

Opportunity Title:	WaterSMART: Drought Resiliency Project Grants for Fisca
Offering Agency:	Bureau of Reclamation
CFDA Number:	15.514
CFDA Description:	Reclamation States Emergency Drought Relief
Opportunity Number:	R15AS00046
Competition ID:	
Opportunity Open Date:	05/11/2015
Opportunity Close Date:	06/25/2015
Agency Contact:	Irene Hoiby Grants Officer E-mail: ihoiby@usbr.gov Phone: 303-445-2025

This opportunity is only open to organizations, applicants who are submitting grant applications on behalf of a company, state, local or tribal government, academia, or other type of organization.

Application Filing Name: City of Duncan, Ok

Select Forms to Complete

Mandatory

Application for Federal Assistance (SF-424)

Optional

- ☒ Budget Information for Construction Programs (SF-424C)
- ☒ Assurances for Construction Programs (SF-424D)
- ☒ Attachments
- ☐ Disclosure of Lobbying Activities (SF-LLL)
- ☐ Budget Information for Non-Construction Programs (SF-424A)
- ☐ Assurances for Non-Construction Programs (SF-424B)

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Application for Federal Assistance SF-424

* 1. Type of Submission

- ☐ Preapplication
☒ Application
☐ Changed/Corrected Application

* 2. Type of Application:

- ☒ New
☐ Continuation
☐ Revision

* If Revision, select appropriate letter(s)

* Other (Specify):

* 3. Date Received:

Completed by Grants.gov upon submission.

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name

City of Duncan

* b. Employer/Taxpayer Identification Number (EIN/TIN):

73-6005165

* c. Organizational DUNS:

0207352210000

d. Address:

* Street1:

P.O. Box 969

Street2:

* City:

Duncan, Ok

County/Parish:

* State:

OK: Oklahoma

Province:

* Country:

USA: UNITED STATES

* Zip / Postal Code:

73534-0969

e. Organizational Unit:

Department Name:

City Manager's office

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:

* First Name:

James

Middle Name:

* Last Name:

Frieda

Suffix:

Title:

City Manager

Organizational Affiliation:

Chief Executive Officer

* Telephone Number:

580-252-0250

Fax Number:

580-255-1710

* Email:

jfrieda@cityofduncan.com

JUN 25 '15 PM12:01

Application for Federal Assistance SF-424

* 9. Type of Applicant 1: Select Applicant Type:

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

* 10. Name of Federal Agency:

Bureau of Reclamation

11. Catalog of Federal Domestic Assistance Number:

15.514

CFDA Title:

Reclamation States Emergency Drought Relief

* 12. Funding Opportunity Number:

R15AS00046

* Title:

WaterSMART: Drought Resiliency Project Grants for Fiscal Year 2015

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment

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* 15. Descriptive Title of Applicant's Project:

Clear Creek Lake Pump Station Rehabilitation and Pipeline Replacement Project

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

Application for Federal Assistance SF-424**16. Congressional Districts Of:*** a. Applicant * b. Program/Project

Attach an additional list of Program/Project Congressional Districts if needed

 Add Attachment

Delete Attachment

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17. Proposed Project:* a. Start Date: * b. End Date: **18. Estimated Funding (\$):**

* a. Federal	300,000.00
* b. Applicant	391,348.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	691,348.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**☐ a. This application was made available to the State under the Executive Order 12372 Process for review on ☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.☒ c. Program is not covered by E.O. 12372.*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**☐ Yes ☒ No

If "Yes", provide explanation and attach

 Add Attachment

Delete Attachment

View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list is contained in the announcement or agency specific instructions.

Authorized Representative:Prefix: * First Name: Middle Name: * Last Name: Suffix: * Title: * Telephone Number: Fax Number: * Email: * Signature of Authorized Representative * Date Signed

City of Duncan, Stephens County, Oklahoma

Waurika Lake Master Conservancy District, including cities of Comanche, Lawton, Temple, Walters and Waurika, all located in the State of Oklahoma

ATTACHMENTS FORM

Instructions: On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines

Important: Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

1) Please attach Attachment 1	areas affected.docx	Add Attachment	Delete Attachment	View Attachment
2) Please attach Attachment 2		Add Attachment	Delete Attachment	View Attachment
3) Please attach Attachment 3		Add Attachment	Delete Attachment	View Attachment
4) Please attach Attachment 4		Add Attachment	Delete Attachment	View Attachment
5) Please attach Attachment 5		Add Attachment	Delete Attachment	View Attachment
6) Please attach Attachment 6		Add Attachment	Delete Attachment	View Attachment
7) Please attach Attachment 7		Add Attachment	Delete Attachment	View Attachment
8) Please attach Attachment 8		Add Attachment	Delete Attachment	View Attachment
9) Please attach Attachment 9		Add Attachment	Delete Attachment	View Attachment
10) Please attach Attachment 10		Add Attachment	Delete Attachment	View Attachment
11) Please attach Attachment 11		Add Attachment	Delete Attachment	View Attachment
12) Please attach Attachment 12		Add Attachment	Delete Attachment	View Attachment
13) Please attach Attachment 13		Add Attachment	Delete Attachment	View Attachment
14) Please attach Attachment 14		Add Attachment	Delete Attachment	View Attachment
15) Please attach Attachment 15		Add Attachment	Delete Attachment	View Attachment

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	\$ 200.00	\$	\$ 200.00
2. Land, structures, rights-of-way, appraisals, etc.	\$	\$	\$
3. Relocation expenses and payments	\$	\$	\$
4. Architectural and engineering fees	\$ 7,248.00	\$	\$ 7,248.00
5. Other architectural and engineering fees	\$	\$	\$
6. Project inspection fees	\$ 14,900.00	\$	\$ 14,900.00
7. Site work	\$	\$	\$
8. Demolition and removal	\$	\$	\$
9. Construction	\$ 669,000.00	\$	\$ 669,000.00
10. Equipment	\$	\$	\$
11. Miscellaneous	\$	\$	\$
12. SUBTOTAL (sum of lines 1-11)	\$ 691,348.00	\$	\$ 691,348.00
13. Contingencies	\$	\$	\$
14. SUBTOTAL	\$ 691,348.00	\$	\$ 691,348.00
15. Project (program) income	\$	\$	\$
16. TOTAL PROJECT COSTS (subtract #15 from #14)	\$ 691,348.00	\$	\$ 691,348.00
FEDERAL FUNDING			
17. Federal assistance requested, calculate as follows. (Consult Federal agency for Federal percentage share.) Enter eligible costs from line 16c Multiply X % Enter the resulting Federal share.			\$ 0.00

ASSURANCES - CONSTRUCTION PROGRAMS

OMB Number: 4040-0009
Expiration Date: 06/30/2014

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0042), Washington, DC 20503

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progressive reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards of merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681 1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

- 11 Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
- 12 Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
- 13 Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.
- 14 Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
- 15 Will comply with environmental standards which may be prescribed pursuant to the following (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523), and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
- 16 Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
- 17 Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
- 18 Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
- 19 Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
- 20 Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE Mayor
APPLICANT ORGANIZATION City of Duncan	DATE SUBMITTED Completed on submission to Grants.gov

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART
Drought Resiliency Project Grant Proposal
Funding Opportunity Announcement No. R15AS00046

Prepared for the City of Duncan
P.O. Box 969
Duncan, OK 73534-0969

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June 23, 2015

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Appendix A - Drought Contingency Planning Documentation

1.0 Technical Proposal

1.1 Executive Summary

Date: June 23, 2015

Applicant: City of Duncan

City/County/State: Duncan, Stephens County, Oklahoma

This application is for funding by the Bureau of Reclamation's (Reclamation) WaterSMART: Drought Resiliency Project Grants for FY 2015 Funding Opportunity Announcement (FOA) No. R15AS00046. This application is seeking \$300,000 in federal funding assistance for Federal Funding Group I. The City of Duncan (City) proposes to install 1,520 lineal feet (LF) of pipeline and rehabilitate the pump station at Clear Creek Lake to be able to provide additional raw water supply from that lake. The project will provide benefits within Task Area A - Increasing the Reliability of Water Supplies through Infrastructure Improvements as defined by Reclamation's FOA. When complete, the project will result in better management of 1,596 acre-feet (AF) as described in this grant application. The requested funds (\$300,000) comprise 43% percent of the \$692,468 total project cost and will provide the resources needed to assist the City with implementing the Clear Creek Lake Improvements Project. Construction for the project will begin in winter 2015 and be complete by spring 2016. The project is not located on federal lands.

1.2 Background Data

Located in south central Oklahoma, Duncan is situated approximately 85 miles southwest of Oklahoma City, the state capitol, and approximately 30 miles southeast of Lawton, home to Fort Sill. Duncan was founded in 1892 prior to statehood and currently serves as the county seat for Stephens County. Part of Stephens County, including part of Duncan, lies within the western limits of the Chickasaw Nation. The community has experienced significant population growth surges in the past, primarily in response to oil booms and the establishment and growth of Energy Services providers.

The Oklahoma Comprehensive Water Plan (OCWP) updated in 2012 by the Oklahoma Water Resources Board (OWRB) lists 12 "Hot Spots", areas which hold the dubious distinction of having the most significant water supply challenges within the next 50 years. Duncan is located in Basin 26 of the Beaver-Cache Watershed Planning Region, which is one of these "Hot Spots".

Situated in the northwest quadrant of Stephens County, Duncan is centrally located between five surface water sources. Four of these lakes are municipally-owned¹. These lakes are Clear Creek Lake, Duncan Lake, Lake Fuqua, Lake Humphreys and Waurika Lake.

Duncan Lake was built by the Works Progress Administration in approximately 1937. Built in approximately 1948, the construction of Clear Creek Lake (a.k.a. Chisholm Trail Lake) was funded by proceeds from bonds issued by the City of Duncan. Subsequent projects by the Soil Conservation Service (now known as the Natural Resources Conservation Service) of the US Department of Agriculture resulted in the construction of Lake Humphreys in about 1958 and Lake Fuqua² in 1963. Prior to the construction of these lakes Duncan relied totally on groundwater for public water supply.

Owned and operated by the US Army Corps of Engineers, Waurika Lake was constructed in 1977 and put into service in 1982. It is located southwest of Duncan in parts of Cotton, Jefferson and Stephens Counties. The Waurika Lake Master Conservancy District (WLMCD) owns the Municipal water storage of Waurika Lake and owns and operates the conveyance facilities that provide water to its member cities³. These member cities are Comanche, Duncan, Lawton, Temple, Walters and Waurika.

1.2.1 Area Map, System Map and Project Map

The following maps are included at the end of this section to provide orientation of the project.

Figure 1 is an area map which depicts Duncan's location.

Figure 2 provides Duncan's location relative to its water sources, and the raw water supply network.

Figure 3 shows the project location relative to Clear Creek Lake.

