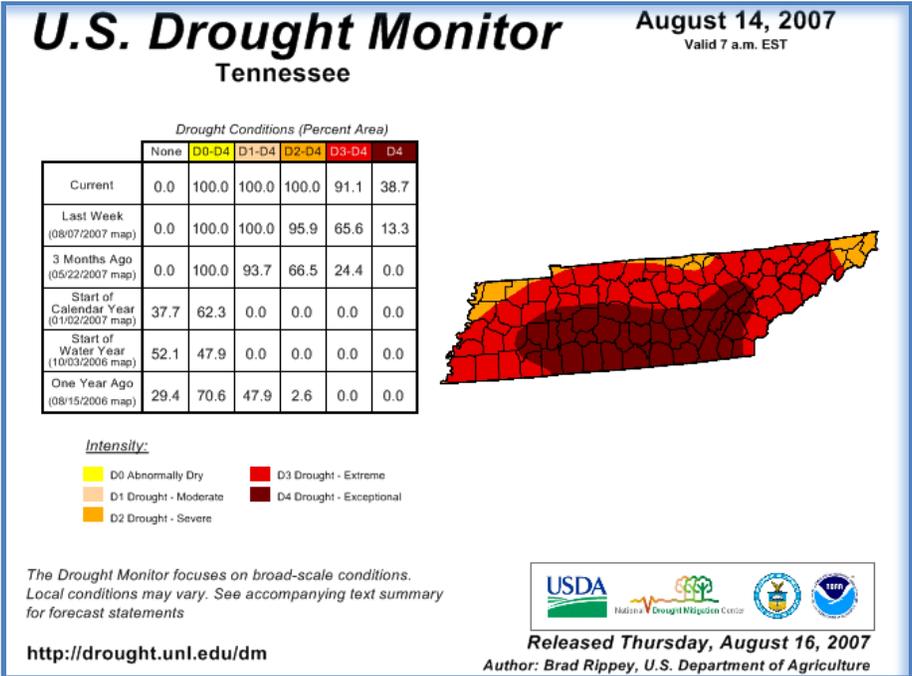


CITY OF BRENTWOOD



DROUGHT MANAGEMENT PLAN



MARCH, 2011

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

TABLE OF CONTENTS

- I. Introduction: Purpose and Authority
 - a. Applicability to Other Emergencies
 - b. Water System Characteristics

- II. Drought Management Planning
 - a. Goals
 - b. Regional Planning

- III. Existing Plans and Partnerships
 - a. Adjacent systems
 - b. Legal Authority
 - c. Communication and Enforcement

- IV. Regional Stakeholders
 - a. Water Systems in the Cumberland River Basin

- V. Drought Management Plan Phases
 - a. Triggerpoints
 - b. Public Notice
 - c. Plan Management Phases
 - i. Drought Alert Phase
 - ii. Voluntary Water Reduction Phase
 - iii. Mandatory Water Reduction Phase
 - iv. Emergency Water Management

- VI. Drought Management Implementation

- VII. Drought Management Team

- VIII. Reviews and Updates

CITY OF BRENTWOOD DROUGHT MANAGEMENT PLAN

I. INTRODUCTION

Droughts cannot be avoided, but their effects on water systems can be mitigated through proper planning and preparedness. This plan is not intended to replace existing emergency planning efforts or to add complex layers of planning, measuring and reporting to current operational procedures; rather, it is hoped that this plan may be incorporated into ongoing activities and exercises within the Brentwood Water Department, other City departments, and intergovernmental agencies in the area.

Three interrelated goals of this drought management plan are:

1. Provide our customers with a clear, concise, and fair plan that sets specific triggerpoints that reduce water consumption to certain levels dependent upon water supply limitations.
2. Provide adjacent water systems, specifically the City's parent systems of Harpeth Valley Utilities District and Metro Water Services, with a plan that emulates actions and precautions being taken in those systems. Given that all systems are different in terms of usage patterns, infrastructure, and customer expectations, it is not possible to create uniformity in the realm of drought management planning, but having those plans compliment and conform to each other is feasible.
3. Provide the Tennessee Department of Environment and Conservation, Division of Water Supply, with a plan that meets the requirements set forth in correspondence dated January 11, 2010, which references guidance developed in December of 2009.

