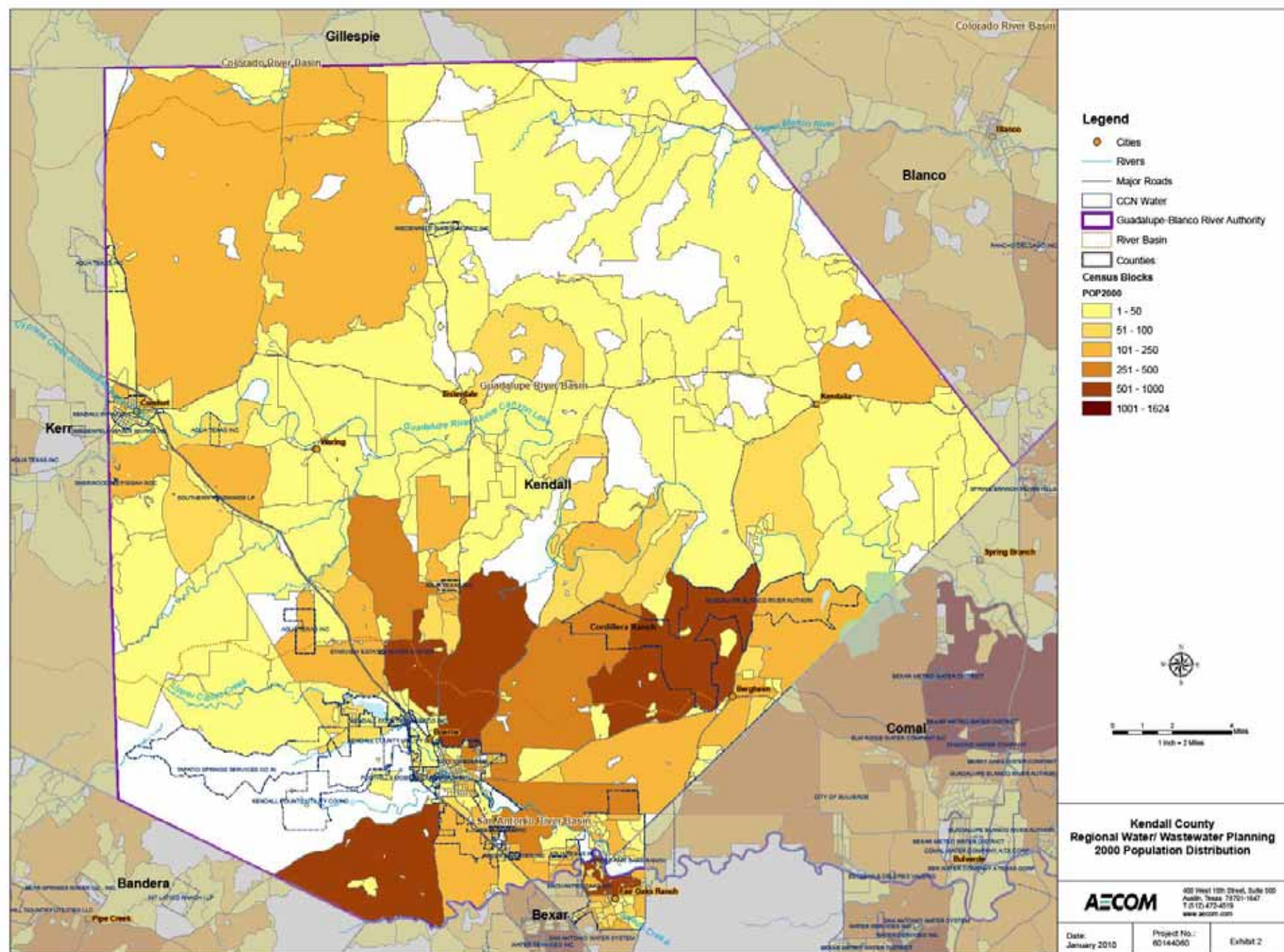
Year	Texas State Data Center Projection				Region L Projection
	Scenario 0.0	Scenario 0.5	Scenario 1.0	Scenario 2000-2007	
2000	23,743	23,743	23,743	23,743	
2005	23,992	26,692	29,678	29,047	
2010	24,427	29,939	36,620	35,351	35,720
2015	25,126	33,575	44,466	42,350	
2020	25,725	37,307	53,009	49,401	50,283
2025	26,039	40,999	62,029	56,223	
2030	26,073	44,411	71,052	62,749	65,752
2035	26,044	47,603	79,560	68,826	
2040	26,105	50,744	87,319	74,353	78,690

Scenario	Description
0.0	Inmigration = Outmigration
0.5	Average of 0.0 and 1.0
1.0	1990 to 2000 development trend
2000-2007	2000 to 2007 development trend

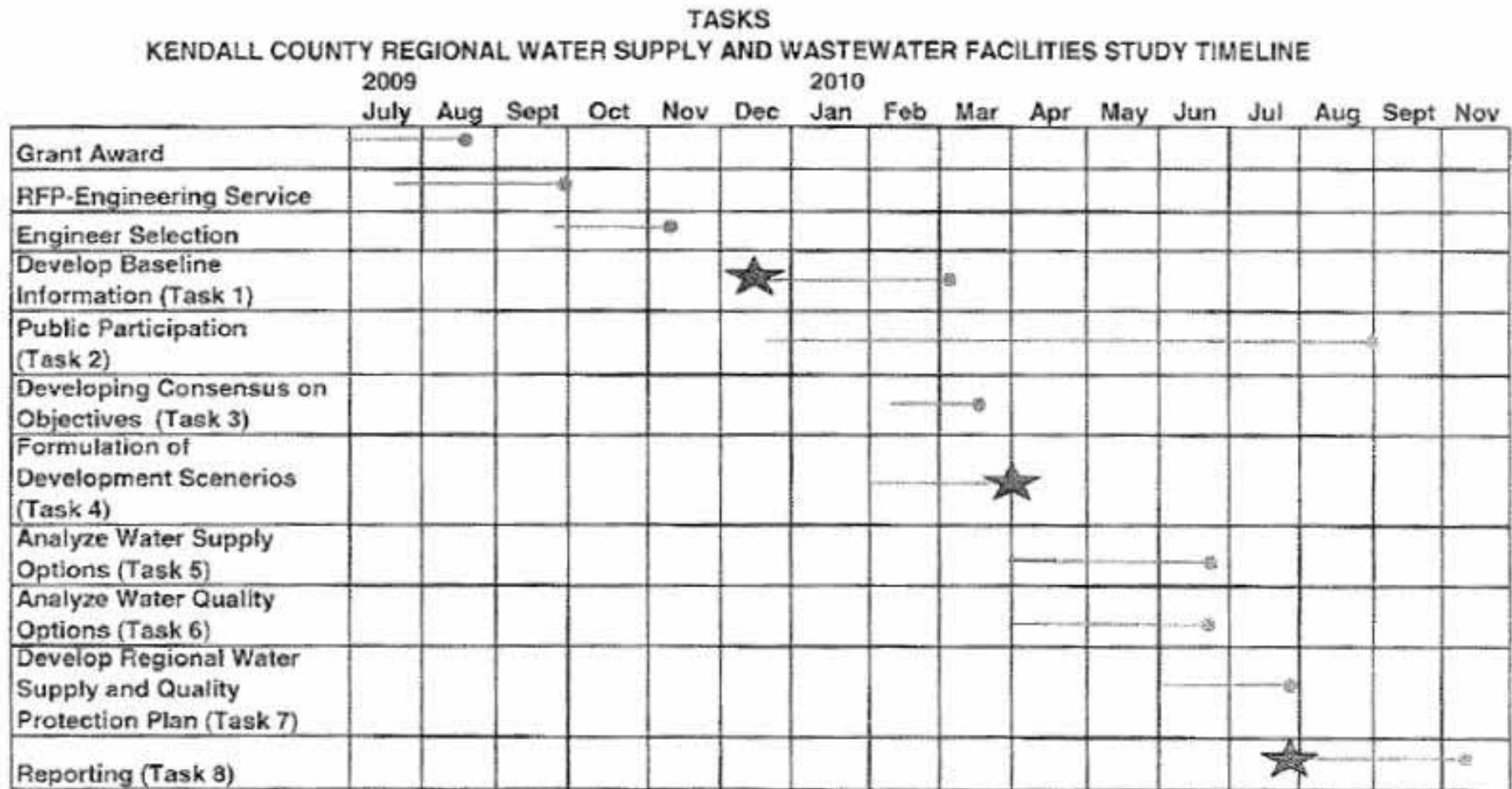


# Population Projection

Entity	2000 Census	2010 RWP Projection	1/1/2008 TSDC Estimate
Boerne	6,178	8,600	9,217
Fair Oaks Ranch	4,695	6,181	6,175
Kendall County	23,743	35,720	32,474



# Project Timeline



★ = public meeting

# Project Milestones

- Public Kickoff Meeting 01/11/2010
- Development Scenario Memo 03/26/2010
- Mid-point Public Meeting 03/31/2010
- Draft Report 08/2/2010
- Final Public Meeting 08/18/10
- Final Report 11/01/2010

# Questions ?





## Managing Water Solutions for the Future

Regional Water/Wastewater  
Planning for Kendall County  
and Fair Oaks Ranch, Texas

Advisory Committee Meeting

March 23 2010



## Outline

- Project Overview
  - Project Overview
  - Baseline Information
- Population Projections
  - Review and Identify Preferred
  - Distribution of Population
- Water Supply Options
- Wastewater Options

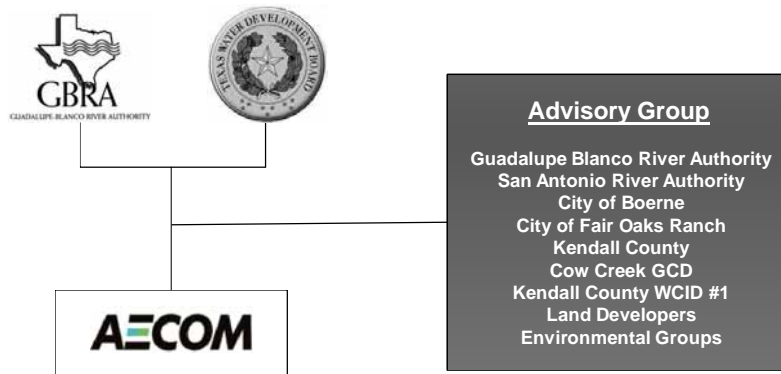
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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Planning Objectives

- Identify the water and wastewater facilities needed for future demands
  - *through a thirty year planning period*
  - *while protecting the surface water quality and groundwater supplies*
  - *including potential regional management for water and wastewater facilities associated with development*

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## Project Organization



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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Scope of Work



Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Baseline Information



- GIS Data (Handout)
- Water supply and water quality data (Handout)
- Reports and studies, ordinances (Handout)
- Water utility survey (Handout)
- List of water systems in Kendall County (Handout)
- Population and demand projection
- Planned public infrastructure development

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## Baseline Information (Continued)

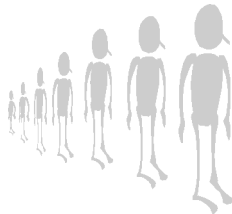
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## Population

- Review of Population Projection
- Decision on Preferred Projection
- Distribution of Population

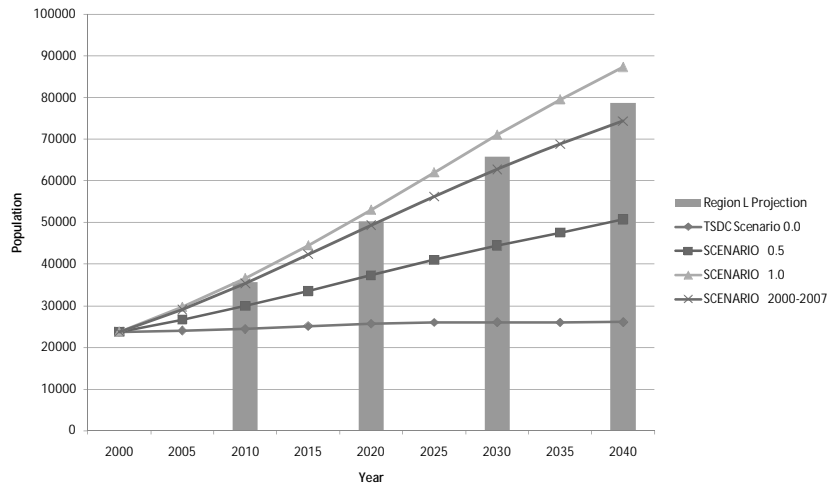


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# Comparison of Population Projections

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Kendall County Population Projections



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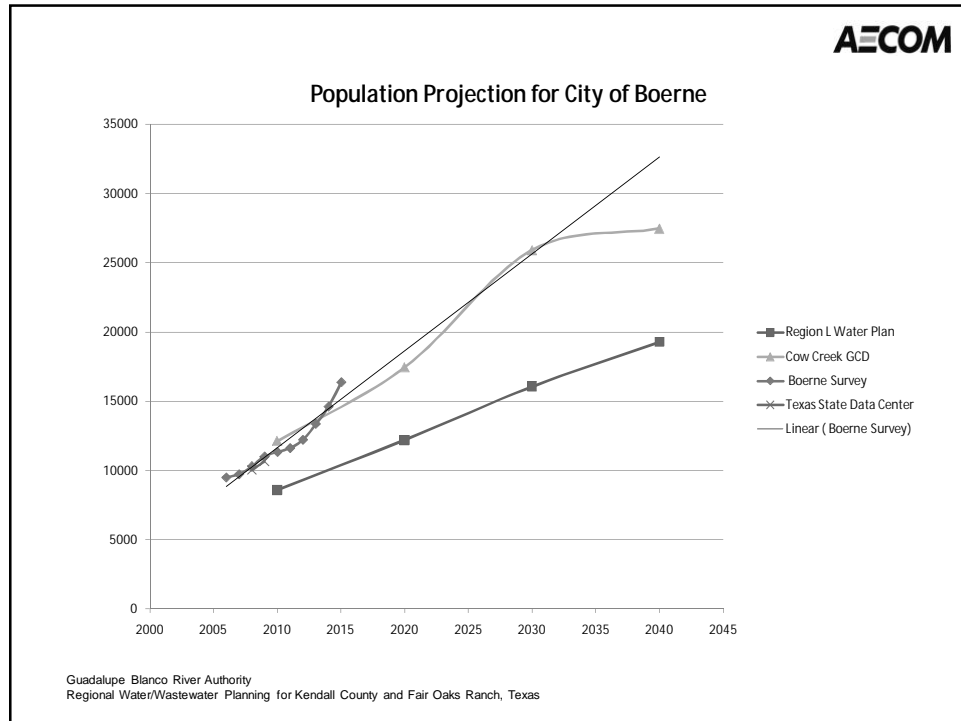
## Population Projection

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## Recommended Population Projection

Entity	2010	2015	2020	2030	2040
Boerne <sup>1</sup>	11,500	16,375	17,457	25,924	27,480
Fair Oaks Ranch <sup>2</sup>	1,234	1,258	1,282	1,308	1,335
Kendall County <sup>3</sup>	35,720	43,002	50,283	65,752	78,690

<sup>1</sup> 2010 and 2015 population estimate is provided by City of Boerne. 2020, 2030 and 2040 estimates are from Cow Creek GCD Water Management Plan.

<sup>2</sup> Region L Water Plan and Cow Creek GCD have same population projections for the Kendall County portion of Fair Oaks Ranch.

<sup>3</sup> Region L Water Plan.

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## Preferred Population Projection

- Discussion point
- Consensus

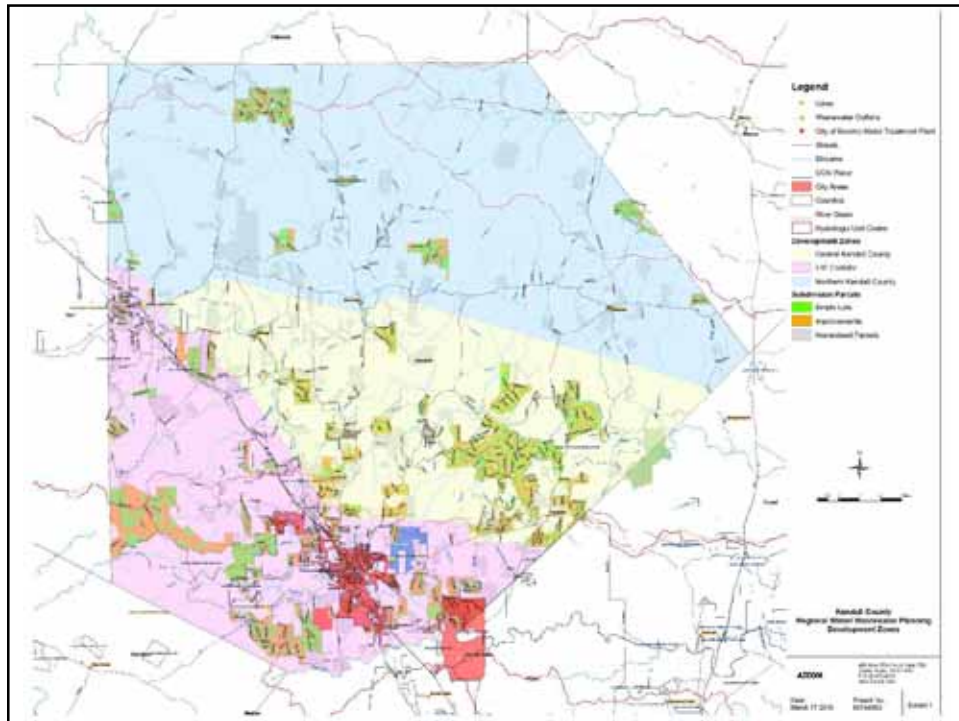
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## Distribution of 2010 Population

Entity	2010 Population	Source
Kendall County	35,720	Region L WP 2010 Pop
City of Boerne	11,500	Email from Mike Mann
Fair Oaks Ranch	1,234	Region L WP 2010 Pop
Kendall minus Cities	22,986	

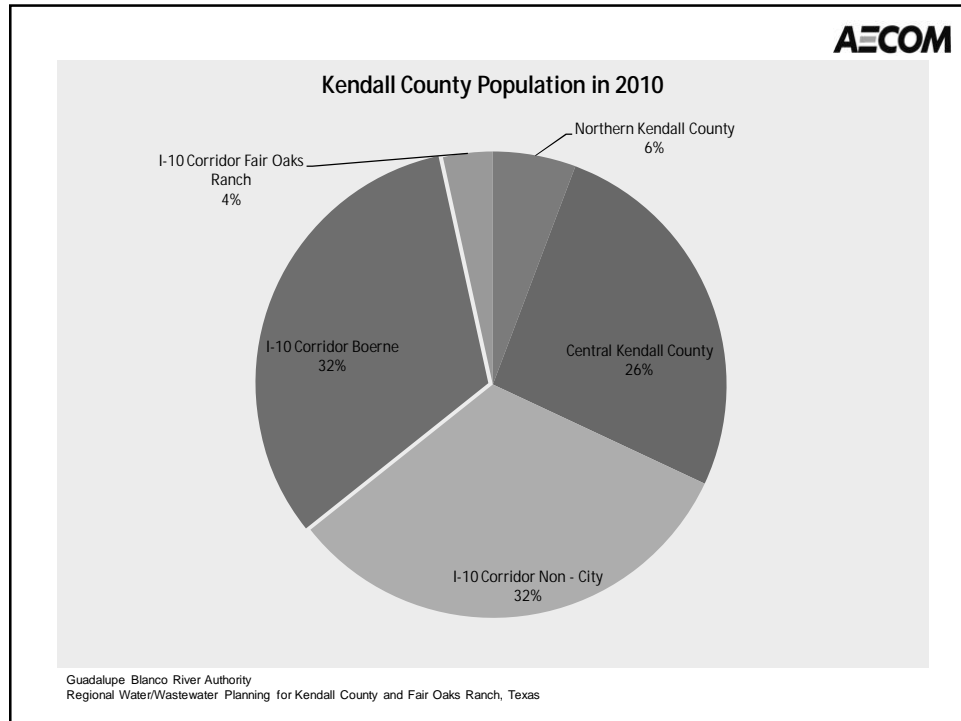
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## Distribution of 2010 Population

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- Population outside City Area = 22,986
- Distributed to Three Development Zones
- Total Occupied Lots in each Zone
- Occupied Lots = Subdivision Lots with Improvements + Non-subdivision Lots with Homestead Value
- 22,986 people distributed based on number of occupied lots in each zone



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## Population in Development Zones

Zone	2010 Population
Northern Kendall County	2,050
Central Kendall County	9,361
I-10 Corridor	24,309
<b>Total</b>	<b>35,720</b>

### Breakdown of Population in I-10 Corridor

Zone	City	2010 Population
I-10 Corridor	Non - City	11,575
I-10 Corridor	Boerne	11,500
I-10 Corridor	Fair Oaks Ranch	1,234
<b>I-10 Corridor</b>	<b>Total</b>	<b>24,309</b>

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## Empty Subdivision Lots

### Empty Subdivision Lots in the Development Zones

Development Zone	Empty Subdivision Lots	Projected Occupancy in Empty Lots *
Northern Kendall County	305	659
Central Kendall County	1,871	4,041
I-10 Corridor	5,026	10,856
<b>Total</b>	<b>7,202</b>	<b>15,556</b>

### Breakdown of Empty Lots in I-10 Corridor

Development Zone	City	Empty Subdivision Lots	Projected Occupancy in Empty Lots *
I-10 Corridor	-	1,446	3,123
I-10 Corridor	Boerne	1,026	2,216
I-10 Corridor	Esperanza	2,480	5,357
I-10 Corridor	Fair Oaks Ranch	74	160
<b>I-10 Corridor</b>	<b>Total</b>	<b>5,026</b>	<b>10,856</b>

\*80% of lots occupied.