FIGURE 1
AREA MAP

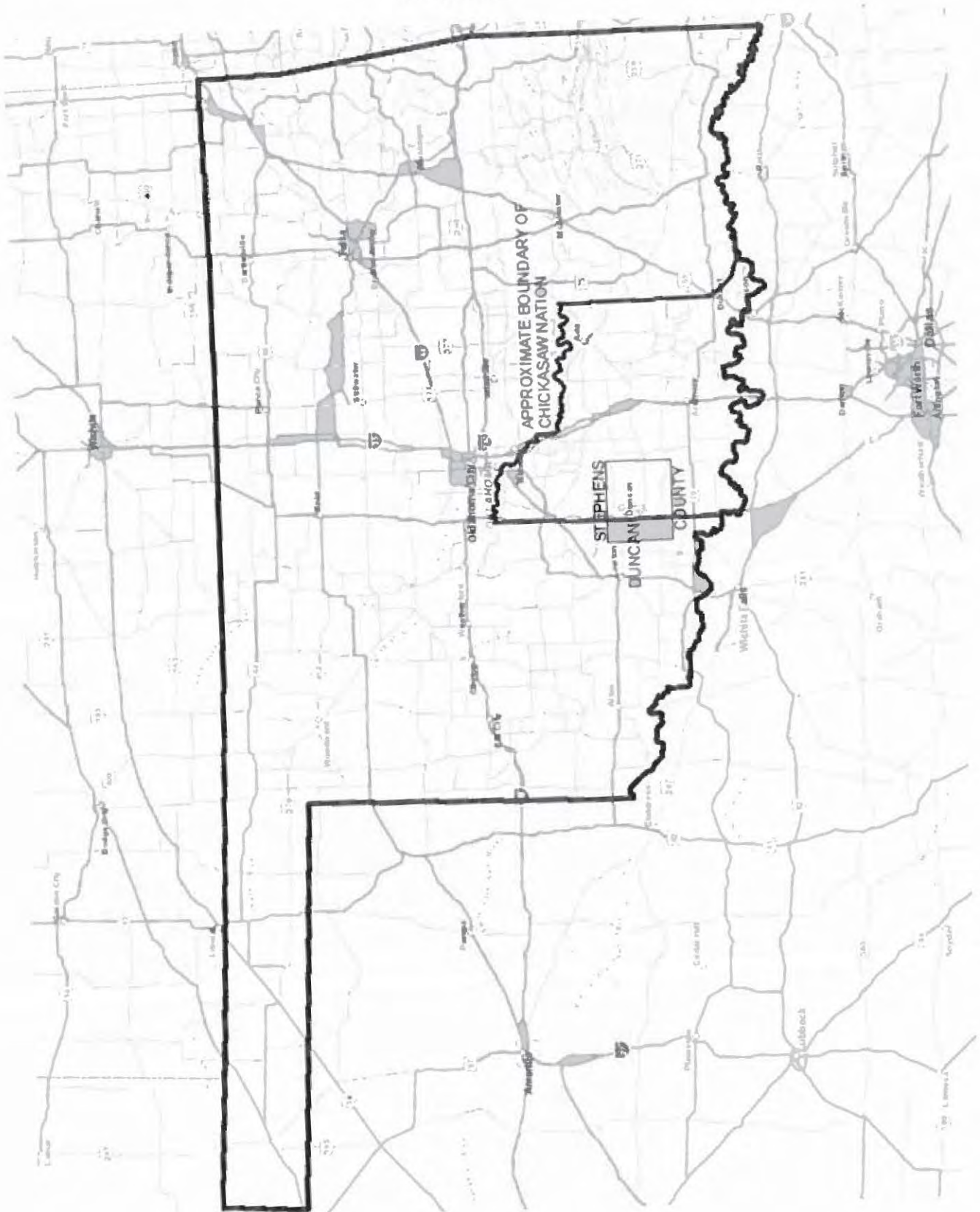


FIGURE 2
RAW WATER SYSTEM MAP

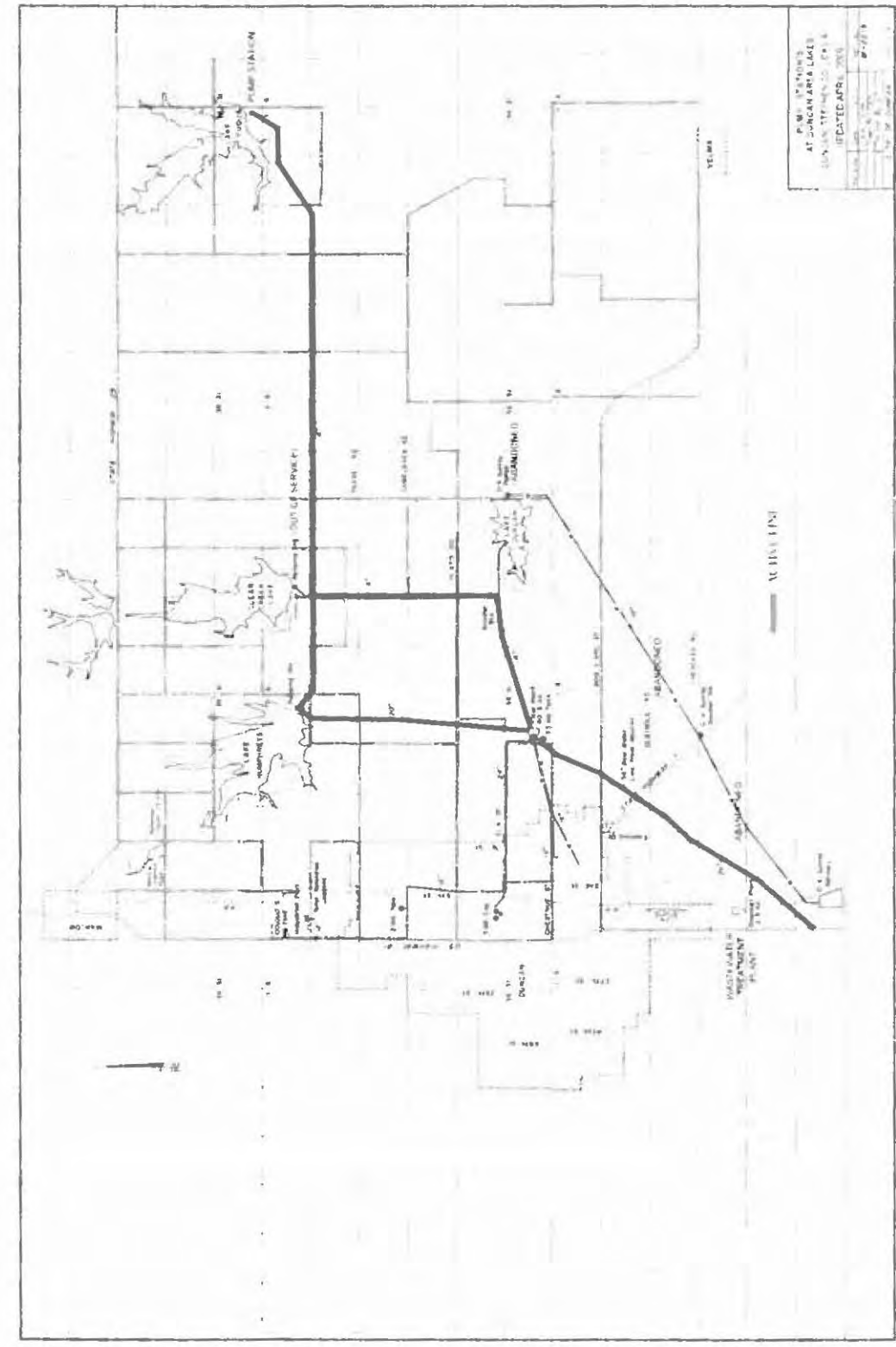
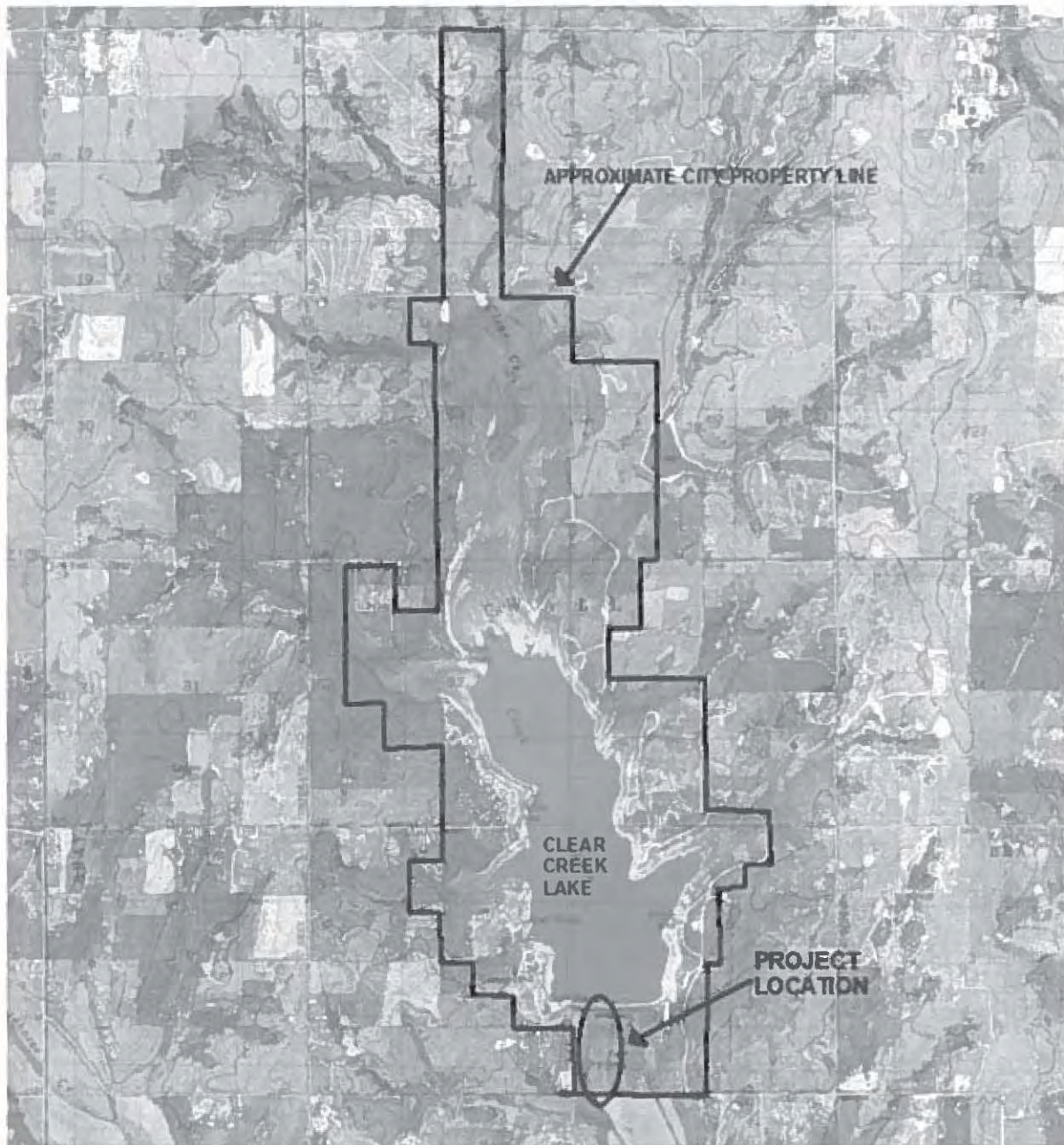


FIGURE 3
PROJECT LOCATION
MAP



1.2.2 Water Supply and Water Rights

Water Supply

All of the Municipal, Commercial and Industrial water delivered by the City comes from surface water sources.

Table 1 below summarizes the City's annual water supply.

TABLE 1
ANNUAL WATER SUPPLY

Year	Total Usage (AF)	Waurika Lake (AF)	Lake Humphreys (AF)	Lake Fuqua (AF)	Clear Creek Lake (AF)	Duncan Lake (AF)
2000	5,054	4,870	184	0	0	0
2001	4,895	1,799	3,096	0	0	0
2002	3,581	474	3,107	0	0	0
2003	4,195	4,195	0	0	0	0
2004	4,230	4,230	0	0	0	0
2005	3,753	3,771	0	0	0	0
2006	4,809	4,809	0	0	0	0
2007	4,998	4,998	0	0	0	0
2008	4,469	4,469	0	0	0	0
2009	4,277	4,277	0	0	0	0
2010	4,459	4,459	0	0	0	0
2011	5,160	5,160	0	0	0	0
2012	4,383	4,383	0	0	0	0
2013	3,719	3,241	43	436	0	0
2014	3,055	3,055	63	132	0	0
AVG	4,336	3,879	433	38	0	0

Water Rights

City-owned stream water rights are summarized in Table 2 on the following page.

Table 2
City Public Water Supply Water Rights

LAKE	Clear Creek	Duncan	Fuqua	Humphreys	Fuqua/ Humphreys	TOTALS FUQUA/ HUMPHREYS	TOTALS
NIDID	OK10736	OK10023	OK01175	OK01192	N/A	N/A	N/A
WATER RIGHT NUMBER	2014-076	N/A	19620028	19550061	19890003	N/A	N/A
WATER RIGHTS (AF/YR)	1,600	0	1,245	2,168	3,240	6,653	8,253
100% SAFE YIELD (AF/YR)	N/A	N/A	2,654	2,442	N/A	5,096	5,096
98% SAFE YIELD (AF/YR)	1,596	800	2,744	2,520	N/A	5,264	7,660
98% SAFE YIELD (MGD)	1.4	0.7	2.4	2.2	N/A	4.6	6.7
NORMAL POOL MUNICIPAL CAPACITY (AF)	10,200	5,326	17,590	10,681	N/A	28,271	43,797
MAXIMUM PUMPING CAPACITY (MGD)	0	0	2.0	6.5	N/A	8.5	8.5

The City recently obtained Water Rights to Clear Creek Lake for Public Water Supply. The City's Water Right Permit 2014-076, in the amount of 1,600 AF includes a vested right of 1,283 AF, established when the lake was built. The net effect of this permit establishes a Public Water Supply Right approximating the 98% Safe Yield of 1,596 AF. This Water Right was established May 7, 2015 through a cooperative effort with the Oklahoma Water Resources Board (OWRB).

While an exact date cannot be determined, it is believed that sometime during the 1960's the municipal pump stations at Clear Creek Lake and Duncan Lake were removed from service. It is also indicated that use of Duncan's water wells was discontinued during this time period. Therefore, from the 1960's through the 1980's Duncan relied entirely on Lake Humphreys and Lake Fuqua for municipal raw water supply. Duncan Lake and Lake Fuqua were used to provide water to DX Sunray Oil Refinery from the 1960's to about 1983.

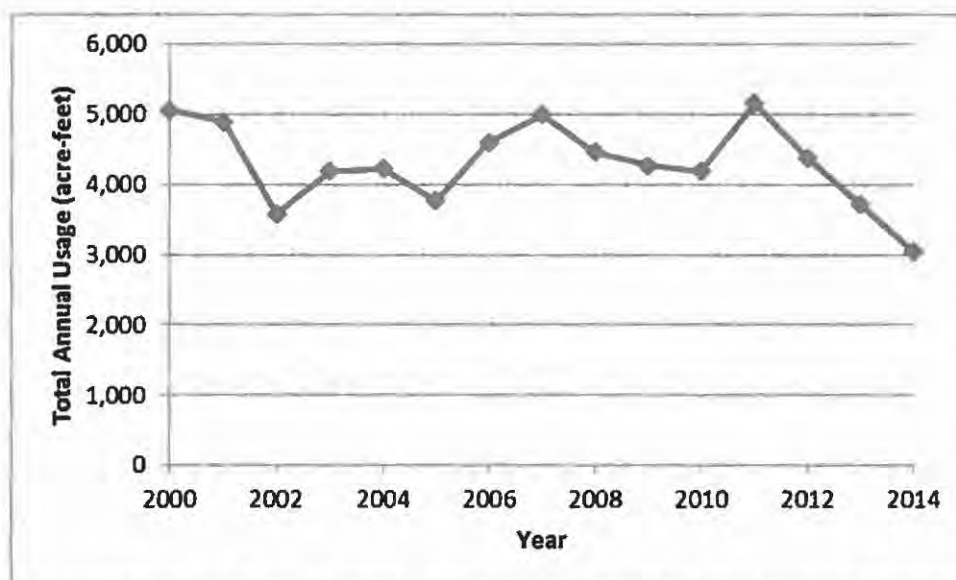
1.2.3 Projected Demand

Projected Water Demand

Since at least 1979 Duncan has supplied treated water to two Rural Water Districts, serving customers in Jefferson and Stephens counties^{4, 5}. Accordingly, the current water sources for Duncan serve parts of Comanche, Cotton, Jefferson and Stephens Counties. It is estimated a population of over 275,000 is served by Waurika Lake, the primary source of water⁶. Duncan supplies a conservative estimate of 30,000 persons with treated water, including the population estimate of 23,400 residing in Duncan.

Figure 4 graphically represents the total annual water usage volume for this period.

FIGURE 4
TOTAL ANNUAL
WATER USAGE
(ACRE-FEET)



This information is taken directly from City of Duncan Water Production Department data.

