City of Cambridge
Executive Department

YI-AN HUANG
City Manager

CMA 2025 #143
IN CITY COUNCIL
June 9, 2025

To the Honorable, the City Council:

Please find attached a memorandum regarding Awaiting Report #25-24 to conduct outreach and communicate the drought status from the Managing Director of the Water Department, Mark Gallagher.

Very truly yours,

Yi-An Huang
City Manager

To: Yi-An Huang, City Manager

From: Mark Gallagher, Managing Director

Date: 6/4/2025

Re: Water Department Response to Council Policy Order POR 2025 #45

Response to Council Policy Order POR 2025 #45

Date of Order: March 31, 2025

ORDERED:
That the City Manager be and hereby is requested to work with relevant City departments to do more outreach to residents, businesses, and property owners to communicate the drought status and take all measures to reduce nonessential water use citywide, and provide a report on citywide water usage and water supply; and be it further

ORDERED:
That the City Manager be and hereby is requested to report back to the City Council in a timely manner.

Executive Summary

This response outlines the City's communication strategies, interdepartmental coordination, water conservation efforts, regulatory updates, and drought management activities in response to ongoing drought conditions from July 2024 through May 2025. It also details the implementation of enforceable water restrictions and provides updates on citywide water supply status.

I. Public Outreach and Communication

Objective: Increase awareness and promote compliance with drought restrictions and sustainable water use.

Public Outreach

The Water Department's communications plan includes keeping residents, businesses and other members of our community informed of changes to the drought status by the state's Energy and Environmental Affairs, important steps the community is required to take in order to adhere to drought regulations, and the promotion of sustainable water use practices.

Thus far in 2025, the City has issued three advisories related to ever-changing drought conditions, while simultaneously promoting ongoing water conservation, including the use and purchase of rain barrels to conserve water for residential irrigation purposes.

In order to create awareness with the broader community, the communications strategy has been focused on reaching a number of key audiences:

- Direct outreach and follow-up with the City's largest water users, including our local universities and largest property owners.

- Direct outreach to the Business Associations and Neighborhood Associations
- Direct outreach to local places of worship and key City partners, including the Cambridge Housing Authority
- Outreach, follow-up and coverage with/from local media with a focus on the Cambridge Day, Harvard Crimson, 22-CityView, CCTV, and greater Boston radio
- Direct outreach to City employees
- Additional promotion was conducted with other key influencers in the City.

Furthermore, the City has been intentional in effectively leveraging its core communications channels:

- Multiple lead stories were featured in the City's Daily Update newsletter, which reaches over 16,000 subscribers and has a 60% open rate
- Multiple alert notifications were issued to all local users on NextDoor, which has nearly 33,000 members in the City of Cambridge
- New stories were prominently featured on the City website homepage for multiple weeks when the drought status was elevated
    - Overall, drought-related information was viewed approximately 3,500 times in the last 12 months
- Social media campaigns were implemented, including a concentrated campaign between April 26-May 13, 2025. That campaign resulted in nearly 9,000 views from users on Facebook, Instagram, Threads, and Bluesky.
- Drought status and water use restriction banners were added and prominently displayed on the city's homepage, individual department homepages and the city's on-line bill paying homepage.
- Billing stuffers were updated and added to every envelope for each billing cycle. (See figure 1 example)

Figure 1 – Billing Stuffer Example

II. Interdepartmental Coordination

The Water Department met with other city department heads and division managers of areas where high outdoor water use is typical:

- Provided information and held meetings with the DPWs Parks, Forestry and Golf course divisions, to discuss water conservation for essential outdoor water use as well as required bans for non-essential outdoor water use.

- Made announcements and provided weekly drought status and water restriction updates for city contractors and private developers during the weekly DPW city-wide construction coordination meetings.
- Coordinated with the Fire Department leadership and canceled the annual city-wide hydrant flow testing.

III. Regulatory Measures

An amendment to City Ordinance 13.08.090 was enacted April 7, 2025, in compliance with the Water Management Act (310 CMR 36.07).