\*2.7 person/ household

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## Distribution of Population

- Discussion point

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## Distribution of 2020, 2030 and 2040 Population

### Tentative Population Projection

Entity	2010	2015	2020	2030	2040
Boerne <sup>1</sup>	11,500	16,375	17,457	25,924	27,480
Fair Oaks Ranch <sup>2</sup>	1,234	1,258	1,282	1,308	1,335
Kendall County <sup>3</sup>	35,720	43,002	50,283	65,752	78,690

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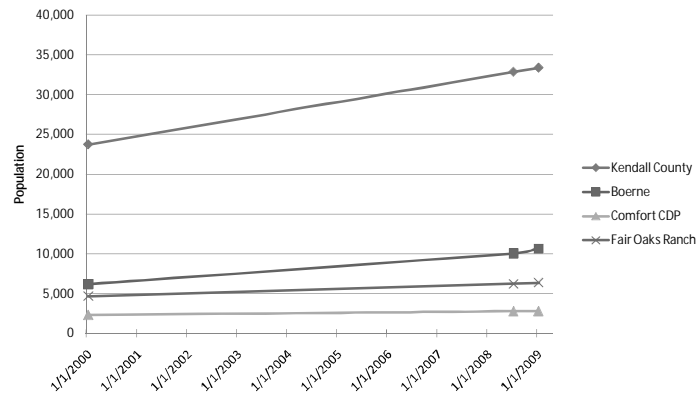
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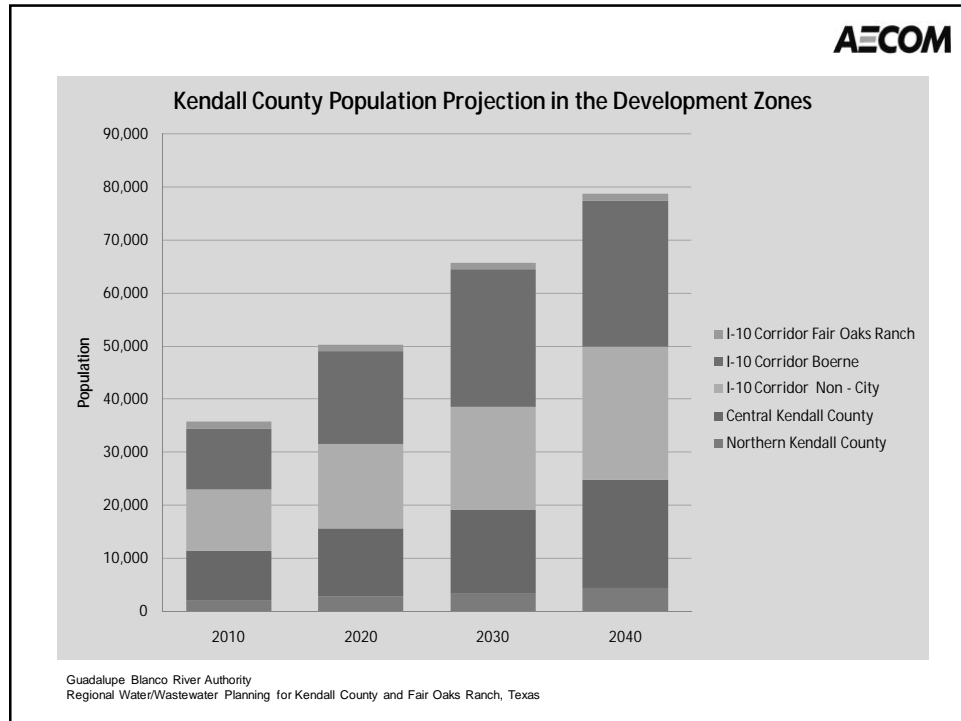


## Growth Trend from 2000 to 2009



Entity	2000 Census Count	1-Jul-08 Population Estimate	1-Jan-09 Population Estimate	Numerical Change 2000-08	Numerical Change 2000-09	Percent Change 2000-08	Percent Change 2000-09
Kendall County	23,743	32,832	33,341	9,089	9,598	38.3	40.4
Boerne	6,178	10,039	10,663	3,861	4,485	62.5	72.6
Comfort CDP	2,358	2,791	2,805	433	447	18.4	19
Fair Oaks Ranch	4,695	6,245	6,382	1,550	1,687	33	35.9

Source: Texas State Data Center



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## Population Projections in Development Zones

Zone	2010	2020	2030	2040
Northern Kendall County	2,050	2,813	3,435	4,448
Central Kendall County	9,361	12,846	15,687	20,311
I-10 Corridor	24,309	34,624	46,629	53,930
<b>Total</b>	<b>35,720</b>	<b>50,283</b>	<b>65,752</b>	<b>78,690</b>

**Breakdown of Population in I-10 Corridor**

Zone	City	2010	2020	2030	2040
I-10 Corridor	Non - City	11,575	15,885	19,397	25,115
I-10 Corridor	Boerne	11,500	17,457	25,924	27,480
I-10 Corridor	Fair Oaks Ranch	1,234	1,282	1,308	1,335
<b>I-10 Corridor</b>	<b>Total</b>	<b>24,309</b>	<b>34,624</b>	<b>46,629</b>	<b>53,930</b>

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# Water Demand and Supply

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## Water Demands (Ac-Ft/Yr)

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WATER USER GROUP	Region L 2011 Initially Prepared Plan				Cow Creek GCD Groundwater Management Plan (12/14/2009)			
	2010	2020	2030	2040	2010	2020	2030	2040
<b>MUNICIPAL</b>								
BOERNE	1,570	2,188	2,843	3,370	2,214	3,129	4,588	4,802
FAIR OAKS RANCH	286	296	300	305	286	296	300	305
WATER SERVICES INC	43	52	61	69	43	52	61	69
COUNTY-OTHER	2,750	3,834	4,938	5,866	3,366	5,234	6,408	8,233
<b>TOTAL MUNICIPAL</b>	<b>4,649</b>	<b>6,370</b>	<b>8,142</b>	<b>9,610</b>	<b>5,909</b>	<b>8,711</b>	<b>11,357</b>	<b>13,409</b>
MANUFACTURING	0	0	0	0	1	1	1	1
STEAM-ELECTRIC	0	0	0	0	0	0	0	0
MINING	6	6	6	6	6	6	6	6
IRRIGATION	714	699	685	671	975	975	975	975
LIVESTOCK	446	446	446	446	422	422	422	422
<b>TOTAL</b>	<b>5,815</b>	<b>7,521</b>	<b>9,279</b>	<b>10,733</b>	<b>7,313</b>	<b>10,115</b>	<b>12,761</b>	<b>14,813</b>

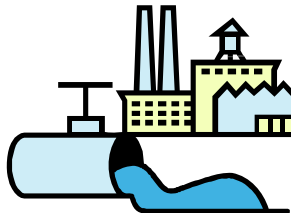
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<div style="text-align: right;"><b>AECOM</b></div> <h2 style="text-align: center;">Water Supply Options</h2>			
Source	Region L 2011 Initially Prepared Plan	Cow Creek GCD Groundwater Management Plan (12/14/2009)	Notes
Trinity Aquifer Availability	3,945 ac-ft/yr	9,189 ac-ft/yr	Region L number based on 2004 CCGCD GW Management Plan
Edwards-Trinity Aquifer Availability	318 ac-ft/yr	318 ac-ft/yr	MAG
Boerne Lake	0 ac-ft/yr	833 ac-ft/yr	Region L number based on minimum annual diversion during drought, overall reliability = 99%
Canyon Lake Reservoir	6,072 ac-ft/yr	6,611 ac-ft/yr	Kendall County use only
Other Surface Water	242 ac-ft/yr	3,624 ac-ft/yr	CCGCD does not include this number in their projected total water supply
<b>Total</b>	<b>10,577 ac-ft/yr</b>	<b>16,960 ac-ft/yr</b>	
<small>Guadalupe Blanco River Authority Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas</small>			

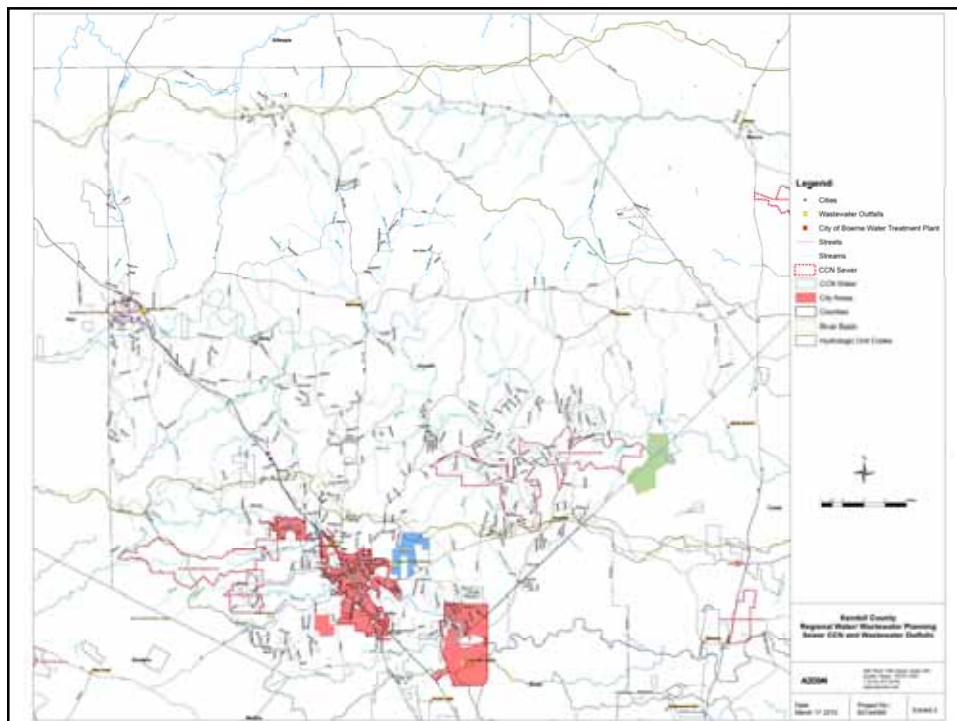
<div style="text-align: right;"><b>AECOM</b></div> <h2 style="text-align: center;">Water Supply Options</h2>	
<ul style="list-style-type: none"> <li>• Additional supply strategies that meet or exceed shortages through 2040:               <ul style="list-style-type: none"> <li>– Municipal Conservation</li> <li>– Purchase water from GBRA                   <ul style="list-style-type: none"> <li>• 2010 supply from unused Western Canyon commitments</li> <li>• 2020 - 2040 supply from Storage above Canyon Reservoir (ASR)</li> </ul> </li> <li>– Edwards-BFZ Aquifer Transfer from Medina County</li> </ul> </li> <li>• Future strategies (after 2040):               <ul style="list-style-type: none"> <li>– Western Canyon WTP Expansion</li> </ul> </li> </ul>	
<p>Source: Region L 2011 Initially Prepared Plan</p> <p><small>Guadalupe Blanco River Authority Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas</small></p>	

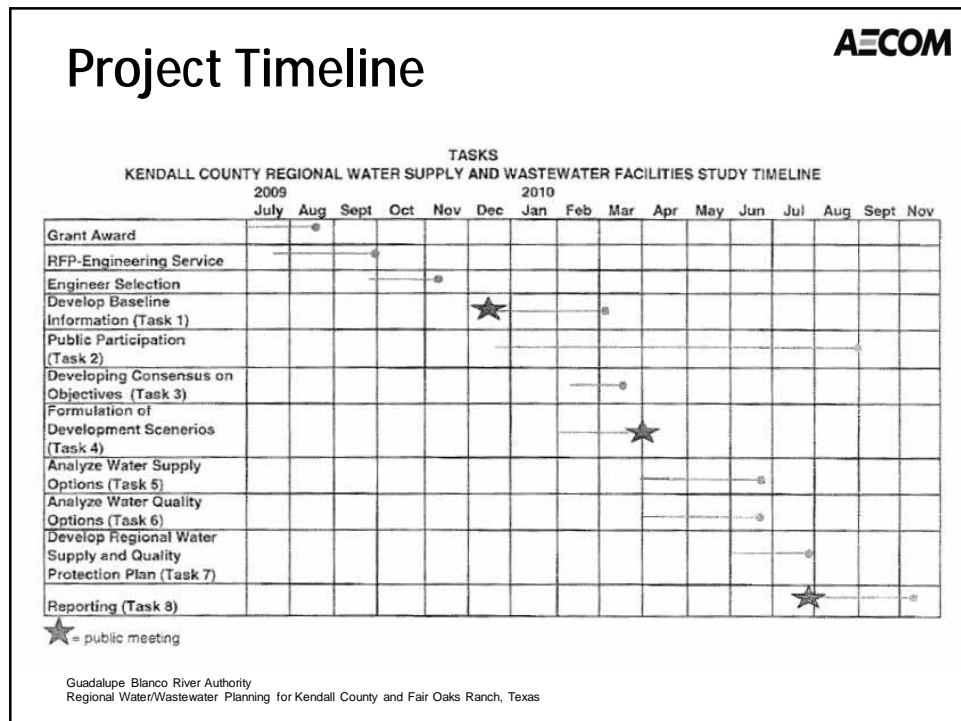
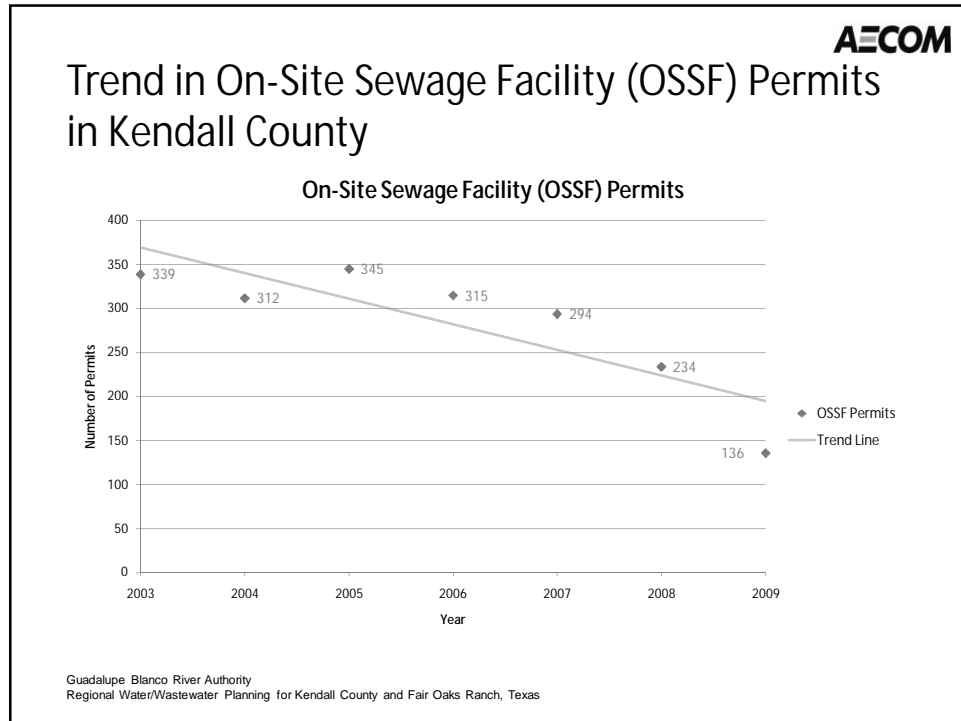
# Wastewater

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas







## Project Milestones/Meetings

- Public Kickoff Meeting 01/11/2010
- 1<sup>st</sup> Advisory Committee Meeting 03/23/2010
- Development Scenario Memo 04/22/2010
- Mid-point Public Meeting 04/29/2010
- 2<sup>nd</sup> Advisory Committee Meeting 05/27/2010
- 3<sup>rd</sup> Advisory Committee Meeting 07/22/2010
- Draft Report 08/02/2010
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## Questions ?



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## Managing Water Solutions for the Future

Regional Water/Wastewater  
Planning for Kendall County  
and Fair Oaks Ranch, Texas

Advisory Committee Meeting

May 27 2010



## Outline

- Growth Scenario.
- Water Supply Planning.
- Wastewater Planning.
- Discussion of Future Work.

