

Lubbock's Future Water Supply: Lake 7

> Aubrey A. Spear, P.E. Director of Water Utilities

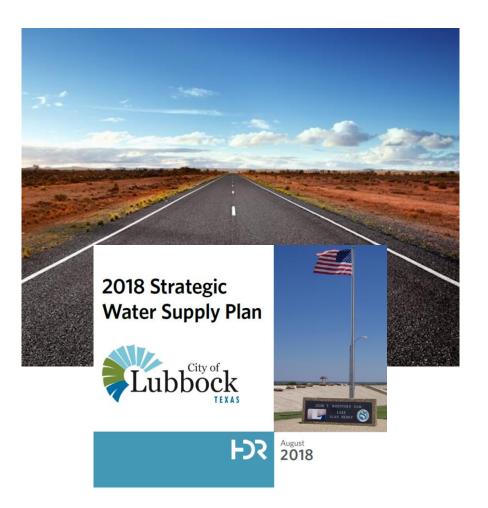
Interested Parties Meeting October 27, 2022



# Lubbock's Water Supply Planning Goals

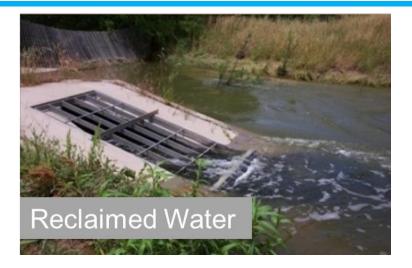


- Provide a road map to develop and implement cost-effective and sustainable water supplies over the next 100 years.
- Diversify the City's water supply portfolio to minimize risk associated with variable climatic conditions.
- Emphasize conservation efforts to delay expensive water supply projects.



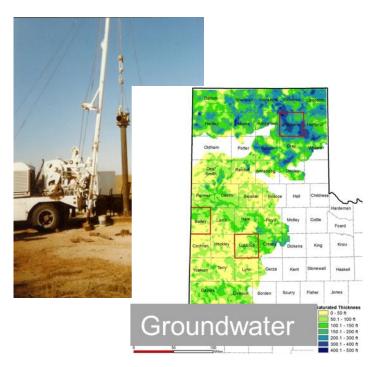
# Water Supply Sources Considered







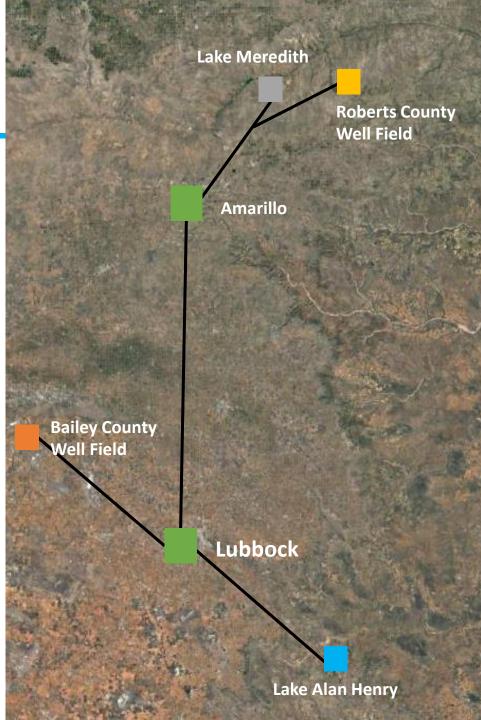
Water Conservation





# **Lubbock's Current Water Supplies**

<u>Water Source</u> Lake Alan Henry	<u>Distance</u>	<u>from Lubbock</u> 65 mi
Lake Meredith		160 mi
Roberts County Wel	ll Field	150 mi
Bailey County Well	Field	75 mi
44%	25	% 20%



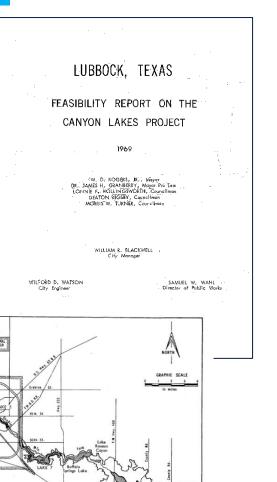
# **Canyon Lake System Concept Development**

1960s — City of Lubbock began discussions about constructing a series of up to eight lakes along the Brazos River Basin from northwest Lubbock to an area southeast of Slaton.

