

Sustainable Water Resource Series Forum

- Jan 7 – Introduction – why and what for
- Jan 21 – State Water Plan
- Feb 4 – Other Water Supply Options
- Feb 18 – Lake Thunderbird
- Mar 4 – Regional Water Supply Solution
- Mar 25 – Financial Conditions of Utilities
- Apr 1 – Trusts
- Apr 15 – Comparison of Financial Options of Long Term Water Solutions

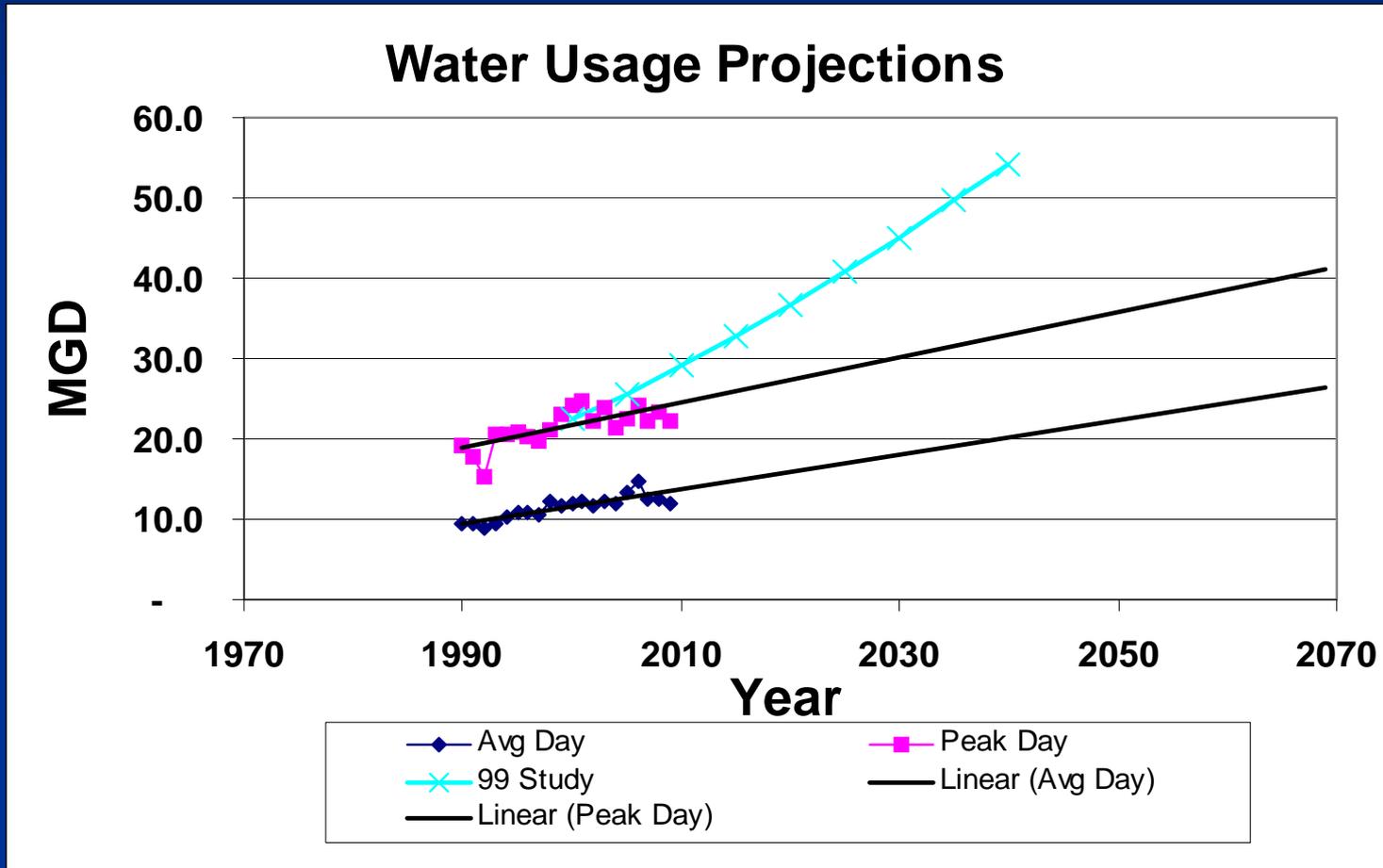
Water

Over 4.5 billion gallons produced/yr
24/7 365 days a year



530 miles of pipelines
170,000 water quality tests
per year

Norman water usage

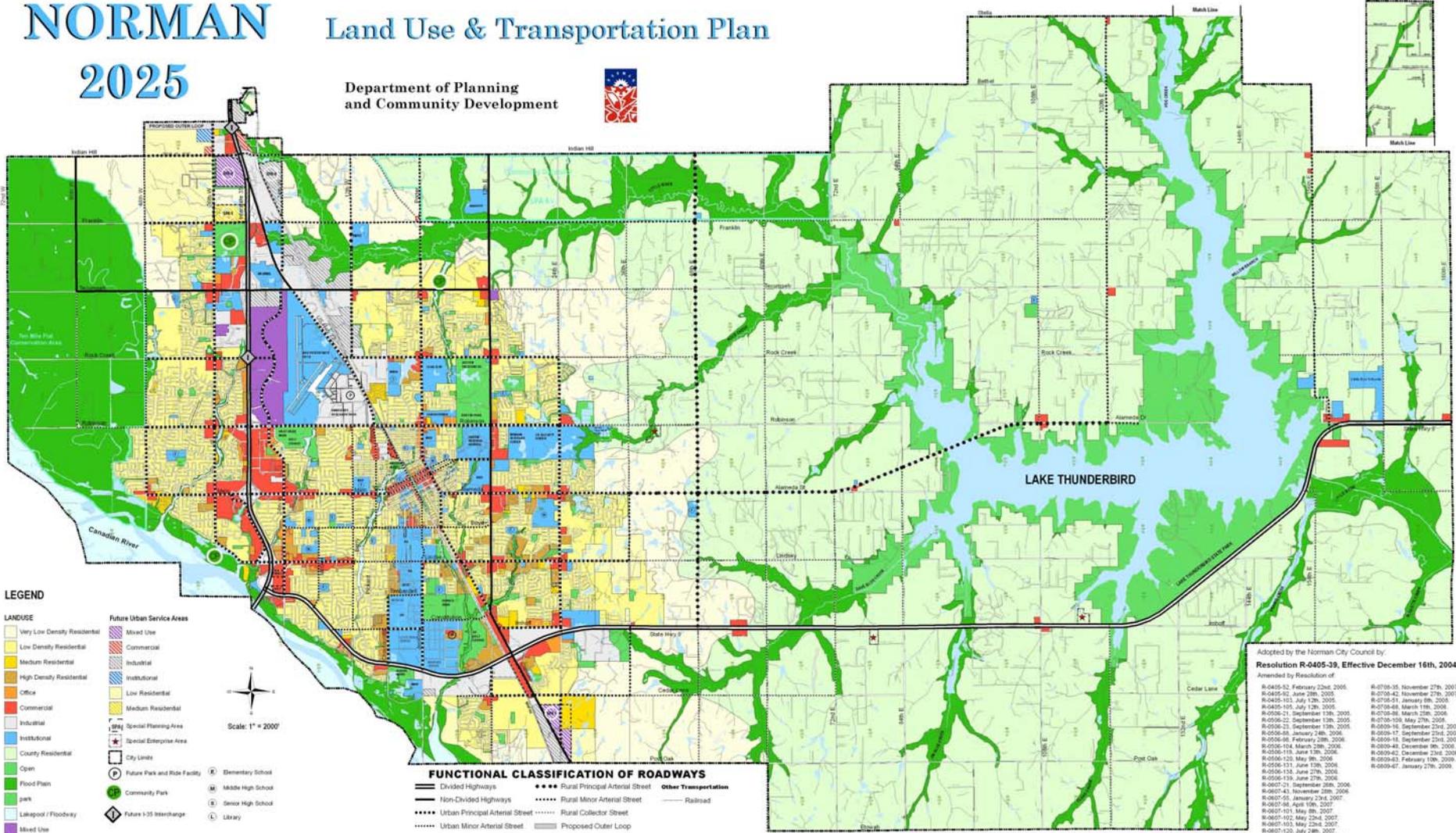


NORMAN

2025

Land Use & Transportation Plan

Department of Planning
and Community Development



LEGEND

- LAND USE**
- Very Low Density Residential
 - Low Density Residential
 - Medium Residential
 - High Density Residential
 - Office
 - Commercial
 - Industrial
 - Institutional