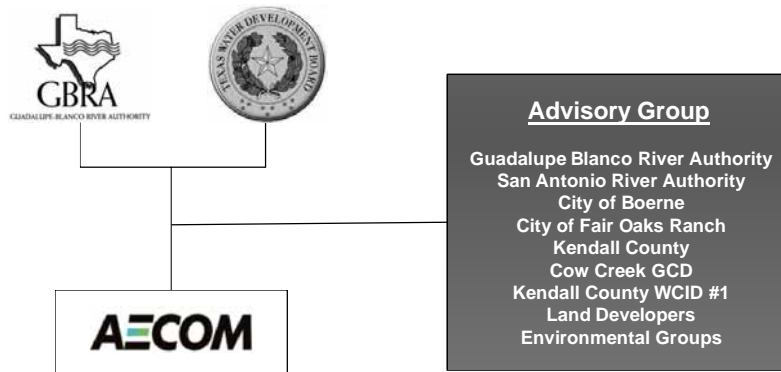


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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

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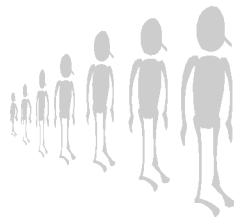


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## Growth Scenario



- Preferred Population Projection
- Development Zones
- Distribution of Population



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## Outcome from Advisory Group Meeting #1



- Identified preferred population projection
- Development zones – identified areas of low probable growth
- Modified development zones
- Modified development concepts

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Preferred Population Projection

Entity	2010	2015	2020	2030	2040
Boerne <sup>1</sup>	11,500	16,375	17,457	25,924	27,480
Fair Oaks Ranch (Kendall County portion) <sup>2</sup>	1,234	-	1,282	1,308	1,335
Fair Oaks Ranch <sup>3</sup>	6,181	-	6,271	6,339	6,408
Fair Oaks Ranch (Including ETJ) <sup>4</sup>	6,491	-	7,841	9,191	10,301
Kendall County <sup>5</sup>	35,720	-	50,283	65,752	78,690

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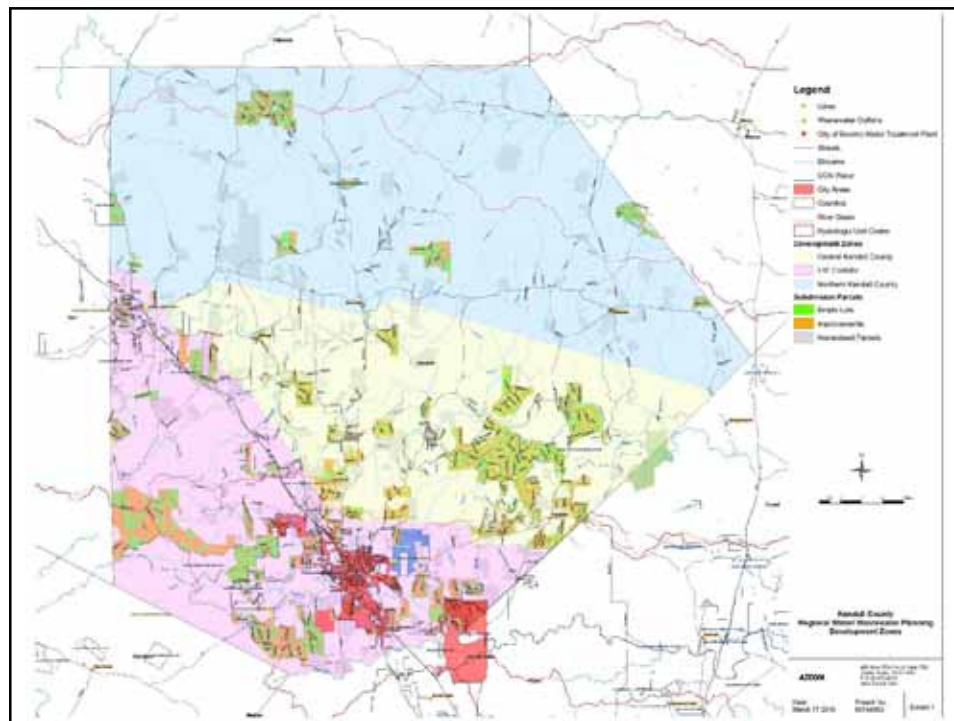
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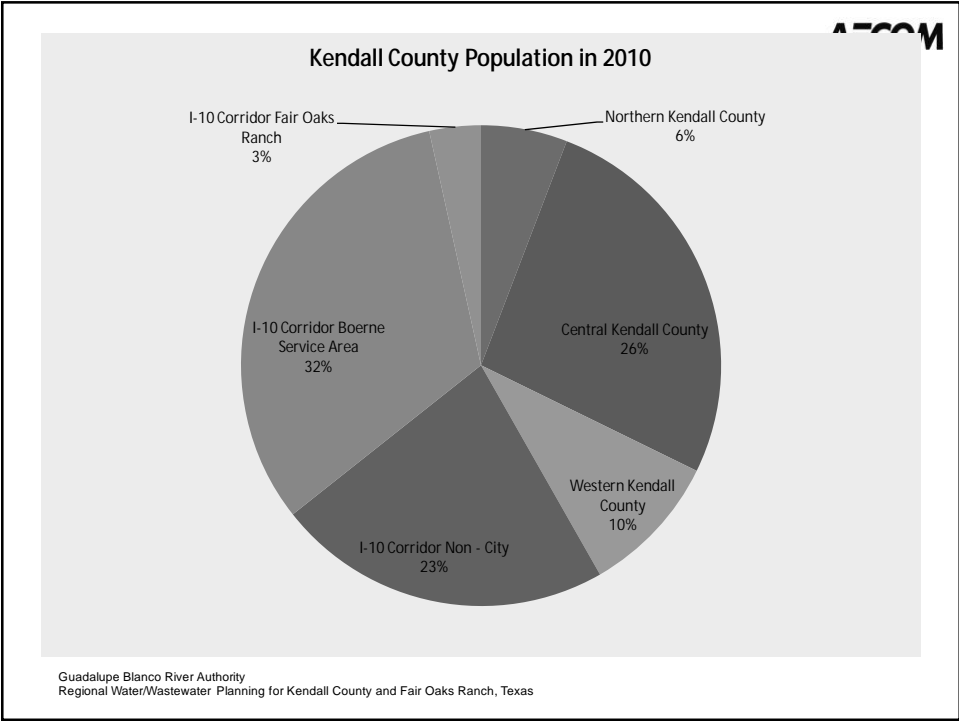
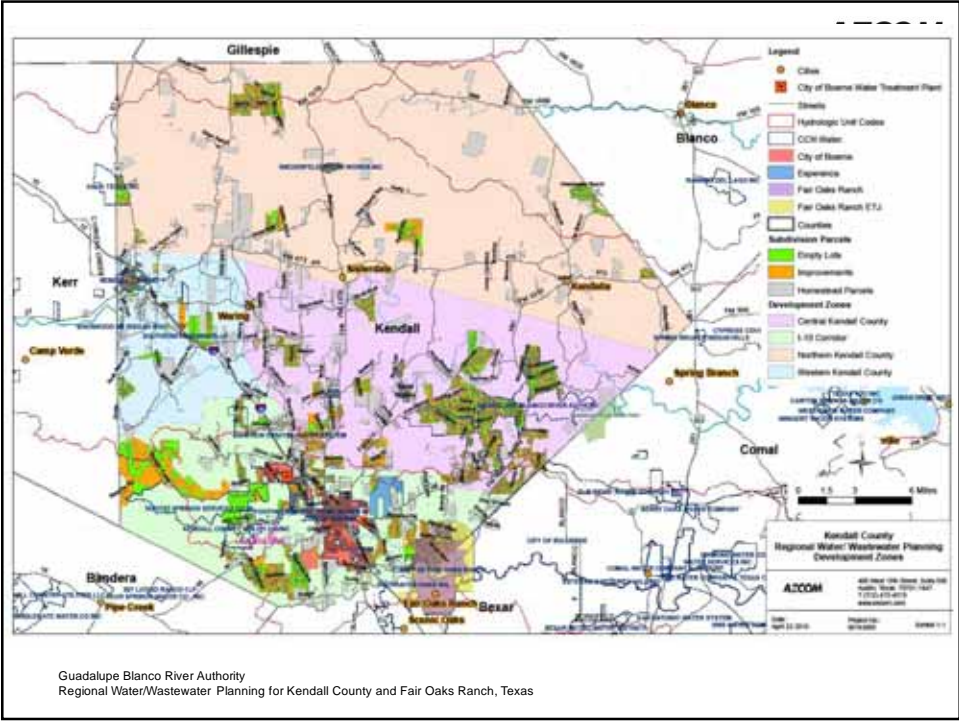
<sup>3</sup> Fair Oaks Ranch population projection excluding ETJ. Estimate from Region L Water Plan.

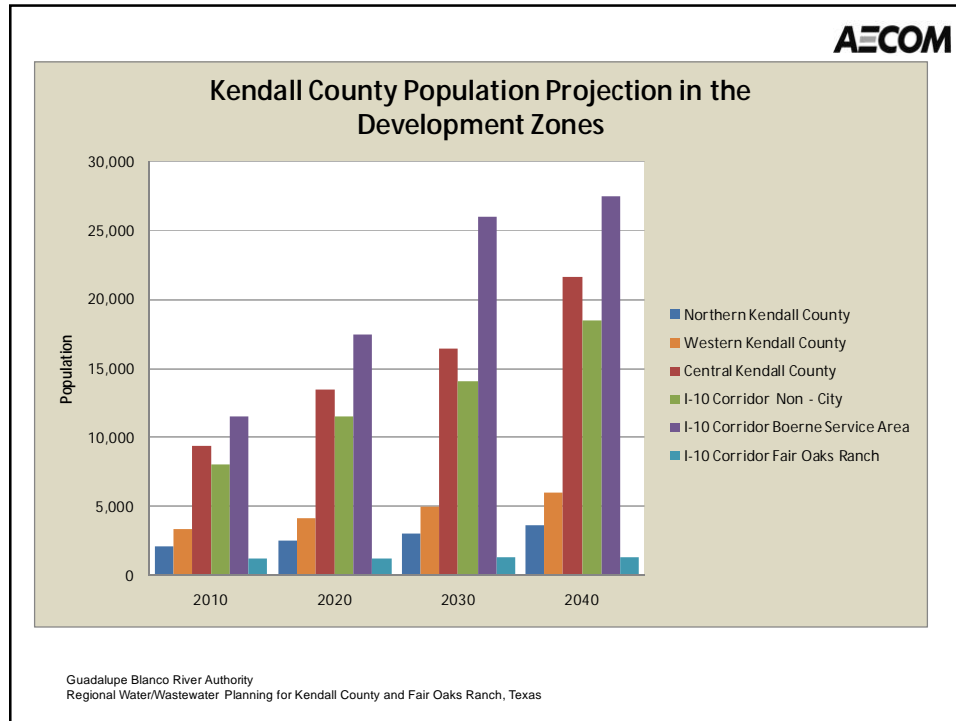
<sup>4</sup> Fair Oaks Ranch population projection including ETJ. 2010 estimate based on number of current water customer (2,404). 2020 and 2030 estimates based on number 50 lot/yr of development. 2040 estimate is based on number of future lots in the City including ETJ (3,815) provided by Ron Emmons. Population estimated at 2.7 people/connection.

<sup>5</sup> Region L Water Plan.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas





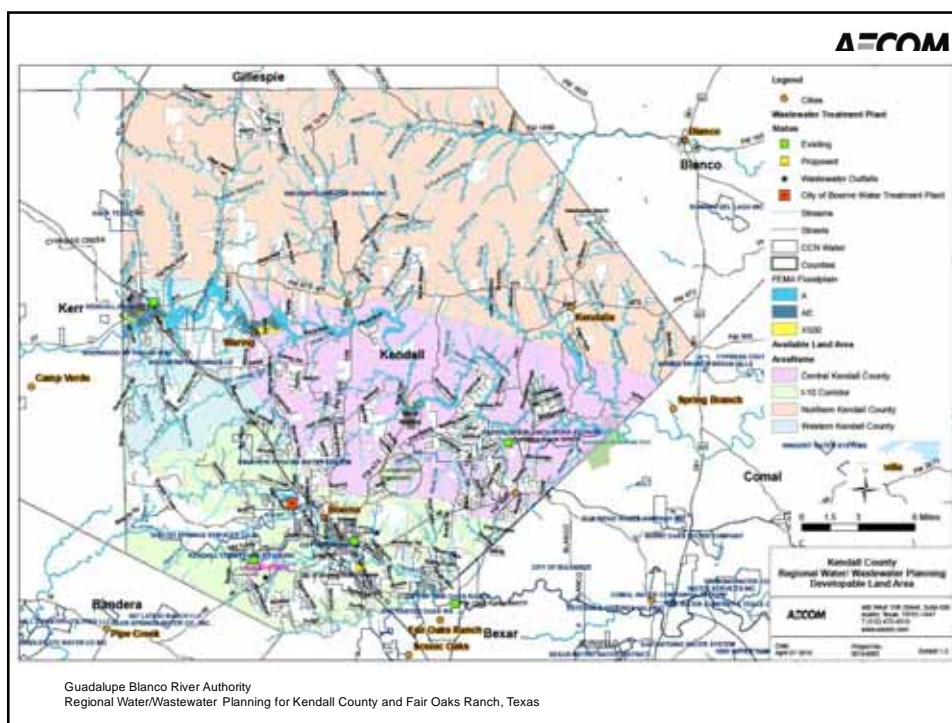


**AECOM**

### Distribution of 2020, 2030 and 2040 Population in Kendall County Development Zones

Zone	City	2010	2020	2030	2040
Northern Kendall County		2,069	2,503	3,029	3,665
Western Kendall County		3,409	4,125	4,991	6,039
Central Kendall County		9,440	13,434	16,445	21,659
I-10 Corridor	Non - City	8,068	11,482	14,055	18,512
I-10 Corridor	Boerne Service Area	11,500	17,457	25,924	27,480
I-10 Corridor	Fair Oaks Ranch	1,234	1,282	1,308	1,335
I-10 Corridor	Total	20,802	30,221	41,287	47,327
<b>County Total</b>		<b>35,720</b>	<b>50,283</b>	<b>65,752</b>	<b>78,690</b>

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## Developable land area and maximum probable occupancy in Kendall County

Area Name	Developable Land Area <sup>1</sup> (ac)	Conservation Easement	80% of Developable Land Area (ac)	Density <sup>2</sup> (ac / lots)	Probable No. of Lots	Maximum Probable Occupancy <sup>3</sup>
Northern Kendall County	158,911		127,129	6	21,188	45,766
Western Kendall County	24,974		19,979	6	3,330	7,193
Central Kendall County	71,265	1,500	55,812	4	13,953	30,139
I-10 Corridor (Non-City)	42,935		34,348	3	11,449	24,730
						107,828

<sup>1</sup> Developable Land Area = Total Land - 100yr Floodplain - Roadway easement - Boerne - Esperanza - Fair Oaks Ranch - Subdivisions - Homesteads

<sup>2</sup> Kendall County development rules governing density assumptions.

<sup>3</sup> Occupancy estimate based on 80% lot occupancy and TSDC estimate of 2.7 person/ household for Kendall County.

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## Growth Scenario Assumptions and Summary

- Four development zones.
- 2010 population outside City areas are distributed based on number of current occupied lots in each zone.
- Northern and Western Kendall County grow at a slower pace.
- Boerne Service area grows at a faster pace in the first two decades as Esperanza is developed.
- Central Kendall County and I-10 Corridor (non-city) grow at the same rate to accommodate most of the non-city growth in Kendall County.

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## Water Supply Planning

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Use Factors

**AECOM**

- Cow Creek GCD Water Use Factors

Water User Group	Per Capita Water Use (gallons per person per day)			
	2010	2020	2030	2040
Boerne	163	160	158	156
Fair Oaks Ranch	207	206	205	204
PWS Other	123	121	119	119
Aqua Texas	149	160	160	169
Kendall County WCID #1	140	135	130	125
Kendall County Utility Company	133	133	133	133
Cordillera Ranch (GBRA)	406	268	268	268
Lerin Hills*	N/A	140	135	130
County-Other	142	140	138	136

- Development Zone Water Use Factors

Zone	Entity	Per Capita Water Use (gallons per person per day)			
		2010	2020	2030	2040
Northern Kendall County		142	140	138	136
Western Kendall County		140	135	130	125
Central Kendall County		140	152	153	152
I-10 Corridor	Non-City	142	140	138	136
	Boerne Service Area	163	160	158	156
	Fair Oaks Ranch (All)	207	206	205	204

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## Water Demand Projections by Development Zone

**AECOM**

Northern Kendall County Zone	2010	2020	2030	2040
Population	2,069	2,503	3,029	3,665
Municipal Water Demand (Ac-Ft/Yr)	329	363	468	558
Mining Water Demand (Ac-Ft/Yr)	6	6	6	6
Irrigation Water Demand (Ac-Ft/Yr)	261	255	250	245
Livestock Water Demand (Ac-Ft/Yr)	190	190	190	190
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>786</b>	<b>814</b>	<b>914</b>	<b>999</b>

Western Kendall County Zone	2010	2020	2030	2040
Population	3,409	4,125	4,991	6,039
Municipal Water Demand (Ac-Ft/Yr)	535	624	727	846
Irrigation Water Demand (Ac-Ft/Yr)	52	51	50	49
Livestock Water Demand (Ac-Ft/Yr)	35	35	35	35
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>622</b>	<b>710</b>	<b>812</b>	<b>930</b>

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Water Demand Projections by Development Zone **AECOM**

Central Kendall County Zone	2010	2020	2030	2040
Population	9,440	13,434	16,445	21,659
Municipal Water Demand (Ac-Ft/Yr)	1,480	2,287	2,818	3,688
Irrigation Water Demand (Ac-Ft/Yr)	208	204	200	196
Livestock Water Demand (Ac-Ft/Yr)	141	141	141	141
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>1,829</b>	<b>2,632</b>	<b>3,159</b>	<b>4,025</b>

I-10 Corridor Zone	2010	2020	2030	2040
Boerne Service Area Population	11,500	17,457	25,924	27,480
Boerne Service Area Municipal Water Demand (Ac-Ft/Yr)	2,100	3,129	4,588	4,802
Fair Oaks Ranch (All) Population*	6,491	7,841	9,191	10,301
Fair Oaks Ranch (All) Municipal Water Demand (Ac-Ft/Yr)	1,505	1,809	2,111	2,354
Non-City Population	8,068	11,482	14,055	18,512
Non-City Municipal Water Demand (Ac-Ft/Yr)	1,283	1,801	2,173	2,820
Total Municipal Water Demand (Ac-Ft/Yr)	4,888	6,739	8,872	9,976
Irrigation Water Demand (Ac-Ft/Yr)	193	189	185	181
Livestock Water Demand (Ac-Ft/Yr)	80	80	80	80
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>5,161</b>	<b>7,008</b>	<b>9,137</b>	<b>10,237</b>

Total water demand for Kendall County and all of the City of Fair Oaks Ranch is expected to reach **16,200 ac-ft/yr by 2040**

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Sources for Kendall County and Fair Oaks Ranch **AECOM**

Supply Source	Surface or Ground?	Annual Volume (Ac-Ft/Yr)	Notes
Middle Trinity Aquifer	Ground	6,336 – 9,189	12/08 GAM run
Edwards-Trinity Aquifer	Ground	318	MAG
Boerne City Lake	Surface	833	Not 100% reliable
Miscellaneous Surface Water	Surface	242	Volume is 100% reliable
Canyon Lake Reservoir (GBRA)	Surface	8,111 – 8,611	Volume is based on the raw water reservations of GBRA customers, and includes an anticipated reservation increase for Cordillera Ranch
<b>Total Water</b>		<b>15,840 – 19,193</b>	

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## GBRA Customers Receiving Canyon Lake Reservoir Water Supply

**AECOM**

Receiving Entity	Current Annual Commitment (Ac-Ft/Yr)	Raw Water Reservation (Ac-Ft/Yr)	Notes
City of Boerne Service Area	975	3,611	
City of Fair Oaks Ranch	890	1,850	
Cordillera Ranch	200	1,000	Request for a raw water reservation increase of an additional 500 ac-ft/yr is pending, for a total of 1,500 ac-ft/yr
Kendall County Utility Company/Tapatío	200	750	Tapatío does not currently have a constructed delivery system for surface water
Lerin Hills	225	750	Lerin Hills does not currently have a constructed delivery system for surface water
Other water users (two years out)	30	150	Contract is pending
<b>Total Water</b>	<b>2,520</b>	<b>8,111</b>	A pending additional 500 ac-ft/yr reservation for Cordillera Ranch would give a total of 8,611 ac-ft/yr

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Shortages by Development Zone

**AECOM**

Northern Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	786	814	914	999
Water Supplies (Ac-Ft/Yr)				
Edwards-Trinity Aquifer	77	77	77	77
Trinity Aquifer	614	642	742	827
Miscellaneous Surface Water	95	95	95	95
Total Water Supplies (Ac-Ft/Yr)	786	814	914	99
Water Shortage (Ac-Ft/Yr)	0	0	0	0

Western Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	622	710	812	930
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer	592	680	782	900
Other Surface Water	30	30	30	30
Total Water Supplies (Ac-Ft/Yr)	622	710	812	930
Water Shortage (Ac-Ft/Yr)	0	0	0	0

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Shortages by Development Zone

**AECOM**

Central Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,829	2,632	3,159	4,025
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer	1,552	1,805	1,857	2,298
Canyon Lake Reservoir*	230	800	1,225	1,650
Other Surface Water	77	77	77	77
Total Water Supplies (Ac-Ft/Yr)	1,859	2,682	3,159	4,025
Water Shortage (Ac-Ft/Yr)	0	0	0	0

City of Boerne Service Area	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	2,100	3,129	4,588	4,802
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer	1,850	1,850	1,850	1,850
Canyon Lake Reservoir*	975	1,890	3,290	3,611
Boerne City Lake	833	833	833	833
Total Water Supplies (Ac-Ft/Yr)	3,658	4,573	5,973	6,294
Water Shortage (Ac-Ft/Yr)	0	0	0	0

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Shortages by Development Zone

**AECOM**

City of Fair Oaks Ranch	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,505	1,809	2,111	2,354
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	750	750	750	750
Canyon Lake Reservoir**	890	1,100	1,400	1,850
Total Water Supplies (Ac-Ft/Yr)	1,640	1,850	2,150	2,600
Water Shortage (Ac-Ft/Yr)	0	0	0	0

Non-City Portion of I-10 Corridor Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,283	1,801	2,173	2,820
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	1,478	1,109	855	211
Canyon Lake Reservoir**	425	825	1,300	1,500
Other Surface Water	40	40	40	40
Total Water Supplies (Ac-Ft/Yr)	1,943	1,974	2,195	1,751
Water Shortage (Ac-Ft/Yr)	0	0	0	-1,069

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Strategy Options



- 2011 Region L Initially Prepared Water Plan recommended water management strategies:
  - Municipal Conservation
  - Purchase water from GBRA
    - 2010 supply from unused Western Canyon commitments
    - 2020 - 2040 supply from Storage above Canyon Reservoir (ASR)
    - Western Canyon WTP Expansion

Source: Region L 2011 Initially Prepared Plan

- The “Purchase water from GBRA” strategies mentioned above have limited practical application in creating additional water supply

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Strategy Options



- Small water supply shortage expected through 2040 (~ 1,000 ac-ft).
- A large, expensive water supply project or strategy that creates a new source of supply is not warranted at this time.
- Smaller project/efforts to stretch currently available supplies include:
  - Conservation
  - Drought management
  - Wastewater reuse
  - Brush management
  - Rainwater harvesting
- Determination of the Managed Available Groundwater (MAG) volume for the Trinity Aquifer will provide more insight into how soon additional water supplies may be needed.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Planning Summary



- Over 60% of the 2040 projected water demands are expected to be in the I-10 Corridor Zone.
- Surface water options are currently available in the I-10 Corridor and Central Kendall County Zones. Surface water is not expected to be a future source in the Northern and Western Zones.
- Determination of the MAG volume for the Trinity Aquifer in Kendall County will provide necessary insight into how soon additional water supply options are needed.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Planning Summary

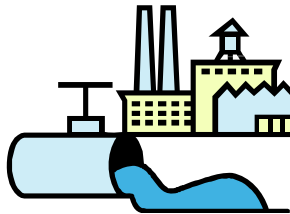


- Based on a conservative estimate of available groundwater, a small shortage of available water will occur in the county by 2040.
- Except for conservation, the water supply strategies recommended in the 2011 Region L Initially Prepared Water Plan will be difficult to implement.
- Conservation, drought management, wastewater reuse, rainwater harvesting, and brush management are smaller-scale projects that can stretch supplies.
- A large-scale project may not be practical at this time.