1969 — Freese, Nichols & Endress completed a Feasibility Report on the Canyon Lakes for the City with maps depicting the location of eight proposed lakes.

1970s — City constructed five out of the eight proposed dams/lakes.



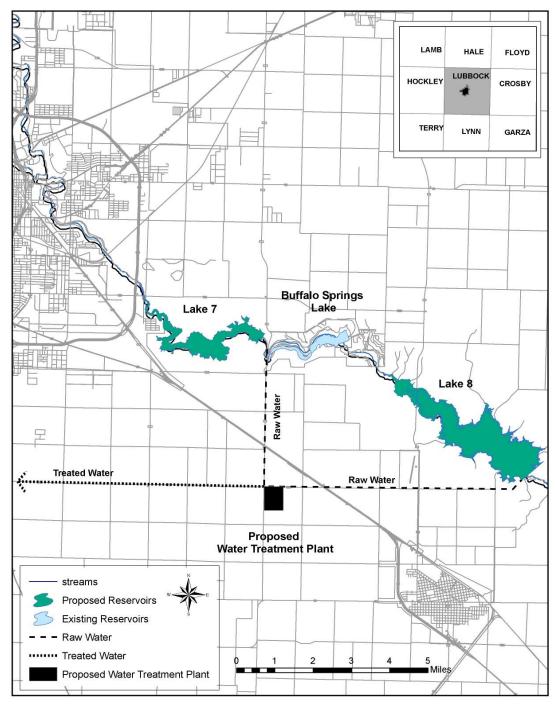




#### **Proposed Lakes 7 & 8 Locations**

Jan. 2006 — Llano Estacado Regional Water Plan included conceptual plans for Lakes 7 and 8.

The water strategy included both lakes reusing water captured from Lubbock's treated wastewater both upstream and downstream of Buffalo Springs and Ransom Canyon.





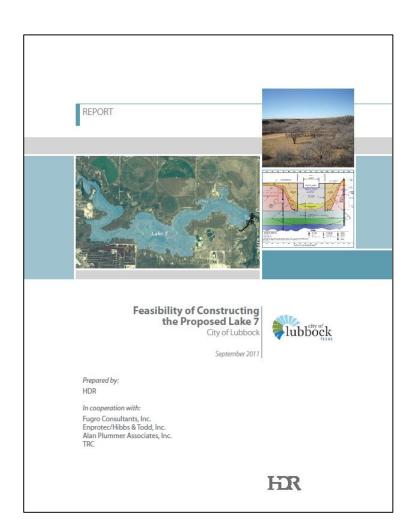
2007 — City's Strategic Water Supply Plan included a strategy to construct Lake 7.

2011 — City's consultants completed a Feasibility Report for the construction of proposed Lake 7.

2013 — City of Lubbock's updated Strategic Water Supply Plan incorporated Lake 7 feasibility report findings.

2016 — Llano Estacado Regional Water Supply Plan included Lake 7 as a feasible water supply for the City.

2018 — City's current Strategic Water Supply Plan includes Lake 7 as one of the most feasible, long-term water supply strategies.