The Water Management Act (M.G.L. c. 21G) became effective in March 1986. The Act authorizes the Massachusetts Department of Environmental Protection (MassDEP) to regulate the quantity of water withdrawn from both surface and groundwater supplies. The purpose of these regulations (310 CMR 36.00) is to ensure adequate water supplies for current and future water needs.

- **Water Management Act Amendment – January 20th 2023:** Registrants shall establish enforceable restrictions limiting nonessential outdoor water use. Such restrictions shall be in place during a drought declaration by the Secretary of Energy and Environmental Affairs for the drought region and nonessential outdoor water use shall be restricted in accordance with 310 CMR 36.07(2)(c)

Per the requirements of the state Water Management Act, the Water Department worked directly with the Law Department to develop an amendment to the city's existing Water System Regulation ordinance 13.08, to develop enforceable non-essential outdoor water use restrictions. The proposed amendment to 13.08.090 was ordained by the City Council on April 7th, 2025 (See Appendix A for amended ordinance)

Since the enactment of the amendment to ordinance 13.08.090, Water Department staff have been trained on the non-essential outdoor water use restrictions for each of the four drought status levels and which outdoor water uses are considered essential and therefore exempt under current regulations. CWD staff have also been tasked with enforcement of the ordinance and are now required to investigate any violations that are observed in the field or reported to the department. Fortunately to date we have not had to issue any warnings or citations but have responded to multiple phone calls and emails from residents and businesses requesting information or clarifications regarding the new restrictions. Since the enactment of the amendment the drought status has improved from a Level 3 (Critical) to Level 0 (Normal).

IV. Drought Conditions Overview (2024–2025)

From July 2024 through May 2025, Cambridge experienced significant drought conditions, primarily due to prolonged periods of below-average precipitation. These conditions led to critical drought declarations, necessitating water conservation measures and highlighting the importance of sustainable water management practices.

Drought Conditions Timeline

- Summer to Fall 2024: Beginning in mid-2024, Cambridge and the broader Northeast region faced escalating drought conditions. By November 2024, the Northeast region, including Cambridge, was elevated to a Level 3 – Critical Drought status due to prolonged lack of rain. This marked the second critical drought in Cambridge within two years.
- Winter 2024–2025: Despite snowfall in February 2025, freezing temperatures prevented effective groundwater recharge, exacerbating drought conditions. By March 2025, the entire state, including Cambridge, remained under significant or critical drought designations.
- Spring 2025: In early May 2025, the state experienced rainfall that improved drought conditions. Consequently, the Central, Northeast, and Connecticut River Valley regions were downgraded from Level 3 – Critical Drought to Level 2 – Significant Drought.
- On May 20th due to continued above average precipitation, the State Drought Task Force held a special mid-month meeting, and the Secretary of Energy and Environmental Affairs downgraded the drought level for the Northeast region to Level 0-Normal.

V. Precipitation Impacts

Throughout this period, Massachusetts experienced a significant precipitation deficit. From August 2024 to March 2025, the state had a rainfall deficit of 8–13 inches. The snowfall in February 2025 did little to alleviate the drought, as prolonged sub-freezing temperatures prevented snowmelt from replenishing water sources. (See Figure 2)