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# Wastewater Planning

AECOM



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# Wastewater Flow Factor

AECOM

## Wastewater Flow Factors for the Four Development Zones

Zone	Entity	Per Capita Wastewater (gallons per person per day)			
		2010	2020	2030	2040
Northern Kendall County		80	80	80	80
Western Kendall County		80	80	80	80
Central Kendall County		80	80	80	80
I-10 Corridor	Non-City	80	80	80	80
	Boerne	120	120	120	120
	Fair Oaks Ranch (All)	80	80	80	80

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# Wastewater Demand

## Wastewater Demands for the Four Development Zones

Zone	Entity	Wastewater Demands (MGD)			
		2010	2020	2030	2040
Northern Kendall County		0.17	0.20	0.24	0.29
Western Kendall County		0.27	0.33	0.40	0.48
Central Kendall County		0.76	1.07	1.32	1.73
I-10 Corridor	Non-City	0.65	0.92	1.12	1.48
	Boerne	1.38	2.09	3.11	3.30
	Fair Oaks Ranch (All)*	0.52	0.63	0.74	0.82

\* Assumed development of the City of Fair Oaks Ranch ETJ occurs by 2040

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# Wastewater System Options

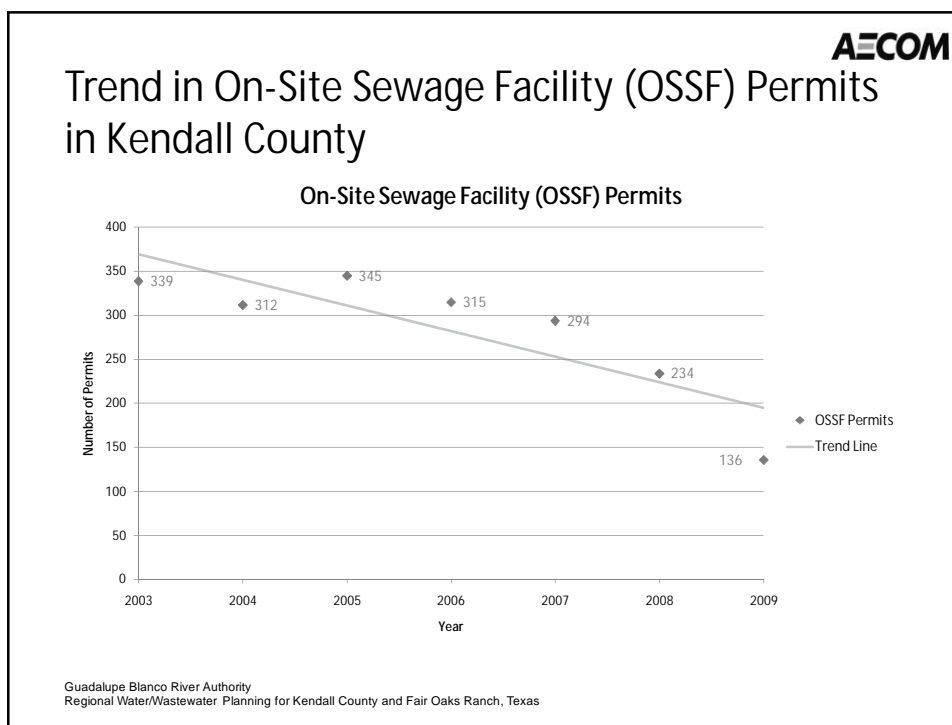
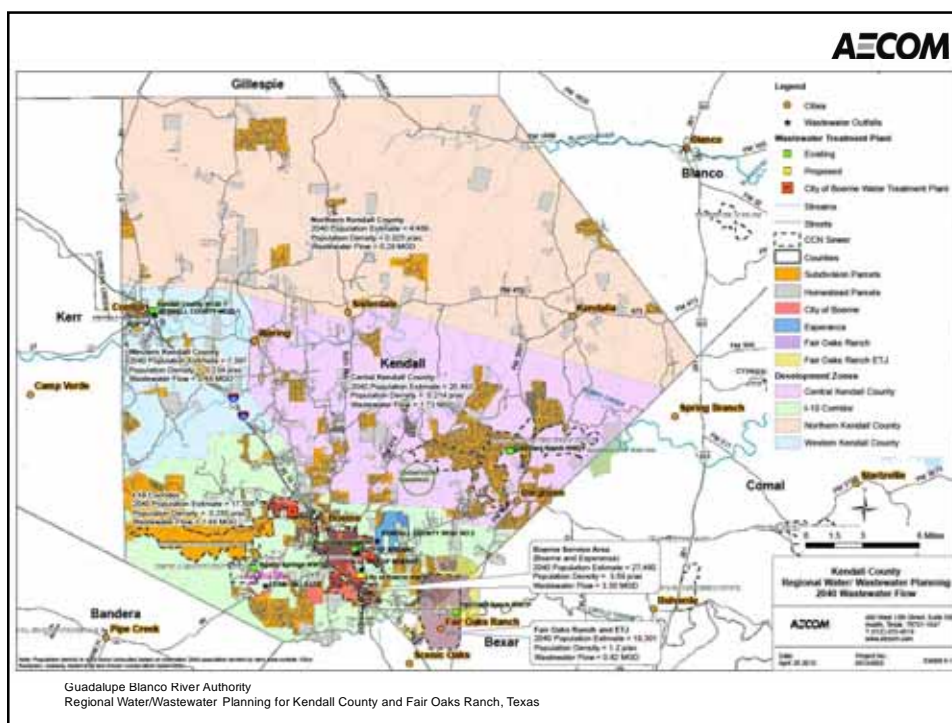
## Existing Conditions

### Wastewater Facilities

- City of Boerne
- Kendall County WCID No. 1
- Cordillera Ranch
- City of Fair Oaks Ranch
- Kendall County WCID No.2
- Tapatio Springs

### On-Site Sewage Facilities (OSSFs)

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## Wastewater Collection System Alternatives

Collection System Alternative	Areas of Potential Applicability
Conventional Collection System	Serve future growth and/or retrofit existing developed areas in City of Boerne; City of Fair Oaks; City of Comfort; Cordillera Ranch; and other densely developed towns and subdivisions along the Guadalupe River and Cibolo Creek and other major drainages.
Pressure Sewer System	Serve future growth or retrofit areas served by failing OSSFs, in areas of complex topography with low to moderate development density in the North and West parts of Kendall County.
STEP/STEG Collection System	Retrofit areas served by existing OSSFs in Fair Oaks Ranch to increase effluent available for golf course irrigation, and serve future growth or areas served by failing OSSFs in moderately steep areas with low to moderate development density throughout the County.

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## Wastewater Treatment System Alternatives

- A single regional treatment facility;
- Multiple treatment facilities; and,
- Packaged treatment plants
- Regional treatment facility to serve both the City of Boerne and the City of Fair Oaks Ranch

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## Wastewater Treatment System Alternatives

**AECOM**

Development Zone	Anticipated WW Treatment Facilities	Anticipated 2040 Flow Rate
Northern Kendall County	OSSFs	< 5,000 gpd each
Western Kendall County	Regional WWTP at Kendall County WCID No.1 Site	< 0.48 mgd + Kerr County Flows
Central Kendall County	Regional WWTP at GBRA Cordillera Ranch WWTP Site	< 1.73 mgd
I-10 Corridor	Regional WWTP at City of Boerne Future WWTP Site	< 5.2 mgd

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## Wastewater Summary

**AECOM**

- Single Plant for the entire County not viable
- Regional Plants most viable at
  - Comfort
  - Cordillera Ranch
  - Boerne
  - Boerne/Fair Oaks

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## Wastewater Summary

- Reuse/Irrigation needs might create need for smaller individual or "scalping" projects
- OSSFs remain most viable option in Northern Kendall County

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## Future Work

- Water Quality
  - Data collection
    - Water models or modeling data
    - Water sample data
      - Ambient
      - Rainfall events
  - Surrogate-based data

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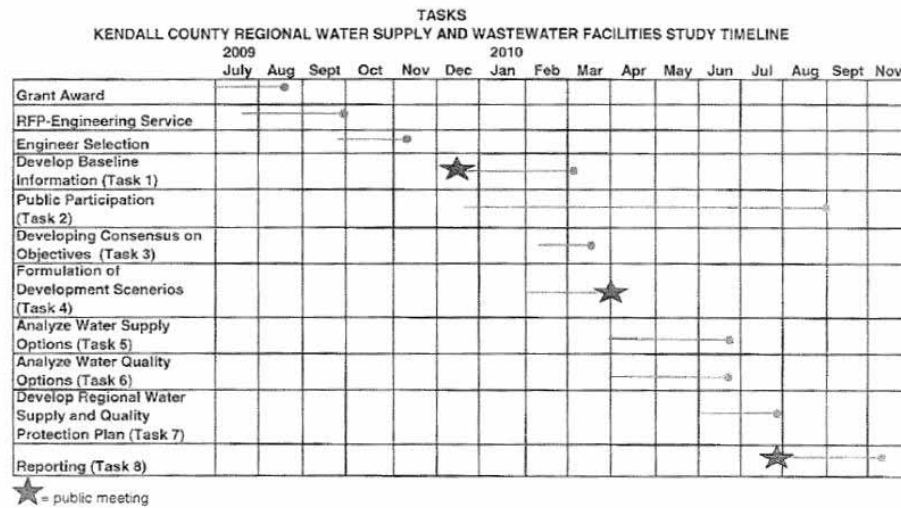
## Future Work

- Water Quality
  - Modeling
    - High level "Qual" type modeling
      - Stormwater impacts from development
      - Nutrient impacts at 5-5-2-1 point discharges
      - Non-point impacts

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## Project Timeline



Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Project Milestones/Meetings

- Public Kickoff Meeting 01/11/2010
- 1<sup>st</sup> Advisory Committee Meeting 03/23/2010
- Development Scenario Memo 04/22/2010
- 2<sup>nd</sup> Advisory Committee Meeting 05/27/2010
- Mid-point Public Meeting 06/17/2010
- 3<sup>rd</sup> Advisory Committee Meeting 07/22/2010
- Draft Report 09/01/2010
- Final Public Meeting 09/07/2010
- Final Report 11/01/2010

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## Further Discussion ?



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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Managing Water Solutions for the Future

### Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

Second Public Meeting

July 01 2010



## Project Organization



### Advisory Group

Guadalupe Blanco River Authority  
San Antonio River Authority  
City of Boerne  
City of Fair Oaks Ranch  
Kendall County  
Cow Creek GCD  
Kendall County WCID #1  
Land Developers  
Environmental Groups

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Planning Objectives

- Identify the water and wastewater facilities needed for future demands
  - *through a thirty year planning period*
  - *while protecting the surface water quality and groundwater supplies*
  - *including potential regional management for water and wastewater facilities associated with development*

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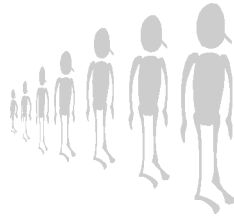
## Topics for Today's Meeting

- Growth Scenario.
- Water Supply Planning.
- Wastewater Planning.
- Discussion of Future Activity .

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## Growth Scenario

- Preferred Population Projection
- Development Zones
- Distribution of Future Population



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## Preferred Population Projection

Entity	2010	2015	2020	2030	2040
Boerne <sup>1</sup>	11,500	16,375	17,457	25,924	27,480
Fair Oaks Ranch (Kendall County portion) <sup>2</sup>	1,234	-	1,282	1,308	1,335
Fair Oaks Ranch <sup>3</sup>	6,181	-	6,271	6,339	6,408
Fair Oaks Ranch (Including ETJ) <sup>4</sup>	6,491		7,841	9,191	10,301
Kendall County <sup>5</sup>	35,720	-	50,283	65,752	78,690

<sup>1</sup> 2010 and 2015 population estimate is provided by City of Boerne. 2020, 2030 and 2040 estimates are from Cow Creek GCD Water Management Plan.

<sup>2</sup> Region L Water Plan and Cow Creek GCD have same population projections for the Kendall County portion of Fair Oaks Ranch.

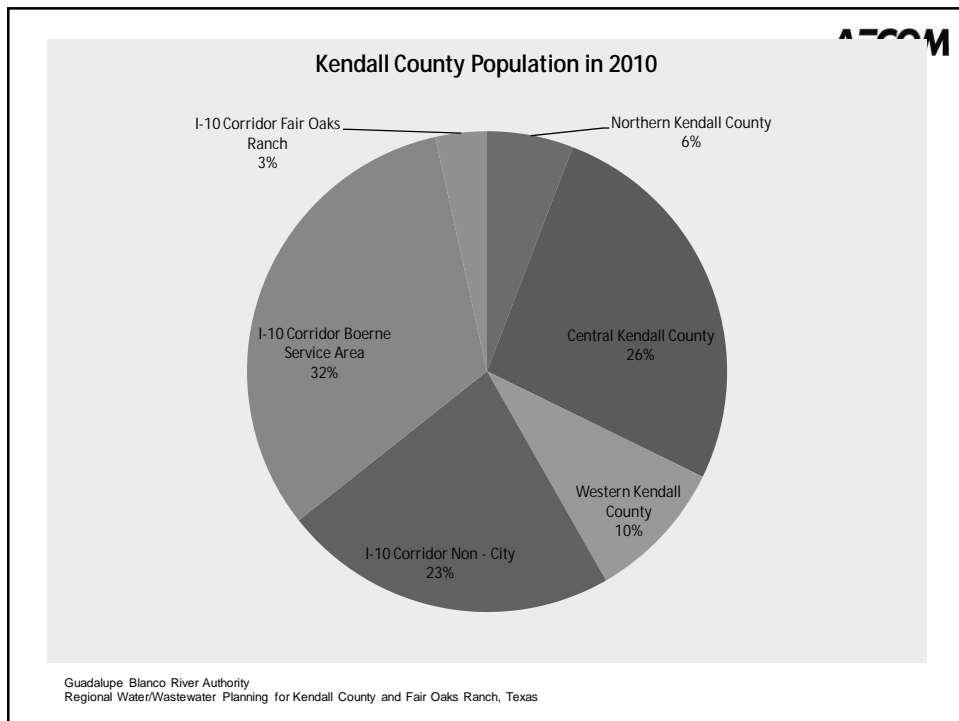
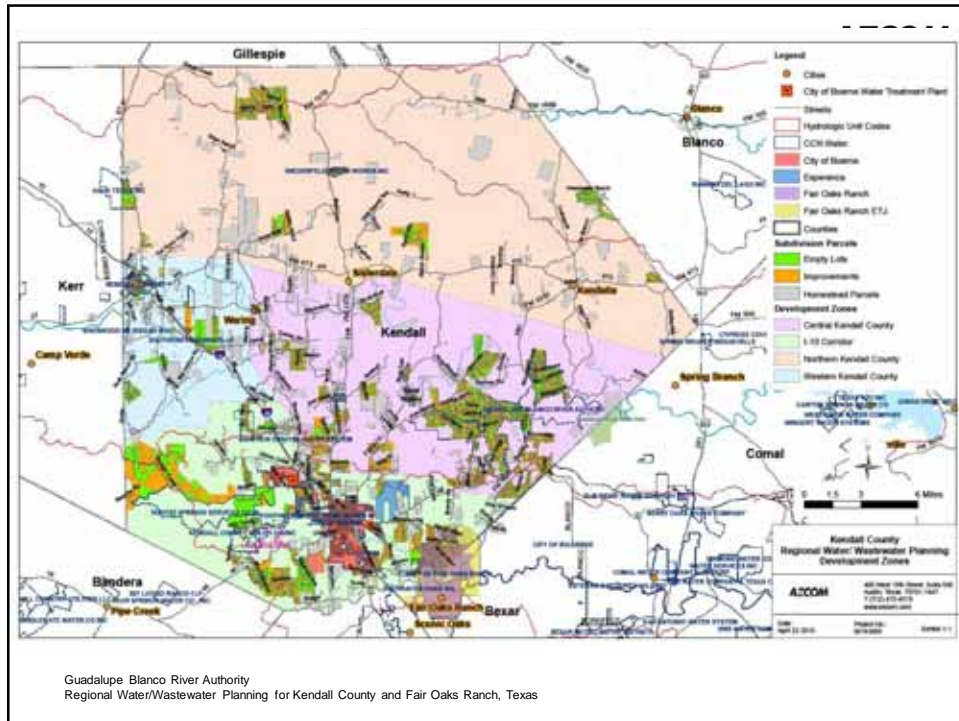
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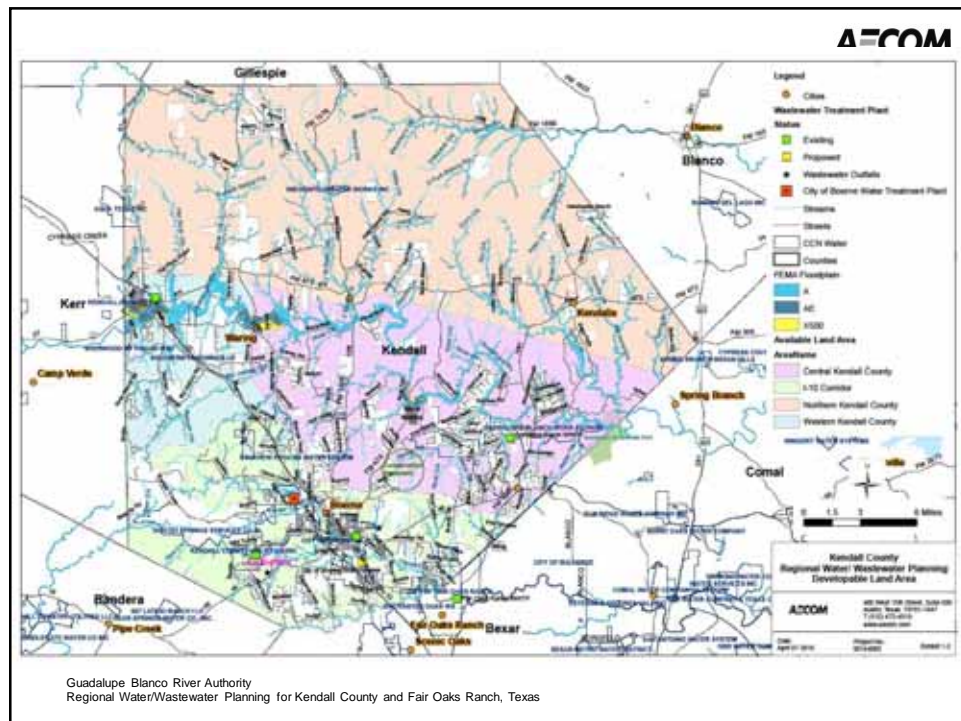
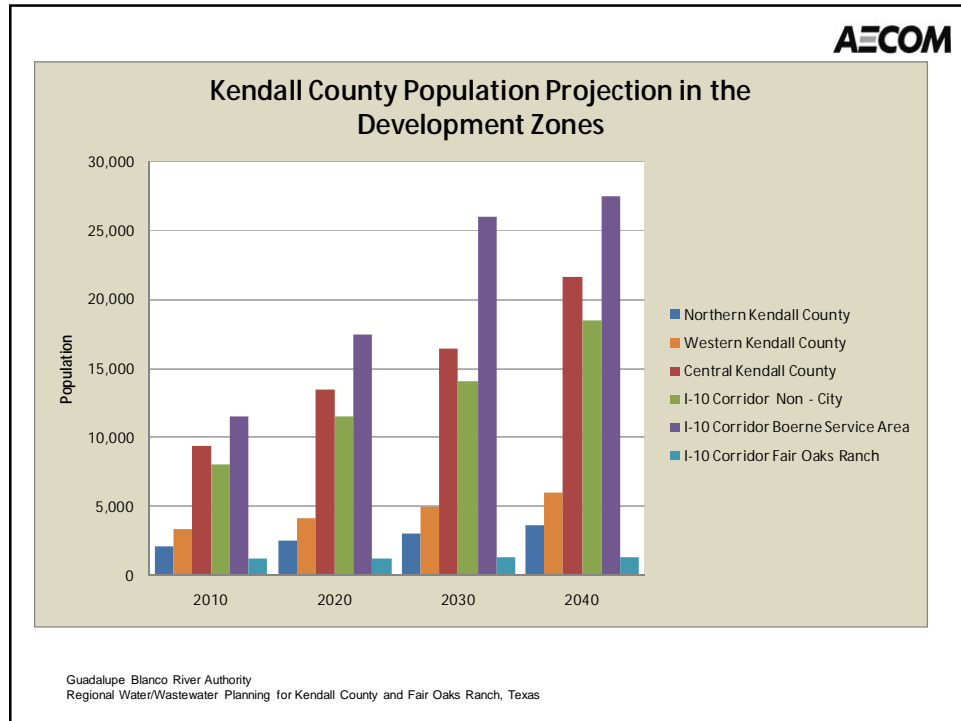
<sup>4</sup> Fair Oaks Ranch population projection including ETJ. 2010 estimate based on number of current water customer (2,404). 2020 and 2030 estimates based on number 50 lot/yr of development. 2040 estimate is based on number of future lots in the City including ETJ (3,815) provided by Ron Emmons. Population estimated at 2.7 people/connection.