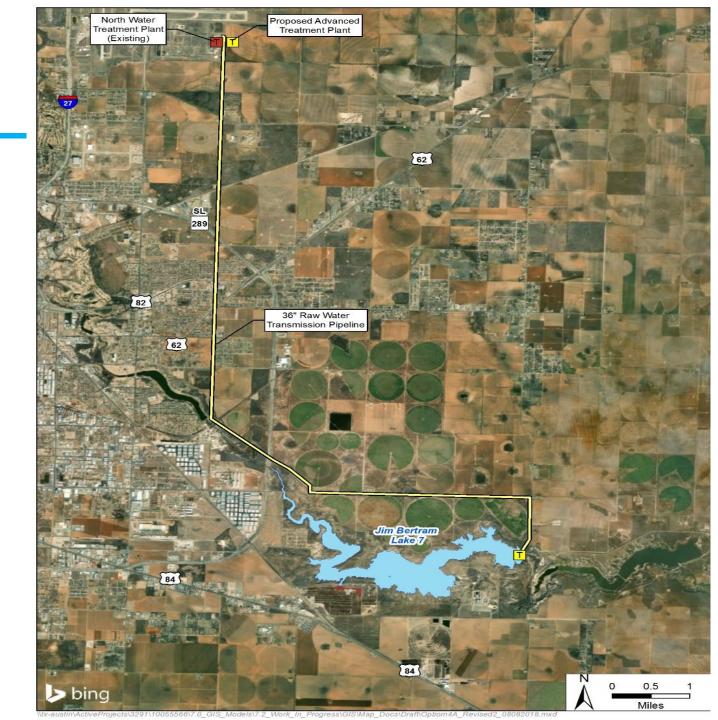
## **Strategic Water Supply**

#### Jim Bertram Lake 7

Supply Sources: Reuse Water Storm Water Developed Water

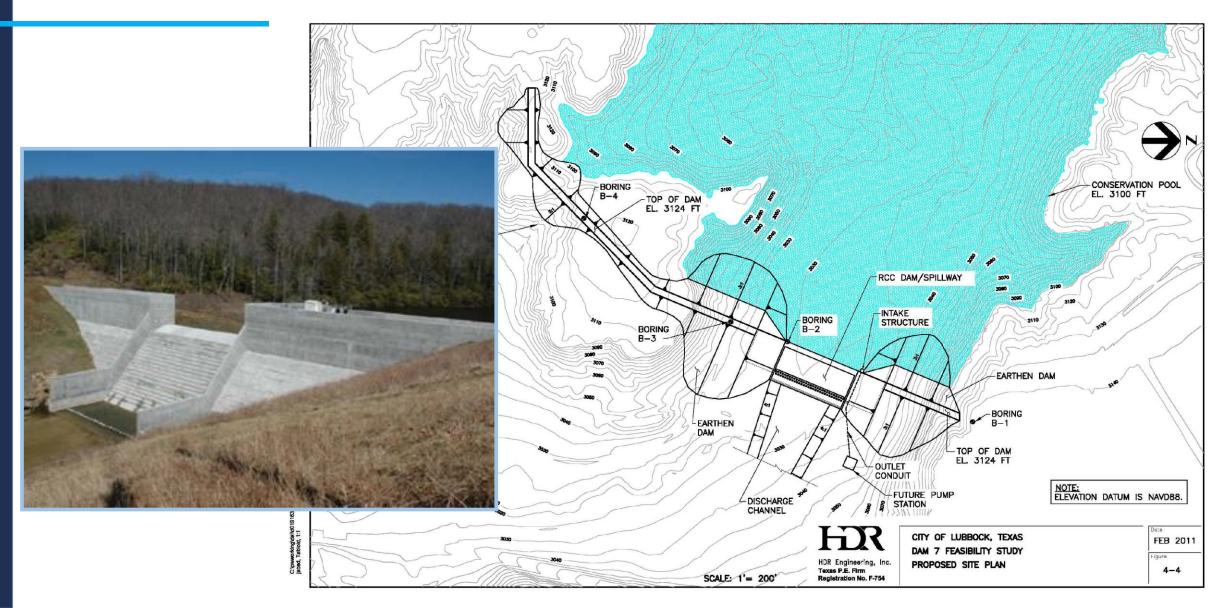
Initial Project Cost: \$207,261,000

Initial Water Supply Potential: 11,975 acre-feet / year 10 million gallons / day



## Lake 7 Dam Conceptual Layout / Type





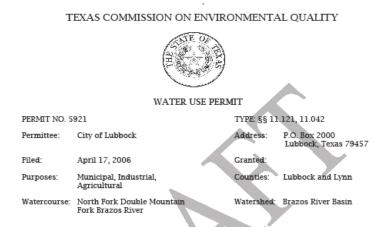


April 2006 — City of Lubbock filed a water rights application with the TCEQ for the right to impound developed and treated wastewater in Lakes 7 and 8.

March 2008 — City withdrew Lake 8 from its TCEQ water rights application.

June 2011 — City submitted an Environmental Information Document supporting the Lake 7 application.

February 2022 — TCEQ issued draft Water Rights Permit No. 5921 to the City.