Evaluation of this information indicates a general increasing trend in water consumption. Most recent trends indicate a marked reduction in consumption, in direct response to implementation of mandatory water conservation measures.

Population projections derived from Oklahoma Department of Commerce information are provided in Table 3.

Table 3
Population Projections⁷

City	2000 Population	POPULATION PROJECTIONS					
		2005	2010	2015	2020	2025	2030
Duncan	22,505	22,360	22,360	22,460	22,620	22,720	22,830

The estimated population of Duncan in 2013 was 23,400, according to the US Census Bureau⁸. Using the population projection formula supplied by the OWRB, and estimating for the year 2045, the projected population of Duncan is calculated as follows:

2013 POPULATION ESTIMATE = 23,400

POPULATION IN YEAR 2000 FROM TABLE 1 = 22,505

RATE OF GROWTH:

$$(F/P)^{1/n} - 1 = r$$

$$(23,400/22,505)^{1/13} - 1 = 0.003004$$

PROJECTED POPULATION IN 2045:

$$23,400(1+0.003004)^{31} = 25,680$$

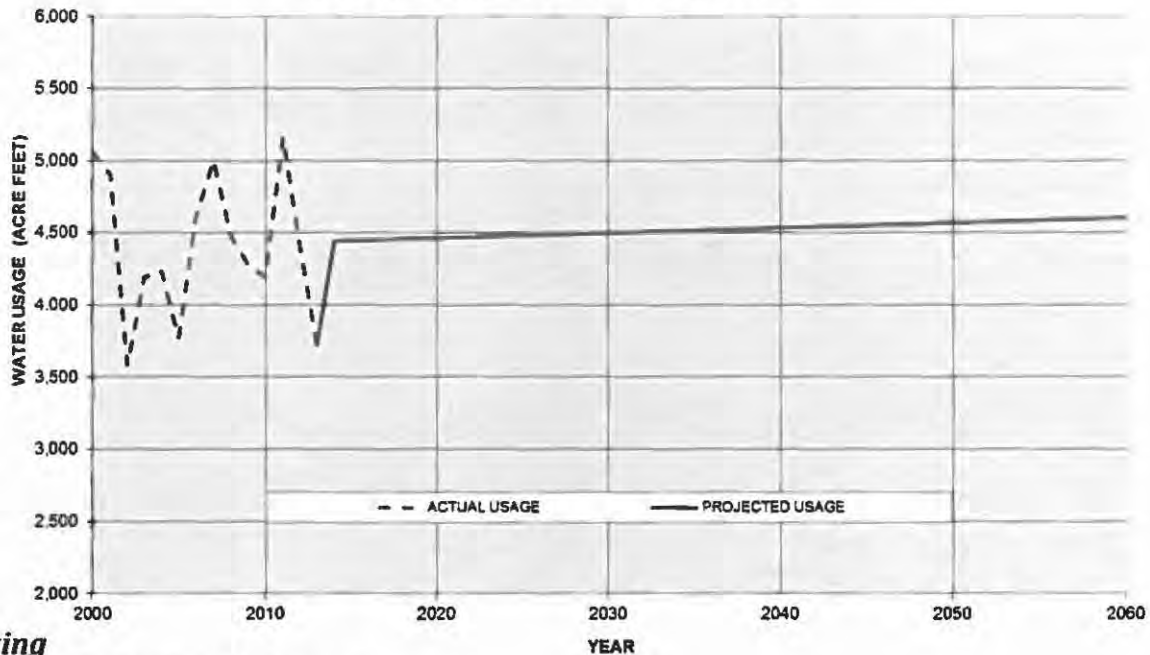
Projected water usage trends for the design period of 30 years and extended into the year 2060 are listed in Table 4 and graphically presented in Figure 5. Projections are based on data collected since 1990 by the Public Works Department. These projections indicate the annual water consumption rate will reach 4,549 acre-feet in 2045 and 4,602 acre-feet in 2060.

Use of the OWRB suggested formula for water projection results in a projected water usage for the year 2045 of 4,800.6 ac-ft. This report will use the more conservative values presented herein.

TABLE 4
WATER USAGE TREND PROJECTION
(ACRE-FEET PER YEAR)

YEAR	2015	2020	2030	2040	2045	2050	2060
USAGE	4,444	4,462	4,497	4,532	4,549	4,567	4,602

FIGURE 5
WATER USAGE TREND PROJECTION



Existing Water Conservation Program

As noted in Section 1.2 historic water resource development by the City resulted in a raw water supply system with substantial redundancy. Over the course of several decades management of this system has resulted in an unfortunate reduction in this redundancy. In recent years, however, the City has recognized the need to improve upon this situation and has taken steps to do so. Beginning in 2007 the City took an active role in the process to update the Oklahoma Comprehensive Water Plan (OCWP). The OCWP update was completed in 2012 with passage by the Oklahoma Legislature of the Water for 2060 Act.

One aspect of the OCWP is the identification of 12 "Hot Spots", noted previously. Continuing with its efforts to improve management of its system, the City has partnered with the OWRB in a Water for 2060 Hot Spot Basin pilot program to evaluate Water Conservation. This pilot program will include a review of efficiencies created through irrigation technology and best practices, a review of current and prospective plumbing codes, an investigation of tiered water rate structures, and the creation of local outreach and educational programs, in relation to Hot Spot Basin 26. This process is ongoing, with final results expected in late 2015.

An additional part of this effort to improve water management by the City was the completion of upgrades to various active pump stations in 2010 at a cost of slightly more than \$1.7 million. Another step in this process was the previously noted completion of an AMR system to improve water distribution system reliability and efficiency in 2011. The portion of this project dedicated to water AMR cost approximately \$9.2 million.

With advancement of the drought beginning in 2010 the City was forced to focus its efforts on drought response. The City's met the near-term goal of ensuring adequate supply during the prolonged drought. To meet this goal, the City conserved water and is taking steps to restore the ability to use Clear Creek Lake as one of its water supply resources.

Use of groundwater sources is also included in the plan for near term efforts to ensure sustained water supply. Intensive public information and commensurate regulatory changes have been enacted to improve water conservation.

Public information has been disseminated through various means. Multiple public meetings and presentations to civic groups have been conducted. Local, statewide and regional media attention has highlighted the situation, as well as continuous posting of the current status on the City's web page at cityofduncan.com.

The citizens of Duncan responded very well to the call for water conservation. Voluntary water conservation was announced in May 2013. As a result, water demand dropped by 26% versus the same period in 2012. Mandatory water conservation was implemented in September 2013, which resulted in an additional 14% reduction in consumption. More restrictive mandatory conservation measures were implemented in September 2014. In December 2014 a total prohibition on outside watering was mandated due to drastically low levels in Waurika Lake. An overall reduction of over 40% in water consumption since 2011 was achieved through these efforts.

The need to continue to conserve water was resolved at the present time only because record-setting rainfall amounts were received during the month of May, 2015. As a result of this rainfall, all of Duncan's water supply reservoirs are currently at or near normal municipal capacity. However, in light of recent drought experience, the need for continued efforts to better manage water supply remains. As recently as March 2015, volumes in Duncan's water supply lakes reached a treacherously low combined capacity of 20 percent.

Ensuring sustainable supply for future generations and continued growth of the community are long-term goals of the City. Various action items have been identified to achieve this goal. One underlying key to this long-term sustainability is the improved management of the existing resources. It is believed that restoring the ability to draw water from all five of its lakes will be critical to the ability to sustain water supply for the future.

As a member of the WLMCD, the City has been actively engaged in development of plans for a dredging project at Waurika Lake. Just as all other member cities, Duncan will necessarily participate in the project on a financial level as well. Currently the estimated share of the project cost to be borne by the City is \$4 million.

However, it has also been identified that Duncan must ensure the viability of the four city lakes as well. One project currently underway is the installation of a bypass at Lake Humphreys, which will allow the transfer of water from Waurika Lake to Lake Humphreys. Future projects identified in this plan include restoring the ability to use Duncan Lake for water supply, installation of larger pipelines in the raw water supply network and lakes improvements to restore storage capacity. The next priority in this plan is to restore and improve the ability to use Clear Creek Lake as a water supply lake. This project will not only increase available water supply, but will also result in increased water management and energy efficiencies.

1.2.4 Water Shortfall

Annual Precipitation History information produced by the Oklahoma State Climatologist available online indicates Oklahoma experienced a severe drought from 2010 through April

2015. Meteorological Drought occurred during 2011 and 2012 when far below rainfall amounts were recorded. Subsequently, the area experienced Hydrological Drought, with the maximum effect being experienced in April 2015.

This prolonged drought has significantly impacted the state, resulting in \$1.5 billion of agriculture losses during 2011 and \$1.7 billion in 2012. The entire state experienced drought during the past five years.

Communities in the region experienced the adverse effects of long term drought. Lawton is considering water reuse to supplement its supply. Communities in the Altus area have developed the Southwest Oklahoma Water Supply Action Plan and are in the process of pursuing options for alternative water sources. The efforts of Wichita Falls, Texas to ensure continued water supply through water reuse have received national attention.

The effects of the drought have been realized locally as well.

In response to the falling water supply volume at Waurika Lake the WLMCD imposed a 10% reduction in water use by its member cities. Further, in order to take measures to preserve the available supply, the City of Duncan imposed mandatory water conservation measures. A comparison of water consumption for 2014 versus 2013 indicates greater than 20% reduction in consumption. Consumption in 2014 versus 2011 was reduced by approximately 40%.

Prior to the anomalous rains in May 2015, WLMCD projected that by March 2016 the District would no longer be able to provide water to all its member cities. This was based on a seriously low lake level at about 30% of municipal pool, as well as siltation at the intake structure preventing access to the water below elevation 925. WLMCD is pursuing a project to remove the siltation and extend the time water is available past this date. Bids for this project are scheduled to be opened on June 23, 2015.

With an annual average consumptive need of 4,400 AF/YR the 100% safe yield of the existing available sources of 5,096 ac-ft presents a safety factor of only 1.15. A further complication is that the pump station at Lake Fuqua is capable of supplying less than the safe yield of that reservoir. However, if all four of the municipal lakes were available, safe yield would be at least 7,492 AF and the safety factor would increase to 1.7.

A comparison of projected needs versus safe yields provides similar results. Existing available 100% safe yield versus the projected need of 4,549 ac-ft per year translates into a safety factor of 1.12. Comparing the safe yield of all four lakes to projected needs provides a safety factor of at least 1.68.

At most recent conservation levels for demand of approximately 3,000 AF/YR, and based on an assumption of average weather conditions for evaporation, Duncan's available water supply was estimated to be depleted within three years. This water shortfall presents a situation in which it is paramount that additional water sources be identified and utilized.

1.3 Technical Project Description

The Clear Creek Lake Improvements Project will restore and improve the ability to draw water from Clear Creek Lake. The project includes upgrades to the existing pump station building with new pumps, variable frequency drives and SCADA; the existing pipeline will be replaced with a larger pipeline. The 1,520 LF pipeline from Clear Creek Lake will have

the ability to deliver water directly from the lake to either the Water Treatment Plant or Lake Humphreys, via the existing raw water supply pipe network.

1.3.1 Planning to Date

1.3.1.1 Project Identification

Duncan Engineering and Public Works Staff have reviewed current and projected water needs and have evaluated available resources to meet these needs. Information regarding current and future water needs have been presented previously in this report. Evaluation of available resources included assessing multiple factors. These factors include whether the project would require acquisition of new land or easements; whether obtaining new water rights permitting is necessary; the potential impact to the environment and the complexity and time involvement of the process to evaluate the impact; the time needed to complete construction, coupled with how quickly the project would have positive effects on supply; and the anticipated water yield of the completed project.

Completion of this evaluation revealed that the Clear Creek Lake project is the most viable recommendation. The City Council on November 25, 2014 formally approved this recommendation. Adoption of a resolution by the City Council on June 23, 2015, found at Attachment B, confirms this formal approval.

1.3.1.2 Pipeline Design

Duncan Engineering and Public Works Staff has provided preliminary general design information for this report.

The City of Duncan retained the firm of Dewberry Engineers, Inc. on May 12, 2015 to provide final detailed design of this project. This design work is scheduled to be complete in September 2015. After this detailed engineering work is completed a Permit to Construct will need to be obtained from the ODEQ. A permit from OWRB will also be needed if repairs to the intake structure are made.

The existing pipeline between Clear Creek Lake and the WTP is 14-inch diameter and was built in c. 1948. It is a lead-jointed pipe located entirely on land owned by the City of Duncan, immediately downstream of Clear Creek Lake.

The City plans to replace the existing pipeline with a larger pipeline for increased capacity and redundancy. This alternative should have no significant environmental impacts and will not require acquisition of easements or rights-of-way.

A key component of improving flexibility and redundancy in the raw water supply network is to ensure each facility has the ability to provide the minimum total daily demand from each lake. This will provide the highest level of assurance that the City can meet its minimum demand under the most extreme conditions. Based on this consideration, 3.0 MGD has been selected as the design peak capacity needed for the pump station and pipeline system.

1.3.1.3 Pump Design

Pertinent design criteria for this project are listed below.

1. 90% Safe Yield (MGD) 1.8
2. 98% Safe Yield (MGD) 1.4
3. Maximum Pump Rate 3.0 MGD (2,100 gpm) (4.64 cfs)
4. Proposed Pipe Diameter (inches) 24
5. Head Data

	Normal Pool or Top of Water Elevation	Pump Flowline Elevation	Head (feet)	Pipeline Length (Miles)	Est. Line Losses (feet)	Total Head Dynamic (TDH) (feet)
Clear Creek Lake	1151.0	1118.8	32.2	0.3	14.3	N/A
Lake Humphreys	1177.8	1118.8	59.0	2.25	53.5	126.8
Water Treatment Plant	1295.6	1118.8	176.8	6.75	160.4	337.2

NOTE: Line Losses (LL) estimate based on C = 100; LL = 4.5 feet/1,000 feet.

6. Pump size

Pump A

Total Dynamic Head = 130 feet

Assume rpm = 1,750

Specific speed (n) = $[(1,750)(2,100)^{1/2}]/(130)^{3/4} = 2,083$

Efficiency = 85%

Water HP = $(62.4 \times 4.64 \times 130)/550 = 68$ HP

Brake HP = $68/0.85 = 80$ HP. Use 100 HP.