<sup>5</sup> Region L Water Plan.

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## Developable land area and maximum probable occupancy in Kendall County

Area Name	Developable Land Area <sup>1</sup> (ac)	Conservation Easement	80% of Developable Land Area (ac)	Density <sup>2</sup> (ac / lots)	Probable No. of Lots	Maximum Probable Occupancy <sup>3</sup>
Northern Kendall County	158,911		127,129	6	21,188	45,766
Western Kendall County	24,974		19,979	6	3,330	7,193
Central Kendall County	71,265	1,500	55,812	4	13,953	30,139
I-10 Corridor (Non-City)	42,935		34,348	3	11,449	24,730
						107,828

<sup>1</sup> Developable Land Area = Total Land - 100yr Floodplain - Roadway easement - Boerne - Esperanza - Fair Oaks Ranch - Subdivisions - Homesteads

<sup>2</sup> Kendall County development rules governing density assumptions.

<sup>3</sup> Occupancy estimate based on 80% lot occupancy and TSDC estimate of 2.7 person/ household for Kendall County.

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## Growth Scenario Assumptions

- 2010 population outside of City areas was distributed based on number of current occupied lots in each zone.
- Northern and Western Kendall County are projected to grow at a moderate pace.
- Boerne Service Area is projected to grow at a faster pace in the first two decades as Esperanza is developed.
- Central Kendall County and I-10 Corridor (non-city) are projected to grow at about the same rate and to accommodate most of the non-city growth in Kendall County.

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## Distribution of 2020, 2030 and 2040 Population in Kendall County Development Zones

Zone	City	2010	2020	2030	2040
Northern Kendall County		2,069	2,503	3,029	3,665
Western Kendall County		3,409	4,125	4,991	6,039
Central Kendall County		9,440	13,434	16,445	21,659
I-10 Corridor	Non - City	8,068	11,482	14,055	18,512
I-10 Corridor	Boerne Service Area	11,500	17,457	25,924	27,480
I-10 Corridor	Fair Oaks Ranch	1,234	1,282	1,308	1,335
I-10 Corridor	Total	20,802	30,221	41,287	47,327
<b>County Total</b>		<b>35,720</b>	<b>50,283</b>	<b>65,752</b>	<b>78,690</b>

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## Water Supply Planning

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## Water Use Factors



- Development Zone Water Use Factors

Zone	Entity	Per Capita Water Use (gallons per person per day)			
		2010	2020	2030	2040
Northern Kendall County		142	140	138	136
Western Kendall County		140	135	130	125
Central Kendall County		140	152	153	152
I-10 Corridor	Non-City	142	140	138	136
	Boerne Service Area	163	160	158	156
	Fair Oaks Ranch (All)	207	206	205	204

– Determined using per capita rates from the Cow Creek GCD Management Plan

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## Water Demand Projections by Development Zone



Northern Kendall County Zone	2010	2020	2030	2040
Population	2,069	2,503	3,029	3,665
Municipal Water Demand (Ac-Ft/Yr)	329	363	468	558
Mining Water Demand (Ac-Ft/Yr)	6	6	6	6
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Livestock Water Demand (Ac-Ft/Yr)	190	190	190	190
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>786</b>	<b>814</b>	<b>914</b>	<b>999</b>

Western Kendall County Zone	2010	2020	2030	2040
Population	3,409	4,125	4,991	6,039
Municipal Water Demand (Ac-Ft/Yr)	535	624	727	846
Irrigation Water Demand (Ac-Ft/Yr)	52	51	50	49
Livestock Water Demand (Ac-Ft/Yr)	35	35	35	35
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>622</b>	<b>710</b>	<b>812</b>	<b>930</b>

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Demand Projections by Development Zone **AECOM**

Central Kendall County Zone	2010	2020	2030	2040
Population	9,440	13,434	16,445	21,659
Municipal Water Demand (Ac-Ft/Yr)	1,480	2,287	2,818	3,688
Irrigation Water Demand (Ac-Ft/Yr)	208	204	200	196
Livestock Water Demand (Ac-Ft/Yr)	141	141	141	141
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>1,829</b>	<b>2,632</b>	<b>3,159</b>	<b>4,025</b>

I-10 Corridor Zone	2010	2020	2030	2040
Boerne Service Area Population	11,500	17,457	25,924	27,480
Boerne Service Area Municipal Water Demand (Ac-Ft/Yr)	2,100	3,129	4,588	4,802
Fair Oaks Ranch (All) Population*	6,491	7,841	9,191	10,301
Fair Oaks Ranch (All) Municipal Water Demand (Ac-Ft/Yr)	1,505	1,809	2,111	2,354
Non-City Population	8,068	11,482	14,055	18,512
Non-City Municipal Water Demand (Ac-Ft/Yr)	1,283	1,801	2,173	2,820
<b>Total Municipal Water Demand (Ac-Ft/Yr)</b>	<b>4,888</b>	<b>6,739</b>	<b>8,872</b>	<b>9,976</b>
Irrigation Water Demand (Ac-Ft/Yr)	193	189	185	181
Livestock Water Demand (Ac-Ft/Yr)	80	80	80	80
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>5,161</b>	<b>7,008</b>	<b>9,137</b>	<b>10,237</b>

Total water demand for Kendall County and all of Fair Oaks Ranch is expected to grow from 8,400 to 16,200 ac-ft/yr by 2040

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## Water Supply Sources for Kendall County and Fair Oaks Ranch **AECOM**

Supply Source	Surface or Ground?	Annual Volume (Ac-Ft/Yr)	Notes
Middle Trinity Aquifer	Ground	6,336 – 9,189	12/08 GAM run
Edwards-Trinity Aquifer	Ground	318	MAG
Boerne City Lake	Surface	833	Not 100% reliable
Miscellaneous Surface Water	Surface	242	Volume is 100% reliable
Canyon Lake Reservoir (GBRA)	Surface	8,111 – 8,611	Volume is based on the raw water reservations of GBRA customers, and includes an anticipated reservation increase for Cordillera Ranch
<b>Total Water</b>		<b>15,840 – 19,193</b>	

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## GBRA Customers Receiving Canyon Lake Reservoir Water Supply

**AECOM**

Receiving Entity	Current Annual Commitment (Ac-Ft/Yr)	Raw Water Reservation (Ac-Ft/Yr)	Notes
City of Boerne Service Area	975	3,611	
City of Fair Oaks Ranch	890	1,850	
Cordillera Ranch	200	1,000	Request for a raw water reservation increase of an additional 500 ac-ft/yr is pending, for a total of 1,500 ac-ft/yr
Kendall County Utility Company/Tapatío	200	750	Tapatio does not currently have a constructed delivery system for surface water
Lerin Hills	225	750	Lerin Hills does not currently have a constructed delivery system for surface water
Other water users (two years out)	30	150	Contract is pending
<b>Total Water</b>	<b>2,520</b>	<b>8,111</b>	A pending additional 500 ac-ft/yr reservation for Cordillera Ranch would give a total of 8,611 ac-ft/yr

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## Summary of Water Shortages by Development Zone

**AECOM**

Development Zone	Water Shortage (Ac-Ft/Yr)			
	2010	2020	2030	2040
Northern Kendall County Zone	0	0	0	0
Western Kendall County Zone	22	110	212	330
Central Kendall County Zone	0	120	222	663
I-10 Corridor Zone				
City of Boerne Service Area	0	0	0	51
City of Fair Oaks Ranch	0	0	0	0
Non-City Portion of Zone	0	0	0	350

**Total water shortage for Kendall County is expected to reach 1,394 ac-ft/yr by 2040**

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## Water Shortages by Development Zone

**AECOM**

Northern Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	786	814	914	999
Water Supplies (Ac-Ft/Yr)				
Edwards-Trinity Aquifer	77	77	77	77
Trinity Aquifer*	2,851	2,851	2,851	2,851
Miscellaneous Surface Water	95	95	95	95
Total Water Supplies (Ac-Ft/Yr)	3,023	3,023	3,023	3,023
Water Shortage (Ac-Ft/Yr)	0	0	0	0
Water Surplus (Ac-Ft/Yr)	2,237	2,209	2,109	2,024

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr).

- Surplus available

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## Water Shortages by Development Zone

**AECOM**

Western Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	622	710	812	930
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	570	570	570	570
Other Surface Water	30	30	30	30
Total Water Supplies (Ac-Ft/Yr)	600	600	600	600
Water Shortage (Ac-Ft/Yr)	-22	-110	-212	-330
Water Surplus (Ac-Ft/Yr)	0	0	0	0

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr).

- Existing shortage during drought
- Proximity to Northern Zone and Kerr County may provide additional wellfield locations for groundwater.

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## Water Shortages by Development Zone

**AECOM**

Central Kendall County Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,829	2,632	3,159	4,025
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	1,635	1,635	1,635	1,635
Canyon Lake Reservoir**	230	800	1,225	1,650
Other Surface Water	77	77	77	77
Total Water Supplies (Ac-Ft/Yr)	1,942	2,512	2,937	3,362
Water Shortage (Ac-Ft/Yr)	0	-120	-222	-663
Water Surplus (Ac-Ft/Yr)	113	0	0	0

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr).

\*\*Amount shown is primarily the anticipated annual commitment total for Cordillera Ranch.

- Projected shortage by 2020
- Additional surface water may be available from GBRA
- Proximity to Northern Zone may provide additional wellfield locations for groundwater

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## Water Shortages by Development Zone (I-10)

**AECOM**

City of Boerne Service Area	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	2,100	3,129	4,588	4,802
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	307	307	307	307
Canyon Lake Reservoir**	975	1,989	3,448	3,611
Boerne City Lake	833	833	833	833
Total Water Supplies (Ac-Ft/Yr)	2,115	3,129	4,588	4,751
Water Shortage (Ac-Ft/Yr)	0	0	0	-51
Water Surplus (Ac-Ft/Yr)	15	0	0	0

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr).

\*\*Amount shown is the anticipated annual commitment for the City of Boerne service area (including Esperanza).

- Projected shortage by 2040
- Additional surface water may be available from GBRA

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Shortages by Development Zone (I-10) **AECOM**

City of Fair Oaks Ranch	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,505	1,809	2,111	2,354
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	543	543	543	543
Canyon Lake Reservoir**	962	1,266	1,568	1,850
Total Water Supplies (Ac-Ft/Yr)	1,505	1,809	2,111	2,393
Water Shortage (Ac-Ft/Yr)	0	0	0	0
Water Surplus (Ac-Ft/Yr)	0	0	0	39

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr) plus 500 ac-ft/yr from the wells in Bexar and Comal Counties.

\*\*Amount shown is anticipated annual commitment for the City of Fair Oaks Ranch.

- No shortage by 2040
- Build-out expected by 2040 (including Extra-Territorial Jurisdiction, ETJ)

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## Water Shortages by Development Zone (I-10) **AECOM**

Non-City Portion of I-10 Corridor Zone	2010	2020	2030	2040
Water Demands (Ac-Ft/Yr)	1,283	1,801	2,173	2,820
Water Supplies (Ac-Ft/Yr)				
Trinity Aquifer*	930	930	930	930
Canyon Lake Reservoir**	425	835	1,300	1,500
Other Surface Water	40	40	40	40
Total Water Supplies (Ac-Ft/Yr)	1,395	1,805	2,270	2,470
Water Shortage (Ac-Ft/Yr)	0	0	0	-350
Water Surplus (Ac-Ft/Yr)	112	4	97	0

\* The amount shown as available from the Trinity Aquifer is the proportional amount by area of the suggested minimum total available aquifer volume for Kendall County (6,336 ac-ft/yr).

\*\*Amount shown is the anticipated annual commitment is for Lerin Hills and Kendall County Utility Company/Tapatío.

- Projected shortage by 2040
- Additional surface water may be available from GBRA

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

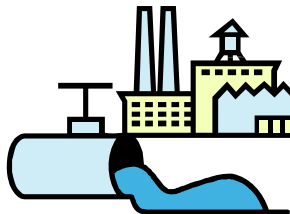
## Water Supply Strategy Option Summary **AECOM**

- 1,300 ac-ft/yr water supply shortage expected by 2040.
- Additional groundwater wells in the Northern Zone and additional surface water from GBRA may create some future supplies.
- Smaller project/efforts to stretch currently available supplies include:
  - Conservation
  - Drought management
  - Wastewater reuse
  - Brush control
  - Rainwater harvesting
- Determination of the Managed Available Groundwater (MAG) volume for the Trinity Aquifer will provide more insight into how soon additional water supplies may be needed.

Public Education is a key component of all of these options.

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## Wastewater Planning **AECOM**



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# Wastewater Flow Factor



## Wastewater Flow Factors for the Four Development Zones

Zone	Entity	Per Capita Wastewater (gallons per person per day)			
		2010	2020	2030	2040
Northern Kendall County		80	80	80	80
Western Kendall County		80	80	80	80
Central Kendall County		80	80	80	80
I-10 Corridor	Non-City	80	80	80	80
	Boerne	120	120	120	120
	Fair Oaks Ranch (All)	80	80	80	80

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# Wastewater Demand



## Wastewater Demands for the Four Development Zones

Zone	Entity	Wastewater Demands (MGD)			
		2010	2020	2030	2040
Northern Kendall County		0.17	0.20	0.24	0.29
Western Kendall County		0.27	0.33	0.40	0.48
Central Kendall County		0.76	1.07	1.32	1.73
I-10 Corridor	Non-City	0.65	0.92	1.12	1.48
	Boerne	1.38	2.09	3.11	3.30
	Fair Oaks Ranch (All)*	0.52	0.63	0.74	0.82

\* Assumed development of the City of Fair Oaks Ranch ETJ occurs by 2040

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# Wastewater System Options

AECOM

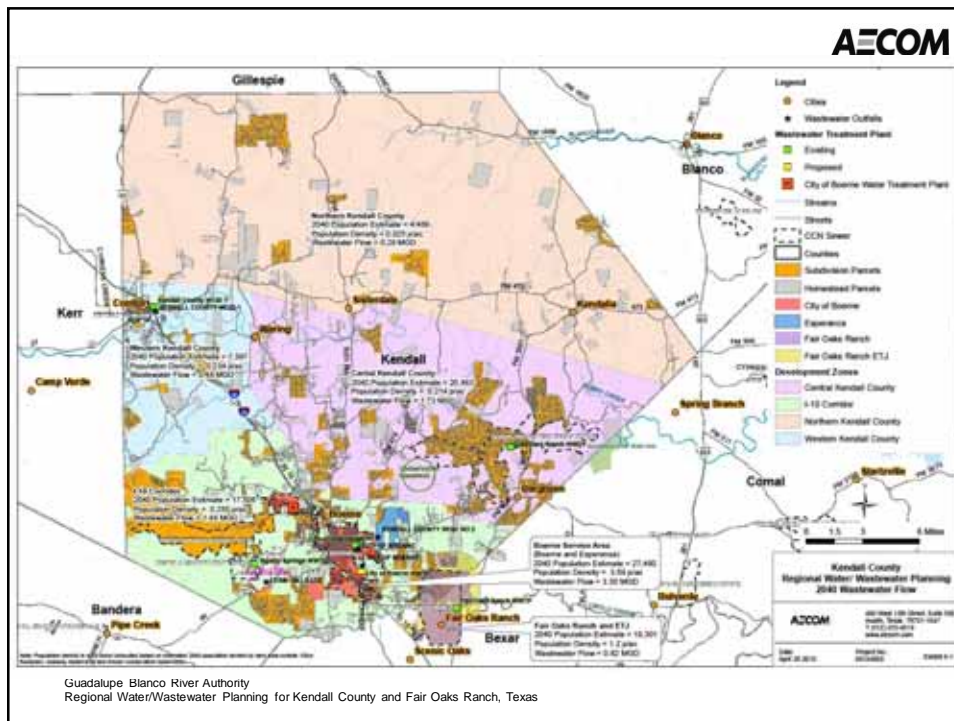
## Existing Conditions

### Wastewater Facilities

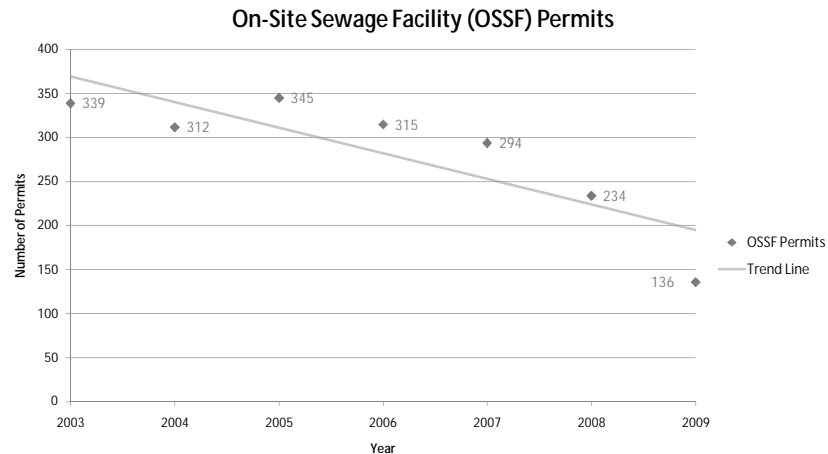
- City of Boerne
- Kendall County WCID No. 1
- Cordillera Ranch
- City of Fair Oaks Ranch
- Kendall County WCID No.2
- Tapatio Springs

### On-Site Sewage Facilities (OSSFs)

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## Trend in On-Site Sewage Facility (OSSF) Permits in Kendall County



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## Wastewater Collection System Alternatives

Collection System Alternative	Areas of Potential Applicability
Conventional Collection System	Serve future growth and/or retrofit existing developed areas in City of Boerne; City of Fair Oaks; City of Comfort; Cordillera Ranch; and other densely developed towns and subdivisions along the Guadalupe River and Cibolo Creek and other major drainages.
Pressure Sewer System	Serve future growth or retrofit areas served by failing OSSFs, in areas of complex topography with low to moderate development density in the North and West parts of Kendall County.
STEP/STEG Collection System	Retrofit areas served by existing OSSFs in Fair Oaks Ranch to increase effluent available for golf course irrigation, and serve future growth or areas served by failing OSSFs in moderately steep areas with low to moderate development density throughout the County.