Because of water shortages experienced in the 1980's and early 1990's in the City of Brentwood, many aspects of drought management planning as outlined in the TDEC guidance are already in place. For example, as stated in Section 70-165 of the City Code, the City of Brentwood specifically has the authority to regulate water usage during times of emergencies or water shortages. However, since reference is made to a resolution from 1984 (#84-24), Ordinance 70-165 is to be updated to specifically reflect this Plan upon TDEC approval.

Authority and Applicability to Other Emergencies

While this document is prepared specifically in response to anticipated supply issues that might arise due to prolonged drought, the actions and preparations put in place should be applicable to other emergencies as well. Because the City of Brentwood's source of supply, the Cumberland River, has historically not been inhibited by droughts, much of this document is tailored toward actions that might be taken and preparations that might be made for the more-likely eventualities such as the ice storm of 1994 or the flood of 2010. In any case, the responses to impacted supply will be two-fold:

1. Increase or augment the supply from alternative sources, and;
2. Decrease demand as necessary to maintain domestic service to our customers as fully as possible.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

The City's approved Emergency Response Plan goes into some detail regarding actions that can be taken should sources become compromised. As such, the City of Brentwood Water and Sewer Department has, through the City Code, been given authority to implement necessary measures for maintaining a safe and reliable water supply for its customers. Specifically, Section 70-165 of the City Code states that the City has the authority to regulate water usage during times of emergencies or water shortages. As part of the implementation of this Drought Management Plan, the City anticipates revising this ordinance to specifically reference this plan.

Water System Characteristics

The City of Brentwood water system serves a population of approximately 25,000. Other systems, including Harpeth Valley Utilities District, Nolensville, and Mallory Valley Utility District, directly serve portions of the City. The City currently purchases approximately 75% of its water from Harpeth Valley Utilities District, with the remaining 25% being provided by Nashville Metro Water Services. Both water sources have proven to be very reliable over the years.

The water distribution system consists of 2" through 24" diameter water lines. There are two main pressure zones: the "North" zone of hydraulic grade 875', fed directly from the north by Metro Water Services, and the "South" zone of hydraulic grade 925', fed directly from the northwest at two locations by Harpeth Valley. The dividing line between the two zones is approximately the Little Harpeth River, but there are interconnects between the two systems that can be utilized during emergencies if the need arises. A summary table outlining the tanks, pressure zones, and pumping stations is included below:

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

TANK NAME	YEAR BUILT	MATERIAL	SIZE (GAL)	HEIGHT (FT)	HYDRAULIC GRADE	SUPPLYING PUMP
Carriage Hills #1	1987	Prestressed Concrete	2,000,000	34'	925'	Murray Lane / Johnson Chap
Carriage Hills #2	2001	Prestressed Concrete	3,000,000	34'	925'	Murray Lane / Johnson Chap
Brentwood Park #1	1984	Prestressed Concrete	2,000,000	33'	875'	East Park Pump Station
Brentwood Park #2	2000	Prestressed Concrete	2,000,000	33'	875'	East Park Pump Station
Chenoweth Tank	1986	Prestressed Concrete	2,000,000	34'	925'	Murray Lane / Johnson Chap
Willowick Tank	1989	Fused glass-lined	183,000	33'	1150'	Plymouth Drive PS
Mooreland Estates	1970	Welded Steel	500,000	24'	925'	Murray Lane / Johnson Chap
Raintree #1 Tank	1991	Fused glass-lined	103,000	29'	989'	Raintree #1 Pump Station
Robert E Lee Tank	1988	Fused glass-lined	239,000	23'	1155'	Longstreet Drive PS
Split Log Road Tank	2007	Prestressed Concrete	2,500,000	45'	1070'	Split Log Road PS

There are also several smaller pressure zones supplied by continuous-run pumping stations, primarily for individual subdivisions and / or for fire protection. Those are:

- Annandale Pump Station
- Overlook Park Pump Station
- Windstone Subdivision
- Robert E. Lee Zone

The Old Smyrna Road Pumping Station can also be utilized to help transfer flow between the two main pressure zones.

