

Metro Water Services

Drought Management Plan

Purpose

The Metropolitan Government of Nashville and Davidson County's Code of Ordinances grants authority to the Director of Metro Water Services Department (the Department) to prohibit the unnecessary use of drinking water as needed to protect public safety and welfare. The purpose of this document is to identify trigger points and actions that the Director may take to protect the community during periods of drought. This document also provides a brief summary of the Department's water supply system and applicable organizational structure.

Management and Organization of the Department

MWS includes five divisions that report directly to the Director of the Department that also have drought related responsibilities. The following segment includes a brief description of each Division's normal water system and drought related responsibilities:

Water Operations Division

Normal Operations – Operate and maintain water treatment plants, water pump stations and water storage reservoirs. Monitor and report source, finished and distribution system water quality. Monitor and report system demand.

Drought Related Responsibilities – Monitor and report raw water supply quantities, system demands and distribution system performance. Adjust the operation of treatment plants, pump station and or storage reservoir facilities as required.

Wastewater Operations Division

Normal Operations – Operate and maintain wastewater treatment plants, sewer pump stations and equalization facilities. Monitor and report wastewater effluent.

Drought Related Responsibilities – Control wastewater discharge to minimize risks to public health and the environment during drought. Adjust the operations of treatment as required.

System Services Division

Normal Responsibilities - Operate and maintain the Departments buried water infrastructure including fire hydrants and service lines. Maintain and oversee the Department's cross connection program.

Drought Related Responsibilities – Monitor the performance of the distribution system. Adjust the operation and maintenance of the distribution system as needed.

Engineering Division

Normal Responsibilities – Plan and design water distribution system capital improvements. Assist the other operating groups as needed monitoring and troubleshooting water distribution system issues. Oversee and maintain the Department's leak detection program. Maintain water distribution system mapping.

Drought Related Responsibilities - Assist other operating groups as needed monitoring and troubleshooting water distribution system issues.

Customer Service Division

Normal Operations – Monitor and bill customers for water consumption. Manage direct customer communications. Maintain customer’s water meters.

Drought Related Responsibilities – Monitor individual customer consumption or customer class consumption as need. Perform meter lock-offs as required.

In addition to these divisions, the Department also has a Public Information Officer and associated staff that report directly to the Director. This group is responsible drafting press releases and other public communications, ensuring requests for general departmental information are met, maintaining current media contact lists and coordinating or performing media interviews related to departmental activities.

Representatives for the divisions identified above have served on the review committee for this document and agree with its content.

Service Areas

Metro Water Services serves an area of 402 square miles that has an estimated population of 553,500 people all located completely within Davidson County. The area includes residential, commercial, institutional and industrial customers. This system also supplies water to the City of Brentwood, Tennessee.

Water Supply

The Cumberland River serves as the water supply for the Department’s water system. This river is controlled by the U.S. Army Corp of Engineers (USACOE) through a system of dams and associated reservoirs that are located along the river and its tributaries.

The Department withdraws water from the Cumberland River’s Cheatham Reservoir. This reservoir is created by Cheatham Dam which is located downstream of the City of Nashville. As of July 2015, the U.S. army Corp of Engineers had identified 15 users that on average withdraw a combined total of 154 million gallons of water per day (mgd) from this reservoir.

The United States Geological Service (USGS) maintains a historical data base of daily river flows as measured at gauging stations along the Cumberland River. The database includes data from the year 1892 to the present. Four of these gauging stations are located within the vicinity of the Department’s water treatment plant intakes. While none of the four gauges include continuous data dating back to 1892, a composite 124 year history of daily river flows can be constructed from the four sets of data.

Table 1 below summarizes the minimum daily river flows as posted by the USGS for two time periods. The first time period includes all data that has been recorded between 1892 and 2016. The second time period includes only data between 1973 and 2016. The second time period represents the time period after the completion of USACOE dams that are located upstream of the Department’s water treatment plant intakes. The data suggests that these dams and reservoirs have had a significant impact on the river’s minimum daily flow rates.

Table 1-Minimum Cumberland River Flows(MGD)

Period	1 Day Average	3 Day Average	7 Day Average
1892-2016	40	220	300
1973-2016	730	1,000	1,300

The daily flow for both periods average 13 billion gallons of water per day.

Currently, there are no permit withdraw limits for this source.

Distribution System interconnections between the Department's main system and the following utilities currently exist or can be quickly temporarily constructed:

West Wilson Utility District
Harpeth Valley Utilities District
Madison Suburban Utility District

Water Treatment

The water distribution system is supplied by the Department's two conventional water treatment plants. Each plant has a rated capacity of 90 mgd.