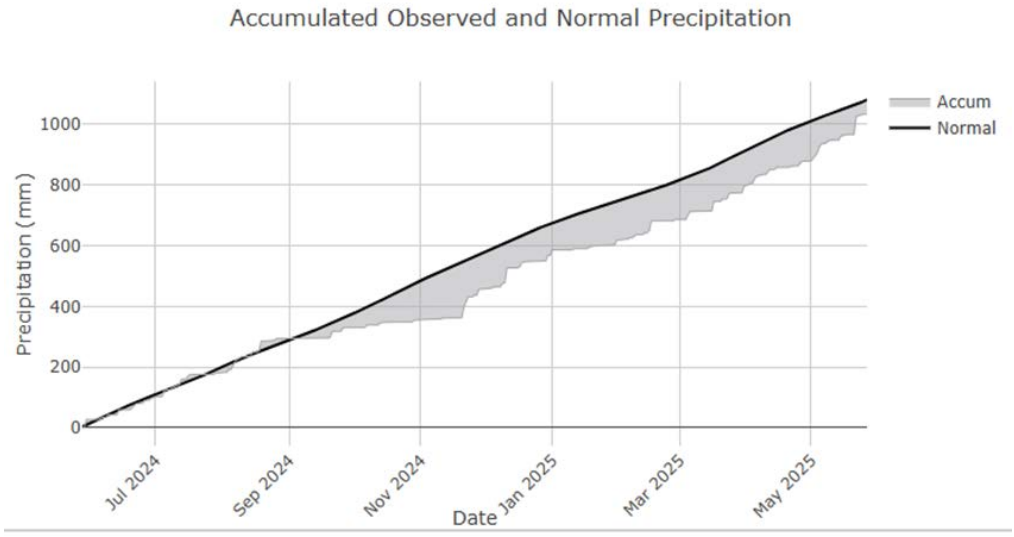

Figure 2 - National Weather Service – Accumulated/Normal Precipitation July 2024 – May 2025 Bedford MA

During the water year from October through June, the Cambridge water supply system typically does not see significant recharge from spring snow melt but is more dependent and directly affected by precipitation, tributary stream flow and ground water levels for reservoir recharge. For the water year 2024-2025 precipitation levels around the Cambridge watershed remained slightly below average through the winter and into early spring. Coupled with the residual effects of the prolonged drought and continued lack of normal precipitation, by late February the reservoir storage level was still

approximately one billion gallons below the fifteen-year median. Through March and April precipitation levels remained slightly below normal and though reservoir recharge continued to increase, storage levels remained well below normal. In May, precipitation frequency and duration increased significantly, and precipitation levels were approximately 3.2 inches higher than normal. (See Figure 3)

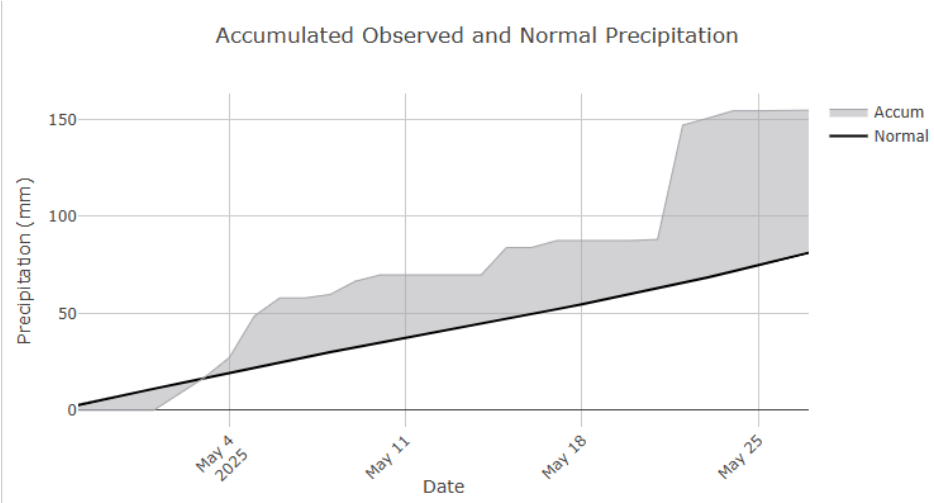

Figure 3 - National Weather Service – Accumulated/Normal Precipitation May 2025 Bedford MA

The above average precipitation in May provided a much-needed boost to reservoir storage levels and provided over 300 million gallons of additional water storage, significantly reducing the deficit from the 15-year median. (See Figure 4)

