

Technical Proposal:
Caney River Water Augmentation and Intake
Improvements to Provide Drought Resiliency
City of Bartlesville, OK

Application for the
WaterSMART Drought Response Program: Drought
Resiliency Project for Fiscal Year 2017

Bureau of Reclamation
FOA No. BOR-DO-17-F010

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Abbreviations

AFY	Acre-Feet per Year
BMA	Bartlesville Municipal Authority
CRWPS	Caney River Raw Water Pump Station
CWWTP	Chickasaw Wastewater Treatment Plant (City of Bartlesville)
DEQ	Department of Environmental Quality (Oklahoma)
DPR	Direct Potable Reuse
EA	Environmental Assessment
FOA	Funding Opportunity Announcement
FS	Feasibility Study
FY	Fiscal Year
IPR	Indirect Potable Reuse
MG	Million Gallons
MGD	Million Gallons per Day
O&M	Operation & Maintenance
OCWP	Oklahoma Comprehensive Water Plan
ODEQ	Oklahoma Department of Environmental Quality
OWRB	Oklahoma Water Resources Board
PAS	Planning Assistance to States
QA/QC	Quality Assurance / Quality Control
RWD	Rural Water District
RWPS	Raw Water Pump Station
SCADA	Supervisory Control and Data Acquisition
USACE (USCE)	U.S. Army Corps of Engineers (U.S. Corps of Engineers)
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
VFD	Variable Frequency Drive(s)
WQ	Water Quality
WWTP	Wastewater Treatment Plant

Background Data

City of Bartlesville is an incorporated municipality in Oklahoma with a 2015 census population of approximately 36,596. Bartlesville operates and maintains its own water and wastewater utilities and its water service area is shown in Figure 1. In addition to serving within its city limits, Bartlesville serves the surrounding communities of Washington County Rural Water District (RWD) #2, Washington County RWD #5, Osage County RWD #1, Town of Ochelata, Town of Ramona, City of Dewey, Strike Axe Water system and the Bar Dew water system.

The Bartlesville service area is approximately 282 square miles covering part of Washington County, Osage County and Nowata County, and serves as the major regional water supplier within the watershed basin. Over the last 10 years, the average annual water use is 6.5 million gallons per day with a peak use of 14 million gallons per day.

Bartlesville's water supply is all surface water; there are no known dependable ground water supplies within the watershed with adequate quantity or quality for potable use. The primary water supply source is Hulah Reservoir, See Figure 2. Hulah Reservoir is a federally owned lake completed in 1951 for flood control, with water supply, low flow regulation, and conservation purposes. Bartlesville has 13,819 acre-feet (12.4 million gallons per day, or MGD) of water rights at Hulah Reservoir and there are no more water supply storage rights available at this lake. Since 1958, Hulah Lake has lost approximately 54% of its water storage due to sedimentation. Previous studies conducted by the US Army Corp of Engineers projected the 2015 dependable yield to be 8.4 MGD, but will diminish to 6.4 MGD by 2035 and 4.4 MGD by 2055.

Raw water from Hulah Reservoir is pumped to Hudson Lake, which is a city-owned lake. Hudson Lake has 2,776 acre-feet of water storage and a limited watershed with no appreciable dependable yield. Thus, Hudson Lake is considered part of the Hulah/Hudson water supply system.

Bartlesville also has water rights on the Caney River, which served as the original raw water supply for Bartlesville prior to the development of the Hulah/Hudson reservoir system. In the late 1920's a low water dam was constructed on the Caney River to create a small impoundment within the river to draw the raw water from. Bartlesville continues to operate a 1940-era raw water pump station on the Caney River (see Figure 2) within this impoundment and uses the Caney River as a secondary source. However, drought conditions and low flow during summer months severely limit the available water, which combined with poor water quality makes the Caney River unreliable and technically challenging to treat.

The current raw water supply portfolio available to Bartlesville is summarized below:

- Surface Water Sources:
 - Hulah Lake. Bartlesville has 13,819 acre-feet (12.4 MGD) of water rights. There are no more water rights available at this Federally owned reservoir. Based on extensive study completed by the U.S. Army Corps of Engineers (USCE), based on historic and projected silting and sediment deposits, the projected dependable yield from Hulah is 6.4 MGD through year 2035 and 4.4 MGD by year 2055.
 - Hudson Lake. Bartlesville has 6,000 acre-feet (5.4 MGD) of water rights which represent all the water rights available at this reservoir. Due to the size of the lake and limited watershed, there is no appreciable yield associated with the lake and is considered part of the Hulah Lake water supply system. Therefore, water right is practically non-usable.
 - Caney River. Bartlesville has 6,000 acre-feet (5.4 MGD) of water rights and operates a 1940-era pump station on the Caney River. The poor water quality and unreliable supply during drought conditions make this source non-dependable. The proposed project under this application will remedy the situation by providing resiliency to this supply and improving the water quality that will allow it to be treated to potable quality at the existing Bartlesville water plant.