Water Distribution

From the two water treatment plants, water is pumped to customers through 2,920 miles of water lines. In addition to these water lines, thirty six water reservoirs with a net capacity of 58.8 million gallons, store water to accommodate peak diurnal demands and to serve as an emergency supply in the event of water treatment plant or pump station service disruption. An additional reservoir with a net capacity of 4 million gallons is currently in construction and will be placed into service shortly which will give the system a total net capacity of 62.8 million gallons of storage. The distribution system is split into eighty nine pressure zones to accommodate the diverse terrain of Davidson County, Tennessee.

Water Demands

The Department's main water distribution system delivered an average of 90 mgd of

drinking water during calendar year 2015. Over the last several years, the system has supplied peak daily summer demands that range between 107 and 130 mgd with the most typical values falling in the range of 115 mgd.

Water Quality

During a drought, water quality may degrade in the water bodies that discharge to the Cumberland River's Cheatham reservoir, namely the Old Hickory reservoir and the Percy Priest reservoir. Metro Water Services monitors the water quality along the Cumberland River including the tail waters at both Old Hickory and Percy Priest reservoirs. Metro also works in cooperation with the U.S. Army Corps of Engineers during drought events. Parameters measured are temperature, blue green algal counts, secci disk, dissolved oxygen, flow rates, power generation, methylisoborneol (MIB) and geosmin, nitrogen and phosphorus compounds. When water temperatures increase to 65° -73° F , Metro Water Services begins analyzing for MIB and geosmin constituents. These two metabolites are typically the main taste and odor causes.

Metro Water treats taste and odor compounds by adding powder activated carbon (PAC). Historically, the Department has been able to reduce the concentration of MIB/geosmin to levels that do not cause taste and odor complaints. Metro is capable of feeding PAC at multiple locations in the plant treatment trains to maximize efficiency.

In the unusual event that these compounds (MIB and geosmin) reach concentrations that cannot be removed below the human detectable levels, Metro Water will notify TDEC and implement our communication plan. This plan will be implemented through

our Public Information Officer, as outlined under the Communications section of this plan. All customer complaints related to taste and odor, rusty water (turbidity) will be handled through our normal customer service system. Work orders and service requests will be generated and each complaint will be investigated and resolved.

During severe drought conditions and high water demands, Metro Water will determine whether flushing for taste and odor negatively impacts the distribution system. It is likely that flushing for taste and odor complaints will be futile. Flushing for turbidity or rusty water will continue to be addressed on a case by case basis. Flushing will be monitored so as not to negatively impact system pressure or supply.

Drought Trigger Points and Actions

Tables II and III on pages five and six of this document identify trigger points, actions and goals for two drought scenarios. Table II represents a drought scenario that has system wide consequences for the water distribution system. Table III represents a drought scenario that impacts one or more pressure zones found within the water distribution system. The required actions shown on these tables are considered the minimum actions required once the associated trigger point has been reached. The alternative actions identified on these tables are possible actions that the Director may choose to enact to enable the Department to meet the stated goals.

It should be noted that the Director may, at his or her discretion, elect to enter a particular phase of this Drought Plan prior to its trigger point being reached. Because it is impossible to plan for all circumstances and contingencies, the Director may, at his or her

discretion, amend the alternative actions identified on Tables II and III during a drought event. These actions may be amended to meet a specific need of the community, better utilize the available resources or to comply with orders or mandates issued by State or Federal agencies.

Communications

During a drought event, the Department's Public Information Officer and associated staff members will be responsible for coordinating drought related public communication for the Department. Communication tools that this group may utilize include, but are not necessarily limited to, the following:

- Television, Radio and Printed Media
- IVR Communication Announcements [Reverse Customer Call]
- Departmental Website
- Metro Nashville Government of Nashville and Davidson County's Local Television Broadcast [Metro 3]

Press releases, announcements or reports will be drafted as needed based on the specific circumstances and contingencies of the drought in a format that is appropriate for the communication tools that will be utilized to convey the information. Communication will be coordinated with any applicable communications from State or Federal agencies.