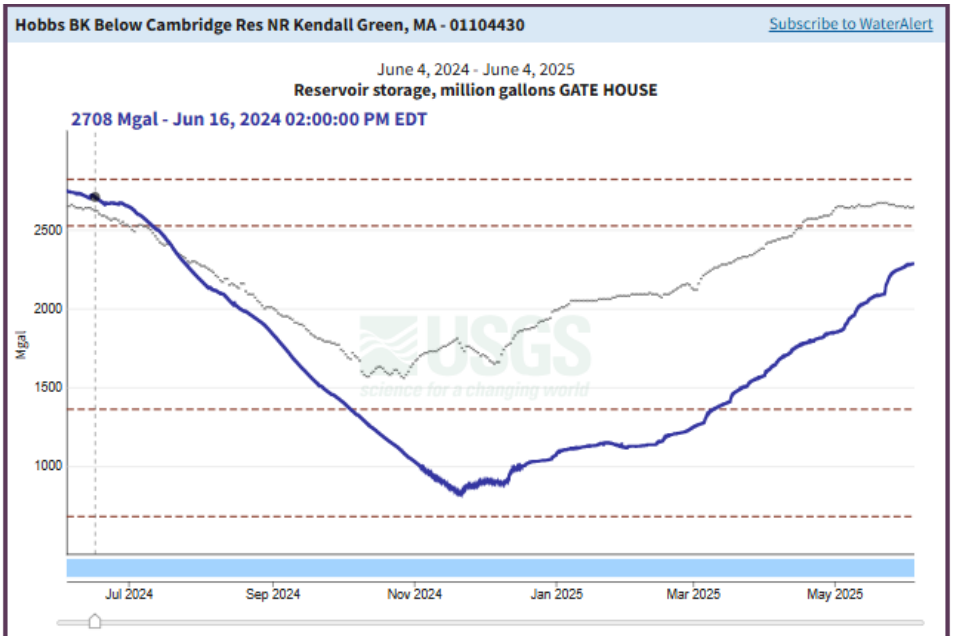

Figure 4 - Hobbs Brook Reservoir water storage level June 2024 - May 2025
(Blue Line = 2024-2025 level – Gray Line = 15 Year Median)

As we head into the warmer summer months with our reservoirs still at a slight deficit, precipitation levels will continue to be a critical factor in our water system's ability to meet the associated increased water demands.

VI. Water Supply Management

The cities' drinking water supply system consists of three in-series reservoirs, the Hobbs Brook, Stony Brook, and Fresh Pond Reservoirs. Hobbs and Stony Brook Reservoirs drain a 24 square mile basin in Lexington, Lincoln, Waltham and Weston, MA. Fresh Pond Reservoir is a glacial kettle-hole lake located in Cambridge with no natural inlets or outlets. Hobbs Brook Reservoir is fed by Hobbs Brook and other unnamed tributaries that discharge directly into the reservoir. Water is released from the Hobbs Brook Reservoir dam at Winter Street in Waltham, which joins Stony Brook about 1.5 miles downstream. Stony Brook Reservoir is fed by Stony Brook and a small tributary from Weston. Both reservoirs receive additional inflows from surface overland flow, engineered drainage systems, groundwater, and direct precipitation. From the Stony Brook Reservoir, water is piped through an underground aqueduct to Fresh Pond Reservoir where it is stored prior to treatment. Fresh Pond raw water is purified at the Walter J. Sullivan Water Treatment Plant (WTP) and pumped to Payson Park Reservoir, a covered storage facility located in Belmont, MA. From there, water flows by gravity to the City of Cambridge distribution system.

The largest of the reservoirs, Hobbs Brook Reservoir, reaches its maximum elevation at ~169.6 feet (NAVD88), its maximum depth at approximately 25 feet, and at full capacity, holds approximately 2.5 billion gallons of water. Stony Brook Reservoir reaches its maximum elevation at ~68.9 feet, its deepest point is approximately 30 feet, and at full capacity contains roughly 418 million gallons of water. Fresh Pond Reservoir reaches its maximum elevation at ~5.3 feet, its maximum depth is 50 feet, and at full capacity, holds roughly 1.5 billion gallons.