Water usage in the Wintertime averages approximately 3 million gallons per day, and in the Summertime can approach 12 million gallons per day. Averaged over the entire year, the daily usage is approximately 6 MGD.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

II. DROUGHT MANAGEMENT PLANNING

Planning for the preparation of the drought management plan began in early 2010, when the initial guidance from the Division of Water Supply was issued. Meetings were held with regional providers, such as Harpeth Valley, and there were numerous discussions with other stakeholders regarding its development. In addition, the City of Brentwood attended the TDEC public meeting in March, 2010, and is following guidance provided at that time.

Goals

The City of Brentwood has the goal of maintaining a safe and reliable water supply to its customers, even in dry times of the year. Because the City has made significant investment in water distribution infrastructure and has maintained a good record of providing accurate demand projections to its suppliers, it is not specifically a goal for the City to restrict water usage during dry times, but the goals are to be cognizant of impending drought situations and be able to manage our customers' demand while monitoring our supply.

The City's Drought Management Plan has four levels of response based on the severity of the water supply situation, as is discussed in Part V of this document. Water demands are split into critical and optional uses. Critical uses are those pertaining to human consumption, particularly those of the elderly care and assisted living facilities in the system. Optional, or "non-essential" uses are those associated with recreation and outdoor watering. A primary goal of the development of the Drought Management Plan is to clearly delineate the difference between those uses.

Regional Planning

The City of Brentwood has two reliable sources of water. Permanent connections to adjoining utilities, such as Mallory Valley and Nolensville – College Grove, are under consideration. However, the City does not envision obtaining its own raw water source. The development of the Drought Management Plan has utilized a regional approach. Permanent and temporary interconnects among utilities will be essential in addressing emergency situations.

Each year, the City of Brentwood is asked to provide 5-year projections of demand to its wholesale suppliers. This mechanism acts as a continual regional plan that is updated annually. If projections regarding peak day demand or maximum month demand are out of step with actual values, then the reasoning for this discrepancy is studied and adjustments are made regarding future demand projections. The City of Brentwood's projections have been fairly accurate for the past several years.

CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN

Even though the City of Brentwood did not institute watering restrictions during the historic drought of 2007, the demands realized during that summer caused the City to begin planning for additional capacity for supply into the system. A water system master plan was developed in 2008 that details capital improvements necessary to obtain an additional 4.0 million gallons per day into the City's distribution system. Some of these projects have already been completed, and others will be scheduled as demands and development necessitate.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

III. EXISTING PLANS AND PARTNERSHIPS

The City of Brentwood maintains an Emergency Operations Plan, some of which specifically references drought management. A portion of that document is excerpted below:

1. Drought Procedures

Severe droughts can occur in the middle Tennessee area, but with both Harpeth Valley and Metro Water Services being supplied by the Corps of Engineers–controlled surface water of the Cumberland River, it is unlikely that the source would dry up completely. Occasional voluntary water usage reductions are not uncommon but do not constitute an “emergency”. During dry weather, the following steps should be followed:

- 1. Frequently monitor Harpeth Valley and Metro Water Services for supply to ensure that the contracted-for amount of water is available.*
- 2. Any restrictions placed by the two suppliers are to be followed per the terms in our contracts.*

If drought conditions call for reduced usage, the provisions outlined in City Drought Resolution 84-24 are to be followed. The text of that resolution is included in the following page.