 - Country Residential
 - Open
 - Flood Plain
 - Park
 - Lakeport / Floodway
 - Mixed Use
- Future Urban Service Area**
- Mixed Use
 - Commercial
 - Industrial
 - Institutional
 - Low Residential
 - Medium Residential
 - Special Planning Area
 - Special Enterprise Area
 - City Limits
 - Future Park and Ride Facility
 - Elementary School
 - Middle High School
 - Senior High School
 - Library
 - Future I-35 Interchange
- Scale: 1" = 2000'

FUNCTIONAL CLASSIFICATION OF ROADWAYS

- Divided Highways
- Non-Divided Highways
- Urban Principal Arterial Street
- Urban Minor Arterial Street
- Rural Principal Arterial Street
- Rural Minor Arterial Street
- Rural Collector Street
- Proposed Outer Loop
- Other Transportation
- Railroad

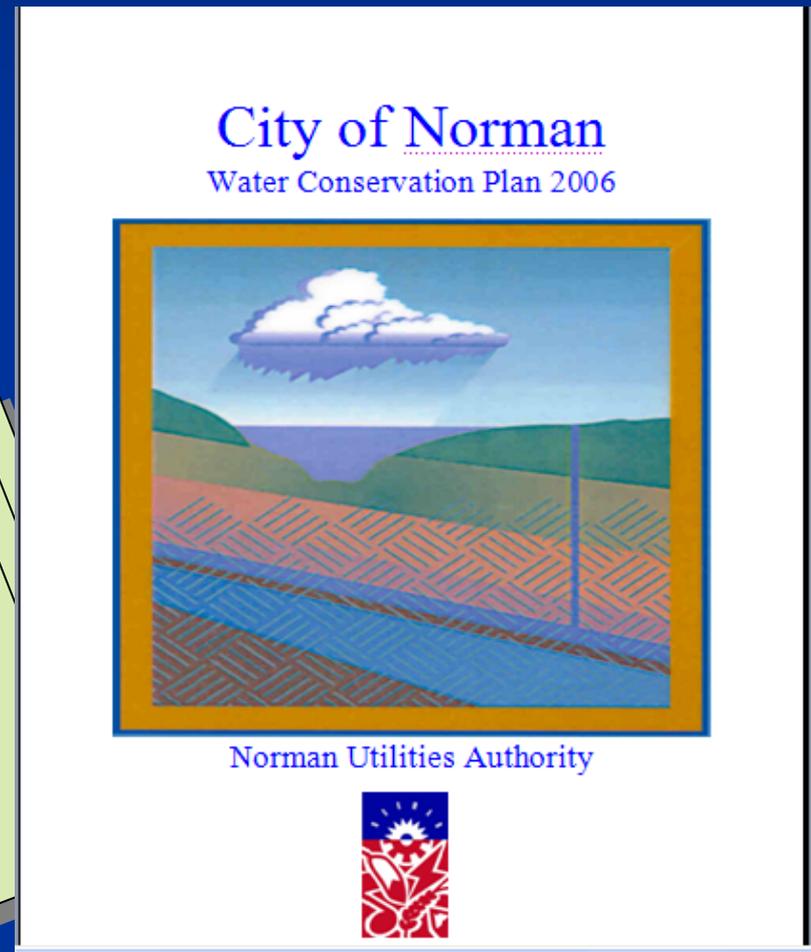
Adopted by the Norman City Council by
Resolution R-0405-35, Effective December 16th, 2004.
Amended by Resolution of:

- R-0405-52, February 22nd, 2005
- R-0405-82, June 29th, 2005
- R-0405-103, July 12th, 2005
- R-0405-105, July 12th, 2005
- R-0506-21, December 13th, 2005
- R-0506-22, September 13th, 2005
- R-0506-28, January 24th, 2006
- R-0506-29, February 28th, 2006
- R-0506-104, March 28th, 2006
- R-0506-113, June 17th, 2006
- R-0506-113, June 27th, 2006
- R-0506-119, June 13th, 2006
- R-0506-120, June 27th, 2006
- R-0506-121, November 29th, 2006
- R-0607-21, September 20th, 2006
- R-0607-41, November 29th, 2006
- R-0607-51, January 23rd, 2007
- R-0607-56, April 16th, 2007
- R-0607-101, May 2nd, 2007
- R-0607-102, May 22nd, 2007
- R-0607-103, May 22nd, 2007
- R-0607-120, July 24th, 2007
- R-0607-121, August 29th, 2007
- R-0607-122, August 29th, 2007
- R-0607-123, August 29th, 2007
- R-0708-35, November 27th, 2007
- R-0708-51, January 9th, 2008
- R-0708-68, March 11th, 2008
- R-0708-88, March 25th, 2008
- R-0708-109, May 27th, 2008
- R-0809-16, September 22nd, 2008
- R-0809-17, September 22nd, 2008
- R-0809-43, December 9th, 2008
- R-0809-62, December 23rd, 2008
- R-0809-63, February 19th, 2009
- R-0809-67, January 27th, 2009

Map produced by the City of Norman
MapSource, Intergraph Systems, February 1994, 1995.