While the Watershed's primary storage reservoir is Hobbs Brook Reservoir, in the winter and spring months it is largely unused. Due to its vast size and relatively small watershed, Hobbs Brook Reservoir is slow to fill up. This winter hiatus is necessary for Hobbs Brook Reservoir to regain the water transferred to the downstream reservoirs in the summer months. Conversely, Stony Brook Reservoir is relatively small compared to its large watershed and fills much faster than Hobbs Brook Reservoir. Water from Stony Brook Reservoir is enough to supply our demand during the winter and spring months and is piped to Fresh Pond Reservoir. In times of above average precipitation, excess water is released to the Charles River to maintain safe dam operating levels. The average annual daily water demand in the City of Cambridge is typically 12 to 13 million gallons per day (MGD).

Based on these standard operating procedures, the Hobbs Brook recharge cycle typically starts in the fall and continues through spring of the following year. During the 2024-2025 drought, the accumulative effects of continued below average precipitation and subsequent higher daily demands from August into October of 2024 required the continued use of Hobbs Brook reservoir to supply supplemental water late into November. The extended use coupled with below average reservoir recharge rates, resulted in the

Hobbs Brook reservoir being drawn down to its lowest level since the drought of 2016. In November as Hobbs Brook reservoir levels neared critical levels, CWD began preparations for supplementing the city's water supply with resources from the Massachusetts Water Resources Authority (MWRA) if conditions did not improve.

In late November, precipitation levels and frequency began to normalize, which provided enough recharge to the Stony Brook reservoir to meet the daily demand and allow Hobbs Brook to start the winter recharge cycle and prevent the need to activate the MWRA for supplemental water. Over the following months CWD continued to closely monitor Hobbs Brook recharge rate and potential for full recovery prior to June 2025 and the start of summer. (See Figure 5)

Date	% water supply capacity	Monthly Recharge Rate (%/day)*	Days until June 1, 2025	Projected % Water Supply Capacity on June 1, 2025	Recharge Rate (%/day) Needed for 90% Capacity by June 1, 2025
10/31/2024	33.0	--	--	--	--
11/30/2024	28.9	-0.137	183	4	0.492
12/31/2024	36.4	0.242	152	73	0.592
1/31/2025	35.5	-0.029	121	32	0.744
2/28/2025	41.3	0.207	93	61	0.986
3/31/2025	52.6	0.365	62	75	1.45
4/30/2025	62.5	0.330	32	73	2.81
5/31/2025	77.8	0.494	1	--	--

** % water supply capacity gain or loss/day, calculated based on the difference in % water supply capacity at the start and end of each monthly interval*

Figure 5 - Monthly recharge rates (%Water Supply Capacity/Day) Water Year 2025

Though there is no way to predict future precipitation levels, comparing current precipitation and recharge data with previous drought years, a direct correlation between precipitation and reservoir levels can be made. Monitoring and analyzing data from previous years allows us to identify potential trends to make management decisions and preparations for contingency plans as needed. (See Figures 6 and 7)

