

# DROUGHT MANAGEMENT PLAN

**MAY 2011**

# **HVUD - DROUGHT MANAGEMENT PLAN**

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## STEP 1 - PREPLANNING

### 1.1 Authority & Status To Plan

Harpeth Valley Utilities District (District) was organized in 1959 pursuant to the terms of the Utility District Law of 1937 (T.C.A. § 7-82-101). Under the authority of that law, HVUD is empowered “to conduct, operate and maintain a system or systems for the furnishing of water...” (T.C.A. § 7-82-302). Therefore the District is authorized under Tennessee law to prepare a Drought Management Plan.

The District is a regional provider of potable water that serves approximately 250,000 people within a 596 square mile area of in Davidson, Cheatham, and Williamson counties. All of the powers of the District are vested in its Board of Commissioners (Board) who are nominated by the Board and are appointed by the Williamson County Mayor and the Seventh Circuit Court of Davidson County. The Board holds a regular monthly meeting at 9:30 AM on the fourth Monday of each month at the District’s offices located at 5910 River Road, Nashville, Tennessee, 37209. Information is also available on the District’s website at [www.hvud.com](http://www.hvud.com).

### 1.2 Water System Characteristics & Risks

#### 1.2.1 Sources

The District’s water source is the Cumberland River at River Mile 173.6. This portion of the river is contained within the backwaters of Cheatham Dam. According to a 1990 report by the US Army Corps of Engineers (USACE), the  $1Q_{10}$  flow in the Cumberland River at the District intake is 2,800 cubic feet per second (CFS).

The Cheatham Reservoir has permanent pool with 82,000 acre-feet of storage at its minimum pool elevation of 382.00 and storage of 104,000 acre-feet at its full pool elevation of 385.00. The USACE must maintain the dam’s pool at or above elevation 382.00 in order to allow barge traffic on the river

#### 1.2.2 Raw Water Intake

Water is withdrawn from the Cheatham Reservoir/ Cumberland River into Pump Station No. 1 through two seventy-two (72) inch pipes. Each pipe has a capacity of 100 MGD. Water is withdrawn from the Cheatham Reservoir/ Cumberland River into Pump Station No. 2 through three fourteen (14) inch pipes. The combined capacity of these lines is 15 MGD. There are two raw water screens at the intakes. Each screen is rated at 50 MGD.

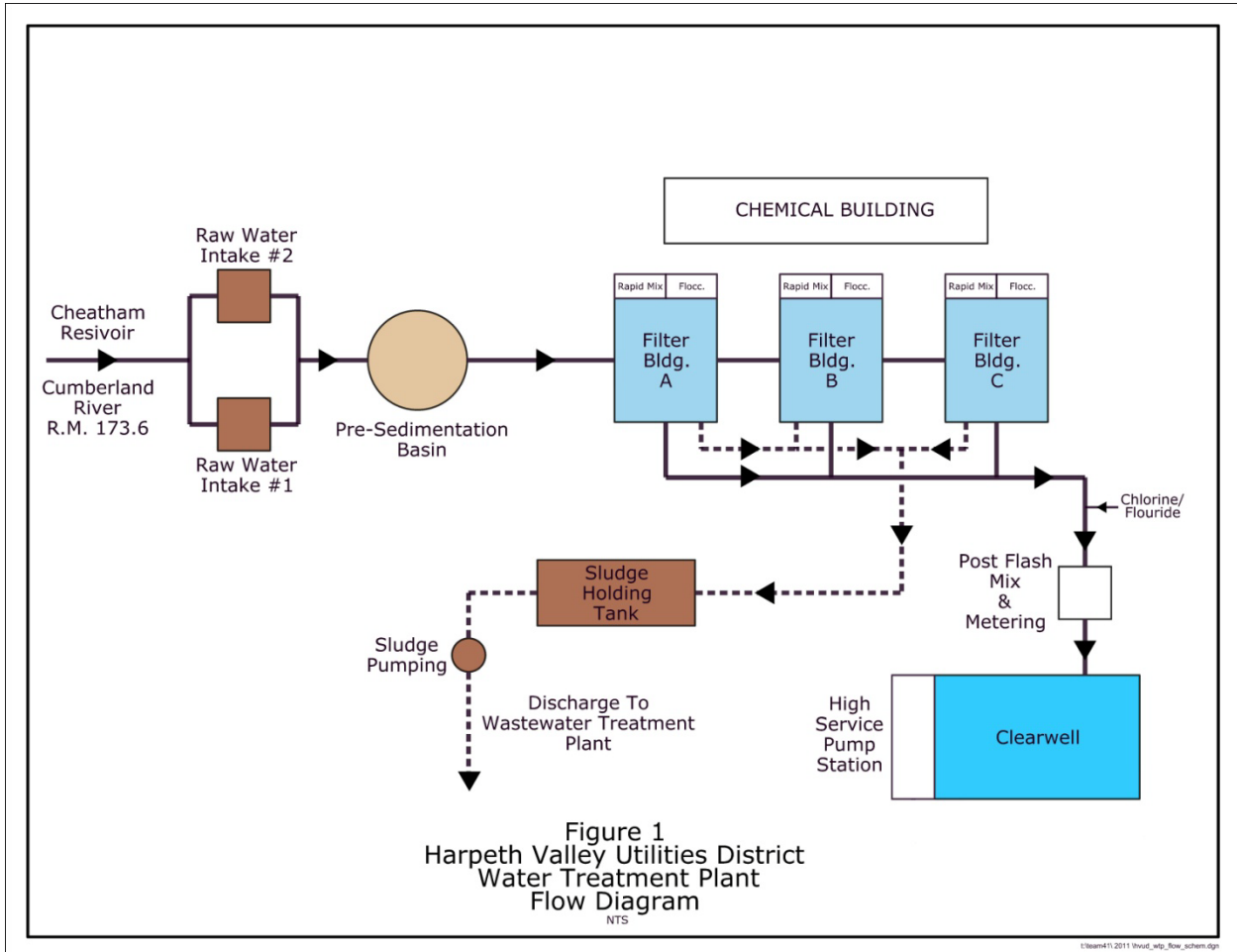
The newer raw water pumping station (Pump Station No. 1) was first built in 1987 and upgraded in 2009. It has a capacity of 60 MGD. The older raw water pumping station (Pump Station No. 2) was upgraded in 1972. It has a capacity of 10 MGD. Therefore the total capacity of the raw water pumps from both intakes is approximately 70.0 MGD. .