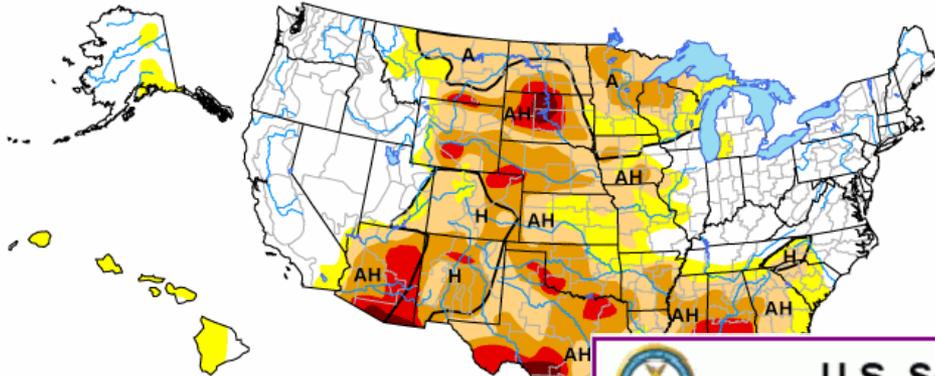
Water Conservation

- Update Water Conservation Plan
- ECAB Conservation Research
- Public Education



U.S. Drought Monitor

July 18, 2006
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

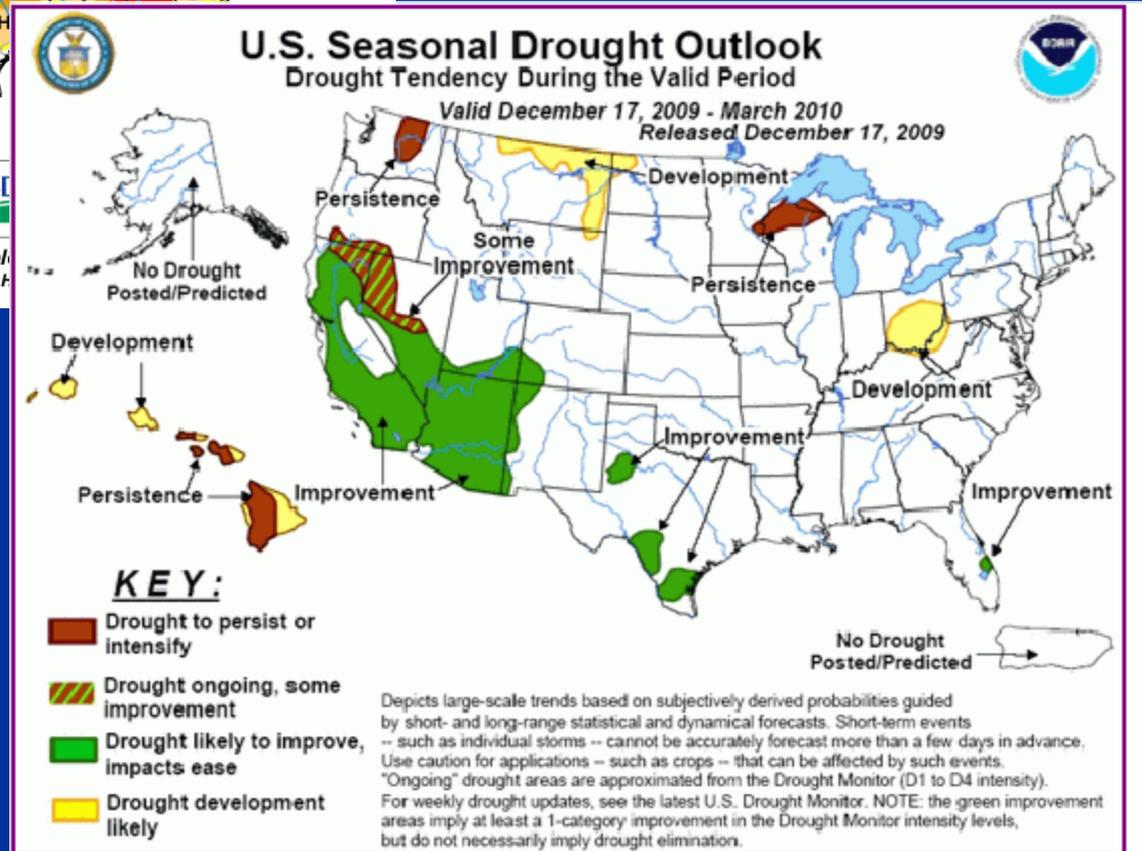
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

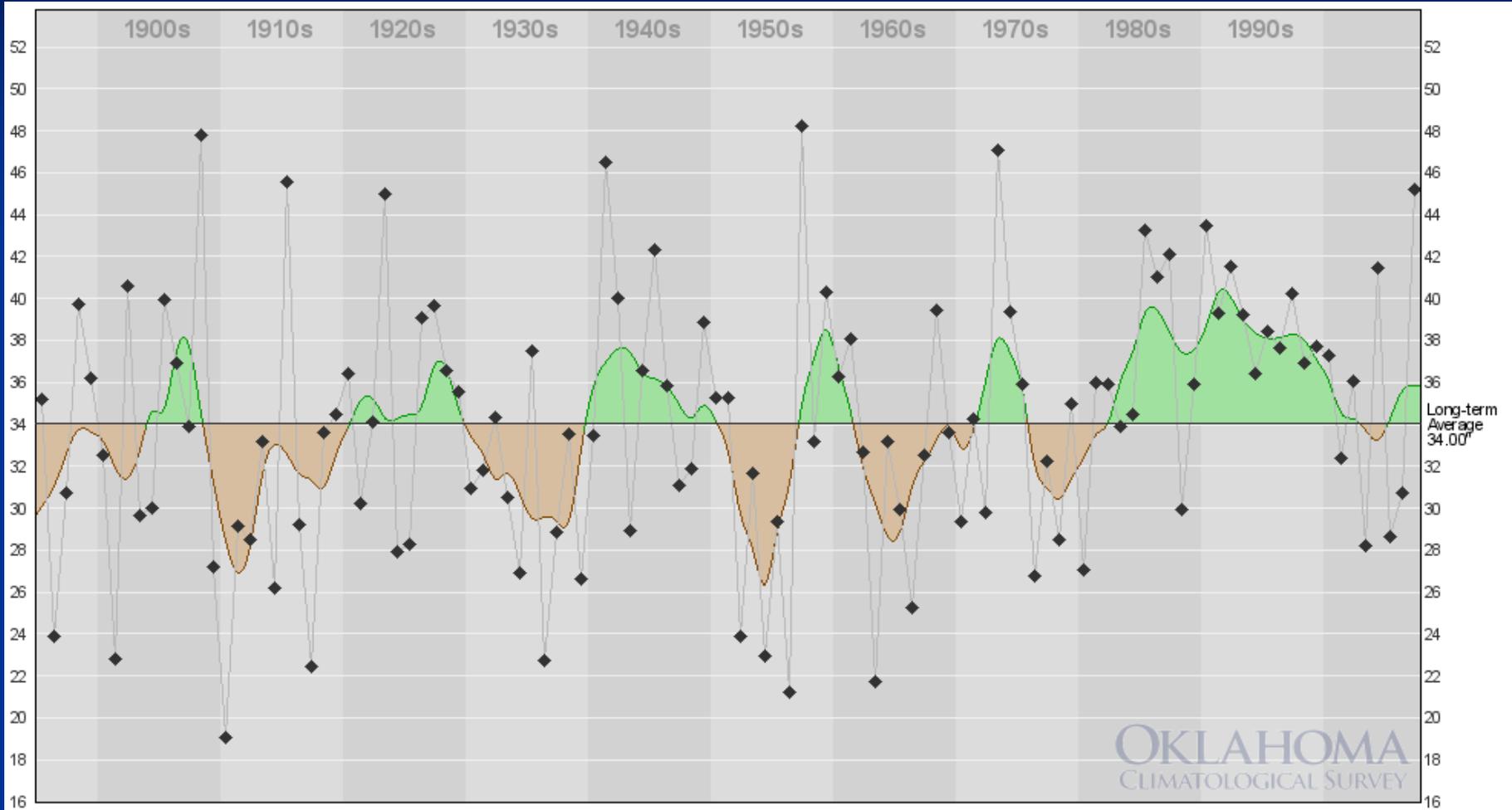
Author: Richard H....