Pump A: 2,100 gpm, 100 HP, 85% efficiency horizontal split case pump

Pump B

Total Dynamic Head = 340 feet

Assume rpm = 1,750

Specific speed (n) = $[(1,750)(2,100)^{1/2}]/(340)^{3/4} = 1,012$

Efficiency = 80%

Water HP = $(62.4 \times 4.64 \times 340)/550 = 179$ HP

Brake HP = $179/0.80 = 223.7$ HP. Use 250 HP.

Pump B: 2,100 gpm, 250 HP, 80% efficiency horizontal split case pump

In order to meet all design conditions, Pump B is the preferred pump. For redundancy, and to comply with ODEQ regulations at OAC 252:626-15-3, install two pumps.

Preliminary design drawings for the pipeline are complete and included at Attachment D. Additional field work will be necessary to provide any remaining information (e.g. updated field survey for the pipeline), and to perform detailed design of the pump station improvements. The final design will be completed by September 2015.

1.4 Evaluation Criteria

1.4.1 Evaluation Criterion A: Project Benefits

How will the project build long-term resilience to drought? How many years will the project continue to provide benefits?

The additional availability of 1,600 AF of water to Duncan, as well as to the WLMCD will add to the long-term drought resilience of the water supply system. The design life of the improvements is 30 years, which will be the minimum length of time the project will provide benefits.

Will the project make additional water supplies available? If so, what is the estimated quantity of additional supply the project will provide and how was this estimate calculated? What percentage of the total water supply does the additional water supply represent?

Completion of this project will benefit other WLMCD member cities by lessening Duncan's overall demand on Waurika Lake. The availability of an additional 1,600 AF of water to Duncan translates to the same volume being made available to the other member cities. This volume represents approximately 35% of Duncan's projected annual water needs.

Will the project improve the management of water supplies? For example, will the project increase efficiency or increase operational flexibility (e.g., improve the ability to deliver water or access other sources of supply)? Will the project make new information available to water managers? If so, what is that information and how will it improve water management?

The project will improve the ability to deliver water from a source (Clear Creek Lake) that is currently unavailable for municipal water supply. When complete, the City of Duncan

will be able to withdraw water from four reservoirs. This will improve management of water not only for Duncan, but for the entire region that is served by WLMCD.

The proposed improvements will include a Supervisory Control and Data Acquisition system (SCADA) for monitoring and controlling the pumps in the pump station. This system will include pump status information and pump controls. The information will be linked into the existing SCADA system used by Duncan for operation of its conveyance facilities and water treatment plant. Connecting this pump station to the existing SCADA system will improve the ability of Duncan to manage its water resources.

What is the estimated quantity of water better managed as a result of the project and how was this estimate calculated? What percentage of the total water supply is being better managed? Also provide a brief qualitative description of the degree/significance of anticipated water management benefits.

Approximately 1,600 AF of water will be better managed after completion of this project. This quantity equals the total Water Right available to Duncan from Clear Creek Lake. This will result in improved management of approximately 37% of Duncan's water needs, while representing almost four percent of Duncan's total available water resources.

Approximately 1,596 AF/yr or, 36.8 percent, of the City's annual water supply will be better managed.

$$\frac{\text{Estimated Amount of Water Better Managed} = 1,596 \text{ AF}}{\text{Average Annual Water Supply} = 4,336 \text{ AF}} = 36.8\%$$

By adding this resource to the available water supply, the redundancy in Duncan's water supply system is improved significantly. After project completion Duncan will have the ability to draw from four alternate sources of surface water, instead of just three. This represents a 33% increase in redundancy. Since the design will provide for the ability to pump 3.0 MGD this will significantly improve Duncan's water management and drought resiliency abilities by providing the ability to withdraw its minimum daily demand from three lakes, instead of just two.

1.4.2 Evaluation Criterion B: Drought Planning and Preparedness

The City has developed a drought contingency plan that includes hazard mitigation planning, conservation, improving and more fully utilizing existing water sources, and potentially utilizing additional resources (ground water). This plan relies on management of the various tools available to the administration in concert with each other. Documentation of these resources is found in Appendix A.

The most recent Hazard Mitigation Plan (HMP) for Duncan includes drought contingency planning. It is currently being updated through a cooperative effort of the City of Duncan, Stephens County, the Association of South Central Governments (ASCOG) and the Oklahoma Department of Emergency Management (OEM) and multiple other stakeholders. A profile of drought, historical events and identification of vulnerable populations are included in the plan. In its conclusion on this section, the plan states in part "There is a need to focus more on long-term water management and planning issues". This plan was developed with input from many stakeholders including schools, hospital, various City of

Duncan departments, business representatives and other private citizens through a series of public meetings.

By virtue of existing ordinances, the City encourages conservation through voluntary and mandatory actions to be taken by its customers. As noted in the background section of this report, the citizens of Duncan have responded well to the call for conservation, achieving an overall reduction of over 40% in water consumption since 2011.

The City Council has developed a plan for making improvements to its raw water supply system in order to capitalize on more of its existing raw water resources. While completing the total plan is estimated to cost over \$40 million and will undoubtedly require a long time to achieve, the City has already begun investing in this effort. Currently improvements are underway at Lake Humphreys at a total cost of \$545,000 to complete Priority 1 of the improvement list. Currently, design engineering is being provided by Dewberry Engineers at a cost of \$69,720 for the Clear Creek Lake Pump Station Rehabilitation and Pipeline Replacement project that is the subject of this grant proposal.

In a cooperative effort with the Duncan Area Economic Development Foundation (DAEDF) the City is currently evaluating water supply needs, available resources and potential alternative sources, such as groundwater, to strengthen its ability to provide water during periods of drought. The firm of Professional Engineering Consultants (PEC) has been hired at a cost of \$76,200 to provide this evaluation. This evaluation is due to be complete by September of this year. Further, Duncan continues in its cooperative effort with the OWRB to implement an improved comprehensive water conservation plan.

1.4.2.1 Explain how the applicable plan addresses drought. Proposals that reference plans clearly intended to prepare for and address drought will receive more points under this criterion.

The drought plan relies on hazard identification and mitigation, conservation, improvements to maximize existing resources and identification of potential additional water sources.

1.4.2.2 Explain whether the drought plan was developed with input from multiple stakeholders. Was the drought plan developed through a collaborative process?

Development of the various elements of the plan was achieved with input from multiple stakeholders as noted above and involved a collaboration of efforts by multiple entities, as stated previously.

1.4.2.3 Briefly describe how your proposed drought resiliency project will implement an action(s) (e.g., response or mitigation actions) that is supported by an existing drought plan.

The proposed drought resiliency project is a direct product of the existing drought plan. The Hazard Mitigation Plan concludes that long-term water management is essential to surviving drought. This project will significantly improve Duncan's ability to manage its water resources. Further, this project was identified by the City Council as a top priority for this very reason.

1.4.2.4 Describe how the proposed project is prioritized in the referenced drought plan.

Completing this project was established by the City Council as the number two priority for raw water supply improvements. This priority was established after receiving public input during a series of presentations made to various civic groups and in other public settings. The City Council specifically listed establishing the priorities for these projects as one of their agenda items and subsequently took action to establish the priorities in a regularly scheduled City Council meeting.

1.4.3 Evaluation Criterion C – Severity of Actual or Potential Drought Impacts

1.4.3.1 If the proposed project area is not experiencing drought at the time you submit your application, describe the impacts of past drought events and the frequency of past drought occurrences

As noted in Section 1.2.4, much of the state including Duncan experienced a severe drought from late 2010 through early 2015.

Evaluation of information obtained from the Oklahoma State Climatologist indicates South-Central Oklahoma has suffered cyclic meteorological drought events since modern climatological record-keeping began. The Standard Hazard Mitigation Plan Update for Oklahoma⁹ reports that the state has experienced multi-year and multi-regional drought events during the late 1890's and 1909 to 1918, 1930 to 1940, 1952 to 1958 and 1962 to 1972. The drought experienced during the 1930's resulted in what is widely known as the Dust Bowl Days. This resource lists Drought as the number four (4) Priority Risk for the state. The Calculated Priority Risk Index for drought is 3.1, based on a Likely probability of occurring and a Catastrophic Magnitude/Severity.

The most recent extended drought period exhibited below normal rainfall and above normal temperatures for two years during this period of time. As a result, lake levels became treacherously low, primarily due to evaporation. The divergence between actual accumulated rainfall amount versus what would have normally been expected during this period of time reached the peak value of 34 inches below normal in October 2014. This equates to a lack of approximately one year's worth of rainfall.

Waurika Lake experienced its lowest level during the drought cycle in May 2015 when the water surface fell to 234 inches below normal, equating to approximately 27% of normal municipal capacity. However, due to the existing siltation in the intake channel, this capacity was more realistically below 20%. At that time, projections indicated the availability of water from Waurika Lake would last for **less than one year**.

1.4.3.2 Describe ongoing or potential drought impacts to specific sectors in the project area if no action is taken and the severity of those impacts.

One significant complication of the drought is the matter of water quality. As lake levels recede, stratification of water in the lake is reduced and raw water quality deteriorates from the standpoint of treatment for human consumption. This phenomenon is existent in all of Duncan's surface water sources. Total Organic Carbon (TOC) is one measure of raw water quality that is directly related to the ability of a Water Treatment Plant to produce regulatory compliant water. Sources of TOC include decaying natural organic matter in the water. TOC is therefore used as a measure of organic matter in the raw water.

Organic chemicals dissolved in water when combined with free chlorine in the treatment process form Trihalomethane (THM), a substance regulated under the Safe Drinking Water

Act (SDWA). Tests on Duncan's source water have shown an increase in TOC levels, coincident with lowering lake levels. As a result, while not an acute concern, this has directly impacted Duncan's ability to produce water that complies with SDWA primary drinking water standards for THM's.

Further, economic losses have been realized by the City of Duncan as a result of the drought. Water sales and sewer revenues have declined significantly, directly related to mandatory reduction in water consumption. Listed in Table 6 below are gross revenues in each category for the years 2011 through 2014. The drop in revenue has a major negative impact on budgetary operations of the City of Duncan, recognizing over \$2 million in losses during this period of time.

**TABLE 5
CITY OF DUNCAN
WATER AND SEWER REVENUES
2011 THROUGH 2014**

	2011	2012	2013	2014
CATEGORY				
Water & Pumping Surcharge	\$ 7,043,570	\$ 6,388,991	\$ 5,550,486	\$ 5,029,042
Sewer	2,351,117	2,208,312	2,097,429	2,029,807
TOTAL REVENUES	\$ 9,394,687	\$ 8,597,303	\$ 7,647,915	\$ 7,058,849
DIVERGENCE	N/A	\$ (797,384)	\$ (949,388)	\$ (589,066)

In addition, various commercial enterprises in Duncan have been forced to obtain alternate sources of water supply to continue to operate. Halliburton Energy Services (a major manufacturing center in Duncan), Duncan Regional Hospital, Duncan Public Schools and numerous car wash businesses have invested in water wells in order to provide essential water supply for their operations. At an approximate average cost of \$40,000 per well, this effort represents a significant investment on the part of these entities, directly resulting from the drought.

1.4.4 Evaluation Criterion D – Nexus to Reclamation

Will the project help Reclamation meet trust responsibilities to any tribe(s)?

A portion of the City of Duncan is located within the limits of the Chickasaw Nation. The City currently supplies water to a Chickasaw housing addition and to a Chickasaw Senior Citizens Center, both located within city limits. The City has been in negotiations with the Chickasaw Nation to expand the City's service area to a Gaming Center. This project will make additional water available to all water users, including the Chickasaw Nation.

1.4.5 Evaluation Criterion E – Project Implementation

1.4.5.1 Describe the implementation plan of the proposed project.

Local funding for design is available now. If awarded the WaterSMART grant by July 2015, the City will finalize design by September 2015 and will obtain all permits in the fall of

2015. The City will begin construction during winter 2015 and have the project completed by spring 2016.

Attachment D represents an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

1.4.5.2 Describe any permits that will be required, along with the process for obtaining such permits.

Federal approvals for the project include the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), and Endangered Species (ESA) compliance. If successful in obtaining a WaterSMART grant, the City will work with Reclamation to determine the appropriate level of NEPA compliance. Construction will be limited to the City's property and no known environmental or cultural resources of special value exist within the project corridor. Therefore, it is expected that activities required for NEPA, NHPA, and ESA compliance will be minimal. If awarded the WaterSMART grant by July 2015, the City is confident that the necessary approvals can be secured by fall 2015.

An Oklahoma Department of Environmental Quality (ODEQ) Permit to Construct is required. This process will be completed by fall 2015.

An OWRB permit is needed if work on the intake structure takes place. This process will be completed by fall 2015.

Local permitting requirements involve City of Duncan Building Permit review and can be accomplished in one week or less.

1.4.5.3 Identify and describe any engineering or design work performed specifically in support of the proposed project.

Duncan Engineering and Public Works Staff have provided general design information for the pump station and preliminary design of the pipeline. A copy of the preliminary construction plans are found at Attachment E.

The City of Duncan retained the firm of Dewberry Engineers, Inc. on May 12, 2015 to provide Final Design and some Bidding and Construction Services on this project. Dewberry is currently in the Technical Memorandum phase. Field Survey work was completed on May 19, 2015. An underwater inspection of the existing intake structure was completed on May 26, 2015 and the DRAFT Inspection Report was delivered on June 4, 2015. All design work is scheduled to be complete in September 2015.

1.5 Performance Measures

Following construction the City will continue to maintain records of water usage at all its lakes to verify water savings resulting from the project. Lakes levels and weather conditions will be monitored and documented, as has been done by the City of Duncan for decades. Performance will be evaluated by comparing actual usage from Clear Creek Lake to the proposed usage.