In 2006, the City of Bartlesville partnered with the US Corp of Engineers to perform a Planning Assistance to States (PAS) study to evaluate the current and projected water demand through 2055, the dependable yield from current water supply sources as well as several options for additional water supply to bridge the gap between the projected water demand and dependable yield. The recommendations from the PAS study, which was completed in 2007, include purchasing new water storage rights from Copan Lake as well as reallocating portions of the flood control pools within both Hulah and Copan Lake for water supply. This reallocation requires additional studies to identify and mitigate the environmental and downstream flooding impacts resulting from the flood pool modification. However, the cost to purchase the corresponding water storage rights, mitigate the environmental/downstream flooding impacts and develop the necessary infrastructure to convey the raw water to the water treatment facility has a present day cost of over \$90 million dollars, which is beyond the capacity of Bartlesville's utility customers.

Bartlesville is a regional water supplier and the water demand for the region is expected to grow. Based on previous studies, the projected average water demand for the Bartlesville service area is projected to grow to 9 MGD under an average growth scenario and 10.8 MGD under an optimistic growth scenario by the year 2065, See Figure 3a. The current supply portfolio will experience a supply gap in the next 15 years and this is even without consideration of the impact from climate change including drought. The proposed project will not only fill this gap but also provide resiliency and increase reliability to the water supply system. As shown on Figure 3b, the proposed project will increase the water supply 13 – 15 years depending on how much is utilized from this source.

Bartlesville water distribution system includes approximately 309 miles of pipeline ranging in size from 2-inch to 42-inch. There are 9 ground storage and 4 elevated storage tanks in the system with a total storage capacity of 11.25 million gallons (MG). There are five distribution system booster pump stations. The distribution system is monitored and managed by a city wide Supervisory Control and Data Acquisition (SCADA) system.

