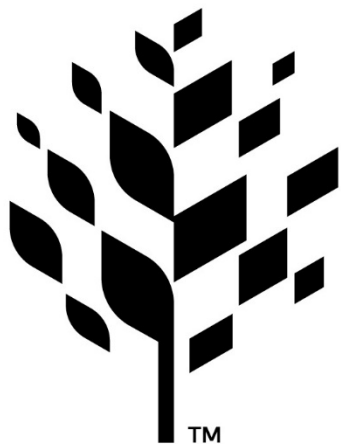


# **City of Raleigh**

## **Water Shortage Response Plan**



**Raleigh**  
**Water**

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# I: PURPOSE AND BACKGROUND

This document, referred to as the “Water Shortage Response Plan” (WSRP), describes the actions and operational changes the Raleigh Water will implement in the event of an impending water shortage or emergency water shortage. Specifically, the WSRP outlines when water use restrictions will be adopted, rescinded and how potable water demand will be reduced.

Originally, the WSRP was developed per the requirements set forth in 15A NCAC 02E .0607 and Session Law 2008-143, and subsequently adopted by the City of Raleigh Council on October 19, 2010. The WSRP was approved by the North Carolina Division of Water Resources (NC-DWR), and minor modifications were made since that time to update terminology, staff positions, and tables.

In general, the WSRP is organized as recommended in the NC-DWR *Water Shortage Supply Plan Guidelines* document, issued January 2009. Therefore, the WSRP is intended to address the following criteria:

- The designation of a staff position or organizational unit responsible for the implementation of their Water Shortage Response Plan;
- Notification procedures that will be used to inform employees and water users about the implementation of the plan and required water conservation response measures;
- Tiered levels of response actions to be taken to reduce water use based on the severity of water shortage conditions;
- Specific measurements of available water supply, water demand and system conditions that will be used to determine the severity of water shortage conditions and to initiate water use reduction measures and the movement between various levels;
- Procedures that will be used to regulate compliance with the provisions of the plan;
- Procedures for affected parties to review and comment on the plan prior to final adoption;
- Procedures to receive and review applications for variances from specific requirements of the plan and the criteria that will be considered in the determination to issue a variance;
- An evaluation method to determine the actual water savings accomplished and the effectiveness of the Water Shortage Response Plan when implemented; and
- Procedures for revising and updating Water Shortage Response Plans to improve plan effectiveness and adapt to new circumstances.

In addition to the actions and policies detailed in the WSRP, the CORPUD has developed numerous long-term water use reduction strategies. These efforts include:

- Adoption of tiered residential water rates in November, 2011.
- Requirement for a separate meter for all new (since June, 2007) outdoor irrigation systems; usage is billed at the highest residential unit price (Tier 3).
- Promotion and development of a reuse water distribution system for non-potable uses.
- Water treatment plant process water is recycled.
- Annually conduct system wide American Water Works Association M36 water audit.
- Use of leak detection equipment to identify leaks and schedule for repair.
- Implementation of Asset Management Plan to help identify and replace old and poor condition water distribution infrastructure.
- Promotion of water efficiency and conservation concepts through literature, social media campaigns, and public outreach events.

Ultimately, the goal of the WSRP and the long-term conservation strategies is to efficiently manage the available water resources and thereby provide a reliable drinking water source for Raleigh and the merger communities.

## **II: AUTHORIZATION**

As stated in City of Raleigh Code, Section 8-2172, the Raleigh Director of Public Utilities (i.e. Raleigh Water) and designated staff are responsible for monitoring water usage from the public water system and the amount of public water supply that is available to the City on a continuous basis. In the event of an emergency water shortage, the City Manager may enact the Water Shortage Response Plan immediately. The City Manager will enact the Water Shortage Response Plan within one week of specified water level triggers being met.