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## Wastewater Treatment System Alternatives



- A single regional treatment facility;
- Multiple treatment facilities; and,
- Packaged treatment plants
- Regional treatment facility to serve both the City of Boerne and the City of Fair Oaks Ranch

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## Wastewater Treatment System Alternatives



Development Zone	Anticipated WW Treatment Facilities	Anticipated 2040 Flow Rate
Northern Kendall County	OSSFs	< 5,000 gpd each
Western Kendall County	Regional WWTP at Kendall County WCID No.1 Site	< 0.48 mgd + Kerr County Flows
Central Kendall County	Regional WWTP at GBRA Cordillera Ranch WWTP Site	< 1.73 mgd
I-10 Corridor	Regional WWTP at City of Boerne Future WWTP Site	< 5.2 mgd

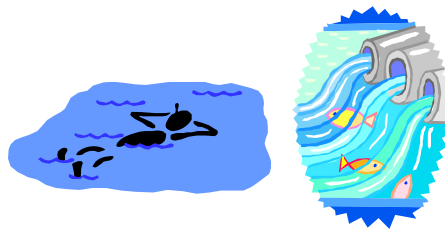
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## Wastewater Summary

- Regional Plants most viable at
  - Comfort
  - Cordillera Ranch
  - Boerne
  - Boerne/Fair Oaks
- Reuse/Irrigation needs might create need for smaller individual or “scalping” projects
- OSSFs remain most viable option in Northern Kendall County

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## Future Study Activities



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## Future Work

- Water Quality
  - Data collection
    - Water models or modeling data
      - Qual-TX input/output data from TCEQ
      - Qual2K model from City of Boerne
    - Water sample data
      - Ambient
      - Rainfall events
    - Surrogate-based data
      - Based on event mean concentration data from City of Austin

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## Future Work

- Water Quality
  - Modeling
    - High level Qual2K modeling
      - Stormwater impacts from development
      - Nutrient impacts at 5-5-2-1 point discharges
      - Non-point impacts

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## Project Milestones/Meetings

- Public Kickoff Meeting 01/11/2010
- 1<sup>st</sup> Advisory Committee Meeting 03/23/2010
- Development Scenario Memo 04/22/2010
- 2<sup>nd</sup> Advisory Committee Meeting 05/27/2010
- Mid-point Public Meeting 07/01/2010
- 3<sup>rd</sup> Advisory Committee Meeting 07/22/2010
- Draft Report 09/01/2010
- Final Public Meeting 09/07/2010
- Final Report 11/01/2010

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## Questions?



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## Managing Water Solutions for the Future

### Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

Final Advisory Group Meeting

July 22 2010



## Project Organization



### Advisory Group

Guadalupe Blanco River Authority  
San Antonio River Authority  
City of Boerne  
City of Fair Oaks Ranch  
Kendall County  
Cow Creek GCD  
Kendall County WCID #1  
Land Developers  
Environmental Groups

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Planning Objectives

- Identify the water and wastewater facilities needed for future demands
  - *through a thirty year planning period*
  - *while protecting the surface water quality and groundwater supplies*
  - *including potential regional management for water and wastewater facilities associated with development*

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## Topics for Today's Meeting

- Water Supply Planning.
- Wastewater Planning.
- Water Quality Modeling.

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## Water Supply Planning



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## Summary of Updates



- Outcome from second advisory group and public meetings
- Revised availability in Middle Trinity Aquifer
- Updated Strategy

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## Water Use Factors



- Development Zone Water Use Factors

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Non-City Population	8,068	11,482	14,055	18,512
Non-City Municipal Water Demand (Ac-Ft/Yr)	1,283	1,801	2,173	2,820
Total Municipal Water Demand (Ac-Ft/Yr)	4,888	6,739	8,872	9,976
Irrigation Water Demand (Ac-Ft/Yr)	193	189	185	181
Livestock Water Demand (Ac-Ft/Yr)	80	80	80	80
<b>Total Zone Water Demand (Ac-Ft/Yr)</b>	<b>5,161</b>	<b>7,008</b>	<b>9,137</b>	<b>10,237</b>

Total water demand for Kendall County and all of Fair Oaks Ranch is expected to grow from 8,400 to 16,200 ac-ft/yr by 2040

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Sources for Kendall County and Fair Oaks Ranch **AECOM**

Supply Source	Surface or Ground?	Annual Volume (Ac-Ft/Yr)	Notes
Middle Trinity Aquifer	Ground	6,336 – 9,189	12/08 GAM run
Edwards-Trinity Aquifer	Ground	318	MAG
Boerne City Lake	Surface	833	Not 100% reliable
Miscellaneous Surface Water	Surface	242	Volume is 100% reliable
Canyon Lake Reservoir (GBRA)	Surface	8,111 – 8,611	Volume is based on the raw water reservations of GBRA customers, and includes an anticipated reservation increase for Cordillera Ranch
<b>Total Water</b>		<b>15,840 – 19,193</b>	

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## GBRA Customers Receiving Canyon Lake Reservoir Water Supply

Receiving Entity	Current Annual Commitment (Ac-Ft/Yr)	Raw Water Reservation (Ac-Ft/Yr)	Notes
City of Boerne Service Area	975	3,611	
City of Fair Oaks Ranch	890	1,850	
Cordillera Ranch	200	1,000	Request for a raw water reservation increase of an additional 500 ac-ft/yr is pending, for a total of 1,500 ac-ft/yr
Kendall County Utility Company/Tapatio	200	750	Tapatio does not currently have a constructed delivery system for surface water
Lerin Hills	225	750	Lerin Hills does not currently have a constructed delivery system for surface water
Other water users (two years out)	30	150	Contract is pending
<b>Total Water</b>	<b>2,520</b>	<b>8,111</b>	A pending additional 500 ac-ft/yr reservation for Cordillera Ranch would give a total of 8,611 ac-ft/yr

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Summary of Water Shortages by Development Zone

Development Zone	Water Shortage (Ac-Ft/Yr)			
	2010	2020	2030	2040
Northern Kendall County Zone	0	0	0	0
Western Kendall County Zone	22	110	212	330
Central Kendall County Zone	0	120	222	663
I-10 Corridor Zone				
City of Boerne Service Area	0	0	0	51
City of Fair Oaks Ranch	0	0	0	0
Non-City Portion of Zone	0	0	0	350

**Total water shortage for Kendall County is expected to reach 1,394 ac-ft/yr by 2040**

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



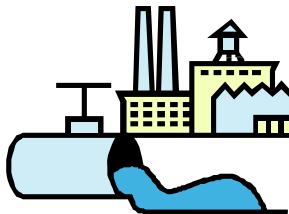
## Water Supply Strategy Option Summary **AECOM**

- 1,300 ac-ft/yr water supply shortage expected by 2040.
- Additional groundwater wells in the Northern Zone and additional surface water from GBRA may create some future supplies.
- Smaller project/efforts to stretch currently available supplies include:
  - Conservation
  - Drought management
  - Wastewater reuse
  - Brush control
  - Rainwater harvesting
- Determination of the Managed Available Groundwater (MAG) volume for the Trinity Aquifer will provide more insight into how soon additional water supplies may be needed.

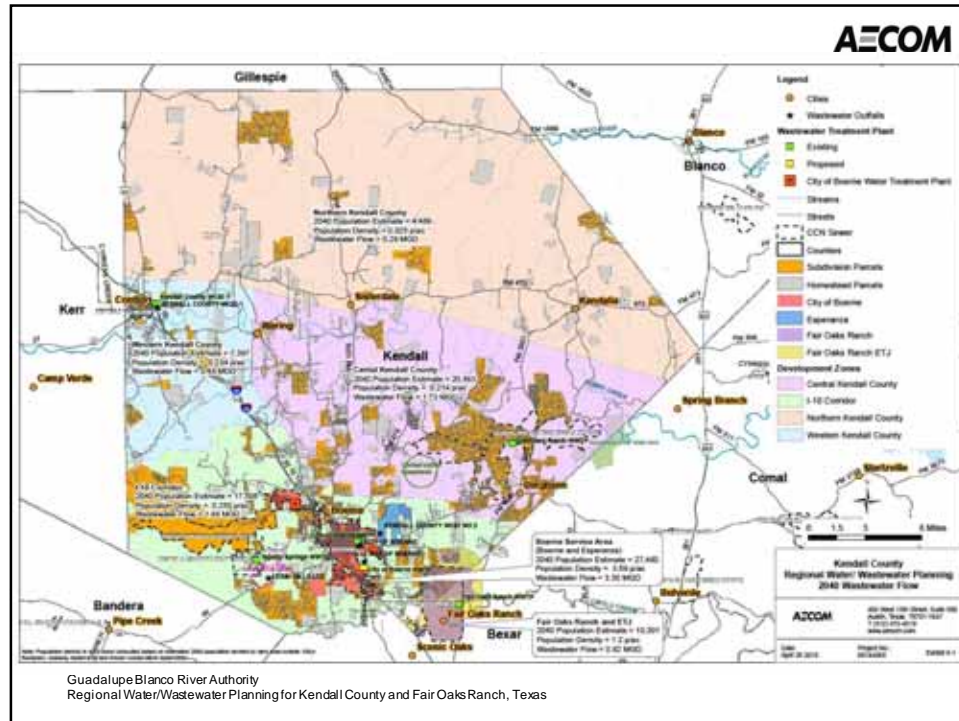
Public Education is a key component of all of these options.

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## Wastewater Planning **AECOM**



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## Wastewater Treatment System Alternatives

**AECOM**

- A single regional treatment facility;
- Multiple treatment facilities; and,
- Packaged treatment plants
- Regional treatment facility to serve both the City of Boerne and the City of Fair Oaks Ranch

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## Wastewater Treatment System Alternatives

**AECOM**

Development Zone	Anticipated WW Treatment Facilities	Anticipated 2040 Flow Rate
Northern Kendall County	OSSFs	< 5,000 gpd each
Western Kendall County	Regional WWTP at Kendall County WCID No. 1 Site	< 0.48 mgd + Kerr County Flows
Central Kendall County	Regional WWTP at GBRA Cordillera Ranch WWTP Site	< 1.73 mgd
I-10 Corridor	Regional WWTP at City of Boerne Future WWTP Site Regional WWTP for Boerne / Fair Oaks Ranch	< 5.2 mgd

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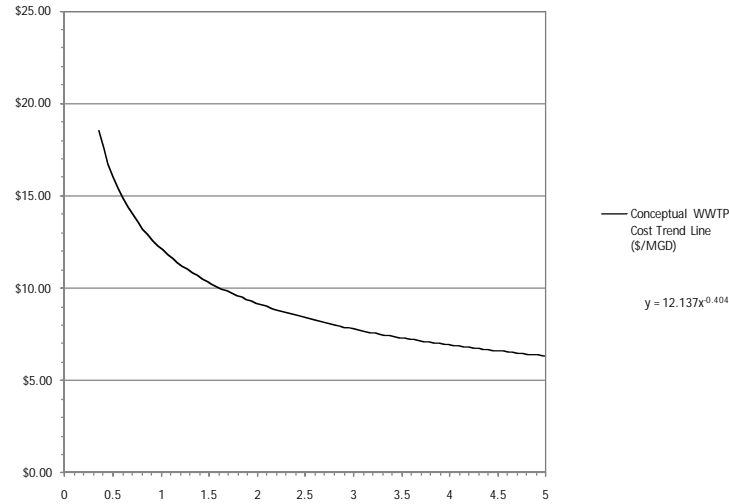
## Wastewater Treatment System Costing

**AECOM**

- Construction cost data for wastewater treatment facilities in Central Texas were evaluated to develop a second order polynomial regression trend line for cost per unit treatment capacity.
- The equation of the resulting trend line was used with the wastewater demand projections to estimate costs for initial WWTP construction (to provide capacity through 2020) and for two subsequent expansion phases (to provide capacity through 2030 and 2040 respectively).
- This second-order polynomial trend line was developed using construction cost data for wastewater treatment facilities capable of advanced treatment (5/5/2/1 effluent quality or better) constructed in Central Texas between 2004 and 2010, ranging from 0.35 mgd to 25 mgd constructed capacity increments.
- The data set for development of the conceptual cost curve included only four facilities, indicating that these costs should not be relied upon for planning purposes beyond the conceptual level.

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## WWTP Construction Unit Cost vs. Capacity (MGD) Trend Line AECOM



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## Conceptual Construction Costs of Regional WWTPs AECOM

Conceptual Construction Costs (\$) for Regional WWTPs		Initial Capacity Through 2020	Expansion for Capacity Through 2030	Expansion for Capacity Through 2040
Northern Kendall County		OSSFs	OSSFs	OSSFs
Western Kendall County		\$6,268,000	\$2,488,000	\$2,694,000
Central Kendall County		\$12,636,000	\$5,312,000	\$7,134,000
I-10 Corridor	Non-City	OSSFs or Small WWTPs	OSSFs or Small WWTPs	OSSFs or Small WWTPs
	Boerne	\$18,833,000	\$12,281,000	\$4,511,000
	Fair Oaks Ranch <sup>1</sup>	\$9,215,000	\$3,257,000	\$2,694,000
	Boerne + Fair Oaks <sup>1</sup>	\$22,035,000	\$13,054,000	\$5,562,000

<sup>1</sup> Costs assume treatment of 100% of flows generated at Fair Oaks Ranch.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



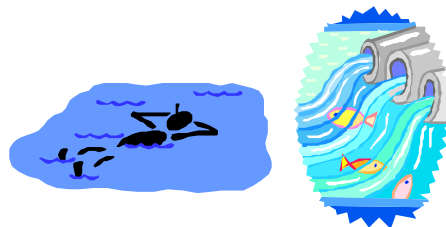
## Wastewater Summary

- Regional Plants most viable at
  - Comfort
  - Cordillera Ranch
  - Boerne
  - Boerne/Fair Oaks
- Reuse/Irrigation needs might create need for smaller individual or “scalping” projects
- OSSFs remain most viable option in Northern Kendall County

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Water Quality Modeling



Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## QUAL-TX Model for Guadalupe River

**AECOM**

Reach #	Reach Length (miles)	Drainage Area (acres)	2010 % Impervious Cover	2040 % Impervious Cover	WWTP within Reach?	2010 WWTP Flow (cfs)	2040 WWTP Flow (cfs)
1	8	26,277	1.01	1.78	KC WCID #1	0.03	0.228
2	8.4	44,898	0.42	0.81	N/A	N/A	N/A
3	4.6	34,511	1.27	2.64	N/A	N/A	N/A
4	9.6	56,527	0.35	0.75	N/A	N/A	N/A
5	1.5	11,080	1.19	2.72	N/A	N/A	N/A
6	11	25,757	1.14	2.60	N/A	N/A	N/A
7	11.4	38,180	1.19	2.72	Cordillera Ranch	0.00	2.38

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Non-Point Loadings for Guadalupe River

**AECOM**

- Average rainfall in Kendall County = 40 inches/yr
- Runoff = Rainfall \* Runoff coefficient
- Runoff Coefficient,  $y = 0.5398x^2 + 0.3333x + 0.0289$  where x is Impervious Cover
- 0.12 ac impervious cover/person.
- Nitrogen, Phosphorus, TSS and Fecal Coliform loadings computed based on information in "Predicting Effects of Urban Development in the Cities of New Braunfels, San Marcos, Seguin and Victoria. Prepared in cooperation with GBRA and TNRCC by PBS&J, November 2000."

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Loadings for Guadalupe River

**AECOM**

Reach #	Non-Point Source TSS (lb./yr)			Point Source TSS (lb./yr)		
	2010	2040	% Change	2010	2040	% Change
1	2,046,552	2,275,728	10.1	266	2,242	88.2
2	3,213,438	3,399,176	5.5	0	0	0.0
3	2,787,325	3,348,460	16.8	0	0	0.0
4	4,004,588	4,243,114	5.6	0	0	0.0
5	884,989	1,086,206	18.5	0	0	0.0
6	2,042,973	2,486,188	17.8	0	0	0.0
7	3,049,538	3,742,901	18.5	0	23,403	100.0

Reach #	Non-Point Source Nitrogen (lb./yr)			Point Source Nitrogen (lb./yr)		
	2010	2040	% Change	2010	2040	% Change
1	8,744	9,832	11.1	106	897	88.2
2	13,601	14,478	6.1	0	0	0.0
3	11,956	14,623	18.2	0	0	0.0
4	16,929	18,056	6.2	0	0	0.0
5	3,792	4,748	20.1	0	0	0.0
6	8,746	10,852	19.4	0	0	0.0
7	13,065	16,360	20.1	0	9,361	100.0

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

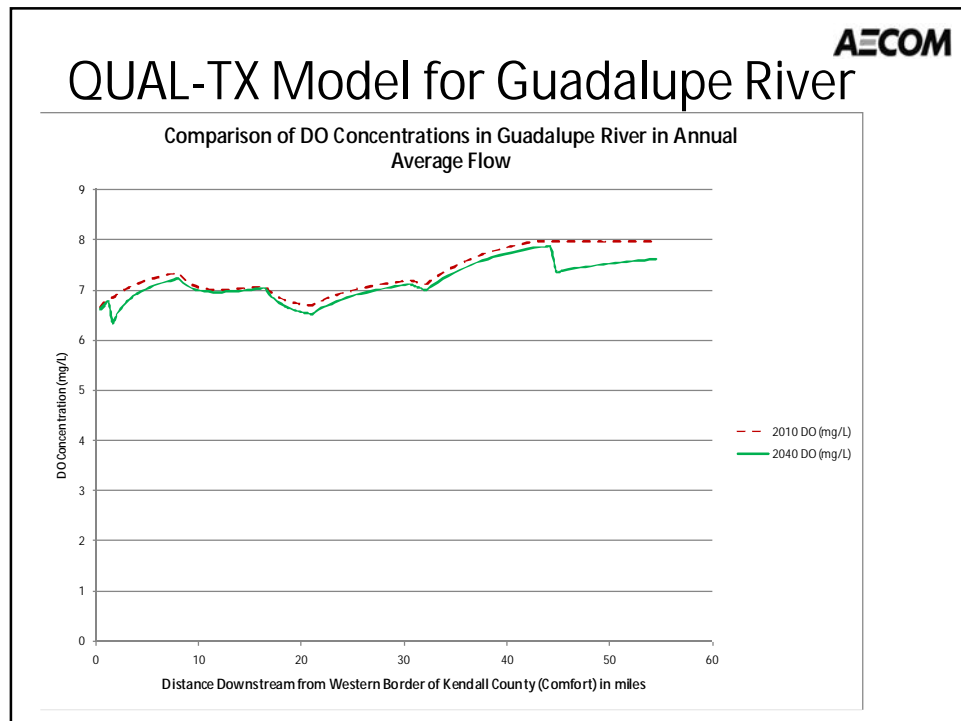
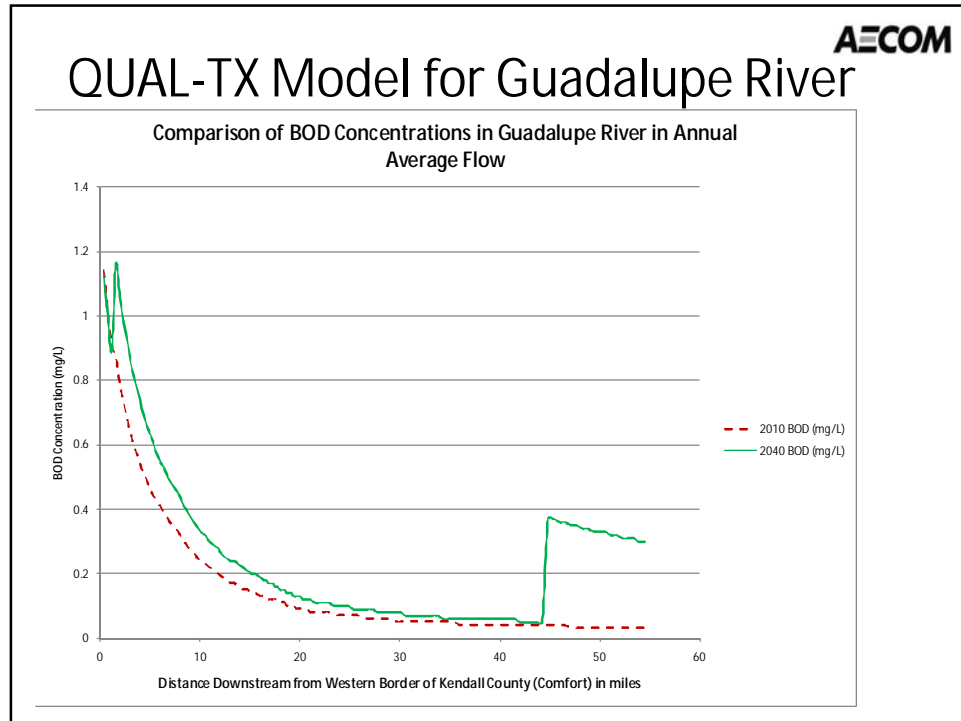
## Loadings for Guadalupe River