#### 1.2.3 Water Production

The District has a conventional water treatment plant that has a nominal rated capacity of 51.0 MGD.

### 1.2.4 Treatment Process

The treatment process consists of raw water pumping, pre-sedimentation, chemical addition, rapid mixing, flocculation, sedimentation, filtration, finished water storage, and high service pumping. A schematic of the treatment plant process is shown in Figure 1.



### 1.2.5 Permitted Withdrawal Limits

The District's withdrawal limit is equal to the capacity of the primary intake lines in the Cheatham Reservoir/ Cumberland River or approximately 115 MGD.

### 1.2.6 Storage Capacity

The District has 13 water storage tanks (also referred to as system reservoirs) with a combined capacity of 22,250,555 gallons. The tanks are listed below in Table 1A.

**Table 1A – Water Storage Capacity**

Storage Tank	Capacity (Gallons)
Gourley Road	100,000
Griffith Road	100,000
Hicks Road	3,000,000
Highway 100	2,000,000*
Iroquois	2,000,000
Johnson's Chapel	3,000,000
Lewis Road	500,000
Luton Hill	1,000,000
Murray Lane	200,000
Nashville Highlands	500,000
Old Natchez Trace	3,000,000
Sawyer Brown	1,850,555
Water Treatment Plant Clearwell	5,000,000
<b>Total Storage</b>	<b>22,250,555</b>

\*This tank is taken off line at times to facilitate system operations, but is available as needed.

### 1.2.7 Breakdown of Water Usage & Seasonal Variations in Demand

The District sells water to about 16,200 customers. Among these are seven municipal customer systems. Collectively the District and its customer systems provide water to approximately 250,000 people in three counties. A breakdown of usage and season variations in usage is indicated in Table 1B below.

**Table 1B - Water Use – Average & Peak Day<sup>1</sup>**

Customer Category	Average Daily Use	% of Total	Peak Daily Use <sup>2</sup>	% of Total	Increase (Peak over Average)	% Increase (Peak over Average)
Residential	3,002,945	12.25%	4,333,875	10.34%	1,330,930	44.32%
Irrigation	305,620	1.25%	441,420	1.05%	135,800	44.43%
Multi-unit	1,049,460	4.28%	1,515,790	3.62%	466,330	44.44%
Commercial	394,975	1.61%	570,480	1.36%	175,505	44.43%
Municipal Customer Systems	18,321,670	74.75%	32,771,765	78.21%	14,450,095	78.87%
Public Use & System Loss	1,436,360	5.86%	2,266,670	5.41%	830,310	57.80%

<sup>1</sup> Based on calendar year 2010 usage

<sup>2</sup> Peak usage by individual customer systems varies by date.

### 1.2.8 Water System Risks

The District has a reliable and substantial water source in the Cheatham Reservoir/ Cumberland River. Based on the District's water source assessment, risks to the District's source are minimal short of a contaminant spill in the river.

Treatment and distribution system risks would be potential line breaks, equipment failure, weather related hazards, or contamination. The District has service crews and equipment that are available to respond to these situations at any time. It should be noted that the District's facilities were impacted by the May 2010 flood event. Despite the severe impacts of the flood, the District was able to maintain continuous service to all of its customers.

### 1.3 Drought Management Plan – Statement of Purpose

The District's goal during a drought is to conserve its water supply source and production capabilities and reduce the effects of weather conditions and droughts on its customers. The District's plan is designed to protect its water production and delivery systems while preserving service to its customers. Due to the unpredictable nature of climate and associated rainfall, it is reasonable and prudent that a Drought Management Plan (DMP) be available for implementation when such a need arises. The District will use a staged approach in dealing with dry weather conditions and droughts and their associated impacts on its system and its customers.