Drought Ready Community

Oklahoma Climatological Survey



Oklahoma Precipitation



OKLAHOMA
CLIMATOLOGICAL SURVEY



Annual Precipitation History with 5-year Tendencies
Oklahoma Statewide: 1895-2007

- Wetter historical periods
- Drier historical periods
- Individual Annual precipitation value

City of Norman, Oklahoma

Norman 2040 Strategic Water Supply Plan



February 2001

Presented By:
Norman Utilities Authority



2040 Strategic Water Supply Plan

- Baseline Development
- Existing System Assessment
- Alternatives Evaluation
 - 17 possible water resource alternatives were identified
 - Each alternative evaluated and characterized based on quality, location, storage capacity, yield, cost policy, etc.

Strategic Water Supply Plan

- Water Resource Alternatives
 - A – Do nothing
 - B – Garber-Wellington Aquifer
 - C – Southeast Oklahoma
 - D – Hugo reservoir
 - E – South Canadian, one treatment plant
 - F – South Canadian, two treatment plant

Alt. A: Do Nothing

- Become a customer of OKC

■ Availability rate	\$1.25
■ Take or Pay	\$2.10
■ Emergency	\$4.47

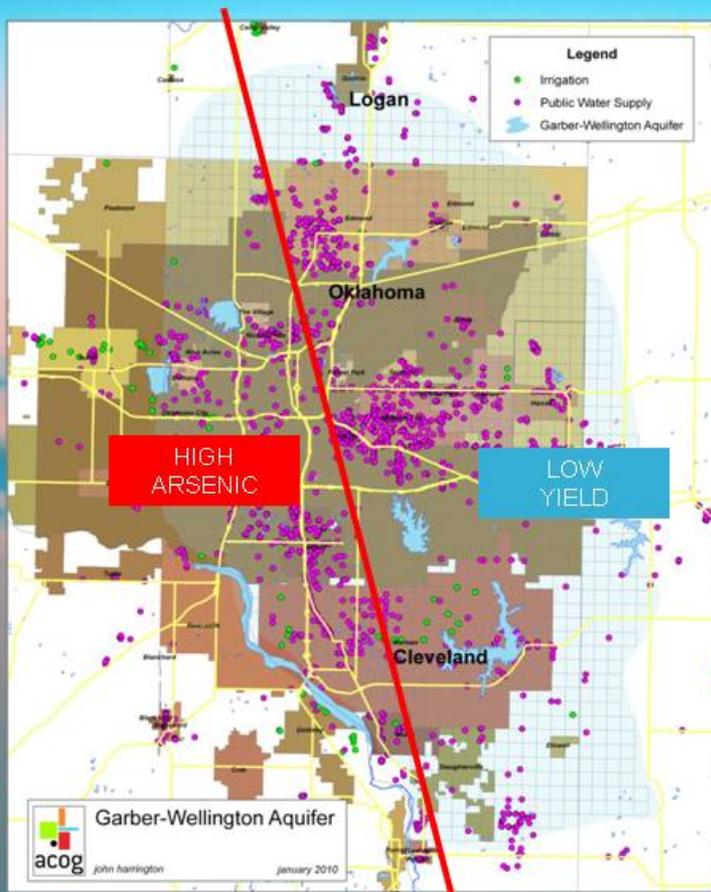
- Add cost :

- > Infrastructure \$20 mil
- > Customer Service
- > Laboratory

- > Line Maintenance
- > Debt
- > Capital Replacement

Alt. B: Garber Wellington

A Groundwater Primer Water Quality Issues



Some issues with the aquifer relate to water quality. More stringent arsenic regulations have made public water supply drilling on the west side of the aquifer far more difficult. Drilling on the east side has better water quality, but not as much saturated rock, leading to smaller well yields.

Garber-Wellington Arsenic Removal

City of Norman Sustainable Water Resource Forum

February 4, 2010



Conclusions

- Arsenic is removed
- No bacterial impacts
- Completely Self-Contained System
 - No Sewer or other infrastructure required
- Non-hazardous Waste
- OJT for operations staff
- As of October 27,2009:
 - 73.6 million gallons / \$155,000 (revenue)



Well Work

- ☑ Well #3 replaced
- ☑ 3 New wells (#41,42,43) working, connected
- ☑ Well #31 Arsenic treatment Project, working
- ☑ 6 New wells (#44 – 49) Drilled, tested, piped and waiting final regulatory approval
- ☑ 10 New Wells (#50-61) Drilled, tested, waiting for well houses and piping to system