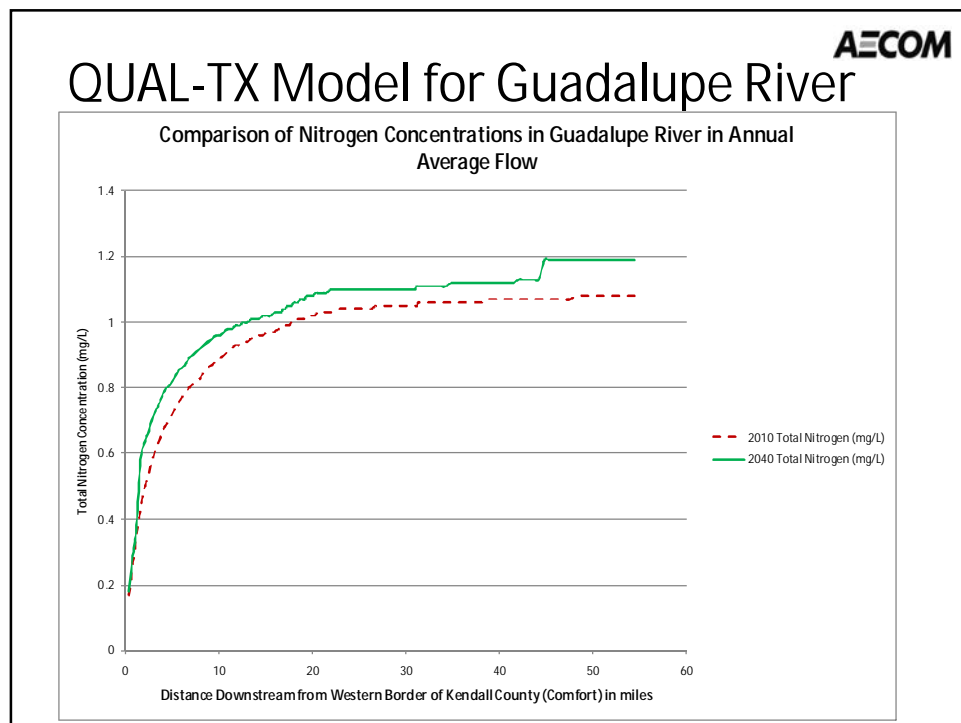
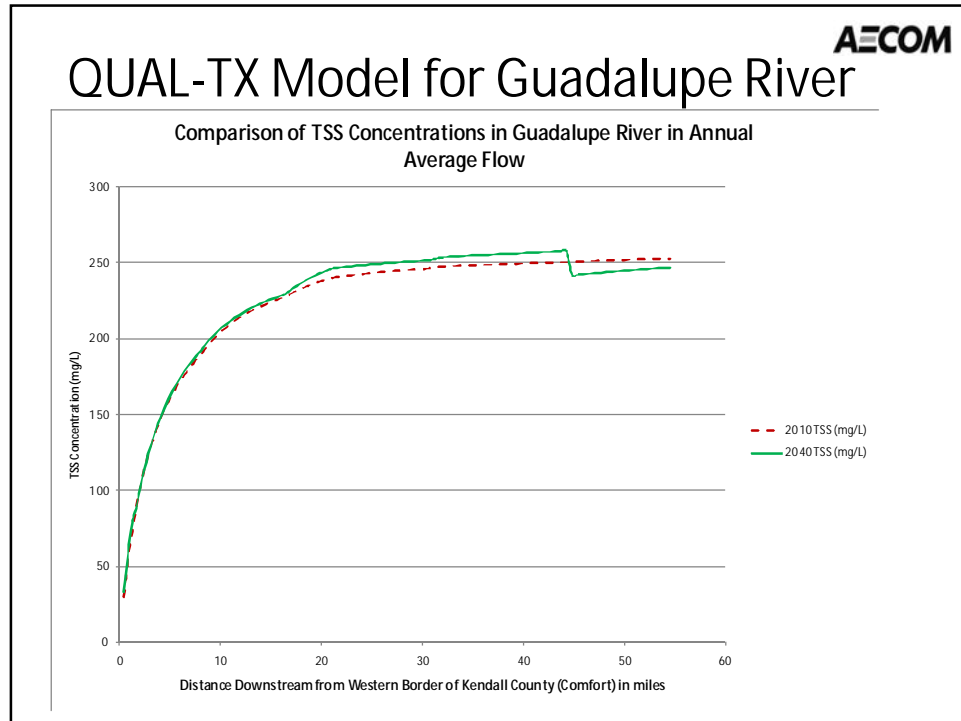
**AECOM**

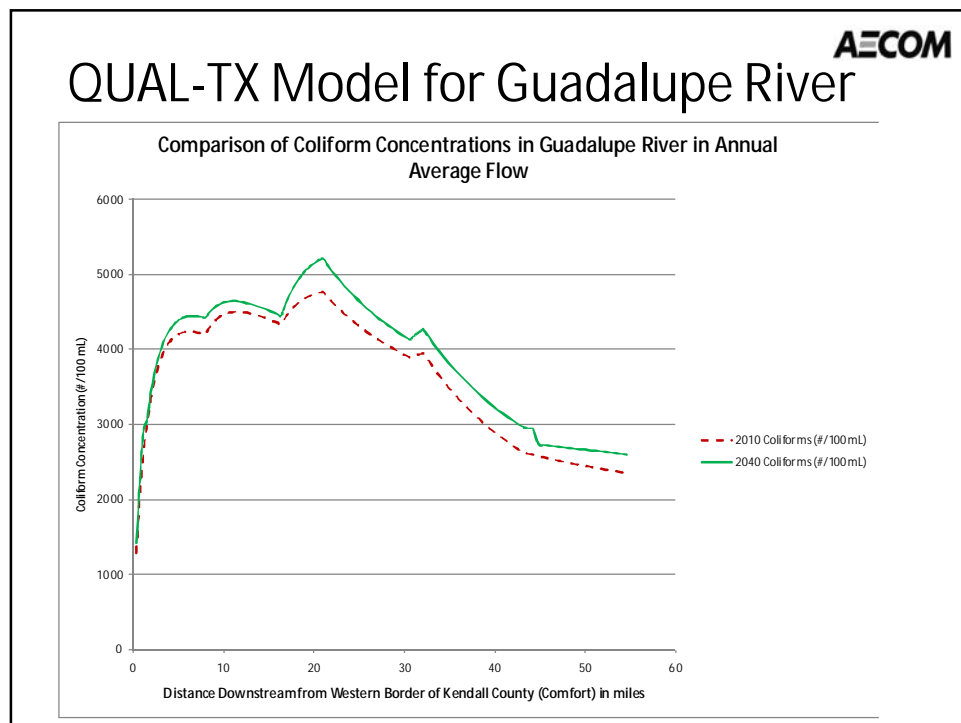
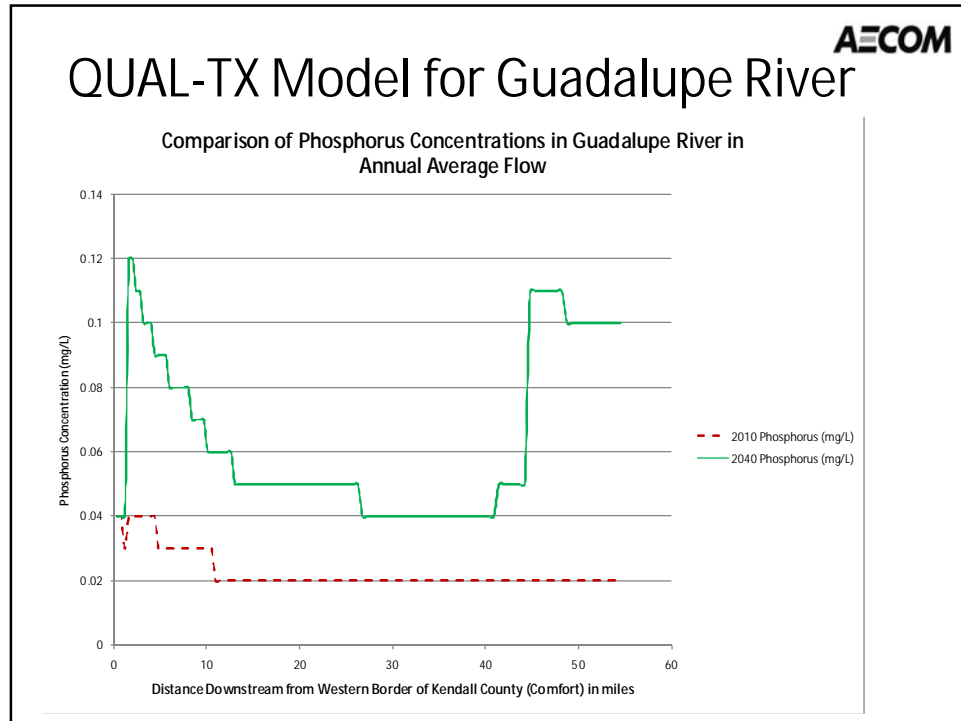
Reach #	Non-Point Source Phosphorus (lb./yr)			Point Source Phosphorus (lb./yr)		
	2010	2040	% Change	2010	2040	% Change
1	179	342	47.7	53	448	88.2
2	120	241	50.2	0	0	0.0
3	305	726	58.0	0	0	0.0
4	124	279	55.6	0	0	0.0
5	91	242	62.4	0	0	0.0
6	201	531	62.1	0	0	0.0
7	313	833	62.4	0	4,681	100.0

Reach #	Coliforms (#/100 mL)		
	2010	2040	% Change
1	11,301	11,770	4.0
2	10,955	11,183	2.0
3	11,457	12,316	7.0
4	10,915	11,147	2.1
5	11,409	12,368	7.8
6	11,379	12,290	7.4
7	11,409	12,368	7.8







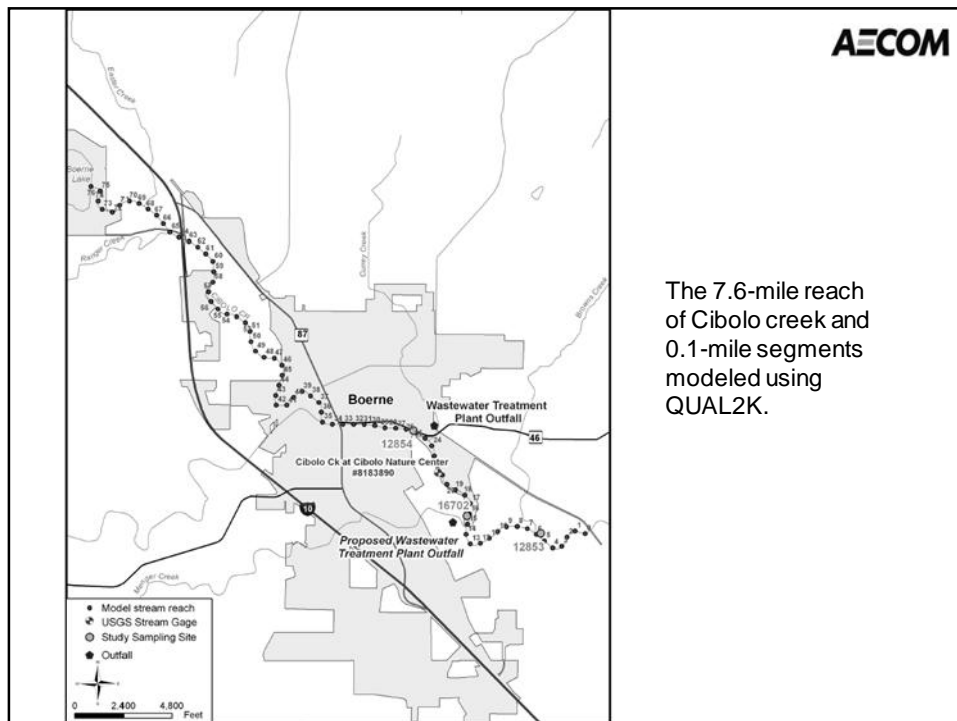


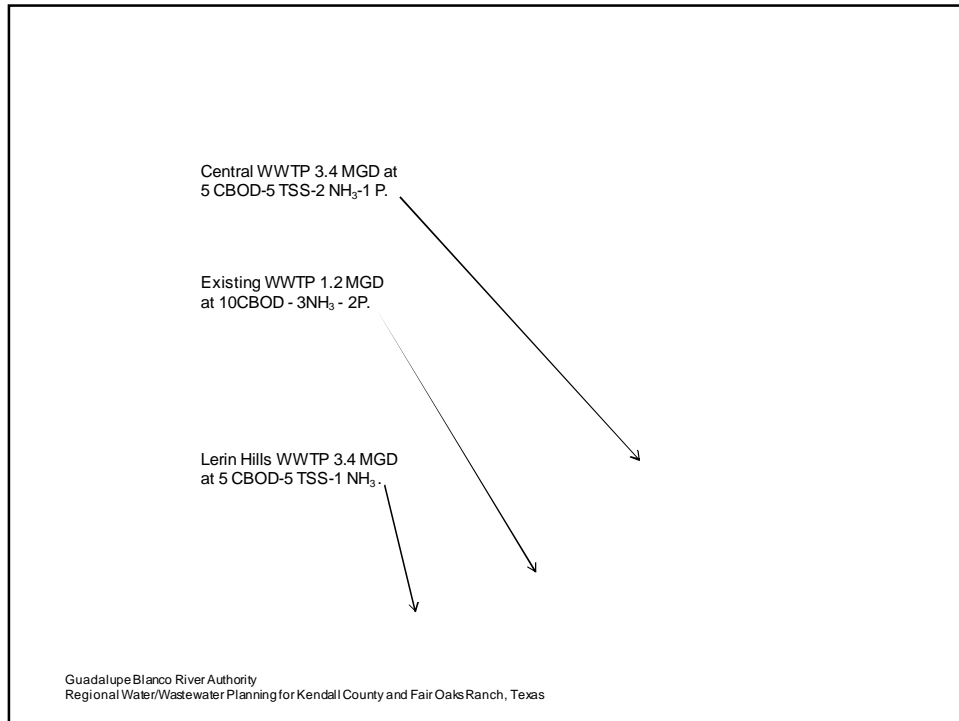
## QUAL-2K Model for Cibolo Creek

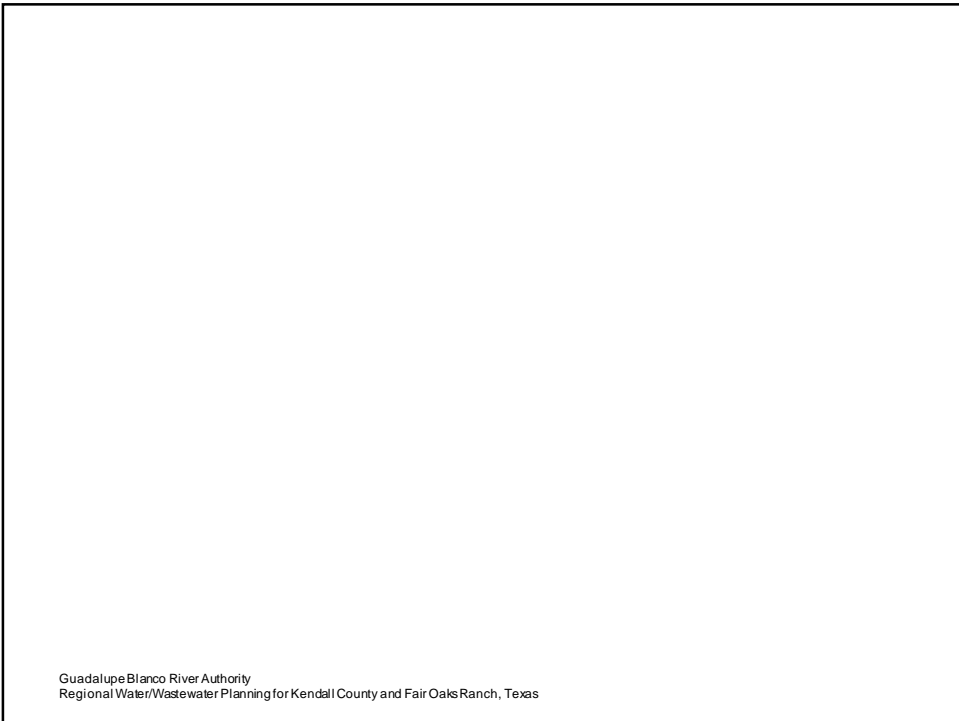
AECOM

- Base Data
  - Qual2K model from City of Boerne
- Surrogate-based data
  - Based on event mean concentration data from City of Austin
- High level Qual2K modeling
  - Stormwater impacts from development
  - Nutrient impacts at 5-5-2-1 point discharges
  - Non-point impacts

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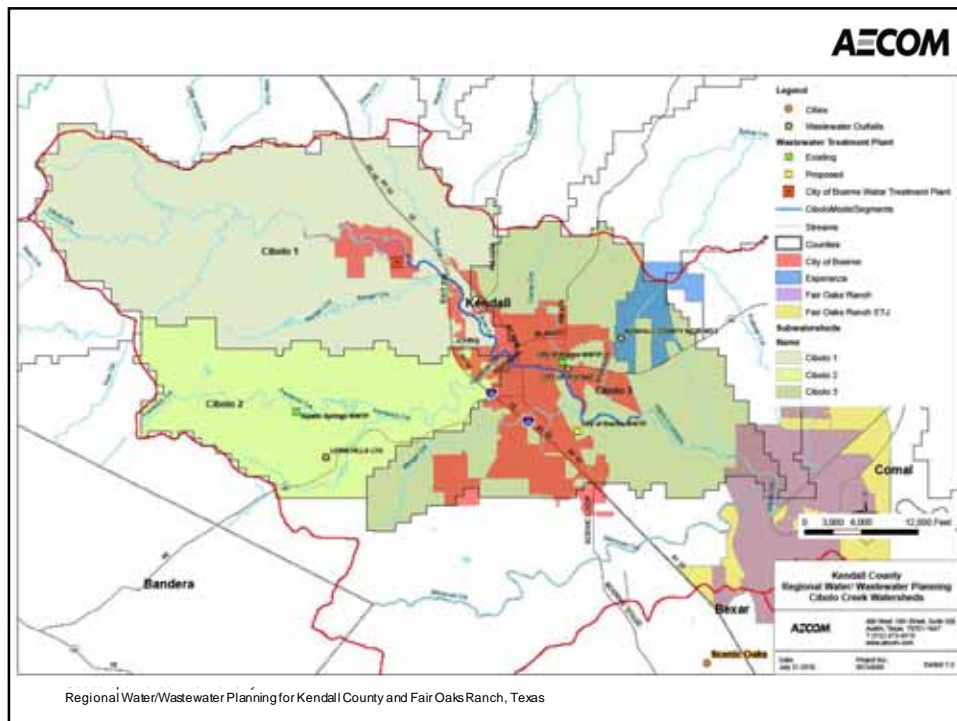