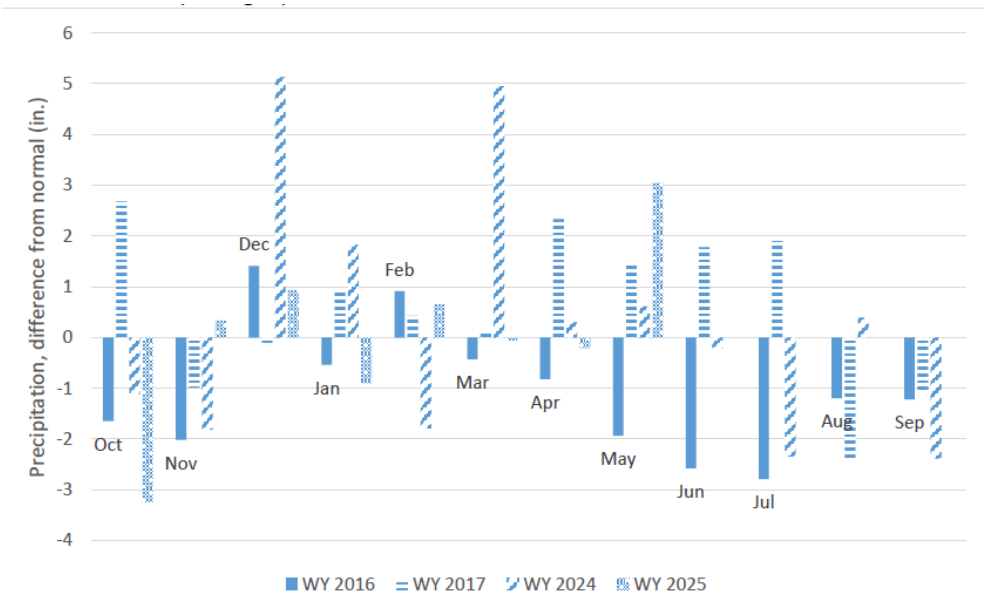

Figure 6 - Monthly Precipitation levels (Lincoln Field Office) Relative to Normal Levels Water Years 2016 – 2017 (Drought) and 2024-2025 (Drought)

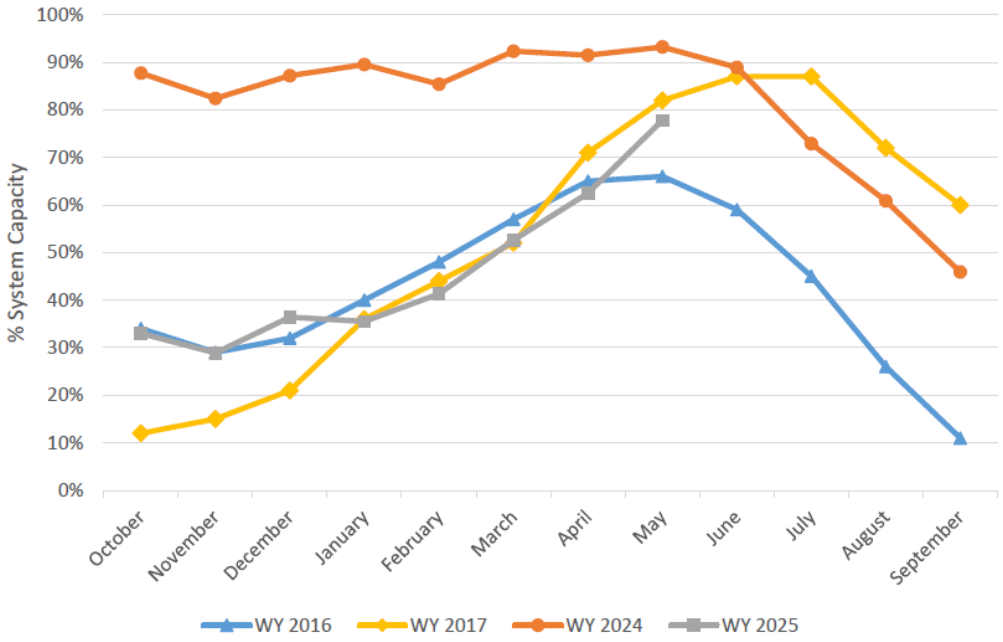

Figure 7 - CWD % System Capacity, Water Years 2016-2017(Drought) and 2024-2025(Drought)

As of June 2025, system storage reached ~78%, still below historical norms but continuing to increase slowly. Historical data suggests that as long as precipitation levels remain normal or above normal the current supply capacity will be able to meet demand throughout the summer. The current NWS and NOAA three-month seasonal precipitation outlook for Massachusetts is positive and indicates that precipitation is leaning towards slightly above normal for June – August 2025. We must note however that these are only predictions and actual precipitation levels may be different, and the best practice is to continue to promote water conservation.

VI. Conservation Measures

In response to the critical drought conditions, Cambridge implemented several water conservation measures:

- Restrictions: The city banned nonessential water use, including automatic lawn sprinklers and irrigation systems.
- Public Outreach: Residents were urged to conserve water by taking shorter showers, running dishwashers and washing machines only with full loads, and promptly fixing leaks.
- Engagement with Large Users: The city contacted major water users, such as Harvard University and the Massachusetts Institute of Technology (MIT), to encourage voluntary reductions in water consumption.