The District is committed to taking appropriate steps to avert and, if necessary, mitigate the effects of a water shortage, which could jeopardize public health, safety, and welfare, and cause economic hardships to its customers. Water conservation by its customers (residential, commercial, institutional, and customer systems) will be the primary focus of these mitigation efforts. This staged approach will utilize system and climatologic factors as triggers. In addition, performance measures including, but not limited to, water demands or usage, storage tank levels and river levels, precipitation deficits, and drought assessment maps will be considered. The District's Management Team (see Step 7) will consider actual values for one or more of the

drought triggerpoints together with the other factors listed above, in its best judgment, to determine the operative drought stage. This Drought Management Plan is designed to remain flexible and to accommodate procedures that would provide the most useful guidance and the ability to minimize the adverse impacts of a drought.

#### **1.4 Drought Management Plan – Interface with Emergency Operations Plan**

Development of the DMP was assigned to the District's General Manager by the Board. He has organized the District's staff and consulted other interested parties in framing the plan. The District's Emergency Operations Plan addresses line breaks, storms, spills and other threats. The DMP addresses management of the water supply and demand during a declared drought event. Step 5 of this Drought Management Plan incorporates appropriate elements from the District's existing Water Use Curtailment policy and the conditions of that document.

The DMP and the Emergency Operations Plan (EOP) both require notification of customers through local media outlets once a drought alert has been declared by the District's General Manager or the Board. The General Manager or the Board will provide similar notification of further drought phases (see Step 5) as appropriate. Notification after a drought has ended will also be sent to local media outlets to allow customers to be aware that a declared alert has ended.

## STEP 2 – ORGANIZING THE PROCESS

### 2.1 Planning Process

The District's planning process was organized and executed by the District staff, District, the Board and other interested parties. Public review has been available as part of the Board meetings.

The District met individually with each of its municipal customer systems to discuss the regional DMP being developed. The District also met with representatives from Metro Water Services in regard to the DMP.

#### 2.1.1 Planning Committee

The planning committee was lead by the District's General Manager with support from the Assistant General Managers and other District staff.

#### 2.1.2 Planning Process

The District followed the TDEC document entitled *Guidance for Developing Community Water System Drought Management Plans* dated December 2009 in formulating this DMP. In addition, the District integrated appropriate recommendations received at the TDEC public meeting on the subject in March 2010.

### 2.2 Identification of Goals

The District's goal during a drought is to conserve its water, supply source and production capabilities and to reduce the effects of weather conditions and droughts on its customers. The District's plan is designed to protect its water production and delivery systems while preserving service to its customers. The DMP has four levels of response based on the severity of the drought situation (see Step 5).

#### 2.2.1 Objectives & Priorities

Water uses, in order of priority, based on the District's current customer base are as follows:

1. Medical & Elderly care facilities
2. Human consumption
3. Fire Protection
4. Pets
5. Environment
6. Commercial uses
7. Industrial & manufacturing
8. Recreation

Information on non-essential water uses is found in Step 5.3.

### **2.2.2 Additional Resources**

The District does not anticipate needing additional resources due to the capacity of the Cheatham Reservoir/ Cumberland River.

### **2.2.3 Hydrologic Modeling**

Hydrologic modeling is available at the National Weather Service office located at the Old Hickory Dam. Updated information is available on a real time basis via the internet and weather radios.

### **2.2.4 Regional Drought Planning**

Each of the District's customer systems has been consulted in preparation of the District's DMP. The customer systems have all agreed to the regional DMP approach formulated by the District and have incorporated common triggerpoints into their respective plans. The District has also consulted Metro Water Services in regard to development of its DMP.

## **2.3 Resource Planning**

The District has considered the issue of resource planning in preparation of its DMP. Specifically, the following three items have been addressed.

### **2.3.1 Additional Raw Water Source**

The District does not anticipate needing an additional raw water source due to the capacity of the Cheatham Reservoir/ Cumberland River.

### **2.3.2 Raw Water Storage**

The District is not thought to need additional raw water storage due to the capacity of the Cheatham Reservoir.

### **2.3.3 Regional Drought Management Plan**

The District has consulted its customer systems (see section 3.1.4) and Metro Water Services in preparation of its DMP. The DMP has been developed on a regional approach.

## STEP 3 - EXISTING PLANS & POLICIES

### **3.1 Policies & Procedures for Connections to Other Systems**

The District has a series of long term contracts with each of its customer systems that vary in lengths of up to forty years. The contracts require the customers to update their water use projections annually. These updates cover the next five year period. The projections include provisions for minimum month, maximum month and peak day for each year. Each of the customer systems have been consulted and are in agreement with the regional DMP approach drafted by the District.

The District is also developing a working agreement with Metro Water Services to supply water to the District in case of emergencies.

#### **3.1.1 Previous Drought Management**

During the 2006-2007 drought period the District's water supply to its customers was not interrupted. Supply from the Cheatham Reservoir/ Cumberland River was more than adequate. In fact the pool level in the Cheatham Reservoir did not go below elevation 383.90 (minimum pool is 382.00).

The District was able to maintain normal system pressure to all customers. Tank levels were consistently maintained within the District's system. Water quality issues were addressed by the water treatment plant processes and operations personnel. The District met and in some cases exceeded the demand projections of all municipal customers. The District was able to bring in temporary portable membrane filtration units that provided increased capacity. Since 2007 the District has increased its water treatment capacity from 36.0 MGD to 51.0 MGD.