2.0 Environmental and Cultural Resources Compliance

(1) Will the project impact the surrounding environment (i.e., soil [dust], air, water [quality and quantity], animal habitat, etc.)? Please briefly describe all earth-

disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The project will have minimal impacts on the surrounding environment. All work will occur within the City's property. During construction, best management practices (BMPs), such as sprinkling the ground surface for dust control, will be maintained in ground disturbance areas.

(2) Are you aware of any species listed or proposed to be listed as a Federal endangered or threatened species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

No known environmental resources of special value occur within the project area. The project is located on land owned by the City.

(3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under Federal Clean Waters Act jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.

No wetlands or other surface waters that could fall under Clean Water Act jurisdiction exist in the project area.

(4) When was the water delivery system constructed?

The delivery system was originally constructed in 1948. The pipeline was replaced in 1968.

(5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No, there will not be any modifications to existing irrigation systems.

(6) Are there any buildings, structures, or features in the project corridor listed or eligible for listing on the National Register of Historic Places?

The land associated with this project is City property and does not likely represent historic conditions. No aboveground structures are present within the project corridor.

(7) Are there any known archeological sites in the proposed project area?

No identified or known cultural resources of significance exist within the project corridor.

(8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

The project will not have a disproportionately high and adverse effect on low income or minority populations.

(9) Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

This project will not limit access to any ceremonial use of Indian sacred sites.

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

The project will not contribute to the spread of noxious weeds or non-native invasive species.

3.0 Drought Planning

Drought Planning efforts are fully described in Section 1.4.2 and documentation is provided in Appendix A.

4.0 Required Permits or Approvals

4.1 Federal Permitting

Federal approvals for the project include NEPA, NHPA, and ESA compliance. The project site is located entirely within the City's property and there are no known environmental or cultural resources of special value; therefore, it is expected that activities required for NEPA, NHPA, and ESA compliance will be minimal.

- It is anticipated that the project does not have significant impacts on the environment and will fit within a recognized Categorical Exclusion (CE) to NEPA. Environmental impacts will be minimized during construction using BMPs.
- Federal cultural resource laws and regulations, including the NHPA and Native American Trust Assets, must also be reviewed prior to project construction. The City will cost share with Reclamation to conduct all necessary field surveys and literature reviews. It is anticipated that the project does not have the potential to cause effects to historic properties and that the findings will be concluded in the Section 106 process.
- It is anticipated that there are no endangered or threatened species or designated critical habitat in the project area and that no further compliance measures are required.

If awarded the WaterSMART grant by July 2015, the City is confident that necessary approvals can be secured by fall 2015.

4.2 State Permitting

4.2.1 ODEQ

An ODEQ Permit to Construct for Water Supply facilities will be needed. Final Construction Plans, Specifications and Engineering report will be submitted to ODEQ. Issuance of the ODEQ permit can be accomplished in 60 days or less, and will be secured by fall 2015.

4.2.2 OWRB

Work on the intake structure, if needed, will require issuance of a permit by OWRB. Final Construction Plans, Specifications and Engineering report will be submitted to OWRB. Issuance of the OWRB permit can be accomplished in 60 days or less, and will be secured by fall 2015.

References

- 1) US Army Corps of Engineers, National Inventory of Dams,
<http://geo.usace.army.mil/pgis/f?p=397:1:16394195202763::NO::>
- 2) US Department of Agriculture, Soil Conservation Service, As-Built Plans for Wildhorse Creek Watershed Project, Flood Prevention-Municipal Water Supply, Multi-Purpose Dam No. 39, May 8, 1963
- 3) USA Contract DACW56-71-C-0013, 12 August 1970
- 4) Water Purchase Contract by and between Consolidated Rural Water & Sewer District
- 5) Water Purchase Contract, by and between Rural Water District No. 5, Stephens County, Oklahoma, and the City of Duncan, 3 March 1979
- 6) Waurika Lake Water Intake Channel, Maintenance Project – Phase 2.0, Preliminary Design Report, dated October 21, 2014, Keithline Engineering Group, PLLC
- 7) Oklahoma Department of Commerce, Oklahoma State Data Center, "Population Projections by City by County"
- 8) US Census Bureau Quick Facts, Duncan, Oklahoma, October 27, 2014
- 9) No. 1, Jefferson County, Oklahoma, and the City of Duncan, 4 October 1976
- 9) Standard Hazard Mitigation Plan Update for the Great State of Oklahoma, February 10, 2014, Oklahoma Department of Emergency Management (OEM)

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART
Drought Resiliency Project Grant Proposal
Funding Opportunity Announcement No. R15AS00046

ATTACHMENT A

BUDGET PROPOSAL

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART

Drought Resiliency Project Grant Proposal

Funding Opportunity Announcement No. R15AS00046

ATTACHMENT B

OFFICIAL RESOLUTION

RESOLUTION AUTHORIZING APPLICATION FOR
BUREAU OF RECLAMATION
WATER SMART GRANT

RESOLUTION NO. 11609

BE IT RESOLVED THAT ON THE 23RD DAY OF JUNE, 2015, AT
A REGULAR MEETING OF THE CITY COUNCIL OF THE CITY
OF DUNCAN, OKLAHOMA, A RESOLUTION TO AUTHORIZE
APPLICATION FOR BUREAU OF RECLAMATION WATER
SMART DROUGHT CONTINGENCY PLANNING GRANT FUNDS
WAS PRESENTED, READ AND ADOPTED:

RESOLUTION

WHEREAS, Bureau of Reclamation Water SMART Program funds have been
made available for Drought Contingency Planning Grants, and

WHEREAS, the City of Duncan, Oklahoma, proposes to complete the Water
Master Plan to improve Drought Contingency Planning, and

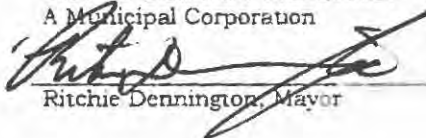
WHEREAS, the City of Duncan has the capacity and is committed to provide
funds for its share of the project costs, and

WHEREAS, the City of Duncan is committed to work with the Bureau of
Reclamation to enter into a cooperative agreement for said project.

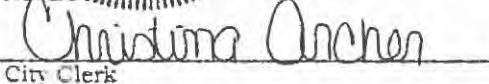
NOW, THEREFORE, BE IT RESOLVED: That the City Council of the City of
Duncan does hereby authorize the Mayor of Duncan, Ritchie Dennington, to make
application for Water SMART financial assistance on behalf of the City of Duncan.



CITY OF DUNCAN, OKLAHOMA
A Municipal Corporation


Ritchie Dennington, Mayor

ATTEST


Christina Archer
City Clerk

Approved as to Form and Legality:


David Hammond, Attorney

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

**Bureau of Reclamation WaterSMART
Drought Resiliency Project Grant Proposal
Funding Opportunity Announcement No. R15AS00046**

ATTACHMENT C

LETTERS OF SUPPORT

WAURIKA LAKE MASTER CONSERVANCY DISTRICT

**5404 East 1890 Road
Waurika, OK 73573
Office: 580-439-8838
Fax: 580-439-5563**

23 June 2015

Mr. James Frieda, City Manager
City of Duncan
P.O. Box 969
Duncan, Oklahoma 73534

Dear Mr. Frieda:

The Waurika Lake Master Conservancy District (WLMCD) supports your attempt to secure a Bureau of Reclamation WaterSmart grant to help share the cost of the drought resiliency project at Clear Creek Lake near Duncan, Oklahoma. The project will install a new larger diameter pipeline and will rehabilitate the existing pump station. This will result in making available an additional 1,600 acre-feet of water for future improved water resource management.

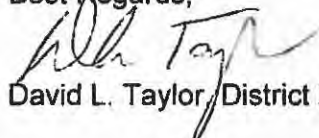
Some of the many reasons this project and grant are important are as follows:

1. Southwest Oklahoma experienced a prolonged drought from late 2010 through early 2015. During this drought, area lake levels were the lowest ever recorded.
2. This project will allow the City to improve water resource management to better withstand future drought conditions. The volume of water that will be available from this project represents approximately 35% of the projected needs of Duncan.
3. The City of Duncan supplies water directly to over 23,000 persons in Duncan. Duncan is a member of the Waurika Lake Master Conservancy District, which provides water for up to 250,000 people, including the cities of Comanche, Duncan, Lawton-Ft. Sill, Temple, Walters and Waurika. The average usage by the cities was reduced over 50% through the drought.
4. WLMCD and the City of Duncan have worked together for 40 years to assure reliable water supplies. This project will improve the city's resilience to future drought conditions.

We wholeheartedly endorse the City of Duncan's efforts in its attempts to assure the community of Duncan survives and thrives through this drought and the next.

If the Waurika Lake Master Conservancy District can be of further help, please let us know.

Best Regards,


David L. Taylor, District Manager



"A COMMUNITY WORKING TOGETHER"

June 17, 2015

Mr. James Frieda, City Manager
City of Duncan
P.O. Box 969
Duncan, Oklahoma 73534

Dear Mr. Frieda:

The Duncan Chamber of Commerce supports your attempt to secure a Bureau of Reclamation WaterSmart grant to help share the cost of the drought resiliency project at Clear Creek Lake near Duncan, Oklahoma. The project will install a new larger diameter pipeline and will rehabilitate the existing pump station. This will result in making available up to an additional 1,600 acre-feet of water for future improved water resource management.

Some of the many reasons this project and grant are important are as follows:

1. Southwest Oklahoma experienced a prolonged drought from late 2010 through early 2015. During this drought, area lake levels were the lowest ever recorded.
2. This project will allow the City of Duncan to improve water resource management to better withstand future drought conditions. The volume of water that will be available from this project represents approximately 35% of the projected needs of Duncan.
3. The City of Duncan supplies water directly to over 23,000 persons in Duncan. Duncan is a member of the Waurika Lake Master Conservancy District, which provides water for up to 250,000 people, including the cities of Comanche, Duncan, Lawton-Ft. Sill, Temple, Walters and Waurika. The average usage by the cities was reduced over 50% through the drought.
4. The larger pipeline and pump station rehabilitation will increase the efficiency of our water resource management system.

We wholeheartedly endorse the City of Duncan's efforts in its attempts to assure the community of Duncan survives and thrives through this drought and the next.

If the Duncan Chamber of Commerce can be of further assistance, please let us know.

Best Regards,

Chris Deal, President & CEO
Duncan Chamber of Commerce

911 Walnut • P.O. Box 699 • Duncan, OK 73534-0699 • 580-255-3644 • Fax: 580-255-6482

Web site: www.duncanchamber.com

FAST TRACK TO SUCCESS!

June 22, 2015

Mr. Scott Vaughn
City of Duncan
P.O. Box 969
Duncan, Oklahoma 73534

Dear Mr. Vaughn:

The Duncan Area Economic Development Foundation (DAEDF) supports your attempt to secure a Bureau of Reclamation WaterSmart grant to help share the cost of the Drought Resiliency for Duncan, Oklahoma. The project will enhance our water supply by installing a new large diameter pipeline and rehabilitate the existing pump station. As a result, our community will have 1,600 acre-feet of water for future improved water resources.

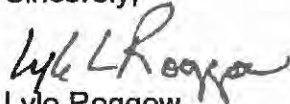
Our region of the United States has recurring droughts that have required our constant attention. In the most recent drought, our main lake supplying the community's water needs reach record low levels of 27 percent. There are five other communities impacted by the drought conditions when these situations arise.

The City of Duncan supplies water directly to over 23,000 persons in Duncan and has total service to 30,000 in the area. Duncan is a member of the Waurika Lake Master Conservancy District, which provides water for up to 250,000 people, including the cities of Comanche, Duncan, Lawton-Ft. Sill, Temple, Walters and Waurika.

Without a Drought Contingency Plan, Industrial development and growth are hampered by the lack of adequate water to take care of basic needs. As an end result, the economic impact is a decrease in community sale tax dollars to maintain city infrastructure. We wholeheartedly endorse the City of Duncan's efforts in its attempts to assure the community of Duncan survives and thrives.

If DAEDF can be of further help, please let us know. Our goal is to always be a community advocate to grow that community in a responsible way!

Sincerely,



Lyle Roggow
DAEDF President



8100 N. Highway 81
Duncan, OK 73533

DUNCAN
AREA ECONOMIC DEVELOPMENT FOUNDATION

www.ok-duncan.com
+1 888-254-9675

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART

Drought Resiliency Project Grant Proposal

Funding Opportunity Announcement No. R15AS00046

ATTACHMENT D

ESTIMATED PROJECT SCHEDULE

**CITY OF DUNCAN
CLEAR CREEK LAKE
PUMP STATION REHABILITATION AND PIPELINE REPLACEMENT
Project Schedule
As of 06/23/15**

Task ID	TASK DESCRIPTION	START	FINISH	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Engg Evaluation/Technical Memo	5/14/15	7/1/15													
		5/19/15														
1A	Field Survey/Pump Station Insp	5/6/15	5/26/15													
		5/6/15	5/26/15													
1B	Intake Structure Inspection	5/14/15	5/21/15													
		5/19/15	6/4/15													
1C	Technical Memorandum	5/19/15														
1D	Environmental Review (if needed)	8/1/15	8/15/15													
2	Preliminary Design	6/22/15	8/15/15													
3	Final Design	8/15/15	9/30/15													
4	Permitting	8/15/15	9/30/15													
5	Bidding	9/15/15	10/7/15													
6	Construction	11/1/15	5/31/15													
7	WaterSMART Grant	6/15/15	9/30/15													

ESTIMATED
ACTUAL

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART

Drought Resiliency Project Grant Proposal

Funding Opportunity Announcement No. R15AS00046

ATTACHMENT E

PRELIMINARY CONSTRUCTION PLANS



BEFORE PERFORMING ANY GRADING OR EXCAVATING WORK THE CONTRACTOR SHALL NOTIFY ALL UTILITY OWNERS OR CALL ONE OKLAHOMA ONE CALL NOT LESS THAN 48 HOURS IN ADVANCE AND SHALL VERIFY OR ESTABLISH THE EXACT LOCATION AND DEPTH OF ALL UNDERGROUND LINES.