Further, the City of Brentwood is a member of the TNWARN program, enabling the City to coordinate and provide mutual aid with other systems during and immediately after emergency situations.

Adjacent Systems

The City of Brentwood maintains close working relationships with adjacent water providers, specifically Harpeth Valley, Metro Water Services, Nolensville – College Grove, and Mallory Valley.

Legal Authority

The City of Brentwood has legal authority to operate its water system as stated in the City Code Section 70-165. This section is being revised to specifically reference the Drought Management Plan.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

Communications and Enforcement

The City of Brentwood will make this document available to the public by posting on its website. During drought phases, communication to the public will be made by a variety of means, ranging from posting on the website to reverse 911 phone notification. The City Code provides the authority to enforce this Drought Management Plan, including interruptions in water service if deemed necessary.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

IV. AGENCY COORDINATION

Water Systems in the Cumberland River Basin

The City will maintain continuing contact with governmental agencies and water suppliers in the event that conditions warrant actions concerning the Drought Management Plan. Those entities include:

- Other Water Systems
 - Harpeth Valley Utilities District
 - Metro Water Services
 - Mallory Valley Utility District
 - Nolensville-College Grove Utility District
 - City of Franklin
- Governmental Agencies
 - Williamson County Government
 - Williamson County EMA
 - US Army Corps of Engineers
- Regulatory Agencies
 - TDEC – Division of Water Supply
 - TDEC – Division of Water Pollution Control

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

V. *DROUGHT MANAGEMENT PLAN PHASES*

Following TDEC guidance in developing a Drought Management Plan, there are four distinct phases to drought emergencies:

1. Drought Alert Phase
2. Voluntary Reduction
3. Mandatory Reduction
4. Emergency Management

Triggerpoints

For many systems in Tennessee, triggerpoints for initiating the Drought Management Plan or for moving from one phase to another are dependent upon river level. Because the City does not have an intake, but instead relies on parent systems, triggerpoints for the City of Brentwood are directly tied to those systems' ability to steadily supply water and to the City's ability to pump it and distribute it. As a result, triggerpoints will have both a limited supply and an excessive demand component.

Public Notice

In each of the tables that follow, there is a specific triggerpoint for supply and for demand, a corresponding reduction goal, customer outreach plan, and monitoring activities that are to take place for a given drought phase.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

Drought Alert Phase

<i>Lower than normal precipitation, declining water in supply reservoirs, and greater than normal demand</i>	
TRIGGERPOINT (supply)	Cheatham Reservoir level falls to 382.00' for over 48 hours.
TRIGGERPOINT (demand)	Daily demand is >90% of projected peak day demand for 2 or more days
Reduction Goal	None
Customer Communication	<ul style="list-style-type: none"> • Post notice on City website • Communicate daily with suppliers
Monitoring Activities	<ul style="list-style-type: none"> • Refer to Drought Monitor Website for updates and information • Review customer billing records to determine largest irrigation users • Monitor USACE website for changes in Cheatham Reservoir level

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

Voluntary Reduction Phase

<i>Declining flow and storage in Cheatham Reservoir and continued increase in customer demand</i>	
TRIGGERPOINT (supply)	Cheatham Reservoir level falls to 381.50 for over 48 hours.
TRIGGERPOINT (demand)	Daily demand is >100% of projected peak day demand for 2 or more days
Reduction Goal	Reduce to projected peak day demand. No additional specific reduction unless mandated by HVUD
Customer Communication	<ul style="list-style-type: none"> • Post notice on City website • Notify largest irrigation users that the City has entered into the Voluntary Reduction Phase of its Drought Management Plan. • Communicate daily with suppliers
Monitoring Activities	<ul style="list-style-type: none"> • Refer to Drought Monitor Website for updates and information • Review customer billing records to determine largest irrigation users • Monitor USACE website for changes in Cheatham Reservoir level • Contact adjoining water systems regarding the possibility of supplementing supply through temporary measures.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