The contact information for the City Manager and designated alternate is listed below:

### PRIMARY RESPONSIBILITY

Marchell Adams-David  
City Manager  
222 West Hargett Street  
Raleigh, NC 27601  
919 996 3070  
[marchell.adams-david@raleighnc.gov](mailto:marchell.adams-david@raleighnc.gov)

ALTERNATE

Whit Wheeler, PE  
Raleigh Water Director  
One Exchange Plaza  
Suite 620  
Raleigh, NC 27602  
919 996 3479  
[whit.wheeler@raleighnc.gov](mailto:whit.wheeler@raleighnc.gov)

## **III: NOTIFICATION OF EMPLOYEES AND CUSTOMERS**

Prior to, or immediately upon, a water shortage declaration as defined in Section 5, the Raleigh Water will make efforts to communicate with both City of Raleigh staff, neighboring water utilities and utility customers. The objective of the communication efforts will be to educate staff, elected officials and customers about water supply conditions, applicable water use restrictions and information on voluntary water conservation practices. The communication efforts will include, but are not limited to, the following:

- The City Manager and/or Public Utilities staff will notify the following officials and agencies:
  - Raleigh City Council members
  - Town managers of Wake Forest, Rolesville, Wendell, Zebulon, Knightdale, and Garner
  - City of Raleigh Communications Director
  - North Carolina Division of Water Resources staff
- The City Manager or the Director of Public Utilities will notify City of Raleigh employees of the water shortage declaration and applicable water conservation requirements. This message will be communicated via mass email distribution, employee staff meetings, City maintained websites, and electronic bulletin boards. Employees will be informed of their roles in supporting compliance with water use restrictions and how to update customers with information or report violations. Public Utilities Code Enforcement staff will receive detailed information about water use restrictions and how to properly enforce these policies.
- Raleigh Water communications staff will coordinate with the City of Raleigh Communications Department to develop appropriate messaging for the public and provide this information to local media outlets (television, newspapers, radio stations, etc...) for immediate distribution. Provided information will include water supply status, application water use restrictions, website links and direct contact information for public inquiries.
- Raleigh Water communications staff will be responsible for updating applicable web content with information pertaining to voluntary water conservation measures, water use restrictions, and water supply levels. Raleigh Water communications staff will also use City maintained social media accounts and utility bill inserts to provide information to customers about the water shortage.

## **IV: WATER SHORTAGE RESPONSE PROGRAM**

Once a trigger has been reached, the WSRP Authority will enact its corresponding Conservation Stage. Each stage is characterized by its own level of response, or necessary restrictions which must be implemented to preserve adequate water supply. The Raleigh City Council reserves the right to implement conservation stages at any point prior to triggers being met; however, City Council may not delay the implementation of these conservation stages once the triggers, stated in this policy, have been met. This section details the four conservation stages in terms of their level of response, or restrictions. These stages include: Permanent Conservation Measures (PCM), and stages 1, 2 and 3.

CONSERVATION STAGE	AVERAGE RESIDENTIAL CONSUMPTION GOAL (GPCD)
PCM	65 gpcd
STAGE 1	55 gpcd or 15% reduction
STAGE 2	35 gpcd or 46% reduction
STAGE 3	25 gpcd or 61% reduction

### **PERMANENT CONSERVATION MEASURES (PCM)**

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**Goal:** ALL residential water customers are requested to limit their consumption to **65 gpcd**: ALL water customers are encouraged to abide by the list of Best Management Practices (BMPs), noted below

**Measures:** Voluntary water use measures and best management practices listed in Appendix A (BMPs) are encouraged.

#### **PCM INDOOR MEASURES**

Everyday mandatory water conservation restrictions:

- Water from the *City of Raleigh public water supply* shall not be served in a public restaurant for drinking water, except upon specific request by customers.
- Hotels/motels/bed and breakfast inns served by the *City of Raleigh public water supply* will ask guests spending more than one night to use their towels and bed linens more than once between laundering.

## **STAGE 1 RESPONSE**

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**Goal:** ALL residential water customers are requested to reduce their water usage to **55 gpcd**

**Measures:** Public Utilities education and outreach programs will encourage water conservation and efficiency measures. In addition to the previous conservation stages, the following responses apply during Stage 1:

### **STAGE 1 OUTDOOR USES**

- Irrigation water must be applied slowly to achieve deep penetration and prevent water run-off. Direct watering of impervious surfaces such as streets, parking lots, driveways and sidewalks is prohibited.
- Automatic spray irrigation and Non-Automatic spray irrigation systems: Watering by spray irrigation systems shall be permitted between MIDNIGHT and 10:00 AM. Properties with ODD numbered addresses may water lawns and landscapes only on TUESDAYS. Properties with EVEN numbered addresses may water only on WEDNESDAYS.
- Hose-end sprinkler: Watering by hose-end sprinklers shall be permitted between 6:00 AM to 10:00 AM and also between 6:00 PM and 10 PM. Properties with ODD numbered addresses may water lawns and landscapes only on TUESDAYS. Properties with EVEN numbered addresses may water only on WEDNESDAYS.
- Handheld hose watering devices shall be permitted at anytime.
- Low Volume Drip Irrigation: Watering by low volume drip irrigation is permitted at any time.
- Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

### **EXEMPTIONS to irrigation requirements:**

- The watering restrictions shall not apply to:
- Properties using non-potable/reuse water and non-public water supply system of the City for landscape irrigation.
- Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
- Visually supervised operation of watering systems for short periods of time to check system condition.
- Irrigation of athletic fields.

### **STAGE 1 INDOOR WATER USES:**

- Drinking water shall not be served in a public restaurant, except upon request.
- Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.

- Commercial and industrial customers are encouraged to review their water uses and implement industry specific best management water conservation practices.
- Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

## ***STAGE 2 REPOSE***

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**Goal:** ALL residential water customers are requested to reduce their water usage to **35 gpcd**;

**Measures:** Public Utilities education and outreach programs will encourage water conservation and efficiency measures. In addition to the previous conservation stages, the following Responses are required during Stage 2:

### **STAGE 2 OUTDOOR USES:**

- Irrigation water must be applied slowly to achieve deep penetration and prevent water run-off. Direct watering of impervious surfaces such as streets, parking lots, driveways and sidewalks is prohibited.
- Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.
- Watering by automatic spray or non-automatic irrigation is prohibited.
- Watering by hose-end sprinklers is prohibited.
- Watering by low volume drip irrigation is permitted at any time.
- Watering by held hose watering devices shall be permitted at any time.

### **STAGE 2 EXEMPTIONS to irrigation requirements:**

The watering restrictions shall not apply to:

- Properties using non-potable/reuse water and non-public water supply system of the City for landscape irrigation.
- Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
- Irrigation of athletic fields.

### **STAGE 2 INDOOR WATER USES:**

- Drinking water shall not be served in a public restaurant, except upon request.
- Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.
- Commercial and industrial customers are encouraged to review their water uses and implement industry specific best management water conservation practices.
- Leaking water services or plumbing must be repaired within 48 hours of written notification by the Public Utilities Director.

## ***STAGE 3 REPOSE***

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**Goal:** ALL residential water customers are expected to reduce their water usage to **25 gpcd**.

**Measures:** Public Utilities education and outreach programs will encourage water conservation and efficiency measures. In addition to the previous conservation stages, the following responses apply during Stage 3:

### **STAGE 3 OUTDOOR WATER USES:**

Uses of the City public water supply are prohibited as follows:

- Prohibited irrigation:
  - Irrigation of athletic fields.
  - Watering by handheld watering devices.
  - Watering of commercial containerized plants and commercial plant stock in trade maintained for resale.
  - Watering by low volume drip irrigation.
- Filling new swimming or wading pools is prohibited. Filling of pools drained for repair after the effective date of Stage 3 mandatory restrictions and rules is prohibited. Potable water may be added to pools to maintain sanitary operating conditions.
- Washing vehicles at any location is strictly prohibited, except as specifically approved by the Public Utilities Director for the purpose of maintaining public health and sanitary conditions of the vehicles.
- Washing of areas such as sidewalks, patios, decks, driveways, parking lots, streets and exterior building surfaces is strictly prohibited. This restriction shall not apply to the washing of soiled areas for maintenance of public health and sanitary conditions.
- Water use from hydrant meters is prohibited unless specifically authorized by the Public Utilities Director for washing of soiled areas for maintenance of public health and sanitary conditions.
- Leaking water services or plumbing will be interrupted immediately upon notification to the City's Public Utilities Department. Once repairs are completed by the customer or their agent, the water service will be restored.

The application of reuse water on the landscape is encouraged and not regulated by the City's water conservation ordinances.

### **EXEMPTIONS to irrigation requirements:**

The watering restrictions shall not apply to:

- Properties using non-potable/reuse water and non-public water supply system of the City for landscape irrigation.