UTILITY CONTACTS

CITY OF DUNCAN
WATER DEPARTMENT
580-476-3091
P.O. BOX 989
DUNCAN, OK 73533

DUNCAN POWER
580-476-3091
P.O. BOX 989
DUNCAN, OK 73533

AT&T
580-381-2338
1708 W. OGDEN
LAWTON, OK 73506

CABLE ONE
580-324-1234
580-323-6992
1206 N. HIGHWAY 81
DUNCAN, OK 73533

CONFIDENTIAL ENERGY
580-324-2741
1127 S. THIRD STREET
OKMULGEE, OK 73652

AMT&C
580-335-3037
1113 S. WILLOW
DUNCAN, OK 73537

CITY OF DUNCAN

CLEAR CREEK LAKE

PUMP STATION REHABILITATION

AND PIPELINE REPLACEMENT

PROJECT LOCATION



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE
2	PLAN AND PROFILE
3	PLAN STATION WITH PLAN
4	PUMP STATION DETAILS

STANDARD DRAWINGS

THE FOLLOWING STANDARD DRAWINGS WILL BE REQUIRED:

CITY OF DUNCAN

10-101
10-102
10-103

CONVENTIONAL SYMBOLS

- | | |
|---|--|
| <ul style="list-style-type: none"> • FIRE HYDRANT ○ GAS METER ○ WATER WELL ○ CIRCULAR TRANSFORMER ○ STORM DRAIN MANHOLE ○ ELECTRIC MANHOLE ○ SANITARY SEWER MANHOLE ○ TELEPHONE MANHOLE ○ SANITARY SEWER CLEANOUT → POWER POLE ○ TELEPHONE PEDestal ○ TRAFFIC/ELECTRIC PULL BOX ○ WATER METER ○ WATER VALVE BOX | <ul style="list-style-type: none"> POWER UNDERGROUND POWER OVERHEAD ○ GAS LINE ○ SANITARY SEWER LINE ○ STORM SEWER ○ TELEPHONE OVERHEAD ○ TELEPHONE UNDERGROUND ○ CABLE TV UNDERGROUND ○ WATER LINE ○ RIGHT-OF-WAY LINES - EXISTING ○ RIGHT-OF-WAY LINES - NEW ○ SECTION LINES ○ QUARTER SECTION LINES ○ BAR ROAD ○ FENCE |
|---|--|

PROJECT LENGTH = 0.29 MILES = 1520 L.F.

CITY OF DUNCAN STANDARDS AND SPECIFICATIONS AS DESCRIBED IN THE BID PROPOSAL AND OTHER CONTRACT DOCUMENTS SHALL GOVERN.

PRELIMINARY

NOT FOR CONSTRUCTION



CITY OF DUNCAN
ENGINEERING AND SURVEYING
2017 - 2018
CLEAR CREEK LAKE
PUMP STATION REHABILITATION AND
PIPELINE REPLACEMENT
City of Duncan Engineers
2018

Rev _____
 Date _____



PROFITS & SCALE:
 HORIZONTAL = 1" = 100'
 VERTICAL = 1" = 10'

PRELIMINARY
NOT FOR CONSTRUCTION

City of Duncan
 Engineering Department
 Civil Engineer
 Pump Station Rehabilitation and
 Potable Replacement

Scale: 1" = 100'
 Date: _____
 Drawn: _____
 Checked: _____
 Approved: _____

City of Duncan, Oklahoma

Clear Creek Lake Improvements Project

Bureau of Reclamation WaterSMART

Drought Resiliency Project Grant Proposal

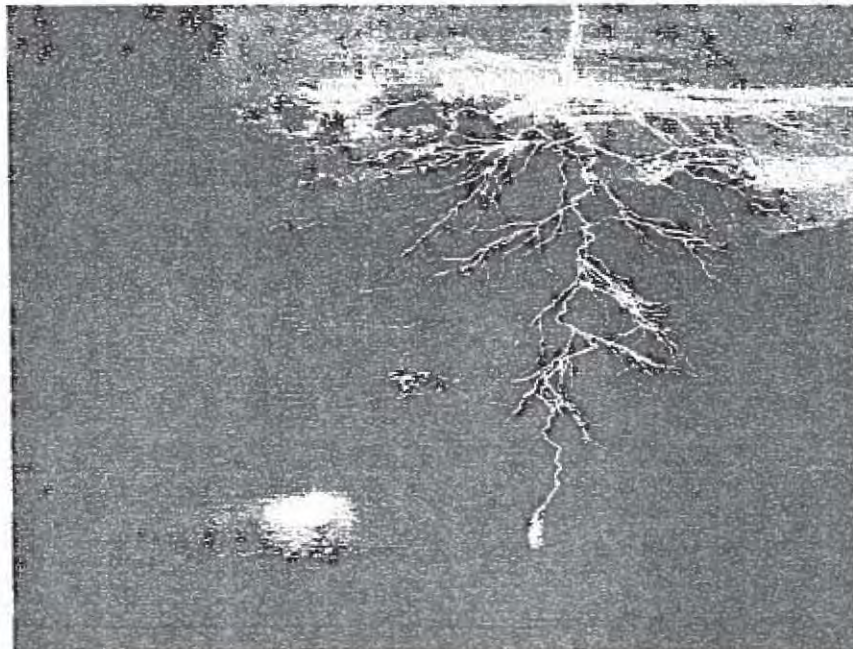
Funding Opportunity Announcement No. R15AS00046

APPENDIX A

DROUGHT CONTINGENCY PLAN DOCUMENTATION

City of Duncan, OK and Duncan Public Schools

Multi-Hazard Mitigation Plan



January 23, 2008

R.D. Flanagan & Associates

Planning Consultants

ALBERT ASHWOOD
STATE DIRECTOR



BRAD HENRY
GOVERNOR

STATE OF OKLAHOMA
DEPARTMENT OF EMERGENCY MANAGEMENT

December 3, 2007

Honorable Gene Brown, Mayor
City of Duncan, Oklahoma
P. O. Box 969
Duncan, OK 73534-0969

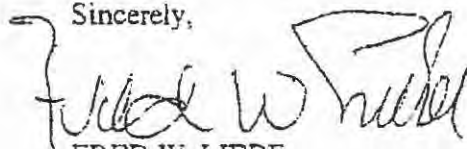
Re: FEMA Satisfactory review (Pending Approval) of the City of Duncan,
Oklahoma Hazard Mitigation Plan HMGP: FEMA-1401-DR-OK, #173

Dear Mayor Brown:

Upon review of the plan, FEMA Region VI staff used the guidance "State and Local Interim Criteria under the Disaster Mitigation Act of 2000" (Final Draft--July 2002) and a Local Mitigation Plan Worksheet (March, 2004 version) and rated the plan as sufficiently "satisfactory" for approval. The Reviewer's Comments are included to assist in further refining the plan for future updates. Although all areas currently met a satisfactory rating, there are some areas listed with Reviewer's Comments to explain the reason for the rating or to be used to refine the plan during future revisions. To gain full approval, action is required at this time on the part of the City of Duncan. A resolution adopting the plan must be passed by your City Council and forwarded to this office within the next 60 days or no later than January 1, 2007 in order for it to arrive at FEMA before their deadline. Please see detailed instructions on Enclosure A of the FEMA letter of November 8, 2007.

Enclosed for your reference is a copy of the approval letter and the worksheet from FEMA. If you have questions regarding this decision, you may contact me by telephone or via email at fred.liebe@oem.ok.gov

Sincerely,


FRED W. LIEBE
Deputy Director

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3.8 Drought

Drought has been defined as "climatic dryness severe enough to reduce soil moisture and water below the minimum necessary for sustaining plant, animal, and human life systems." Drought is caused by a deficiency of precipitation, which can be aggravated by high temperatures, high winds, and low relative humidity. Duration and severity are usually measured by deviation from norms of annual precipitation and stream flows.

3.8.1 Hazard Profile

Drought is an insidious hazard of nature, characterized as a "creeping phenomenon." It is often difficult to recognize the occurrence of drought before being in the middle of one.

Drought analysis is more subjective than that for floods, because droughts do not occur suddenly or spontaneously, but evolve over time as certain conditions are met and spread over a large geographical area. Drought severity depends on its duration, intensity, geographic extent, and the regional water supply demands made by human activities and vegetation. This multi-dimensional nature makes it difficult to define a drought and to perform comprehensive risk assessments. This leads to the lack of accurate, reliable, and timely estimates of drought severity and effects, and ultimately slows the development of drought contingency plans.



The "Dust Bowl" of the 1930s, the greatest natural disaster in Oklahoma history, drove over 800,000 people off the land

Effects

Adverse consequences of drought occur because of deficiencies in the following:

- Public and rural water supplies for human and livestock consumption
- Natural soil water or irrigation water for agriculture
- Water for hydroelectric power, forests, recreation, and navigation
- Water quality

The most direct impact of drought is economic rather than loss of life or immediate destruction of property. Drought affects water levels for use by industry, agriculture, and individual consumers.

Water shortages affect fire-fighting capabilities through reduced water flows and pressures. Drought also affects power production, since when water levels drop, electric companies cannot produce enough inexpensive hydropower to meet demand and are forced to buy electricity from other, usually more costly sources.

Most droughts dramatically increase the danger of wildland fires. When wildlands are destroyed by fire, the resulting erosion can result in the heavy silting of streams, rivers, and reservoirs. Serious damage to aquatic life, irrigation, and power production then occurs. (See the section, "Wildfires.")

Drought is often accompanied by extreme heat. Wildlife, pets, livestock, crops, and humans are especially vulnerable to high heat accompanying drought. When temperatures reach 90 degrees and above, people and animals can suffer sunstroke, heat cramps, and heat exhaustion. (See the section, "Extreme Heat.") During droughts, crops do not mature, wildlife and livestock are undernourished, land values fall, and unemployment increases.

Normal Frequency

Drought is a normal part of virtually all climates. Given that six major drought events have occurred in Oklahoma over the past 50 years and that nine notable droughts have occurred nation-wide in the twentieth century, one may logically conclude that Oklahoma can expect a drought every decade and that droughts will occur more frequently here than the country as a whole. However, long-term forecasts of droughts are difficult and inexact. There is no commonly accepted method of determining the probability of drought that is analogous to the 100-year or 1-percent-annual flood chance.

The U.S. Army Corp of Engineers (USACE) is preparing the *National Drought Atlas* to provide information on the magnitude and frequency of minimum precipitation and stream flow for the contiguous United States. On average, the July-to-January period is the lowest six-month period of stream flow throughout the U.S. and is used to characterize drought. The mean monthly flow from July to January has a once-in-20-years chance of falling below a level that would classify it as a drought. In other words, the average occurrence of drought is once every twenty years. Oklahoma, which has experienced one drought every ten years over the past fifty years, is obviously at a greater than normal risk from drought.

Measurements

A variety of measures are used to predict drought severity and impact, but each one measures different aspects or types of drought. Any single index cannot describe everything about the original data, and the indices are only approximations of real-world phenomena.

The Palmer Index, the most familiar and widely used, measures the departure from normal precipitation. This index uses a range from 4 (extremely wet) to -4 (extremely dry). It incorporates temperature, precipitation, evaporation, runoff, and soil moisture when designating the degree of drought. Hydrologic indices of drought (such as groundwater levels and reservoir volumes or levels) may be used to determine surface water supplies.

Extent of Impact

Because of the gradual nature of drought's onset, and its uneven impacts, it is often difficult to determine the beginning and end of a drought event. Duncan and Stephens County have experienced drought three times in the past 7 years, characterized primarily by crop damage and wildfire. Although Duncan's municipal water supply is strong, with

ownership of four local lakes and rights to water from Waurika Lake, the City has considered purchasing additional capacity at Waurika Lake to meet future needs. Economic damage due to crop loss and wildfire remains, however, a significant threat to the community. Property and crop damage due to drought in Oklahoma between 2000 and 2007 reached \$594 million (\$32.5 million to property and \$561.6 million to crops). In Stephens County and Duncan, property and crop losses due to wildfire in 2005-2006, alone, were over \$17 million. The impacts of drought can be lessened by early warning and notification systems, backup sources of water supply, cooperative agreements with neighboring jurisdictions, local ordinances for rationing water use, clearing brush and Eastern Redcedar from structures in the urban/rural interface, and participating in the national Firewise program.

3.8.2 Historical Events

The National Weather Service's drought monitor map illustrates the pervasive nature and degrees of dryness and prolonged drought in several areas of the country. The current Drought Monitor map for the U.S., which is updated weekly, is at <http://www.drought.unl.edu/dm/monitor.html>.

Approximately 20% of the contiguous United States is currently suffering from the effects of prolonged severe to extreme drought. Parts of the Northwest, Rocky Mountains and Great Plains have been particularly hard hit, and the drought in those areas is so severe that months of above-normal rainfall would be necessary to end it, according to the National Weather Service.

One of the greatest natural disasters in U.S. history and the most severe and devastating to Oklahoma was the decade-long drought in the 1930s that has become known as the Dust Bowl. Reaching its peak from 1935 through 1938, high temperatures and low rainfall combined to destroy crops and livestock. All summer crops failed in 1936. Due to the heat and drought-induced crop failures of the 1930s, corn ceased to be a major cash crop in Oklahoma. In the wake of these crop failures and parched earth, high winds literally blew the land away, causing massive soil erosion. Hundreds of small rural communities were ruined and about 800,000 people were displaced. The total expenditure by the American Red Cross for drought relief in Oklahoma in 1930-1931 was the third largest ever in the nation. Nine notable droughts occurred during the twentieth century in the United States. Damage estimates are not available for most, however estimates indicate that the 1976-1977 drought in the Great Plains, Upper Midwest, and far Western States caused direct losses of \$10-\$15 billion. The 1987-1989 drought cost \$39 billion, including agricultural losses, river transportation disruption, water supply shortages, and wildfires.

Major droughts in Oklahoma, as determined from stream flow records collected since the early 1920s, have predominately occurred during four periods: 1929-1941, 1951-1957, 1961-1971, and 1975-1982. Since 1950, five major drought events have resulted in an estimated \$900 million in crop damage within the state.

Because of their gradual onset and widespread nature, drought data is often not compiled and maintained at the municipal level. However, information has been recorded regionally.