WHEREAS, the City of Lubbock (City) seeks a Water Use Permit to construct and maintain a 20,708 acre-foot capacity reservoir (Jim Bertram Lake 7) on the North Fork Double Mountain Fork Brazos River, Brazos River Basin with the centerline of the dam being at Latitude 33.534012' N, Longitude 101.730515' W in Lubbock County; and

WHEREAS, the City also seeks to divert and use not to exceed 50,000 acre-feet of water per year from anywhere along the perimeter of the aforementioned reservoir, at a maximum diversion rate of 138,12 cfs (62,016 gpm), for municipal, industrial, and agricultural purposes within the City's service area in Lubbock and Lynn counties, Brazos River Basin; and

WHEREAS, the City further seeks to authorize the use of the bed and banks of the North Fork Double Mountain Fork Brazos River, Brazos River Basin to convey up to 14,856 acre-feet of water per year discharged from the South Cubbock Drainage System, up to 8,934 acrefeet of water per year discharged from the South Lubbock Drainage System, and up to 16,240 acre-feet of surface water- and groundwater-based return flows per year from the Southeast Water Reclamation Plant, authorized under TPDES Permit No. WQ00010353002, to Jim Bertram Lake 7 to support storage in and diversions from the reservoir; and

WHEREAS, water from the South Central Lubbock Drainage System and the South Lubbock Drainage System originates from stormwater collected in playa lakes and subsequently discharged to the North Fork Double Mountain Fork Brazos River; and

WHEREAS, the City will also use other water sources available to it in the North Fork Double Mountain Fork Brazos River, that are authorized under Water Permit Nos. 3985, as amended, and 3705, as amended, to support storage in and diversions from the reservoir; and

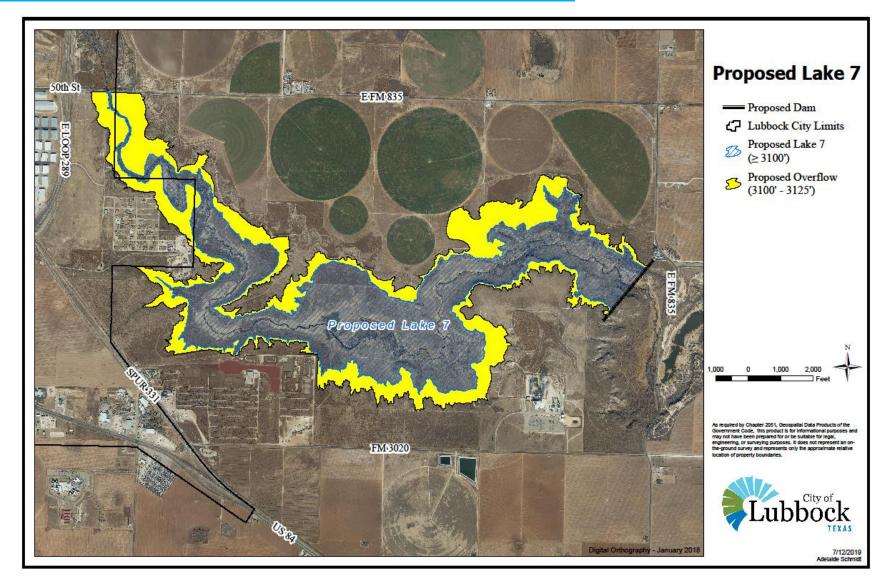
#### Lake 7 Yield & Sources



Volume- 20,000 acre-feet (6.5 billion gallons)

Initial Safe Yield:Return Flows7,300 ac-ft/yrDeveloped Water2,875 ac-ft/yrState Water1,800 ac-ft/yrTotal Yield11,975 ac-ft/yr

Over 85% of Lake 7 Water does not originate from the Brazos River Basin



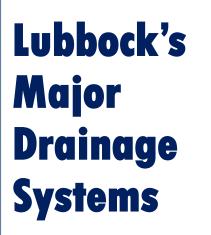
# Lake 7 Return Flows / Treated Wastewater