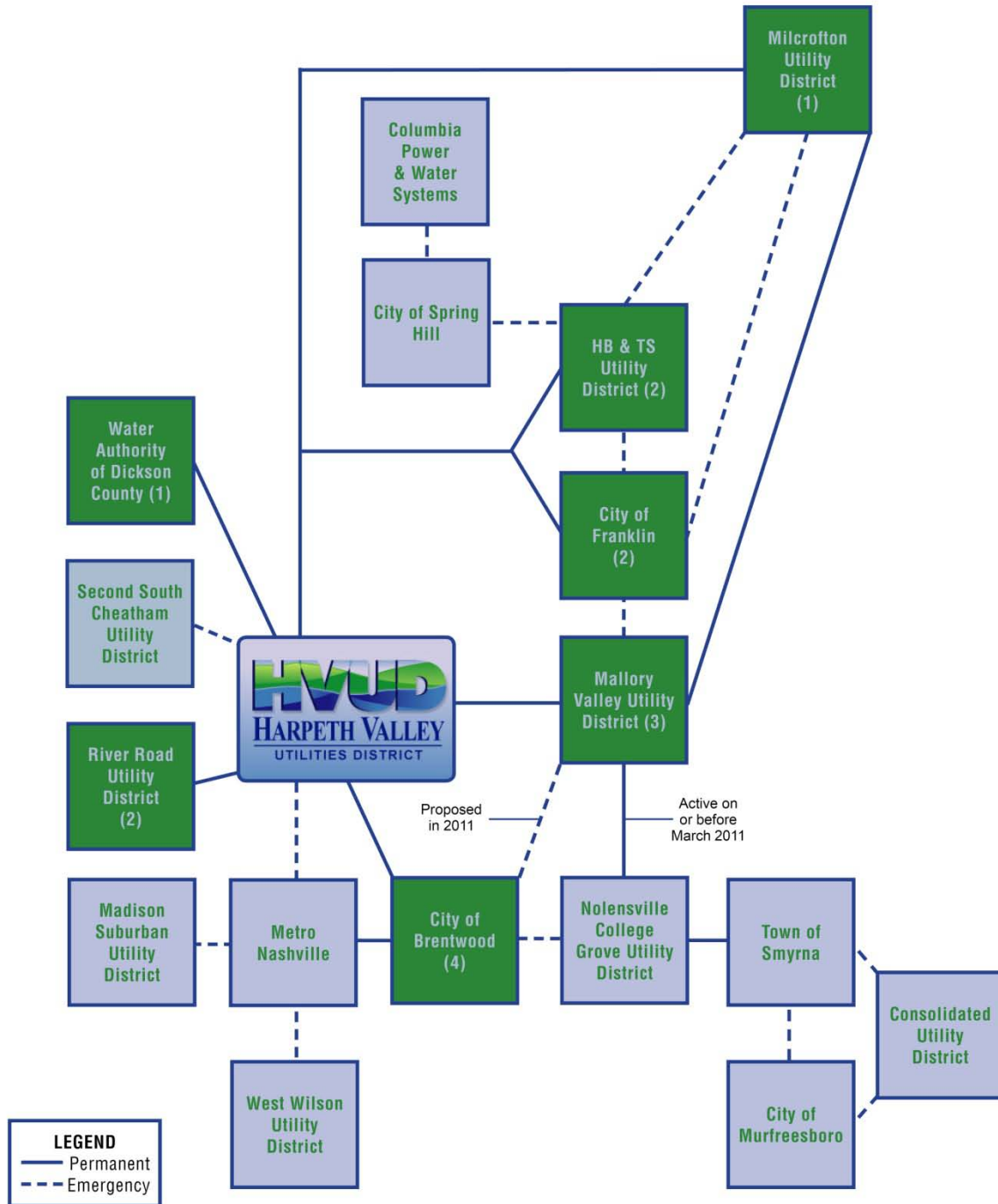
One of the District's customer systems implemented a water conservation program. This customer had a water treatment plant that was off-line due to lack of supply from the Harpeth River. It was later determined that the inactive status of the customer's plant contributed to system distribution issues that inhibited adequate circulation within that customer's system and receipt of supply from the District during the drought.

Prior to the 2006-2007 drought event the District had an electrical system issue that limited its ability to supply water to customers in a 1999 event. The District proactively addressed the situation by bringing in temporary emergency generation equipment to maintain supply to customers. In this instance the District worked in concert with its customers and customer systems to conserve water by implementing an alternate day irrigation schedule. This schedule worked well and has been incorporated into the DMP (see Mandatory Restrictions Phase). Since that event, the District has installed permanent standby generation equipment to address this issue.

#### **3.1.2 Interconnections**

The District maintains connections to several systems on either a permanent basis or on an emergency basis. These are illustrated in Figure 2.

Figure 2  
 Harpeth Valley Utilities District  
 Regional Water Distribution Schematic



Note: Number of metering points for each direct District customer (shown in green) indicated in parentheses.

### **3.1.3 Mutual Aid Agreement**

The District is developing a working agreement with Metro Water Services to supply water to the District and vice versa in case of emergencies. The District also maintains an emergency connect with Second South Cheatham Utility District.