August 2000. Oklahoma began the new century with drought conditions. In early August 2000, an extended period of unusually dry weather lasted for 2 months. Many parts of the state did not receive rain in August, and portions of southern and south central Oklahoma remained dry for almost 90 days, starting in June. Total agricultural losses were estimated between 600 million and 1 billion dollars statewide. Reservoir levels across southwest and south central Oklahoma averaged 50 percent of normal. Seven counties near the Texas border (not including Grady) were declared federal disaster areas.

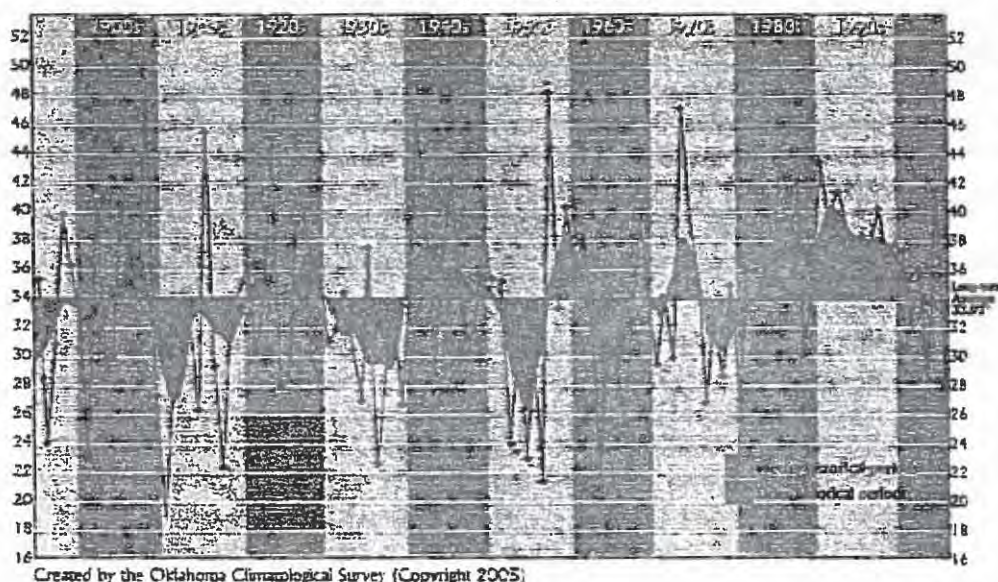
July 2001 – A month of excessive heat and little rainfall brought drought to central Oklahoma and killed eight people

March 2002- Lack of rainfall and an infestation of insects took a toll on western Oklahoma's wheat crop. State officials said 26 percent of the wheat crop was in very poor shape and conditions were so dry in the Panhandle that soil erosion was beginning to occur. The state's "wheat belt" region, the area around and west of U.S. 81, had received less than 50 percent of its normal rainfall since October of 2001, according to Derek Arndt of the Oklahoma Climatological Survey.

March 2005-April 2006 – A sustained period of dry weather and high temperatures spread drought across much of Oklahoma, especially the east central and southeast portions of the state. High winds, combined with dry soil conditions, helped spread the worst series of wildfire outbreaks in Oklahoma history. (See 3.11 *Wildfire*, below)

As illustrated in the following graph, Oklahoma has gone through six drought cycles, state-wide, since the early 1900s, with the latest being an almost 20-year period of wet weather lasting from about 1983 to 2003. If these trends continue, and the recent wet phase of the cycle is followed by a more or less equal number of dry years, then the State may well be facing a period of prolonged drought in the coming decades.

Annual Rainfall History with 5-yr Weighted Trends
Climate Division 10 (Statewide): 1895-2004



Duncan and Stephens County Drought Events

Stephens County has endured three periods of unusually dry weather in the last seven years.

June-July, 2000- An extended period of unusually dry weather affected much of southern and southwestern Oklahoma, including Stephens County. Crop losses were estimated at about \$400 million statewide. In July 2001 a period of excessive heat scorched all of western and central Oklahoma, including Stephens County, with daily temperatures at or above 100 degrees. With rainfall at about one-third that of normal, drought conditions were created. There was one heat related death in Duncan.

December 2005- With below normal precipitation for several months, drought conditions increased across much of the state. Precipitation 12 inches below normal was recorded in Oklahoma City for the end of the year, with amounts closer to 15 to 20 inches below normal for locations across the southeast. The drought conditions and warm temperatures caused an increase in wildfire potential. There were approximately 175,000 acres burned and 150 homes and business damaged or destroyed, along with numerous outbuildings, during the month of December. Structure losses were over \$10 million, with an estimated damage to hay and pasture at over \$500,000. Duncan and Stephens County were especially hard hit by wildfire.

March 2005-April 2006 - A sustained period of dry weather and high temperatures spread drought across much of Oklahoma, especially the east central and southeast portions of the state. The winter of 2005-2006 was the second driest since records began being kept in 1895. High winds, combined with dry soil conditions, helped spread the worst series of wildfire outbreaks in Oklahoma history. By April 2006, the severe drought had become "extreme drought" in some areas, including Duncan, which was forced to begin drawing water from Waurika Lake. Over 40 cities in Oklahoma had to impose some form of water rationing or restrictions on water use, including Duncan.

3.8.3 Vulnerable Population

In all droughts, agriculture feels the impact, especially in non-irrigated areas such as dry land farms and rangelands. Other heavy water users such as landscapers are also negatively impacted, and residential users often have their water-related activities restricted. Droughts also cause power shortages in Oklahoma, since much of the state's electric power comes from hydro plants. Heavy power users can be negatively affected by the results of electricity shortages due to drought, such as brownouts, blackouts, and spiking prices.

Generally, in times of severe drought, when water shortages reach near-disaster proportions, states rely on the Federal Government to provide relief to drought victims. Forty separate drought relief programs administered by 16 Federal agencies provided nearly \$8 billion in relief during the drought years of the mid-1970s. Federal assistance efforts totaled more than \$5 billion nationwide in response to the 1987-1989 drought. However, since the droughts of the mid-1970s, most states are taking a more active role in mitigation and response activities, and drought contingency plans are now in place in at least 27 states.

As historical data for Stephens County suggests, the City of Duncan and Duncan Public Schools are vulnerable to drought. This is also true of all future development areas.

However, the inhabitants most vulnerable to this hazard are those involved in agricultural activities.

3.8.4 Conclusion

There are signs that drought is becoming an increasing problem in the United States, including Oklahoma. However, it is difficult to predict drought probabilities for the near future due to the nature and complexity of the hazard.

The severe droughts of the 1930s led to the construction of Oklahoma's numerous hydroelectric dams and reservoirs, as well as to the implementation of new farming practices and conservation policies. However, more recent drought response and recovery activities in Oklahoma, both on state and local levels, have not been as ambitious or successful. Planning for the state's critical and emergency water resources needs should not be carried on only during drought crises. There is a "need to focus more on long-term water management and planning issues; to integrate the activities of numerous agencies with drought-related missions into a coherent national approach; and to achieve better coordination of mitigation, response, and planning efforts between State and Federal officials."

3.8.5 Sources

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3.9 Expansive Soils

Soils and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soils. Expansive soils are often referred to as swelling clays because clay materials are most susceptible to swelling and shrinking. Dry clays are capable of absorbing water and will increase in volume in an amount proportional to the amount of water absorbed.

3.9.1 Hazard Profile

Changes in soil volume present a hazard primarily to structures built on top of expansive soils.

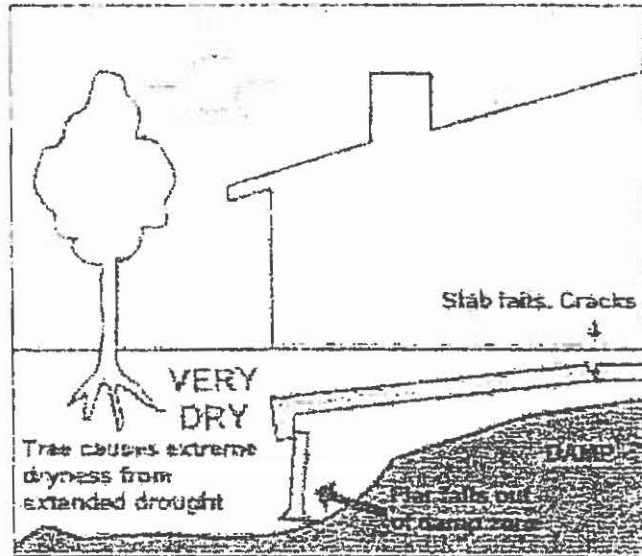
Most engineering problems caused by volume changes in swelling clays result from human activities that modify the local environment, and which commonly involve swelling clays beneath areas covered by buildings and slabs or layers of concrete and asphalt. Damage to the built environment results from differential vertical movement that occurs as clay moisture content adjusts to the changed environment.

The total annual cost of 1) expansive soil-related damage and 2) preventative design of moderate to high-risk structures throughout the United States has been conservatively estimated at just under \$2.5 billion. Recent estimates put the annual damage as high as \$7 billion.

Because the hazard develops gradually and seldom presents a threat to life, expansive soils have received limited attention despite their costly effects. Many problems are not recognized as being related to expansive soils or may be considered only nuisances and therefore never repaired.

Effects

The most extensive damage from expansive soils occurs to highways and streets. The increase in soil volume also causes damage to foundations. The most obvious manifestations of damage to buildings are sticking doors, uneven floors, and cracked foundations, floors, walls, ceilings, and windows. If damage is severe, the cost of repair may exceed the value of the building.



Duncan's property is underlain by soils with shrink-swell potentials ranging from low to very high

17-217: RESERVOIRS PROTECTED:

It is unlawful for any person to bathe in, or to throw any substance into, any reservoir, or place any foreign substance upon any grounds belonging to or connected with or under the control of the authority. (Prior code § 18-29)

17-218: TEMPORARY OR PERIODIC RESTRICTIONS ON WATER USAGE:

- A. Whenever an emergency exists by reason of a shortage of water due to inadequate supply, limited treatment or distribution capacity or failure of equipment or material, the general manager/city manager is hereby authorized to restrict or prohibit the use of water from the water system in whole or in part.
- B. When the rate of water consumption, by all users of the city's water supply and water distribution system, attains such volume that a loss of water pressure is experienced in all or part of the city's water distribution system, or the city's raw water supply becomes excessively low as described herein, the city engineer shall certify this condition to the general manager/city manager, in writing, together with recommendations for the alleviation of such conditions. Upon the certification of the city engineer, the general manager/city manager shall issue a proclamation declaring an emergency, to be executed by the mayor/chairman of trustees under the provisions of this section, establishing restrictions on the use of water. Any provisions of the proclamation restricting water usage shall apply to all consumers of the city's water system, both within and outside the city limits. The city engineer shall review conditions of the city's water system at an appropriate frequency during the effective dates of the proclamation and shall provide the general manager/city manager the findings of said review. Any restrictions on water usage established pursuant to this section shall remain in effect until such time as the general manager/city manager files an order with the city clerk terminating the restrictions, pursuant to a determination by the city engineer that sufficient water pressure has been restored, or that restricted usage is no longer necessary.
- C. The type, nature and extent of the water usage restriction shall be based on prevailing conditions of the city's water distribution system and the rates of consumption, or the city's raw water supply, as certified by the city engineer. Restrictions on water usage shall include the authority to prescribe certain times for use of water, to establish purposes for which water may be used, and to prohibit certain usages of water as provided hereafter. Usage restrictions imposed may apply to the entire city or to only a part or portion of the city in order to protect the public health, safety and welfare. (Ord. 1717, 3-26-2013)

17-219: NOTICE:

- A. Upon the issuance of a proclamation, the same shall become immediately effective upon publication. A certified copy of the proclamation shall be published at least once, within seventy two (72) hours of its issuance, in a newspaper having general circulation within the city. If there is no such newspaper, or if it is not otherwise possible to publish the proclamation within seventy two (72) hours, publication shall be by posting a copy of the proclamation in ten (10) prominent places within the city to include city hall, city police headquarters, city library, Simmons Center, and the Stephens County Courthouse. A certified copy of the proclamation shall also be filed with the city clerk. Violation of such proclamation shall be subject to penalties as set out in section 17-222 of this chapter.
- B. Whenever a sudden or unexpected event so reduces the availability of water or water pressure as to create an immediate threat to public health or safety the notice of the proclamation may be

given by any reasonable means, including electronic means. The emergency shall be in full force and effect upon such notice. However, if any means other than that required in subsection A of this section is used, the proclamation shall be republished in accordance with subsection A of this section within twenty four (24) hours of the first notice. (Ord. 1717, 3-26-2013)

17-220: RESTRICTIONS ON WATER USE:

A. Stage 1 - Voluntary Conservation Of Outside Water Usage:

1. Conditions: The conditions for stage 1 shall exist when the average daily water usage reaches ninety percent (90%) of plant capacity for fourteen (14) consecutive days or when the combined municipal storage of Lake Humphreys and Waurika Lake reaches a level of seventy five percent (75%) or less. Stage 1 conditions may be declared to exist when the municipal storage of Lake Humphreys or Waurika Lake reaches seventy five percent (75%) or less.
2. Voluntary Conservations: Upon certification of the conditions for stage 1, the general manager/city manager may, through appropriate means, call upon consumers to conserve water voluntarily by limiting outside watering to the hours between twelve o'clock (12:00) midnight and nine o'clock (9:00) A.M. every other day from March 1 through October 31 and between eleven o'clock (11:00) A.M. and three o'clock (3:00) P.M. every other day from November 1 through February 29. Watering within said authorized time frames being limited to even numbered days for street addresses ending in an even number and odd numbered days for street addresses ending in an odd number.
3. Termination: Stage 1 shall terminate when the general manager/city manager shall file an order with the city clerk, finding that the conditions for stage 1 no longer exist.