**STAGE 3 INDOOR WATER USES:**

- Drinking water shall not be served in a public restaurant, except upon request
- All non-essential use of water for commercial or public use is prohibited.
- Buildings with water-cooled air conditioners or heating equipment that does not recycle City supplied water must adjust thermostats to the highest or lowest settings available, respectively, except when occupant health and safety are adversely affected.
- Hotels/motels/bed and breakfast inns will ask guests spending more than one night to use their towels and bed linens more than once between laundering.
- Major water customers shall implement industry specific best management water conservation practices.
- Leaking water services or plumbing will be interrupted immediately upon notification of Raleigh Water. Once repairs are completed by the customer or their agent, the water service will be restored

The effective date for Stage 1 and Stage 2 shall be determined by the effective date of the adopted ordinance. The effective date for Stage 3 shall be determined to be upon a finding by the City Manager that the remaining water supply in Falls Lake has reached 90 days or less, as defined in the City's Water Conservation Plan, or on the effective date as adopted by City Council.

All laws, resolutions and clauses thereof in conflict herewith are hereby repealed to the extent of such conflict.

**Summary Table of Water Use Restrictions:**

<b>ACTIVITY</b>	<b>Permanent</b>	<b>Stage 1</b>	<b>Stage 2</b>	<b>Stage 3</b>
Auto & Non-Auto Spray irrigation systems	Allowed	Odd= Tuesday Even= Wednesday Hours= Midnight - 10 am	Prohibited	Prohibited
Hose end sprinklers	Allowed	Odd= Tuesday Even= Wednesday Hours= 6-10 am & 6-10 pm	Prohibited	Prohibited
Hand-held Hose	Allowed	Allowed	Prohibited	Prohibited
Bucket Watering	Allowed	Allowed	Allowed	Prohibited
Drip Irrigation	Allowed	Allowed	Allowed	Prohibited
Subsurface Irrigation	Allowed	Allowed	Allowed	Prohibited
Athletic Field Irrigation	Allowed	Allowed	Allowed	Prohibited
Filling Swimming Pools	Allowed	Allowed	Allowed	Top off for sanitary purposes only
Car Washing	Allowed	Allowed	Allowed	Prohibited except for sanitary, health exceptions or reclaimed waters

Pressure Washing	Allowed	Allowed	Allowed	Prohibited except for sanitary, health exceptions or reclaimed waters
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# V: WATER SHORTAGE RESPONSE TRIGGERS

As required by NCGS 143-355, Raleigh Water has established a set of specific measurements of available water supply to assess the severity of water shortage conditions in order to guide the implementation of various water shortage stages described in Section IV.

In addition to water shortages resulting from severe droughts, it may also be necessary to adopt water use restrictions in the event of catastrophic water treatment or distribution system failure. These scenarios are also addressed in this section.