### **3.1.4 Consecutive Systems**

The District is a regional provider of water that serves the following community water systems:

- City of Brentwood
- City of Fairview (Water Authority of Dickson County)
- City of Franklin
- HB&TS Utility District
- Mallory Valley Utility District
- Milcrofton Utility District
- River Road Utility District

The District also provides water to Nolensville–College Grove Utility District via its connection with Mallory Valley Utility District. The District also maintains emergency connections with Second South Cheatham Utility District and Metro Water Services.

### **3.1.5 Alternate Sources**

The District can and will be connected to Metro Water Services' system to provide water on an emergency basis. Metro maintains two water treatment plants with a total rated capacity of 180.0 MGD.

### **3.1.6 Portable Water**

If a drought event reaches the emergency phase, TEMA may be notified and requested to provide portable water supplies (by truck, tanker or bottle).

### **3.1.7 Livestock Water**

Metro Nashville ordinances limit the areas where livestock can be kept within the District's Davidson County service area. There are scattered instances of livestock within Davidson County and the Williamson County portion of the District's retail service area that collectively represent less than 0.1% of water consumption.

## **3.2 Legal Requirements**

The DMP has been reviewed by the District's legal counsel. The District's DMP is available for review at the District's office located at 5910 River Road in Nashville Tennessee (37209) during normal business hours (M - F 8:00 AM to 5:00 PM). The DMP is also available on the District's website at [www.hvud.com](http://www.hvud.com).

### 3.3 Triggerpoints

The District has developed trigger points that identify critical decision points for water supply. They are identified in Table 3-A below.

**TABLE 3A – DMP Triggerpoints**

Program Phase & Conditions	Triggerpoints
Normal Conditions Water supply is adequate; water quality is acceptable	None
Drought Alert <ul style="list-style-type: none"> <li>• Lower than normal precipitation, declining water in Cheatham Reservoir/ Cumberland River and/or greater than normal demand</li> </ul>	Cheatham Reservoir level at HVUD raw water intake falls to 382.00 for over 48 hrs.
Voluntary Reductions <ul style="list-style-type: none"> <li>• Declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers</li> </ul>	Cheatham Reservoir level at HVUD raw water intake falls to 381.50 for over 48 hrs. <ul style="list-style-type: none"> <li>• Water treatment plant operates at peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
Mandatory Restrictions <ul style="list-style-type: none"> <li>• Continued declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers</li> </ul>	Cheatham Reservoir level at HVUD raw water intake falls to 380.00 for over 48 hrs <ul style="list-style-type: none"> <li>• Water treatment plant operates at 95% of its peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
Emergency Management <ul style="list-style-type: none"> <li>• Severe water supply or water quality problems due to source availability</li> </ul>	Cheatham reservoir level at HVUD raw water intake falls to 378.50 for over 48 hrs. <ul style="list-style-type: none"> <li>• Water treatment plant operates at 90% of its peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>

## STEP 4 – AGENCY COORDINATION

### 4.1 Regional Stakeholders

The District will maintain continuing contact with the following regional agencies in the event that the DMP is activated:

- Tennessee Department of Environment & Conservation (TDEC)
  - Division of Water Supply
  - Division of Water Pollution Control
- US Army Corps of Engineers – Operator of Cheatham Dam & Reservoir
- Community Water Systems
  - City of Brentwood
  - City of Fairview (Water Authority of Dickson County)
  - City of Franklin
  - HB&TS Utility District
  - Mallory Valley Utility District
  - Milcrofton Utility District
  - River Road Utility District
  - Metro Water Services
  - Second South Cheatham Utility District
- Williamson County Government
- Fire & Emergency Departments
  - Metro Nashville
  - Williamson County
  - Cheatham County
- Law Enforcement
  - Metro Nashville Police
  - Williamson County Sheriff
  - Cheatham County Sheriff

Contact with these entities will be by phone, email and/or internet.

### 4.2 Limiting Factors

The known limiting factors associated with the District's water supply are indicated in the subsections that follow.

#### 4.2.1 Raw Water Supply

The District's water source is the Cumberland River at River Mile 173.6. This portion of the river is contained within the backwaters of Cheatham Dam. According to a 1990 report by the USACE, the 1Q<sub>10</sub> flow in the Cumberland River at the HVUD intake is 2,800 cubic feet per second (CFS).

The Cheatham Reservoir has permanent pool with 82,000 acre-feet of storage at its minimum pool elevation of 382.00 and storage of 104,000 acre-feet at its full pool elevation of 385.00. It should be noted that the USACE must maintain the dam's pool at or above elevation 382.00 in order to allow barge traffic on the river.

#### **4.2.2 Intake Design**

The District has two raw water intakes. The older intake has a capacity of 10 MGD. The new intake was upgraded in 2009 and has a capacity of 60 MGD. Future plans call for expansion of raw water pumps to 115 MGD.

#### **4.2.3 Supply to Customer Systems**

The District provides water to the following community water systems:

- City of Brentwood
- City of Fairview (Water Authority of Dickson County)
- City of Franklin
- HB&TS Utility District
- Mallory Valley Utility District
- Milcrofton Utility District
- River Road Utility District

The District provides water to Nolensville–College Grove Utility District via its connection with Mallory Valley Utility District. The District also maintains emergency connections with Metro Water Services and Second South Cheatham Utility District. (See Figure 2 for schematic representation of customer systems.)