Mandatory Water Reduction Phase

<i>Continued declining flows in Cheatham Reservoir and mandated reduction from suppliers</i>	
TRIGGERPOINT (supply)	Cheatham Reservoir level falls to 380.00 for over 48 hours.
TRIGGERPOINT (demand)	Daily demand is >110% of projected peak day demand for 2 or more days
Reduction Goal	To 90% of projected peak day demand
Customer Communication	<ul style="list-style-type: none"> • Post notice on City website • Notify local media • Notify all users that outdoor watering / non-essential use is limited to Tuesday, Thursday and Sunday • Communicate daily with suppliers
Monitoring Activities	<ul style="list-style-type: none"> • Refer to Drought Monitor Website for updates and information • Review customer billing records to determine largest irrigation users • Monitor USACE website for changes in Cheatham Reservoir level • Contact adjoining water systems regarding the possibility of supplementing supply through temporary measures. Implement as feasible and necessary. • Maintain contact with TDEC.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

Emergency Water Management

<i>Continued declining flows in Cheatham Reservoir and mandated reduction from suppliers</i>	
TRIGGERPOINT (supply)	Cheatham Reservoir level falls to 378.50 for over 48 hours.
TRIGGERPOINT (demand)	N/A – will be directed by HVUD and/or MWS
Reduction Goal	To 80% of projected peak day demand
Customer Communication	<ul style="list-style-type: none"> • Post notice on City website • Place notification call to all customers using reverse 911 system. • Notify all users that outdoor watering / non-essential use is limited to Tuesday, Thursday and Sunday and could be restricted altogether until emergency is past. • Communicate daily with suppliers
Monitoring Activities	<ul style="list-style-type: none"> • Refer to Drought Monitor Website for updates and information • Review customer billing records to determine largest irrigation users • Monitor USACE website for changes in Cheatham Reservoir level • Contact adjoining water systems regarding the possibility of supplementing supply through temporary measures. Implement as feasible and necessary. • Maintain contact with TDEC. • Activate TN WARN system • Obtain supplemental water if feasible from adjoining systems.

CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN

VI. DROUGHT MANAGEMENT IMPLEMENTATION

The four drought management phases as discussed in Part V of this Drought Management Plan will be implemented by the City Manager, as directed in Section 70-165 of the City Code. As was done during the drought of 2007 and the flood of 2010, communication with the parent systems shall become more frequent depending on the drought level as defined in this document. Water Department staff monitors:

- Water pressure constantly via SCADA
- Tank level constantly via SCADA
- Daily pumpage at least once per day with real-time meters.

This information will be used in determining the drought phases, making a recommendation to City Management regarding what levels are appropriate. The triggerpoints identified in Step 5 will be utilized in making such a recommendation.

**CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN**

VII. DROUGHT MANAGEMENT TEAM

The City designates the Director of the Water Department as the person in charge of implementation of its Drought Management Plan. The Assistant Director, field staff, legal department and other administrative personnel may also be tasked with carrying out certain aspects of the plan. Functional activation of the plan will begin once a Drought Alert has been issued per the criteria set forth in Part V of this document.

At that time, the Director, as designated by City Management, will assign roles and functions to staff and will monitor and enforce the Drought Management Plan. All records will be maintained at the City's Service Center located at 1750 General George Patton Drive, Brentwood, TN.

Deactivation will follow the same rationale as activation, only in reverse order. Communication to the public shall be performed only by the Director or his designee.

CITY OF BRENTWOOD
DROUGHT MANAGEMENT PLAN

VIII. REVIEWS AND UPDATES

Once a drought event is completed, regardless of which phase is reached, the Director will implement a review of all actions leading up to the drought, and all actions undertaken during and immediately after the event. As necessary, this Drought Management Plan shall be updated. Although not yet specifically required by TDEC, a standard time for updating this document seems reasonable, such as a formal review in the same general timeframe as the Emergency Operations Plan, seems reasonable.