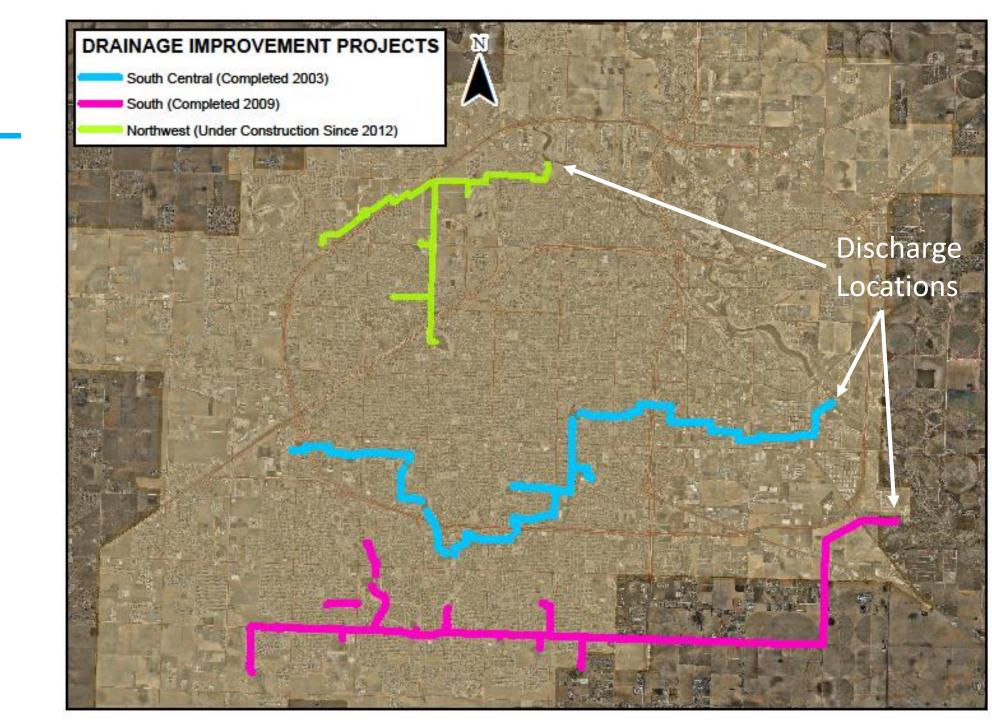


- Lubbock's treated wastewater is also referred to as return flows.
- Would never reach the Brazos River Basin without the City discharging it.
- The City has the right to use all the wastewater and never discharge it.
- If discharged, it is not subject to priority calls by senior water right holders.
- Wastewater represents the largest diversion source for Lake 7.



- Includes water from playa lakes within the City of Lubbock that would never reach the Brazos River Basin.
- Specifically includes water discharged from the City's South, South Central, and Northwest Drainage Systems.
- Is not subject to priority calls from senior water right holders.





### Lake 7 State Water / Stormwater



- Stormwater that is unallocated in the Brazos River Basin is subject to heavy restrictions.
- Subject to environmental flow requirements.
- Subject to priority calls by senior water right holders with priority dates senior to April 17, 2006.



Lubbock's draft Water Rights Permit No. 5921 requires Lubbock to keep a daily diversion accounting plan.

The accounting plan includes details related to how much water the City discharges from various locations that are classified as developed water and/or treated wastewater.

The accounting plan includes details related to how much water the City is diverting from Lake 7.