## STEP 5 – PLAN MANAGEMENT PHASES & TRIGGERPOINTS

### 5.1 Drought Management Phases & Responses

The District has formulated its DMP in accordance with TDEC guidelines. The first monitoring element is connected to the US Drought Monitor level for the District's service area. The US Drought Monitor is sponsored by NOAA, US Department of Agriculture, and the National Weather Service. It is maintained by the National Drought Mitigation Center at the University of Nebraska – Lincoln. The monitor classifies drought conditions into six categories as follows:

- **None**
- **D0** – Abnormally Dry – Going into drought or coming out of drought conditions
- **D1** – Moderate Drought – Water shortages developing or imminent, voluntary water restrictions requested
- **D2** – Severe Drought – Water shortages common, water restrictions imposed
- **D3** – Extreme Drought – Widespread water shortages or restrictions
- **D4** – Exceptional Drought – Shortages of water in reservoirs, streams and wells creating water emergencies

The District will monitor the US Drought map to determine the level(s) of drought within the District's service area.

### 5.2 Triggerpoints

The primary triggerpoint element will be based on the water level of the Cheatham Reservoir. The reservoir is maintained by the USACE. The USACE updates the reservoir level readings hourly. These readings are available via the internet. The District will monitor the Cheatham Reservoir level(s) daily over the internet and make DMP phasing as appropriate. The District will also monitor the level of the Cheatham Reservoir/ Cumberland River at its raw water intake on a daily basis through its instrumentation and control system.

Secondary drought triggerpoint elements are based on performance criteria for major District system assets. The District will monitor water treatment plant production, water reservoir levels and water system pressures. All of these criteria can be monitored on a real-time basis via the District's instrumentation and control system.

The primary emphasis in monitoring water treatment plant production during a drought will be to ensure that conservation levels are maintained. This concept is characterized by reduction goals that build upon one another. For the Voluntary Reduction Phase the water use reduction goal is 5% of the maximum day usage. Therefore the secondary trigger for water plant production under the Mandatory Restrictions Phase is 95% of capacity in order to maintain the 5% reduction from the previous phase. Likewise the secondary trigger for plant production under the Emergency Management Phase is 90% of capacity to reflect the 10% reduction goal from the previous phase.

### 5.3 Non-Essential Uses

The District's Board adopted a policy for Shortages and Emergencies on July 22, 2002. Under the terms of this policy there are three categories of non-essential water uses. They are defined as follows:

- |                 |   |
|-----------------|---|
| Category 1 Uses | <b>Category 1 Service Restrictions -</b><br>Non-essential uses <ol style="list-style-type: none"><li>a) Failure to repair a controllable leak;</li><li>b) Washing sidewalks, driveways, parking areas, tennis courts, patios or exterior paved areas;</li><li>c) Filling or refilling a swimming pool;</li><li>d) Washing of motor vehicles, trailers or boats;</li><li>e) Watering lawns, flower gardens or ball fields;</li><li>f) Watering of any portion of a golf course;</li><li>g) Use of water for dust control or construction compaction.</li></ol> |
| Category 2 Uses | <b>Category 2 Service Restrictions -</b><br>Non-essential water uses (in addition to Category 1) <ol style="list-style-type: none"><li>a) Watering of trees, shrubs, or other plants;</li><li>b) Water served for drinking purposes at restaurants or other public establishments unless such water is specifically requested by the patron or customer.</li></ol>  |
| Category 3 Uses | <b>Category 3 Service Restrictions –</b><br>Non-essential (in addition to categories 1 and 2)<br>Any other additional uses determined by the Board to be non-essential during times of shortages or emergencies.  |

### 5.4 Water Conservation

The District encourages customers to use water wisely at all times. In accordance with this policy the District has identified the following water conservation measures that can be found on the District's website.

- Repair leaking faucets and toilets promptly. The investment will pay you back in savings.
- Don't let water run when you shave, brush your teeth or wash your face.
- Completely fill your dishwasher before running it.
- If you have a fish tank, use the dirty water from the tank on your house plants. It's rich in nitrogen and phosphorous, which are good fertilizers.
- Select the appropriate water level for the size of your load of laundry. Whenever possible, wait until you have a full load of clothes before you run the washing machine.
- If you have a pool, cover it. Evaporation can make hundreds, even thousands, or gallons of water disappear. Covering the pool will cut the loss by 90 percent.
- Hosing down your driveway for five minutes wastes 25 gallons of water. Clean it with a broom or blower instead.
- Water your lawn no more than once every five days, before 10 a.m. or after 7 p.m. to avoid excessive evaporation. Set sprinklers at a slow delivery rate to prevent run-off, and avoid watering the street and sidewalk.

## 5.5 Drought Phases

Specifics for triggerpoints, customer outreach, reductions in usage and monitoring activities are indicated in the sections that follow.