## Non-Point Loadings

**AECOM**

- Average rainfall in Kendall County = 40 inches/yr
- $\text{Runoff} = \text{Rainfall} * \text{Runoff coefficient}$
- $\text{Runoff Coefficient, } y = 0.5398x^2 + 0.3333x + 0.0289$  where x is Impervious Cover
- 0.16 ac impervious cover/person.
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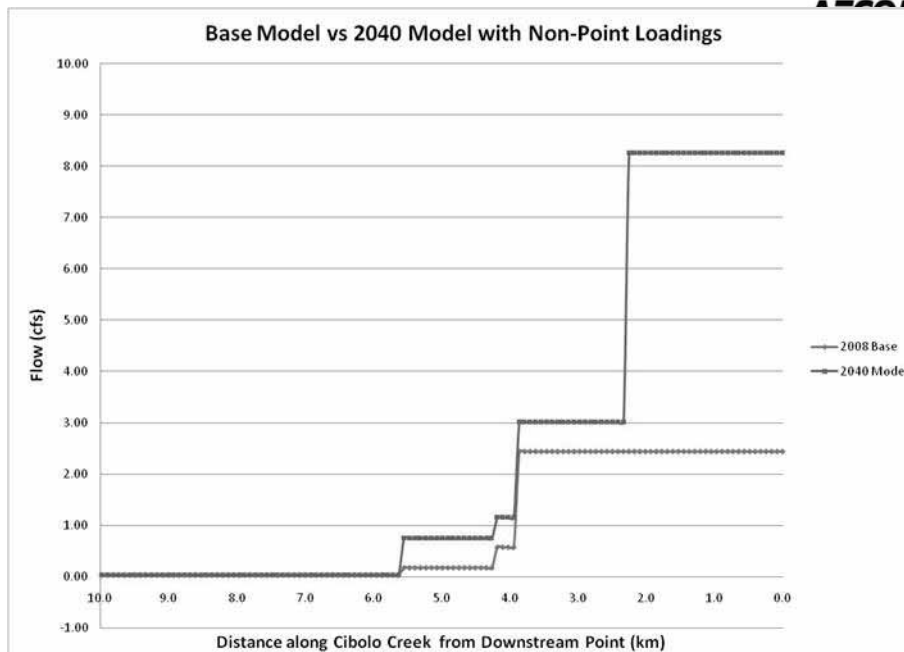




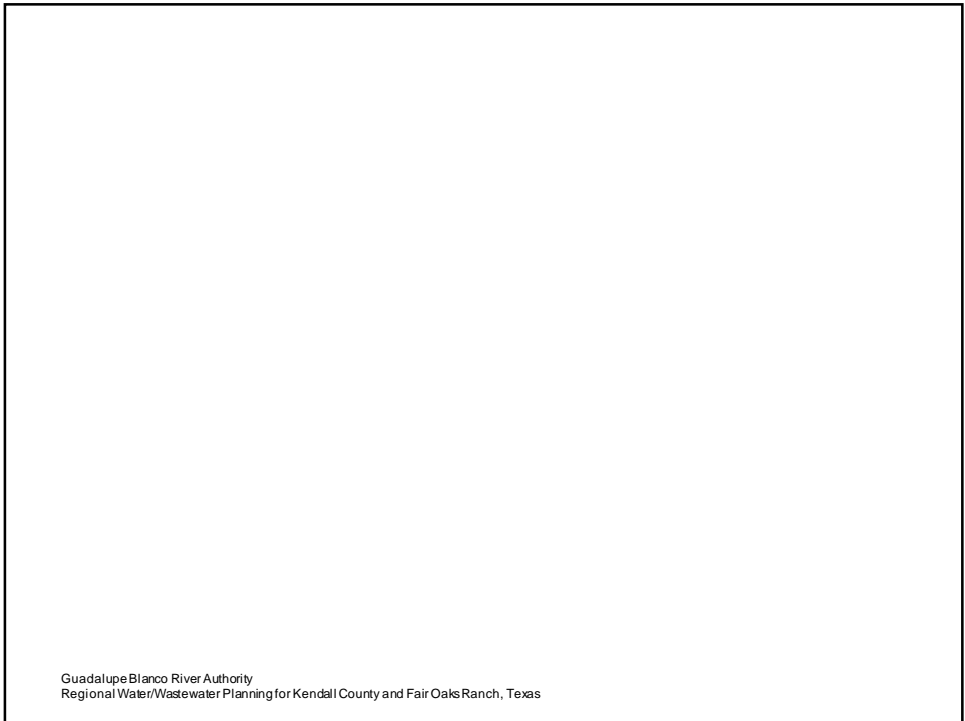
## Non-Point Loadings

Non-point source runoff data					
Watershed 1: Watershed North West of Boerne					
Source : <a href="http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf">http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf</a>					
2010			2040		
Total area =	6197.34	acre	Total area =	6197.34	acre
Total flow =	0.009	m <sup>3</sup> /sec	Total flow =	0.026	m <sup>3</sup> /sec
Nitrogen =	1.286	mg/L	Nitrogen =	1.564	mg/L
Phosphorus =	0.084	mg/L	Phosphorus =	0.198	mg/L
Non-point source runoff data					
Watershed 2: Non-point flow added at Frederick Creek					
Source : <a href="http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf">http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf</a>					
2010			2040		
Total area =	10256.7	acre	Total area =	10256.7	acre
Total flow =	0.004	m <sup>3</sup> /sec	Total flow =	0.012	m <sup>3</sup> /sec
Nitrogen =	1.220	mg/L	Nitrogen =	1.405	mg/L
Phosphorus =	0.057	mg/L	Phosphorus =	0.133	mg/L
Non-point source runoff data					
Watershed 3: Watershed South East of Boerne					
Source : <a href="http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf">http://www.gbra.org/Documents/CRP/SpecialStudies/UrbanDevelopmentStudy.pdf</a>					
2010			2040		
Total area =	11303.4	acre	Total area =	11303.4	acre
Total flow =	0.063	m <sup>3</sup> /sec	Total flow =	0.180	m <sup>3</sup> /sec
Nitrogen =	1.663	mg/L	Nitrogen =	2.469	mg/L
Phosphorus =	0.239	mg/L	Phosphorus =	0.569	mg/L

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas







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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Project Milestones/Meetings

- Public Kickoff Meeting 01/11/2010
- 1<sup>st</sup> Advisory Committee Meeting 03/23/2010
- Development Scenario Memo 04/22/2010
- 2<sup>nd</sup> Advisory Committee Meeting 05/27/2010
- Mid-point Public Meeting 07/01/2010
- 3rd Advisory Committee Meeting 07/22/2010
- Draft Report 09/01/2010
- Final Public Meeting 09/07/2010
- Final Report 11/01/2010

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Questions?

**AECOM**



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## Managing Water Solutions for the Future

### Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

Final Public Meeting

September 14 2010



## Project Organization



### Advisory Group

Guadalupe Blanco River Authority  
San Antonio River Authority  
City of Boerne  
City of Fair Oaks Ranch  
Kendall County  
Cow Creek GCD  
Kendall County WCID #1  
Land Developers  
Environmental Groups

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Planning Objectives

- Identify the water and wastewater facilities needed for future demands
  - *through a thirty year planning period*
  - *while protecting the surface water quality and groundwater supplies*
  - *including potential regional management for water and wastewater facilities associated with development*

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Project Milestones/Meetings

- |  |            |
|--|------------|
| • Public Kickoff Meeting                     | 01/11/2010 |
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| • Mid-point Public Meeting                   | 07/01/2010 |
| • 3rd Advisory Committee Meeting             | 07/22/2010 |
| • Draft Report                               | 09/01/2010 |
| • Final Public Meeting                       | 09/14/2010 |
| • Final Report                               | 11/01/2010 |

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



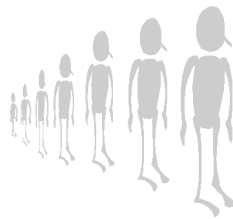
## Topics for Today's Meeting

- Key Findings.
- Conclusions and Recommendations.

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## Population and Water Demand

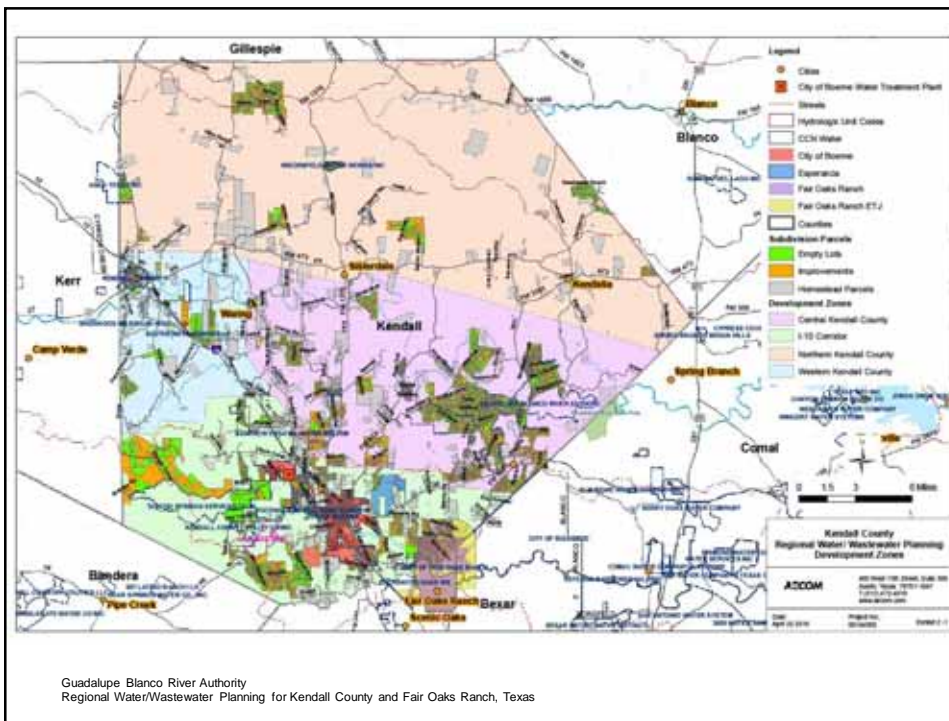


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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Population and Water Demand

- Kendall County's population will grow from 35,720 in 2010 to 78,690 in 2040. There is sufficient available land area in Kendall County to accommodate the projected population in each zone.
- Total water demand for Kendall County and all of Fair Oaks Ranch is expected to grow from 8,400 to 16,200 ac-ft/yr by 2040.
- These demands will need to be satisfied using existing supplies, reducing overall water use (conservation), or finding new supplies.

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# Water Supply Planning



Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Sources for Kendall County and Fair Oaks Ranch



Supply Source	Surface or Ground?	Annual Volume (Ac-Ft/Yr)	Notes
Middle Trinity Aquifer <sup>1</sup>	Ground	6,336 – 9,189	12/08 GAM run
Edwards-Trinity Aquifer	Ground	318	MAG
Boerne City Lake	Surface	833	Not 100% reliable
Miscellaneous Surface Water	Surface	242	Volume is 100% reliable
Canyon Reservoir (GBRA)	Surface	8,111 – 8,611	Volume is based on the raw water reservations of GBRA customers, and includes an anticipated reservation increase for Cordillera Ranch (500 ac-ft)
<b>Total Water</b>		<b>15,840 – 19,193</b>	

<sup>1</sup> Additional GAM run results were available in May 2010, which estimated larger availabilities, but the advisory group was more comfortable with the smaller, more conservative groundwater availability at the time when shortage analysis was performed.

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## GBRA Customers Receiving Canyon Lake Reservoir Water Supply



Receiving Entity	Current Annual Commitment (Ac-Ft/Yr)	Raw Water Reservation (Ac-Ft/Yr)	Notes
City of Boerne Service Area	975	3,611	Includes Esperanza.
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Kendall County Utility Company/Tapatio	200	750	Tapatio does not currently have a constructed delivery system for surface water
Lerin Hills	225	750	Lerin Hills does not currently have a constructed delivery system for surface water
Other water users (two years out)	30	150	Contract is pending
<b>Total Water</b>	<b>2,520</b>	<b>8,111</b>	A pending additional 500 ac-ft/yr reservation for Cordillera Ranch would give a total of 8,611 ac-ft/yr

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Summary of Water Shortages by Development Zone



Development Zone	Water Shortage (Ac-Ft/Yr)			
	2010	2020	2030	2040
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I-10 Corridor Zone				
City of Boerne Service Area	0	0	0	51
City of Fair Oaks Ranch	0	0	0	0
Non-City Portion of Zone	0	0	0	350

Total water shortage for Kendall County is expected to reach 1,394 ac-ft/yr by 2040

Guadalupe Blanco River Authority  
Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supply Strategy Option Summary **AECOM**

- 1,300 ac-ft/yr water supply shortage expected by 2040.
- Additional groundwater wells in the Northern Zone and additional surface water from GBRA may create some future supplies.
- Smaller project/efforts to stretch currently available supplies include:
  - Conservation
  - Drought management
  - Wastewater reuse
  - Brush control
  - Rainwater harvesting
- Determination of the Managed Available Groundwater (MAG) volume for the Trinity Aquifer will provide more insight into how soon additional water supplies may be needed.

Public Education is a key component of all of these options.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas

## Water Supplies and Strategies **AECOM**

- A final determination of the MAG volume for the Trinity Aquifer in Kendall County will provide a greater confidence in the available water supply quantity for that source.
- The Western Canyon Regional Treated Water Supply Project has enabled over 8,000 ac-ft/yr to be supplied to the Kendall County area and significantly reduced the demands on the Middle Trinity Aquifer. This source of surface water may have future quantities of water available for residents of Kendall County.
- Regardless of the predicted timing of future shortages for the Trinity aquifer within Kendall County, it is apparent that the growth of the County will eventually require additional water management strategies to be implemented.

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Regional Water/Wastewater Planning for Kendall County and Fair Oaks Ranch, Texas



## Water Supplies and Strategies

- Initial small water shortages identified within this study can potentially be addressed in most areas through implementation of demand-management measures. This is the most cost-effective method for meeting small shortages.
- Eventually during this thirty-year planning period or soon thereafter, increased importation of other supplies or increased use of interruptible supplies will likely be necessary. The new strategies will be costly and complex. Planning for additional water supplies should not be delayed.


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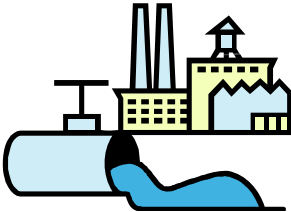
## Water Supplies and Strategies

- The GBRA and other water managers in the County should actively encourage and support
  - research investigations to improve the understanding of the Trinity aquifer in order to better equip the water planners and community leaders in dealing with future water supply issues.
  - improved conservation efforts for both individual homeowners and utility systems.
- The IH-10 Corridor followed by Central Kendall County are the best candidates for regionalization of future water supply systems in Kendall County.
- Opportunities for purchasing additional water from GBRA should be explored when available.

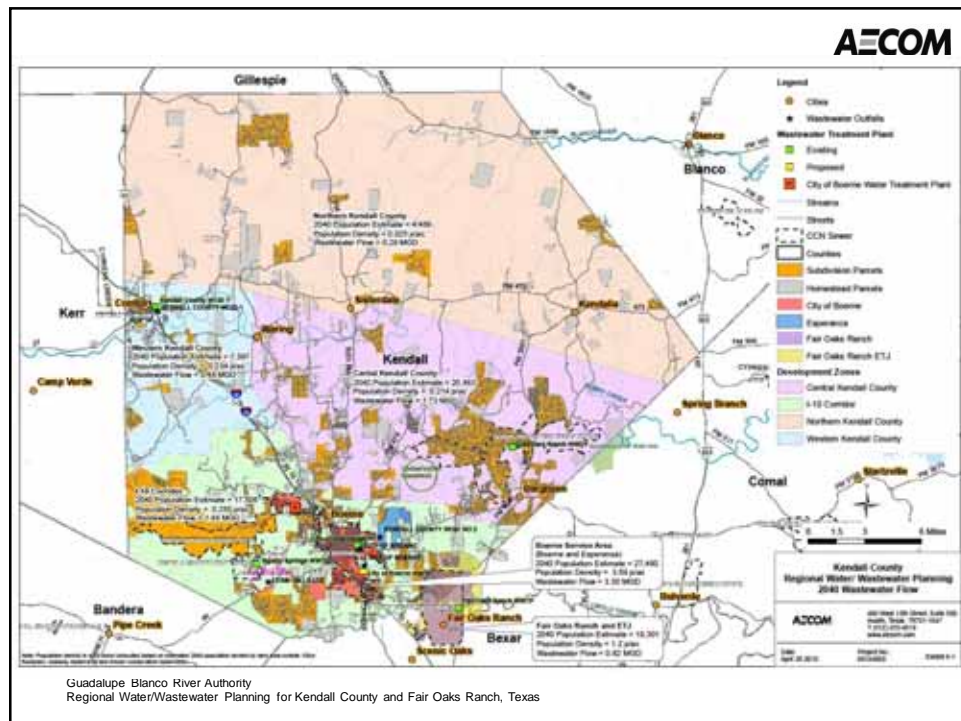
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# Wastewater Planning



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## Wastewater Collection Facilities

- Conventional collection systems- most appropriate for densely developed communities in relatively flat areas.
- Pressure sewer systems- most appropriate in areas of complex topography with low to moderate development density.
- STEP/STEG collection system- potential option for retrofitting existing OSSF communities throughout County.

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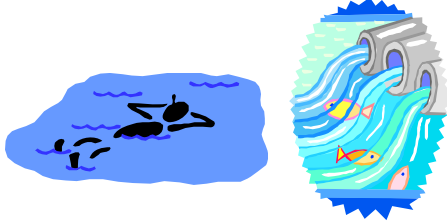
## Wastewater Treatment

- The recommended development scenario for wastewater treatment is use of regional facilities at
  - Comfort
  - Cordillera Ranch
  - Boerne
  - Boerne/Fair Oaks
- Use of packaged treatment plants is not recommended for providing long-term wastewater service.
- Reuse/Irrigation needs might create need for smaller individual or "scalping" projects.
- OSSFs remain most viable option in Northern Kendall County.

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# Water Quality

**AECOM**



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# Water Quality

**AECOM**

- The Guadalupe River and many other streams in Kendall County provide a high quality recreational asset for the entire region. Local officials and the public desire to maintain that high quality.
- Increased level of pollutants in stormwater runoff from increased growth and urbanization in this area are identified as one of the key contributors of possible water quality degradation in Kendall County.
- For the Cibolo Creek watersheds, high *fecal coliform* concentrations in stormwater runoff are expected to remain a concern if proper preventative measures are not implemented in the future.
- Best management practices (BMPs) should be considered to mitigate stormwater pollution. BMPs for sediment removal and nutrient removal may not be as effective at reducing the bacteria loading.

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## Water Quality

- Low impact and low density developments are helpful to reduce pollution from stormwater runoff. Low density developments are prevalent in Guadalupe River watersheds. Low impact developments should be investigated and implemented in the Cibolo watershed for future developments.
- Training for individual homeowners in the County for maintenance of OSSFs is needed to enable proper maintenance of these systems. GBRA has the ability and desire to provide that training.
- The water quality modeling efforts conducted for this study demonstrate that maintaining a high standard of effluent discharge can maintain the quality of water in the river.

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## Questions?



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## Comments on Final Draft Report

- Table 2.7 - Developable Land Area
- Table 3.8 - Water Supply Sources
- 3.2.3.1 - Region L Strategies
- Table 3.16 - Potential Costs for Water Strategies
- 4.4 - Wastewater Treatment Alternatives – collection system and land costs
- 5.0 - Water Quality – modeling results

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