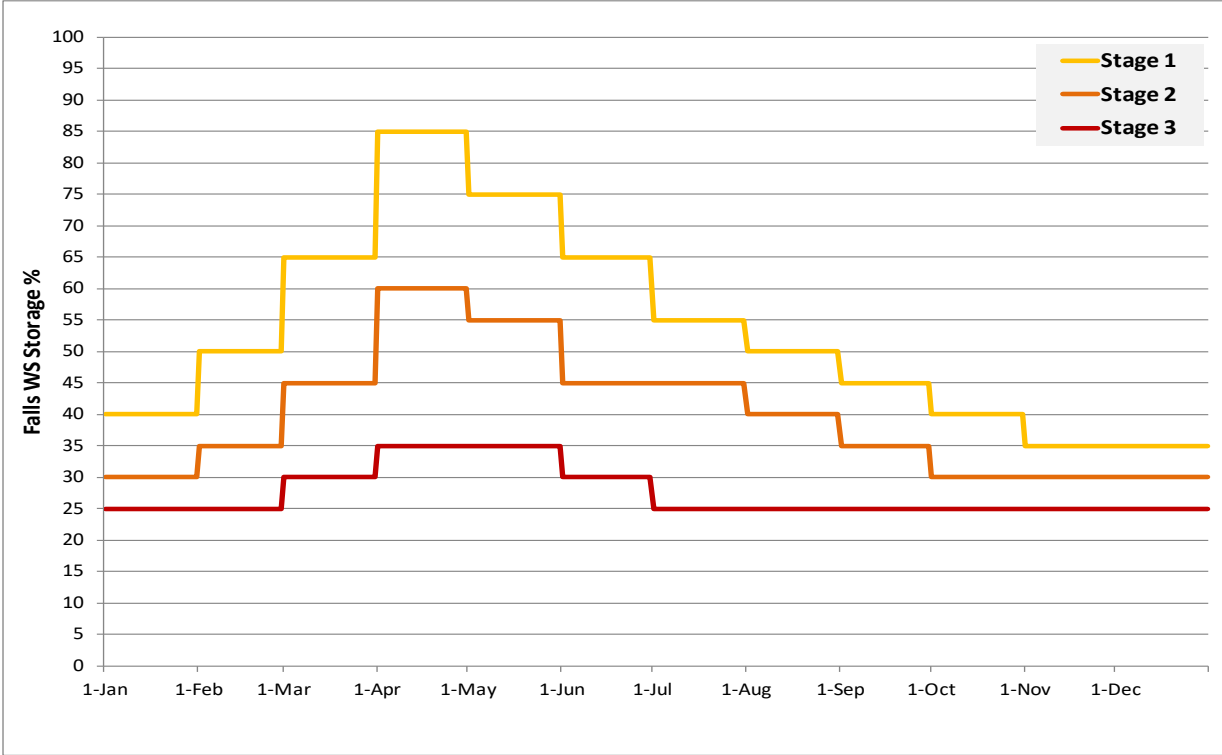
Raleigh Water staff continually monitor and evaluate the operational status of the City's drinking water supply resources, treatment and distribution systems to ensure that customers water demands can be met at all times. Staff also track water demands, reservoir levels, stream inflows and operational performance metrics on a daily basis. This and other information will be used to inform the water shortage response strategy.

## **Triggers to Implement and Rescind Water Shortage Response Stages During Severe Drought Conditions:**

The City of Raleigh currently uses 2 water supply reservoirs, which represent a combined 22.385 billion gallons at full pool. Falls Lake, located in northern Wake County, is the City's primary water supply source and the volume remaining in the Water Supply Pool (i.e. ~58% of the Conservation Pool) dictates the implementation of water shortage stages. Lake Benson, located in Garner, NC represents the City's secondary water source and is directly downstream of Lake Wheeler, which is also used for raw water storage.

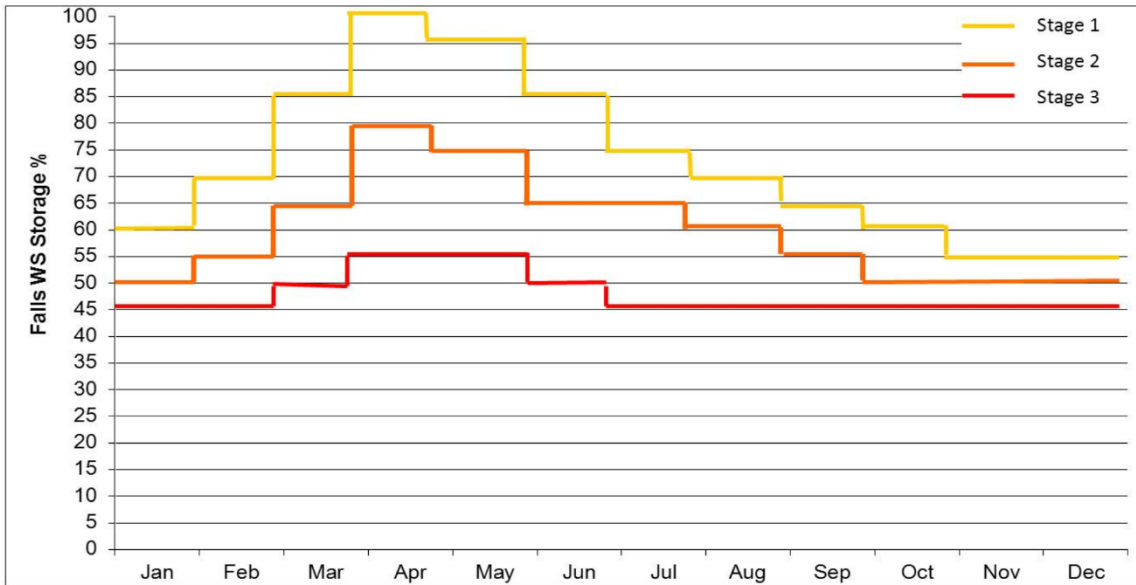
Raleigh Water developed and implemented a water shortage response system that is based on historical seasonal inflows into Falls Lake and Lake Benson. This system uses a hydrologic model (OASIS), which is based on over 100 years of recorded stream flow data and all known withdrawals and discharges in the Falls Lake and Lake Benson watersheds to create a probabilistic seasonal drought trigger system. This approach not only allows for the timely adoption of water conservation restrictions in advance of severe drought conditions, but also minimizes the adoption of water use restrictions when they are not necessary. The below graphic summarizes the monthly water shortage trigger system based on the percent of water remaining in the Water Supply Pool at Falls Lake:

# IMPLEMENTATION TRIGGERS



Likewise, the rescission triggers are also based on the percent of water remaining in the Water Supply Pool at Falls Lake:

## RESCISSION TRIGGERS



This system assumes an average daily water demand of 60 million gallons per day, with Lake Benson providing an average of 10 million gallons per day.

### **Water Shortage Response for Operational Emergencies:**

In the event of an unforeseen and serious failure of the water treatment and/or water distribution systems (i.e. not related to a drought), it may become necessary to quickly implement water use restrictions. Such events include, but are not limited to:

- Dam failure at a water supply reservoir or raw water terminal reservoir
- Treatment plant production is significantly reduced
- Large diameter water transmission main failure
- Raw or treated water quality issue
- Natural disaster

These types of operational emergencies often require the rapid implementation of water shortage responses in order to reduce water demand as much as possible. Therefore, the City Manager (or his/her alternate in their absence) may immediately implement a water shortage response stage and associated restrictions as he/she deems necessary given the nature, magnitude and expected duration of water emergency conditions. Conversely, the City Manager (or his/her alternate) may immediately rescind a water shortage response stage if he/she has determined the water emergency conditions have been resolved. In addition to rapidly adopting water use restrictions, Raleigh Water has water interconnections with the City of Durham (Hwy. 70 and Alexander Dr.), Town of Cary (Tryon Rd., Globe Rd. and Trinity Rd.) and Johnston County (Hwy. 70) and can receive water from these systems. These interconnections are currently being evaluated and upgraded as needed to ensure water can be effectively transferred between systems in the case of a water emergency. Mutual Aid Agreements are in place between these systems to ensure water can be transferred in an effective and timely manner.

## **VI: ENFORCEMENT**

Raleigh Water has the statutory authority to impose civil penalties for violations of water use restrictions. In addition, Raleigh Water can discontinue service for repeated violations of water use restrictions. Raleigh Water has Code Enforcement staff that will be tasked with enforcing water use restrictions, although additional Raleigh Water and City/Town Police personnel can be trained to look for and report violations of water use restrictions when they have been implemented.

Upon becoming aware of a water use restriction violation or a suspected violation, Raleigh Water Code Enforcement staff will attempt to contact the customer by phone, in person or a written letter or door hanger to clearly inform them of:

- The water restrictions in effect
- The nature of violation of water use restrictions
- The need for corrective action by the customer
- The penalties and potential penalties incurred for the violation

### **VIOLATIONS OF STAGE 1:**

Violation of this ordinance may be punished by any of the means available to the City through the provisions of N.C.G.S 160A-175. A warning shall be issued for the first violation, a second violation of this ordinance is \$50.00 and a third violation is \$200.00. For a fourth violation the City will issue written notification to the customer and occupant of intent to interrupt water service and twenty-four (24) hours later will interrupt water service. Each day shall constitute a separate violation. If water service has been interrupted due to repeat violation of this ordinance, service will not be re-instated until

the Public Utilities Director has determined that the risk to the City water supply has been alleviated or the Public Utilities Director is otherwise assured of compliance.