### 5.5.1 Drought Alert Phase

<b>Drought Alert Phase</b> Lower than normal precipitation, declining water in Cheatham Reservoir/ Cumberland River and/or greater than normal demand	
<b>Triggerpoint</b>	Cheatham Reservoir level at HVUD raw water intake falls to 382.00 for over forty-eight (48) hours.
<b>Customer Outreach</b>	<ul style="list-style-type: none"><li>• Post notice at District office and on website</li><li>• Issue public notification</li><li>• Notify regional stakeholders</li></ul>
<b>Reduction Goal</b>	None
<b>Monitoring Activities</b>	<ul style="list-style-type: none"><li>• Monitor USACE Website for changes in Cheatham Reservoir level daily</li><li>• Monitor Cumberland River level at HVUD Raw Water Intake daily</li><li>• Monitor US Drought Map</li><li>• Monitor water treatment plant production, and water reservoir levels</li><li>• Monitor customer water usage</li></ul>

### 5.5.2 Voluntary Reduction Phase

<b>Voluntary Reductions Phase</b> Declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers	
<b>Primary Triggerpoint</b>	Cheatham Reservoir level at HVUD raw water intake falls to 381.50 for over forty-eight (48) hours.
<b>Secondary Triggerpoints</b>	<ul style="list-style-type: none"> <li>• Water treatment plant operates at peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
<b>Customer Outreach</b>	<ul style="list-style-type: none"> <li>• Put customer systems on notice that daily usage will be limited to current year contractual peak day allocations</li> <li>• Post notice at District office and on website</li> <li>• Issue public notification</li> </ul>
<b>Reduction Goal</b>	<b>5% reduction per day in base peak demand</b>
<b>Monitoring Activities</b>	<ul style="list-style-type: none"> <li>• Monitor USACE website for changes in Cheatham Reservoir levels daily</li> <li>• Monitor Cumberland River level at HVUD Raw Water Intake daily</li> <li>• Maintain contact with regional stakeholders</li> <li>• Monitor customer and customer systems' water usage</li> <li>• Monitor water treatment plant production, and water reservoir levels</li> <li>• If reduction goal is not met, implement mandatory restrictions</li> </ul>

### 5.5.3 Mandatory Restrictions Phase

<b>Mandatory Restrictions Phase</b> Continued declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers	
<b>Primary Triggerpoint</b>	Cheatham Reservoir level at HVUD raw water intake falls to 380.00 for over forty-eight (48) hours.
<b>Secondary Triggerpoints</b>	<ul style="list-style-type: none"> <li>• Water treatment plant operates at 95% or more of its peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
<b>Customer Outreach</b>	<ul style="list-style-type: none"> <li>• Limit non-essential water use (See Category 1 in Section 5.3, for irrigation see <b>Table 5A</b>)</li> <li>• Post notice at District office and on website</li> <li>• Site message place on office phone</li> <li>• Implement alternate day irrigation program with customer systems (<b>see Table 5A</b>)</li> <li>• Notify customers by mail</li> <li>• Issue public notification</li> </ul>
<b>Reduction Goal</b>	<b>10% reduction per day in base peak demand</b>
<b>Monitoring Activities</b>	<ul style="list-style-type: none"> <li>• Monitor USACE website for changes in Cheatham Reservoir levels</li> <li>• Monitor customer water usage for compliance with restrictions</li> <li>• Monitor water treatment plant production, and water reservoir levels</li> <li>• Maintain contact with regional stakeholders &amp; TDEC</li> <li>• If reduction goal is not met, implement emergency management restrictions</li> </ul>

**TABLE 5A**  
**Alternate Day Irrigation Program**

Customer System	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
HVUD		YES		YES			YES
Franklin	YES		YES			YES	
HB&TS		YES		YES			YES
Brentwood		YES		YES			YES
Mallory Valley	YES		YES			YES	
Milcrofton	YES		YES			YES	

### 5.5.4 Emergency Water Management

Emergency Management Phase Severe water supply or water quality problems due to source availability	
<b>Primary Triggerpoint</b>	Cheatham Reservoir level at HVUD raw water intake falls to 378.50 for over 48 hrs
<b>Secondary Triggerpoints</b>	<ul style="list-style-type: none"> <li>• Water treatment plant operates at 90% or more of its peak design capacity for over forty-eight (48) hours straight.</li> <li>• Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> <li>•</li> </ul>
<b>Customer Outreach</b>	<ul style="list-style-type: none"> <li>• Restrict non-essential water uses (See Categories 1 and 2 – Section 5.3)</li> <li>• Post notice at District office and website</li> <li>• Site message place on office phone</li> <li>• Notify customers by mail</li> <li>• Issue public notification</li> </ul>
<b>Reduction Goal</b>	<b>20% reduction per day in base peak demand</b>
<b>Monitoring Activities</b>	<ul style="list-style-type: none"> <li>• Notify TDEC &amp; TEMA</li> <li>• Monitor USACE website for changes in Cheatham Reservoir levels daily</li> <li>• Monitor Cumberland River level at HVUD Raw Water Intake daily</li> <li>• Monitor customer water usage and preserve service to priority uses</li> <li>• Customer systems limited to 80 % of contract peak day allocation</li> <li>• Monitor customer water usage for compliance with restrictions</li> <li>• Maintain contact with regional stakeholders</li> </ul>

## STEP 6 - IMPLEMENTATION PLAN

### **6.1 Monitoring Supply & Demand**

The District has established four drought management phases (see Step 5). In addition to the phase initiation triggerpoints identified in Step 5, the District will monitor:

- Water pressure within the distribution system
- Water pressure at customer system meters
- Tank levels
- Raw water quality
- Finished water quality

### **6.2 Plan Activation**

The District's DMP will be initiated in accordance with the triggerpoints identified in Step 5.