B. Stage 2 - Mandatory Restriction Of Outside Water Usage To Every Other Day:

1. Conditions: The conditions for stage 2 shall exist when the average daily water usage reaches ninety five percent (95%) of the plant capacity for seven (7) consecutive days or when the municipal combined storage of Lake Humphreys and Waurika Lake reaches a level of sixty percent (60%) or less. Stage 2 conditions may be declared to exist when the municipal storage of Lake Humphreys or Waurika Lake reaches sixty percent (60%) or less. (Ord. 1717, 3-26-2013)
2. Mandatory Restrictions: Upon certification of the conditions for stage 2, the general manager/city manager may order the mandatory restriction of outside water usage including, but not limited to, watering of lawns, trees, shrubs, gardens and bedding plants, vehicle washing, or hosing down of sidewalks, driveways and streets, filling of pools or other recreational uses to the hours between twelve o'clock (12:00) midnight and nine o'clock (9:00) A.M. every other day from March 1 through October 31 and between eleven o'clock (11:00) A.M. and three o'clock (3:00) P.M. every other day from November 1 through February 29. Watering within said authorized time frames shall be limited to the days of Monday, Wednesday, and Friday for street addresses ending in an even number and Tuesday, Thursday, and Saturday for street addresses ending in an odd number. Outside water usage will be restricted for all street addresses on Sunday with said usage being limited to the watering of gardens and flowerbeds only. All other outside watering on Sunday will be prohibited. (Ord. 1718, 5-28-2013)
3. Termination: Stage 2 shall terminate when the general manager/city manager shall file an order with the city clerk and cause the same to be published in a newspaper of general circulation with the city, finding that the conditions for stage 2 no longer exist; provided, however that the general manager/city manager may in such order call upon consumers to voluntarily conserve water as provided in stage 1 herein.

C. Stage 3 - Mandatory Restriction Of Outside Water Usage To Wednesdays And Saturdays:

1. Conditions: The conditions for stage 3 shall exist when the average daily water usage reaches ninety eight percent (98%) of the plant capacity for three (3) consecutive days or when the combined municipal storage of Lake Humphreys and Waurika Lake reaches a percentage of fifty percent (50%) or less. Stage 3 conditions may be declared to exist when the municipal storage of Lake Humphreys or Waurika Lake reaches fifty percent (50%) or less.

2. **Mandatory Restrictions:** Upon certification of the conditions for stage 3, the general manager/city manager may order the mandatory restriction of outside water usage including, but not limited to, watering of lawns, trees, shrubs, gardens and bedding plants, vehicle washing, washing or hosing down of sidewalks, driveways and streets, filling of pools or other recreational uses to the hours between twelve o'clock (12:00) midnight and nine o'clock (9:00) A.M. on Wednesdays and Saturdays only from March 1 through October 31 and between eleven o'clock (11:00) A.M. and three o'clock (3:00) P.M. on Wednesdays and Saturdays only from November 1 through February 29.
3. **Termination:** Stage 3 shall terminate when the general manager/city manager shall file an order with the city clerk and cause the same to be published in a newspaper of general circulation with the city, finding that the conditions for stage 3 no longer exist; provided, however that the general manager/city manager may in such order impose the restrictions of stage 2 or may call upon consumers to voluntarily conserve water as provided in stage 1 herein.

D. Stage 4 - Mandatory Prohibitions Of Outside Water Usage:

1. **Conditions:** The conditions for stage 4 shall exist when the average daily water usage reaches one hundred percent (100%) of the plant capacity for two (2) consecutive days or when the municipal storage of Lake Humphreys or Waurika Lake reaches a percentage of forty percent (40%) or less.
2. **Restrictions And Prohibitions:** Upon certification of the conditions for stage 4, the general manager/city manager shall prohibit all outside water usage including, but not limited to, watering of lawns, trees, shrubs, gardens and bedding plants, vehicle washing, washing or hosing down of sidewalks, driveways and streets, filling of pools or other recreational uses.
3. **Termination:** Stage 4 shall terminate when the general manager/city manager shall file an order with the city clerk and cause the same to be published in a newspaper of general circulation with the city, finding that the conditions for stage 4 no longer exist; provided, however that the general manager/city manager may in such order impose the restrictions of stage 3 or stage 2 or may call upon consumers to voluntarily conserve water as provided in stage 1 herein.

E. Emergency Conditions And Measures:

1. **Emergency Conditions:** In addition to the conditions set forth above authorizing the city engineer to certify that stage 1, 2, 3, or 4 water restrictions or prohibitions should be implemented, the city engineer may also certify to the general manager/city manager the need for implementation of stage 1, 2, 3 or 4 should any of the following emergency conditions occur:
 - a. If one or more pumps fail at the Lake Fuqua or Lake Humphreys pump station causing the transfer of water to fall below the needed operating volume;
 - b. If one or more pumps fail at the Lake Waurika pump station or relift station causing the transfer of water to fall below the needed operating volume;
 - c. If a failure in the Lake Fuqua or Lake Humphreys raw water pipeline or the Waurika pipeline should occur causing the transfer of water to fall below the needed operating volume; or
 - d. If in the professional judgment of the city engineer that any portion of the city's water supply and water distribution system is otherwise threatened by any emergency conditions resulting from a loss of water pressure or the city's raw water supply becomes extremely low.
2. **Mandatory Restrictions Or Prohibition:** Upon certification of stage 1, 2, 3 or 4 water restrictions or prohibitions based on the above conditions, the general manager/city manager may prohibit water usage consistent with the applicable stage 1, 2, 3 or 4 restrictions or prohibitions set forth for the applicable stage as set forth in this section for that stage.
3. **Termination:** The general manager/city manager shall terminate the applicable stage 1, 2, 3 or 4 restrictions or prohibitions consistent with the applicable termination requirements for the stage so certified as set forth in this section for that stage.

F. Sale Or Discharge Of Raw Water From Lake Fuqua:

1. **Stage 1 - Restrictions On Sale Or Discharge Of Water:**
 - a. **Conditions:** The condition for stage 1 shall exist when the municipal storage of Lake Fuqua reaches a level of seventy five percent (75%) or less.

- b. Restrictions: Upon certification of the conditions for stage 1, the general manager/city manager shall, through appropriate means, restrict the sale or discharge of water from Lake Fuqua for nonmunicipal supply uses to an aggregate maximum of two hundred thirty five thousand (235,000) gallons per day.
 - c. Termination: Stage 1 shall terminate when the general manager/city manager shall file an order with the city clerk, finding that the conditions for stage 1 no longer exist.
- 2. Stage 2 - Restrictions On Sale Or Discharge Of Water:
 - a. Conditions: The conditions for stage 2 shall exist when the municipal storage of Lake Fuqua reaches a level of sixty percent (60%) or less.
 - b. Restrictions: Upon certification of the conditions for stage 2, the general manager/city manager shall, through appropriate means, restrict the sale or discharge of water from Lake Fuqua for nonmunicipal supply uses to an aggregate maximum of one hundred fifty thousand (150,000) gallons per day, every other day.
 - c. Termination: Stage 2 shall terminate when the general manager/city manager shall file an order with the city clerk, finding that the conditions for stage 2 no longer exist; provided, however that the general manager/city manager may in such order restrict the sale or discharge of water as provided in stage 1 herein.
- 3. Stage 3 - Restrictions On Sale Or Discharge Of Water:
 - a. Conditions: The conditions for stage 3 shall exist when the municipal storage of Lake Fuqua reaches a percentage of fifty percent (50%) or less.
 - b. Restrictions: Upon certification of the conditions for stage 3, the general manager/city manager shall, through appropriate means, restrict the sale or discharge of water from Lake Fuqua for nonmunicipal supply uses to an aggregate maximum of one hundred fifty thousand (150,000) gallons per day, on Wednesdays or Saturdays only.
 - c. Termination: Stage 3 shall terminate when the general manager/city manager shall file an order with the city clerk, finding that the conditions for stage 3 no longer exist; provided, however that the general manager may in such order impose the restrictions of stage 2 or stage 1 herein.
- 4. Stage 4 - Prohibition On Sale Or Discharge Of Water:
 - a. Conditions: The conditions for stage 4 shall exist when the municipal storage of Lake Fuqua reaches a percentage of forty percent (40%) or less.
 - b. Prohibitions: Upon certification of the conditions for stage 4, the general manager/city manager shall prohibit all sales or discharges of water from Lake Fuqua for nonmunicipal supply uses.
 - c. Termination: Stage 4 shall terminate when the general manager/city manager shall file an order with the city clerk, finding that the conditions for stage 4 no longer exist; provided, however that the general manager/city manager may in such order impose the restrictions of stage 3 or stage 2 or stage 1 herein. (Ord. 1717, 3-26-2013)

17-221: EXEMPTIONS:

- A. Stage 2 And Stage 3 Exemptions: The following activities, users, or usages of water shall be exempt from the stage 2 and stage 3 water restrictions:
 - 1. Watering upon the immediate premises of any commercial nursery raising plants, shrubs, or trees for sale;
 - 2. Commercial car washes and service stations;
 - 3. Washing of motor vehicles used in food transportation, food products, perishable goods or motor vehicles used for garbage collections;
 - 4. Food producing crop for personal use or consumption only;
 - 5. Lawns which have been treated by commercial nurseries, landscape gardeners, or similar type businesses, if:
 - a. The watering is completed within twenty four (24) hours from the treatment of the lawns; and
 - b. A sign is conspicuously posted on the premises stating the date and time of the lawn treatment;

6. Newly planted lawns for a period of two (2) weeks with the posting of a sign which sets out the date of the start of such two (2) week period; and
 7. Watering around the foundations of property structures by use of a hose.
- B. Stage 4 Exemptions: The following activities, users, usages of water shall be exempt from the stage 4 water restrictions:
1. Washing of motor vehicles used in food transportation, food products, perishable goods or motor vehicles used for garbage collections; and
 2. Watering around the foundations of property structures by use of a hose.
- C. Fire Hydrant Meters: The use of fire hydrant meters during stage 2, 3 or 4 is prohibited except for approved subdivision construction contracts and where building permits have been issued by the city. (Ord. 1717, 3-26-2013)

17-222: PENALTIES FOR VIOLATIONS OF STAGE 2, STAGE 3 OR STAGE 4 PROHIBITIONS:

- A. Any violation of the restrictions of stage 2, stage 3 or stage 4 by any party receiving water as a customer located inside the city limits shall be deemed in violation of this code and the penalties shall be as set out in section 1-108 of this code for a first offense. Each day that an offense occurs or continues shall be deemed a separate offense. Second and subsequent offenses shall also be prosecuted in municipal court and fines shall be enhanced with fines set out herein.
1. Convictions for violations of stage 2 or stage 3 shall be punishable by the following: First offense shall be punishable by a fine of one hundred dollars (\$100.00) plus court costs. Conviction of a second offense shall be punishable by a fine of one hundred fifty dollars (\$150.00) plus court costs. Conviction of a third offense shall be punishable by a fine of two hundred fifty dollars (\$250.00) plus court costs.
 2. Violations of stage 4 restrictions shall entail the following: Conviction of a first offense shall be punishable by a fine of two hundred fifty dollars (\$250.00) plus court costs. Conviction of a second offense shall be punishable by a fine of five hundred dollars (\$500.00) plus court costs. Conviction of a third offense shall be punishable by a fine of seven hundred fifty dollars (\$750.00) and/or thirty (30) days in jail.
- B. Customers receiving water under the terms of a contract shall for a first violation receive a letter of notice of violation and the water rate applicable to that customer shall be increased by fifty percent (50%) for the duration of that billing period. For a second violation by the customer during the declared water emergency, the customer shall receive a notice of violation and the water rates applicable to that customer shall be doubled for not only the duration of that billing period but for the remainder of the declared emergency as well. A third violation during the declared emergency by the customer shall cause the customer(s) agreement to be canceled and immediately terminate water service(s). The customer, whether inside the city limits or outside the city limits, shall be required to reapply for water service and additional application fees and deposits will be required as established by other ordinances of this code in effect at the time of such violation. Water service agreements with customers outside the city limits are at the discretion of the general manager/city manager. For purposes of this section, "customer" is defined as the individual or entity contracting with the city for water service provided through a master meter. If the customer has additional customers attached beyond the master meter it is the customer's responsibility to ensure compliance with the declared water emergency requirements by all its additional customers. (Ord. 1717, 3-26-2013)

CITY OF DUNCAN
Raw Water Supply Improvements Project List

Priority	Project Goal	Project Detail Narrative	Estimated Construction Cost	Estimated Engineering Cost
1	Pump additional water from Waurika Lake to Lake Humphreys to supplement supply	Construct bypass at Lake Humphreys pump station to deliver water through existing pipeline	\$ 502,000.00	\$ 43,000.00
2	Use Clear Creek Lake to supplement raw water supply	Restore pump station and repair, rehabilitate or replace existing pipeline as needed	\$ 525,550.00	\$ 69,720.00
3	Use groundwater to supplement raw water supply in Clear Creek Lake	Drill wells and deliver to Clear Creek Lake via existing drainage paths upstream of the lake	\$ 1,400,000.00	\$ 168,000.00
4	Use Duncan Lake to supplement raw water supply	Restore pump station and repair, rehabilitate or replace existing pipeline as needed	\$ 1,405,000.00	\$ 140,500.00
5	Resolve deficiencies in pipeline from Clear Creek Lake to Water Treatment Plant	Rehabilitate/Replace pipeline from Clear Creek Lake to Water Treatment Plant	\$ 6,468,000.00	\$ 776,160.00
6	Increase volume of water that can be delivered from Lake Fuqua to the Water Treatment Plant	Install larger pipeline from Lake Fuqua to Water Treatment Plant	\$ 13,728,000.00	\$ 1,647,360.00
7	Restore as-designed storage capacity of lakes	Dredge lakes and make various structural repairs	\$ 6,000,000.00	\$ 720,000.00
8	Use groundwater to supplement water supply in Lake Humphreys	Drill wells and deliver to Lake Humphreys via existing drainage paths upstream of the lake	\$ 3,000,000.00	\$ 360,000.00
9	Use groundwater to supplement drinking water supply (offset demand on lakes)	Drill well(s) and install pipeline to Water Treatment Plant	\$ 8,131,200.00	\$ 975,744.00
TOTALS			\$ 41,159,750.00	\$ 4,900,484.00