U64	4 *	: X 🗸	f <sub>x</sub>																		
7	A	Q	R	s	т	U	v	W	X	v	Z	AA	AB	AC	AD	AE	AF				
ī													10		RETURN FLOW C						
2			Hv	drologic D	iata				ΙΔΚΕΔΙΔΝΙ	LAKE ALAN HENRY & LAKE 7 STATE WATER CANADIAN RIVER BASIN SURFACE W											
-									Datendari	IN-Basin		Crembrer	Canadian		Lake 7						
						PHDI				State Water			<b>River Basin</b>			Non-State					
						(Wt'd Ave of				Sourced		Canadian	Surface Water	Canadian	Lake 7	Water					
						<u>High Plains,</u>		Total	In-Basin	Effluent	In-Basin	<b>River Basin</b>	Sourced	<b>River Basin</b>	Non-State	Sourced					
		USGS			Possum	Low Rolling		Source	State Water	Land Applied	State Water	Surface Water	Effluent	Surface Water	Water	Effluent	Lake 7				
		Recorded			Kingdom	Plains, and		Water	Sourced	and/or	Sourced	Sourced	Land Applied	Sourced	Sourced	Land Applied	Sourced				
		Streamflow	Lake 7	Lake 7	<u>Reservoir</u>	North Central	Total	Consume	Effluent	Directly	Effluent	Effluent	and/or	Effluent	Effluent	and/or	Effluent				
3	Date	at Loop 289	Outflow	WSEL	<u>WSEL</u>	Divisions)	Effluent	d	Produced	Reused	Discharged	Produced	Directly	Discharged	Produced	Directly	Discharged				
4 r	mm/dd/yyyy	cfs	cfs	ft-msl	ft-msl	none	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD				
5	12/31/2017			3100.0		1.00															
6	1/1/2018	50	1	3099.9	1,001.0		32.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	14.0	2.0				
7	1/2/2018	50	1	3099.8	1,001.0		31.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
8	1/3/2018	50	1	3099.7	1,001.0		31.0	19.0	0.0	0.0	0.0	11.0	11.0	0.0	0.0	0.0	0.0				
9	1/4/2018	50	1	3088.0	1,001.0		31.0	4.0	6.0	6.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0				
10	1/5/2018	50	1	3099.5	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
11	1/6/2018	50	1	3099.4	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
12	1/7/2018	50	1	3099.0	1,001.0		21.0	12.0	0.0	0.0	0.0	8.4	8.4	0.0	7.6	1.6	6.0				
13	1/8/2018	50	1	3099.2	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
14	1/9/2018	50	1	3099.1	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
15	1/10/2018	50	1	3099.0	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
16	1/11/2018	50	1	3098.9	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
17	1/12/2018	50	1	3098.8	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
18	1/13/2018	50	1	3098.7	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
19	1/14/2018	50	1	3098.6	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
20	1/15/2018	50	1	3098.5	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
21	1/16/2018	50	1	3098.4	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
22	1/17/2018	50	1	3098.3	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
23	1/18/2018	50	1	3098.2	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
24	1/19/2018	50	1	3098.1	1,001.0		21.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

# **2021 Annual Supply & Demand Projections**

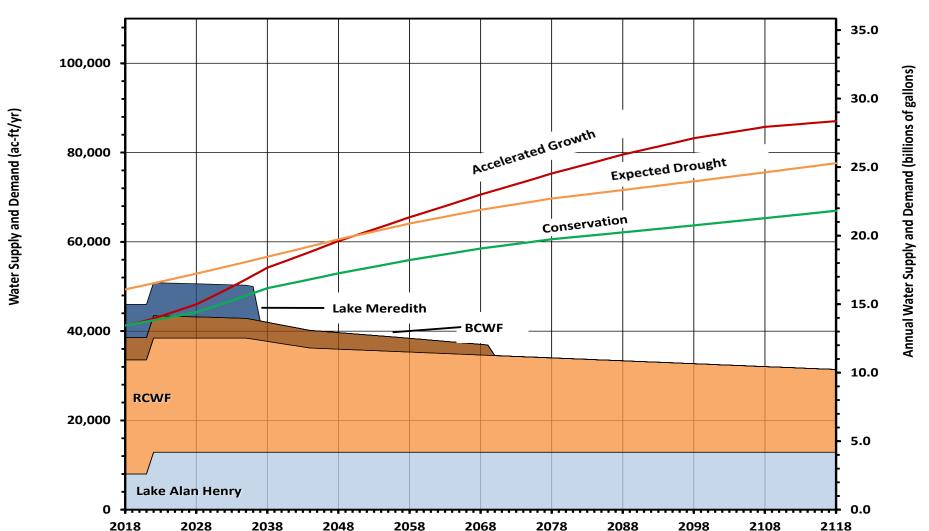


Figure 5.1. Comparison of Annual Water Supply and Demands (updated November 2021)



#### Lake 7 Proposed Timeline



#### Lake 7 Timeline: 15 years to a waterdrop

LAKE	7 DEVELOPMENT ACTIVITY	202	21	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	20	36
	Project Implementation Plan																		
R	TCEQ Water Right Permit		-																
$\bigcirc$	Update SWSP		•																
R o	Evaluate Lake 7 Water Quality																		
	Identify and Initiate Funding																		
	Conceptual Design Alternatives and 10% Design																		
C	Develop Conceptual Mitigation Strategies																		
$\sim$	USACE 404/NEPA Process																		
	Suppl. Design (30%) for Preferred Alt. and Mitigation																		
	Design (90%) and Land Acquisition																		
$\bigcirc$	Final Design																		
	Construction																		

#### **Questions?**









# Lubbock's Future Water Supply: Lake 7

Aubrey A. Spear, P.E. Director of Water Utilities aspear@mylubbock.us