Alt. C: Southeast Oklahoma



GOLDSBY



COWRA

Central Oklahoma Water Resource Authority

PO Box 851331
Yukon, OK 73085-1331

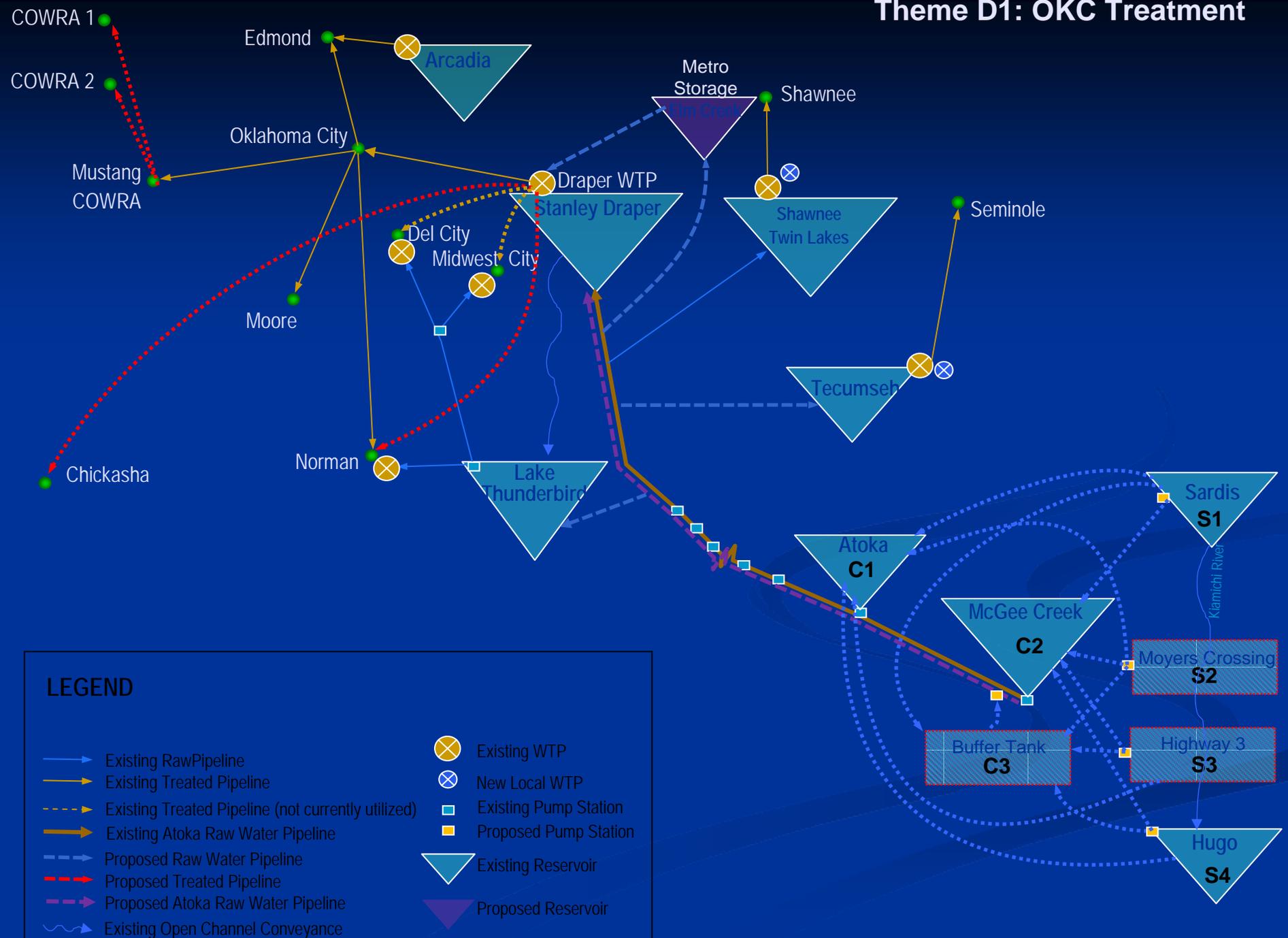


Alternative Ranking

- Phasing potential
- Permitting/Environmental
- Constructability
- Water Rights
- Public Perception
- Atoka Delivery/Source Yield
- O & M Costs
- Capital Costs



Theme D1: OKC Treatment



LEGEND

- Existing Raw Pipeline
- Existing Treated Pipeline
- Existing Treated Pipeline (not currently utilized)
- Existing Atoka Raw Water Pipeline
- Proposed Raw Water Pipeline
- Proposed Treated Pipeline
- Proposed Atoka Raw Water Pipeline
- Existing Open Channel Conveyance
- Existing WTP
- New Local WTP
- Existing Pump Station
- Proposed Pump Station
- Existing Reservoir
- Proposed Reservoir

Raw Water Transportation

- Planning level costs based on alignment conditions



River Crossings



Pump Stations



Alignment Conditions

90" Parallel Atoka Pipeline - \$1 Billion

Source Alternatives Capital

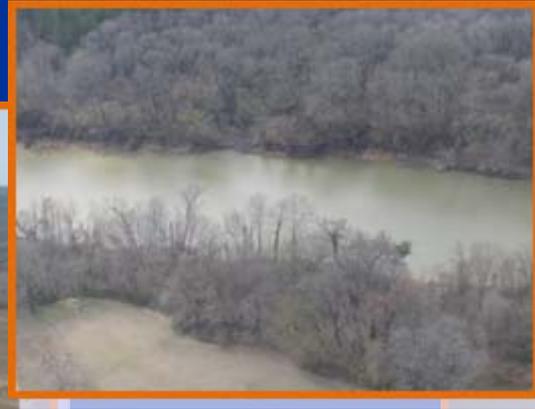
Planning level costs were established for each of the four source water alternatives:



Lake Sardis
Alt. 1



Moyer's
Alt. 2



Highway 3
Alt. 3



Lake Hugo
Alt. 4

Lake Sardis to Atoka - \$348M (Alt. 1)
HWY 3 to McGee to Atoka - \$408M (Alt. 3)

Moyer's to McGee to Atoka - \$312M (Alt. 2)
Hugo to McGee to Atoka - \$456M (Alt. 4)

Capital Cost Summary

		Regional Distribution Themes (2008 Dollars, Presented in Billions)		
		OKC Treatment Theme D1	Regional Treatment Theme D2	Raw Water Delivery Theme D3
Raw Water Transmission Alternative	Lake Sardis Alt. 1	\$1.58	\$1.78	\$1.81
	Moyer's Crossing Alt. 2	\$1.53	\$1.73	\$1.76
	Highway 3 Alt. 3	\$1.63	\$1.83	\$1.86
	Lake Hugo Alt. 4	\$1.68	\$1.88	\$1.91

Capital Cost Summary – Norman

Appendix G

		Regional Distribution Themes (2008 Dollars, Presented in Millions)		
		OKC Treatment Theme D1	Regional Treatment Theme D2	Raw Water Delivery Theme D3
Raw Water Transmission Alternative	Lake Sardis Alt. 1	\$365.8	\$403.9	\$403.9
	Moyer's Crossing Alt. 2	\$360.3	\$398.4	\$398.4
	Highway 3 Alt. 3	\$375.1	\$413.2	\$413.2
	Lake Hugo Alt. 4	\$382.5	\$420.6	\$420.6

Atoka Pipeline		Calculation	Norman's Share
Atoka to Seminole/Shawnee		\$900,000,000	
Norman Demand			
2060	23.67 mgd		
Project Demand 2060	154.16 mgd	15.40%	
		<u>\$138,600,000</u>	\$138,600,000
Seminole/Shawnee to Stanley Draper		\$180,000,000	
Norman Demand			
2060	23.67 mgd		
Project Demand 2060	146.16 mgd	16.20%	
		<u>\$29,160,000</u>	\$29,160,000
Supply Pipeline			
Moyers' Crossing to McGee Cr. To Atoka		\$312,000,000	
Norman Demand			
2060	23.67 mgd		
Project Demand 2060	154.16 mgd	15.40%	
		<u>\$48,048,000</u>	\$48,048,000
Sardis Lake Estimated Debt		\$70,000,000	
Norman Demand			
2060	23.67 mgd		
Project Demand 2060	154.16 mgd	15.40%	
		<u>\$10,780,000</u>	\$10,780,000
Distribution Theme D1			
Norman (Cost from Stanley Draper)		\$20,089,200	\$20,089,200
Stanley Draper WTP Expansion			
Expansion Need (2 x peaking factor)		144.94 mgd	
Cost per Gallon		\$2.40	
		<u>\$347,856,000</u>	
Norman Demand			
2060	23.67 x 2 mgd		
Project Demand 2060	72.47 x 2 mgd	32.66%	
		<u>\$113,616,000</u>	\$113,616,000
Total of Norman's Share of Capital Costs			\$360,293,200

Supply from Moyers Crossing and Distribution D1

Norman - Annual and Unit Costs

	Treated Water - Immediate Projects Only (Year 2020)	Treated Water - - Immediate & Deferred Projects (Year 2040)	Treated Water - Immediate & Deferred Projects (Year 2060)
Norman - Moyers/D1			
Capital Costs Allocated to Participant (Table 10-6)	\$226,588,000	\$360,293,200	\$360,293,200
Projected Annual Debt Service (Table 10-6)	\$18,272,000	\$29,054,000	\$10,782,000
Coverage Requirement (20%)	3,654,400	5,810,800	2,156,400
O&M Costs Pumping	1,072,577	2,819,013	5,324,799
O&M Costs Allocated to Participant (Table 10-3)	652,000	1,791,000	3,110,000
Total New Costs	\$23,650,977	\$39,474,813	\$21,373,199
Existing Participant Costs			
O&M	\$8,841,052	\$8,841,052	\$8,841,052
Annual Debt Service	858,275	858,275	858,275
Total Existing Costs	\$9,699,327	\$9,699,327	\$9,699,327
Less: Non-Operating Revenues	(1,082,783)	(1,082,783)	(1,082,783)
Net Operating Revenue Requirement	\$8,616,544	\$8,616,544	\$8,616,544
Total - Existing Plus New Revenue Requirement	\$32,267,521	\$48,091,357	\$29,989,743
Existing User Fee Revenues - Increased for 2020/2040/2060* Customer Base	\$17,226,373	\$23,201,427	\$31,248,958
User Fee Revenue Required	\$32,267,521	\$48,091,357	\$29,989,743
Percent Increase in User Fee Revenue	87.31%	107.28%	-4.03%
Annual Charge per Connection - Existing	\$193.20	\$193.20	\$193.20
Monthly Charge per Connection - Existing	\$16.10	\$16.10	\$16.10
Annual Charge per Connection - Projected	\$361.89	\$400.46	\$185.41
Monthly Charge per Connection - Projected	\$30.16	\$33.37	\$15.45
Annual Gallons (in 1,000's)	1,810,400	4,974,950	8,639,550
New Costs per 1,000 Gallons	\$13.06	\$7.93	\$2.47

* Annual customer growth assumption 1.5%.