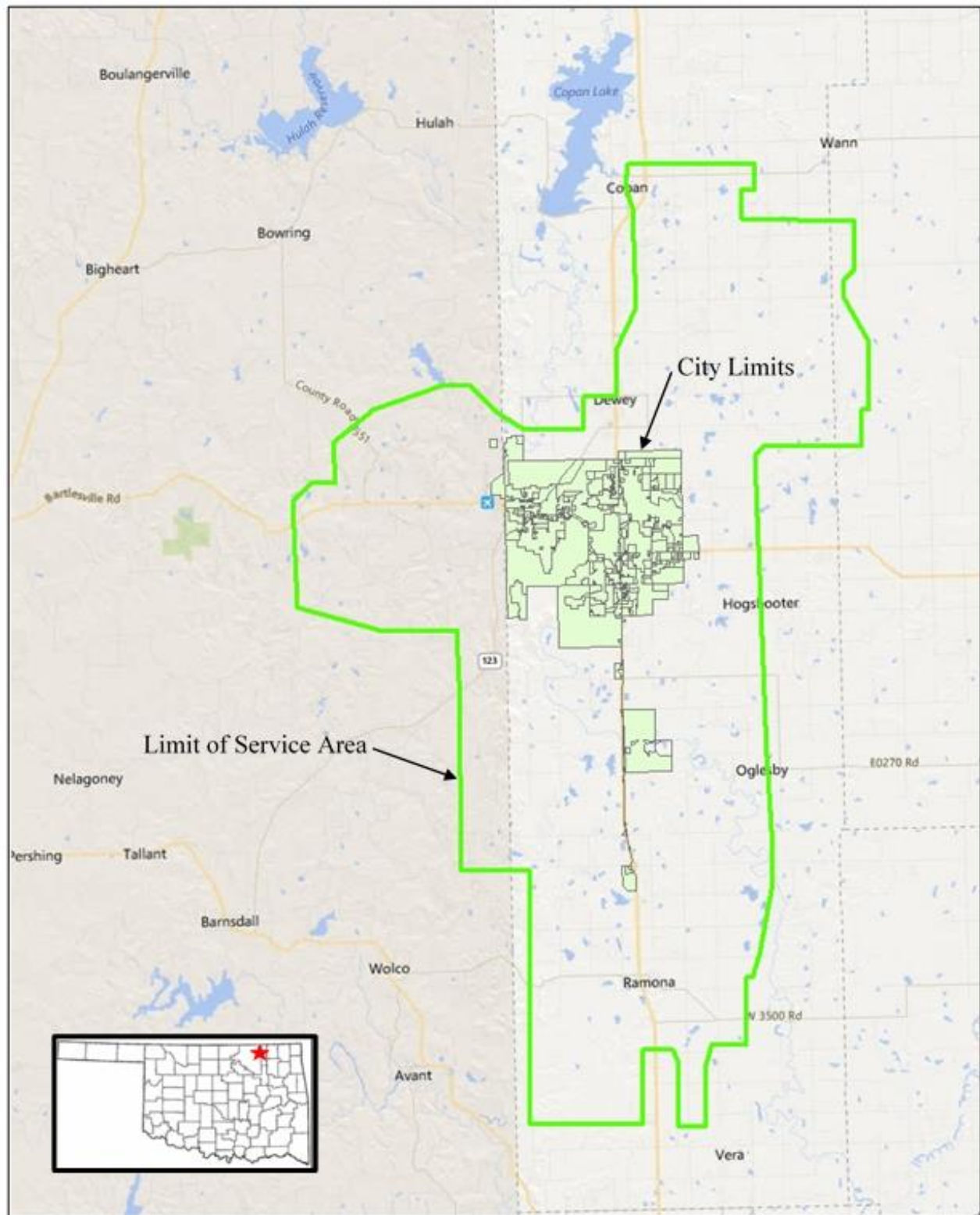


Figure 1- Bartlesville Vicinity and Water Service Area

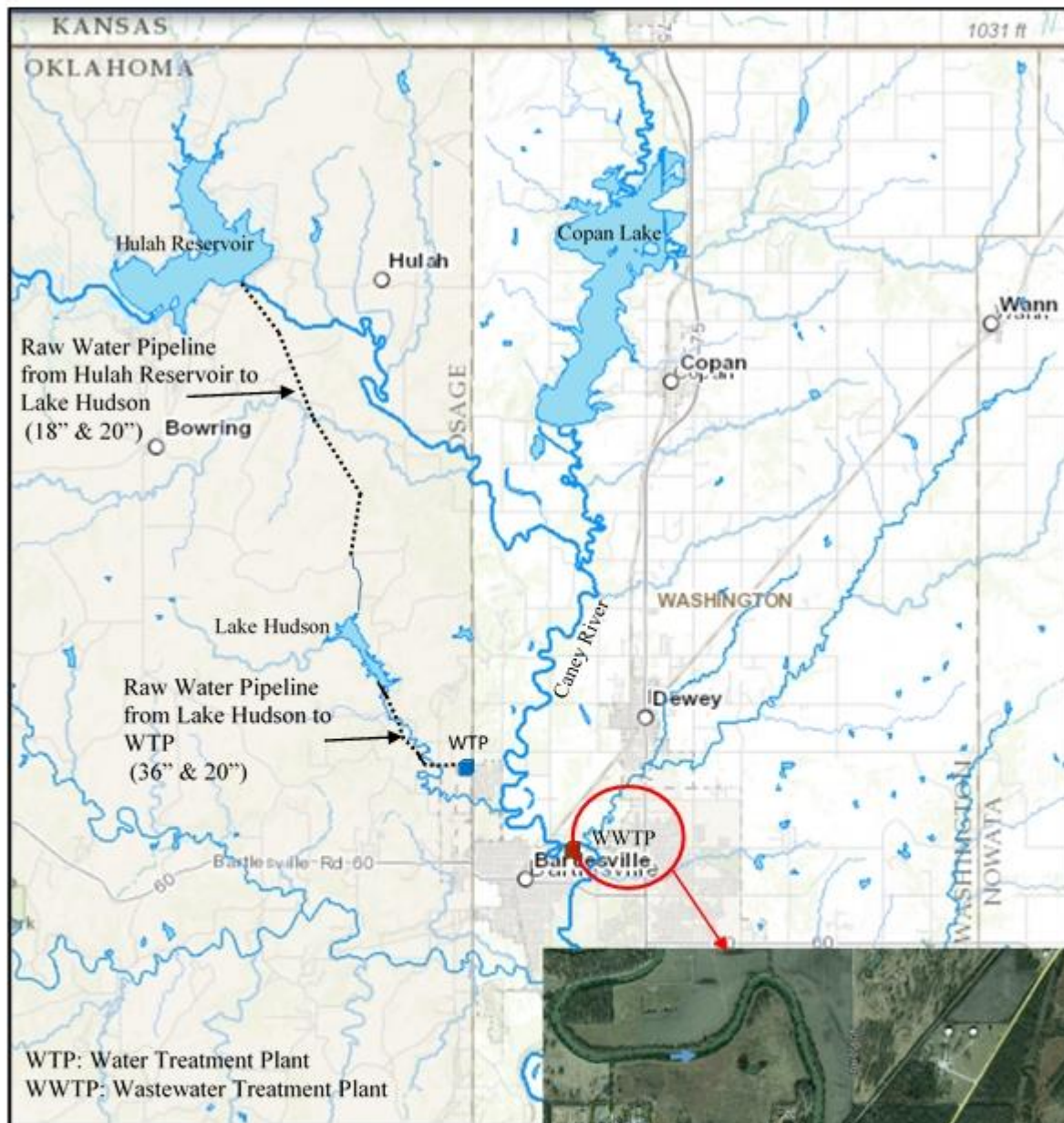


Figure 2 - Bartlesville Existing Water Supply Sources