Though it is difficult to quantify any direct effect that the imposed water restrictions and increased public outreach had on water conservation, water production comparisons (FY24 vs. FY25) show reduced usage following bans and outreach. Water production data shows that between the months of July - November of FY25, water use was consistently higher than for the same period in FY24. During FY25 from November – April (excluding Jan*), water consumption rates decreased and remained equal to FY24 levels.. Overall, the data indicates that the water bans and public outreach contributed to reduced water consumption. (See Figure 8)

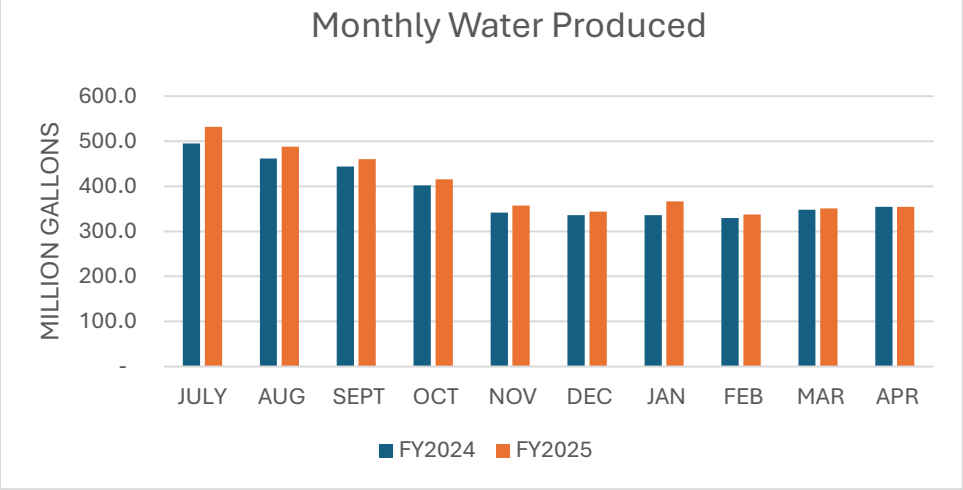

Figure 8 – FY24 – FY25 Monthly water production comparison

*In January 25 there was a slight increase in water production which can be attributed to an above average number of water main breaks and subsequent water loss caused by several weeks of sub-freezing temperatures.

VII. Recommendations

To enhance water resilience and prepare for future drought conditions, the following measures are recommended:

- Infrastructure Investment: Encourage residents, businesses and institutions to implement rainwater harvesting systems to capture and store rainwater for non-potable uses, reducing demand on municipal water supplies.
- Public Education: Continue educating residents and businesses on water conservation practices and the importance of sustainable water use.
- Policy Development: Develop and enforce policies that promote water efficiency in new developments and renovations.

APPENDIX A – Drought Ordinance Amendment

13.08.090 - Water restriction authority.

A. The Water Board shall have the power to restrict the use of hand-hose or automatic sprinkler or similar devices to such hours of the day as it may deem necessary pursuant to G.L. c. 41, §69B, and the City Manager or if designated, the Managing Director of the Water Department, shall limit nonessential outdoor water use during a drought declaration by the Secretary of Energy and Environmental Affairs for the drought region, pursuant to 310 CMR 36.00; and for any violation of such restrictions the occupant of the premises shall be liable to the penalties imposed in Section 13.08.110 for a waste or improper use of water and Chapter 13.12 of this code. A
drought declaration by the Secretary shall restrict water uses as follows:

1. In accordance with 310 CMR 36.07(2)(c), if the Massachusetts Secretary of Energy and Environmental Affairs declares a drought in the region, county or watershed, such restrictions
shall be in place during a drought declaration and nonessential outdoor water use shall be restricted as follows:

a. Level 1 (Mild Drought). All nonessential outdoor water uses restricted to no more than one day per week, before 9:00 a.m. and after 5:00 p.m., except that watering of ornamentals and flower gardens with drip irrigation, hand-held hose or watering cans may be permitted.

b. Level 2 (Significant Drought). All nonessential outdoor water uses banned, except that watering of ornamentals and flower gardens with drip irrigation, hand-held hose or watering cans may be permitted.

c. Level 3 (Critical Drought) or Level 4 (Drought Emergency). All nonessential outdoor water uses are banned.