### **VIOLATIONS OF STAGE 2:**

Violation of this ordinance may be punished by any of the means available to the City through the provisions of N.C.G.S 160A-175. A civil penalty of warning \$50.00 shall be issued for the first violation, a second violation of this ordinance is \$200.00. For a third violation the City will issue written notification to the customer and occupant of intent to interrupt water service and twenty-four (24) hours later will interrupt water service. Each day shall constitute a separate violation. If water service has been interrupted due to repeat violation of this ordinance, service will not be re-instated until the Public Utilities Director has determined that the risk to the City water supply has been alleviated or the Public Utilities Director is otherwise assured of compliance.

### **VIOLATIONS OF STAGE 3:**

Violation of this ordinance may be punished by any of the means available to the City through the provisions of N.C.G.S 160A-175. The civil penalty amount for the first violation of this ordinance is \$1,000.00 and a reoccurring violation may result in interruption of water service to the offending customer. The City will issue written notification to the customer and occupant of intent to interrupt water service and twenty-four (24) hours later will interrupt water service unless the violation has ceased. Each day shall constitute a separate violation. If water service has been interrupted due to repeat violation of this ordinance, service will not be re-instated until the Public Utilities Director has determined that the risk to the City water supply has been alleviated or the Public Utilities Director is otherwise assured of compliance.

## **VII: VARIANCE REQUESTS**

Customers may request a variance from water use restrictions by submitting a letter or email to the Public Utilities Director (or acting Director) specifically describing the nature and reason for the requested variance.

A decision to approve or deny the individual variance requests will be communicated to the customer by letter or email within 2 weeks of receipt of the requests. The following criteria will be considered in evaluating individual requests:

- Purpose and necessity for use of potable water
- Social and economic importance/hardship imposed by compliance with the water use of restriction
- The prevention of structural damage impact
- Practicality of options for alternative water sources
- Anticipated impact of water use on remaining water resources

- Expected duration of the use for which the variance is requested

Public Utilities Director contact information:

Whit Wheeler:

Public Utilities Director

One Exchange Plaza

Suite 620

Raleigh, NC 27602

919 996 3479

[whit.wheeler@raleighnc.gov](mailto:whit.wheeler@raleighnc.gov)

## VIII: PLAN EFFICACY

While it is unknown exactly how the implementation of water use restrictions will impact future water demands, some estimates can be made based on previous demand reductions during recent severe drought events (2001, 2005, 2007/2008) and more recent demand trends. The following table reflects the water demand reduction goals in various Stages of Water Use Restrictions and time of year:

Month	Total Demand Reductions in Each Stage		
	Stage 1	Stage 2	Stage 3
Jan	0.0%	5.0%	15.0%
Feb	0.0%	5.7%	16.4%
Mar	0.0%	5.4%	15.7%
Apr	3.3%	13.1%	26.1%
May	5.4%	17.3%	31.3%

Jun	3.7%	17.2%	33.1%
Jul	5.9%	20.4%	36.5%
Aug	8.4%	20.8%	34.1%
Sep	13.2%	26.4%	38.7%
Oct	8.8%	20.0%	32.2%
Nov	2.7%	10.6%	22.0%
Dec	0.0%	5.9%	16.7%

Updates to these reduction estimates may be made once more information is available on long term water demand trends or if any Water Use Restriction Stage is implemented in the future which indicates a change may be appropriate.

## VIII: PUBLIC REVIEW AND COMMENT

As required by State regulations, the City’s draft WSRP was issued for public review and comment, and all submitted comments were reviewed prior to the formal adoption of the WSRP by City Council. Comments were solicited on the City’s website in addition to a press release, and comments could be submitted via email to:

[water.conservation@raleighnc.gov](mailto:water.conservation@raleighnc.gov)

Comments were also accepted at a public hearing on September 21, 2010 at 1:00 pm in the City of Raleigh Council Chambers. Efforts were also made to contact the utility merger communities and collect their respective comments.

The WSRP was formally adopted on October 19, 2010 by the Raleigh City Council and included in Section 8-2178 Article E of the City’s ordinances.

# **IX:FUTURE REVIEW AND REVISION**

In accordance with State requirements, Raleigh Water will review the WSRP and revise if necessary, as follows:

- Concurrent with the 5 year update as required per NCGS 143-355(l).
- Following the implementation and subsequent rescission of Water Use Restrictions in Stages 1,2, or 3.
- At any time as deemed necessary to reflect changes to water supply storage capacity, water demand trends, and new information regarding the efficacy of Water Use Restrictions.