Figure 3a - Bartlesville Water Demand and Water Supply Dependable Yield (Existing Portfolio)

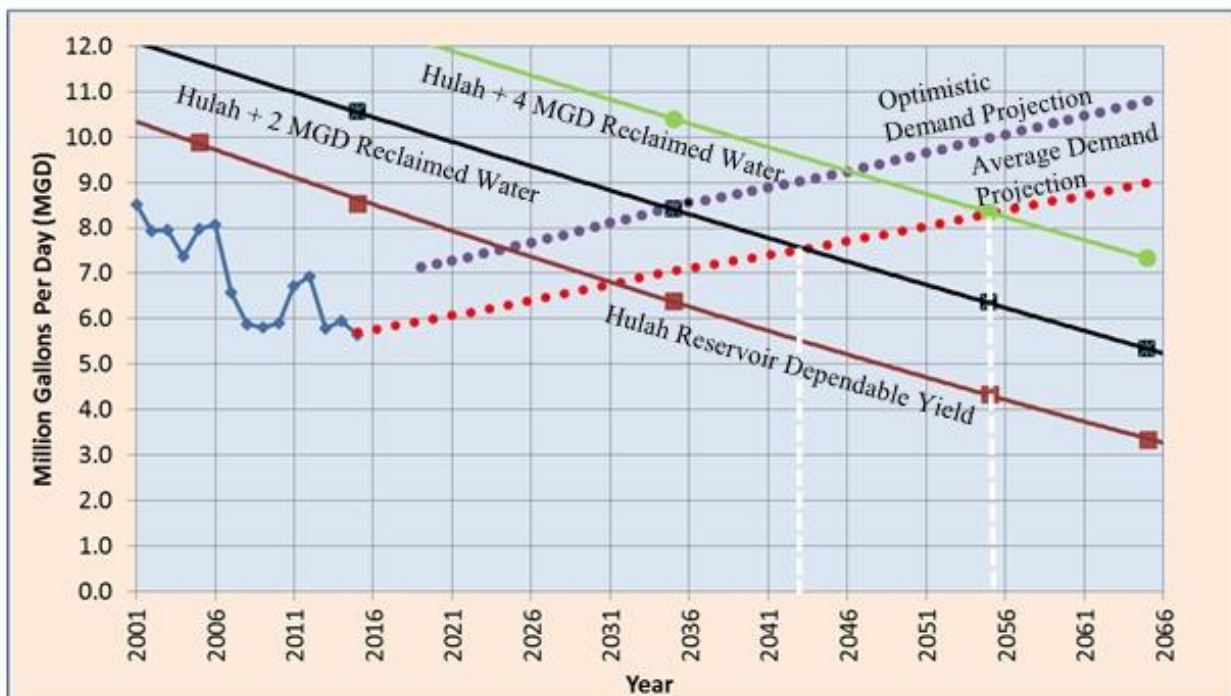


Figure 3b - Bartlesville Water Demand and Water Supply Portfolio with Reclamation and Reuse