### **6.3 Plan Triggerpoints**

The District's plan triggerpoints are identified in Table 6A

**Table 6A – Plan Triggerpoints**

Program Phase & Conditions	Triggerpoints
<p>Normal Conditions Water supply is adequate; water quality is acceptable</p>	<p>None</p>
<p><b>Drought Alert</b></p> <ul style="list-style-type: none"> <li>Lower than normal precipitation, declining water in Cheatham Reservoir/ Cumberland River and/or greater than normal demand</li> </ul>	<p>Cheatham Reservoir/ Cumberland River level at HVUD raw water intake falls to 382.00 for over 48 hrs.</p>
<p><b>Voluntary Reductions</b></p> <ul style="list-style-type: none"> <li>Declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers</li> </ul>	<p>Cheatham Reservoir/ Cumberland River level at HVUD raw water intake falls to 381.50 for over 48 hrs.</p> <ul style="list-style-type: none"> <li>Water treatment plant operates at peak design capacity for over forty-eight (48) hours straight.</li> <li>Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
<p><b>Mandatory Restrictions</b></p> <ul style="list-style-type: none"> <li>Continued declining flow/water quality in Cheatham Reservoir/ Cumberland River and/or conflicts among customers</li> </ul>	<p>Cheatham Reservoir/ Cumberland River level at HVUD raw water intake falls to 380.00 for over 48 hrs.</p> <ul style="list-style-type: none"> <li>Water treatment plant operates at 95% or more of its peak design capacity for over forty-eight (48) hours straight.</li> <li>Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>
<p><b>Emergency Management</b></p> <ul style="list-style-type: none"> <li>Severe water supply or water quality problems due to source availability</li> </ul>	<p>Cheatham Reservoir/ Cumberland River level at HVUD raw water intake falls to 378.50 for over 48 hrs</p> <ul style="list-style-type: none"> <li>Water treatment plant operates at 90% or more of its peak design capacity for over forty-eight (48) hours straight.</li> <li>Water level in three or more of system reservoirs cannot be brought above one-half (1/2) full in a forty-eight (48) hour period.</li> </ul>

#### **6.4 Prioritization of Use**

Priority uses have been established for the District's system. These are identified as follows in order of priority:

1. Medical & Elderly care facilities
2. Human consumption
3. Fire Protection
4. Pets
5. Environment
6. Commercial uses
7. Industrial & manufacturing
8. Recreation

Information on non-essential water uses is found in Step 5.3.

#### **6.5 Water Quality**

The District has included raw and finished water quality among the parameters to be monitored as part of its DMP. Taste and odor are the two most common water quality issues experienced by the District. The District monitors customer complaints in regard to these issues on a consistent basis.

#### **6.6 Enforcement**

Under the terms of this DMP, the District's General Manager is authorized to provide notices to customers (phone, door hangers or other means) conduct meter readings, and to shut off water to customers that do not comply with water restriction measures during a declared drought. If the customers fail or refuse to immediately comply with restrictions, service shall be cut off by the District.

Any customer whose service is disconnected because of failure to comply with the requirements of a declared drought shall have the right, after the first such disconnection, to have service reinstated upon payment to the District of customary reconnection charge and upon execution of a written statement that the customer will comply with the requirements of the drought management plan. If service is disconnected because of subsequent failure to comply, such customer shall have the right to reinstatement of service only after approval of the Board and subject to such terms and conditions as the Board shall impose.

Through the use of its electronic water meters, the District is able to monitor customer usage on a real time basis at the District's office. This data can be employed to enforce the terms of this DMP. The District utilizes billing software that is capable of administering surcharges if authorized by the Board.

## STEP 7 – MANAGEMENT TEAM

### **7.1 Purpose**

The District has designated its General Manager as the person in charge of implementation of its DMP. In addition, the District's assistant general manager(s), office and field support staff may be directed to perform certain required tasks under the DMP by the General Manager. The General Manager and the District staff will monitor all activities under the DMP.

### **7.2 Members**

The Management Team is composed of the District's General Manager and the Assistant General Manager(s).

### **7.3 Activation**

The Management Team's functions are activated once a Drought Alert Phase has been declared.

### **7.4 Roles & Functions**

The General Manager will assign roles and functions to District staff as required to implement, monitor and enforce the DMP.

### **7.5 Records**

DMP records will be maintained by the District's General Manager and/or his designee.

### **7.6 Deactivation**

The General Manager will monitor each drought situation and determine when phases may be stepped back and when the plan can be de-activated.

## STEP 8 – REVIEW

### **8.1 Evaluate Plan Effectiveness**

Once a drought event is completed, the General Manager will initiate a review of all DMP actions, records and results to determine the effectiveness of the plan.

### **8.2 Update Plan**

If areas are found lacking or need to be updated, the General Manager will have an update of the DMP prepared for adoption by the District's Board.

### **8.3 Adopt Updated Plan**

Once an updated plan is completed it will be adopted by the District's Board for use in subsequent drought events.