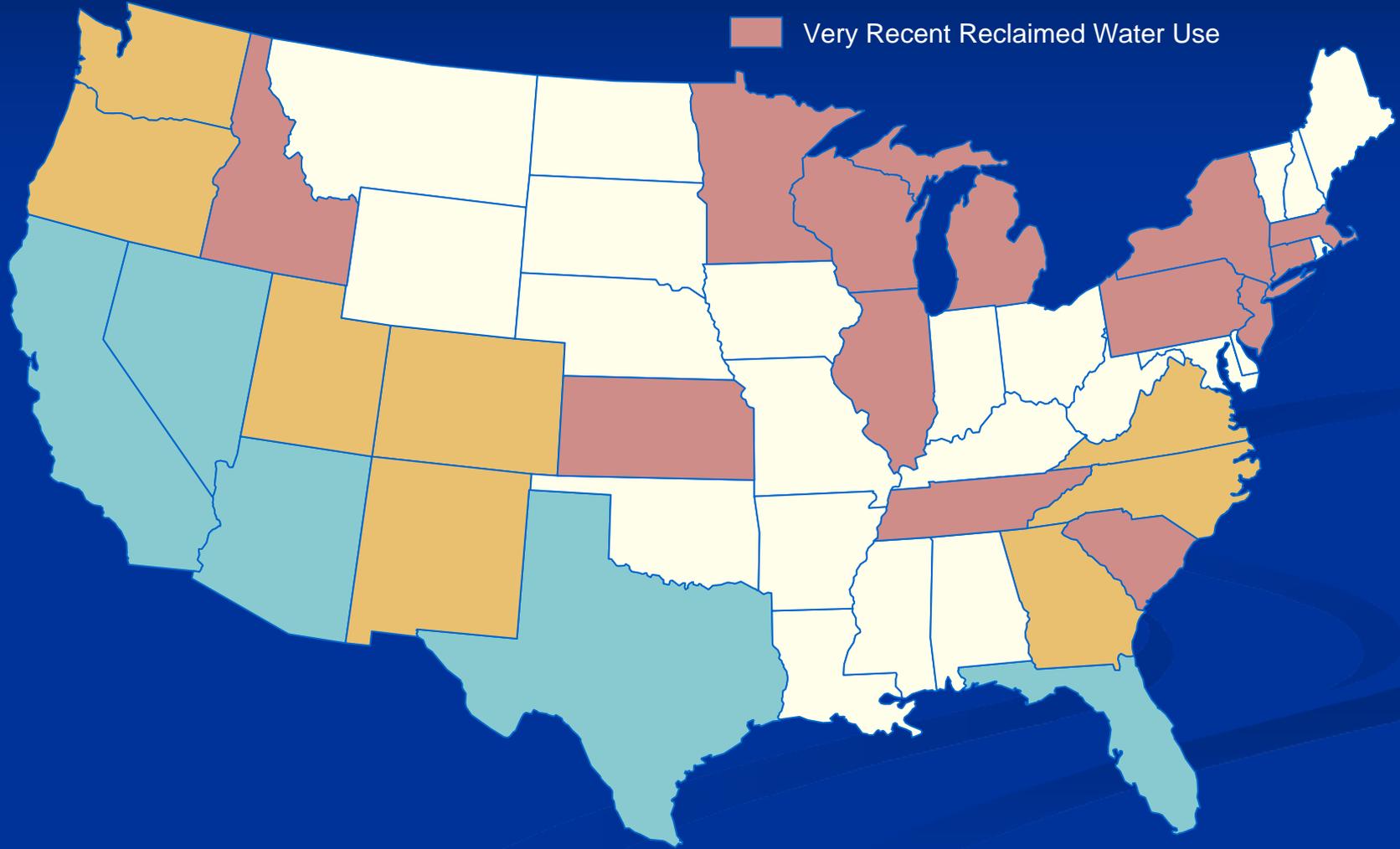
Other Options

Reuse



National reuse trends

- Long-Term Reclaimed Water Use
- Somewhat Recent Reclaimed Water Use
- Very Recent Reclaimed Water Use



Alternative Source – Re-use

<u>Process</u>	<u>\$ million</u>
■ WWTP – BNR for existing 12 MGD	36 - 48
■ WWTP – BNR for new 12MGD	126 –150
■ Reuse water line and pump sta.	25 - 30
■ WTP – for existing 17 MGD	13 - 17
■ WTP - for new 47 MGD peaking	<u>70 –117</u>
TOTAL	270 - 362

Alternative Source – Re-use

Process	Immediate \$ million	Future \$million
■ WWTP - existing 12 MGD	36 - 48	
■ WWTP - new 12MGD		126 – 150
■ Reuse water line/pump	25 - 30	
■ WTP - existing 17 MGD	13 - 17	
■ <u>WTP - new 47 MGD peaking</u>		<u>70 – 117</u>
TOTAL	74 – 95	196 - 267

Alternative Source – Re-use

Items not included with SE Water Proposal

Process	Immediate \$ million	Future \$million
■ WWTP - existing 12 MGD	36 - 48	
■ WWTP - new 12MGD		126 – 150

Alternatives

SE Water Supply

■ Pipeline	226
■ Draper to Nor.	20
■ WTP	<u>113</u>
■ WWTP	
■ Total	360

Re-use

■ WTP existing	17
■ WTP new	117
■ WWTP exist.	48
■ WWTP new	<u>150</u>
■ Total	332

All figures in \$ millions

Residential Water Rates

**Residential Water
Monthly charge for 10,000 gallons**