Table II : System Wide Drought Management Trigger Point and Action Plan

Phase	Observation	Required Action	Alternate Actions	Goal
Drought Alert	Customer demand exceeds 80% rated treatment capacity <i>or</i> Nashville District of the USACOE notifies Metro Water Services that flow into the Cheatham Reservoir may not support all users	<ol style="list-style-type: none"> 1. Monitor source water supply and customer demand daily 2. Notify Tennessee Department of Environment and Conservation of current drought management phase 	<ol style="list-style-type: none"> 1. Issue a press release requesting customers to reduce non-essential water use 	Not applicable
Voluntary Reduction	Customer demand exceeds 85% of rated treatment capacity or available water supply	<ol style="list-style-type: none"> 1. Monitor source water supply and customer demand daily 2. Notify Tennessee Department of Environment and Conservation of current drought management phase 3. Issue a press release explaining current drought phase and requesting a voluntary reduction in non-essential water use 	<ol style="list-style-type: none"> 1. Purchase water from surrounding utilities 2. Contact large users directly to request voluntary water use curtailment 3. Publically request a voluntary reduction in water use that is not directly related to health, safety or welfare 	Reduce customer demand to 80% of water supply or rated treatment capacity
Mandatory Water Restriction	Customer demand exceeds 90% of rated treatment capacity or available water supply	<ol style="list-style-type: none"> 1. Monitor source water supply and customer demand daily 2. Notify Tennessee Department of Environment and Conservation of current drought management phase 3. Issue a press release that notifies the public of the current drought phase and of a mandatory reduction in non-essential water use. The percentage targeted for reduction shall be set by the Director 	<ol style="list-style-type: none"> 1. Purchase water from surrounding utilities 2. Notify the public that that water use not required for health, safety or welfare should be completely eliminated 3. Lock meters that supply commercial and or industrial water users where the use is deemed not required for public health, safety or welfare by the Director 4. Lock Irrigation Meters 5. Adjust billing rates for water 	Reduce customer demand to 85% of water supply or rated treatment capacity
Emergency Water Management	Customer demand exceeds 95% of rated treatment capacity or available water supply	<ol style="list-style-type: none"> 1. Monitor source water supply and customer demand daily 2. Notify Tennessee Department of Environment and Conservation of current drought management phase 3. Issue a press release that notifies the public of the current drought phase and that non-essential water use is not allowed 	<ol style="list-style-type: none"> 1. Purchase water from surrounding utilities 2. Lock meters that supply commercial and or industrial water users where the use is deemed not required for public health, safety or welfare by the Director 3. Lock Irrigation Meters 4. Adjust billing rates for water 	Reduce customer demand to 90% of supply available water supply or rated treatment capacity

Table III : Local Drought Management Trigger Point and Action Plan

Phase	Observation	Required Action	Alternate Actions	Goal
Drought Alert	Reservoir levels reach low level alarm for three consecutive days due to irrigation demand <i>or</i> System pressures are found to approach 20 psi due to demand	Monitor reservoir levels and or system pressures as appropriate	<ol style="list-style-type: none"> Contact larger water users and request voluntary reduction in water demand or voluntary change of use to a different time of day or day of week as needed Purchase water from surrounding utilities 	Not applicable
Diurnal Adjustment	Reservoirs levels drop to a level of 3 ft due to irrigation demand but return to full within 24 hours demand <i>or</i> System pressures fall below 20 psi due to irrigation demand but returns to normal within six hours	Monitor reservoir levels and or system pressures as appropriate	<ol style="list-style-type: none"> Purchase water from surrounding utilities Directly contact large users and request voluntary water use curtailment Request local voluntary reduction in water use that is not directly related to health, safety or welfare during certain time periods during the day and or certain days of the week Lock Irrigation Meters Lock meters within the pressure zone that supply commercial and or industrial water users were the use us deemed not required for public health, safety or welfare by the Director 	Eliminate Diurnal Issues
Capacity Adjustment	Reservoirs levels do not return to a level of 80 percent maximum capacity for three consecutive days due to irrigation demand <i>or</i> System pressures fall and remain below 20 psi due to irrigation demand	Monitor reservoir levels and or system pressures as appropriate	<ol style="list-style-type: none"> Purchase water from surrounding utilities Directly contact large users and request voluntary water use curtailment Request local voluntary reduction in water use that is not directly related to health, safety or welfare Lock Irrigation Meters Lock meters within the pressure zone that supply commercial and or industrial water users were the use us deemed not required for public health, safety or welfare by the Director 	Return Reservoirs to 100 percent capacity daily and or return system pressures above 20 psi

Activation Review Policy

It shall be the policy of Metro Water Services to review the Department’s Drought Management Plan as follows:

If any part of the Drought Management Plan is activated then Metro Water Services shall perform an Activation Review. This review will be performed within six months after any phase of the plan has been implemented. The review will be performed to evaluate effectiveness and allow for revisions to be made if necessary.

A three year review shall also be performed to review, evaluate, and update the plan every three years. The plan shall also be updated if any significant change is made to the water system.