2.For withdrawals for the maintenance of golf course greens, tees, fairways, and roughs during a drought declaration by the Secretary of Energy and Environmental Affairs for the drought region, registrants shall comply with the following restrictions on nonessential outdoor water use:

a. Level 1 (Mild Drought). Irrigation of fairways shall be reduced to 80% of normal, irrigation of roughs shall be reduced to 50% of normal, and there shall be no irrigation of landscaping and ornamentals.

b. Level 2 (Significant Drought). Irrigation of fairways shall be reduced to 60% of normal, and there shall be no irrigation of roughs, landscaping and ornamentals.

c. Level 3 (Critical Drought) or Level 4 (Drought Emergency). Irrigation of fairways reduced to 40% of normal, and there shall be no irrigation of roughs, landscaping and ornamentals.

3. The Water Board shall have the power to implement nonessential outdoor water use restrictions that are more stringent than those set forth in 310 CMR 36.07(2)(c), as described in Section 13.08.090 A, 1 through 2, and D.

4. Once implemented, pursuant to 310 CMR 36.07(2)(c), restrictions on nonessential outdoor water use at least as restrictive as described in Section 13.08.090 A, 1 through 2, and D, shall remain in place for the respective declared drought level until the drought level is changed by the Secretary.

5. The Water Department in accordance with G.L. c. 40, §41A, may, upon notification to the water takers, shut off the water at the meter or curb cock or by other means as the case may be, during a drought, hurricane, conflagration or other disaster when in the opinion of the department of environmental protection an emergency exists.

B. Public Notification of a Drought Declaration: Notice to the public of all provisions, including all restrictions, requirements and conditions imposed by the City as part of a drought declaration shall be made as soon as possible, but no later than 48 hours following the declaration of a drought and the City may utilize any of the following forms of notice: publication in a newspaper of general circulation within the City, notice on the City website, signage on major roadways or intersections, reverse 911 calls, social media, public service announcements on local media, informal posting, or other such means reasonably calculated to reach and inform all water customers.

C. Notice of Termination of Drought Declaration: Upon notification to the City that the declaration of a drought has been terminated by the Secretary, the public will be notified of the termination in the same manner as the notification of its imposition.

D. The following is a list of outdoor water uses that will not be restricted under the new conditions (pursuant to 310 CMR 36.03):

a) for health or safety reasons, including public facilities used for cooling such as splash pads and swimming pools, and for washing of boats, engines, or marine equipment to prevent negative saltwater impacts or the transfer of invasive aquatic species, and for the preservation of trees, including trees on private property, by using slow release watering bags or other slow release systems, because trees promote the health, safety and welfare of residents for multiple reasons, including but not limited to improving air quality and reducing urban heat island impacts;

b) by permit, license, statute or regulation;

c) for the production of food, including vegetable gardens, and fiber;

d) for the maintenance of livestock;

e)to meet the core functions (those functions essential to the commercial operations) of a business, including but not limited to:

1. plant nurseries as necessary to maintain stock;

2. golf courses as necessary to maintain greens and tees, and limited fairway watering per 310 CMR 36.07(2)(c)2.a. through c.;

3. venues used for weddings or similar special events that limit watering to hand-held hose or drip irrigation as necessary to maintain gardens, flowers and ornamental plants;

4. professional washing of exterior building surfaces, parking lots, driveways and/or sidewalks as necessary to apply surface treatments such as paint, preservatives, stucco, pavement, or cement in the course of construction, reconstruction or renovation work;

f) for irrigation of public parks before 9:00 A.M. and after 5:00 P.M.,

g) for irrigation of public and private recreation fields, including those operated by schools, colleges, universities and athletic associations, before 9:00 A.M. and after 5:00 P.M.,

h) for irrigation of publicly-funded shade trees and trees in the public right-of-way; or

i) to establish a new lawn as necessary to stabilize soil in response to new construction or following the repair or replacement of a Title 5 system.

E. Enforcement of Penalties: Any person who violates any provision of this Section 13.08.090 shall be liable to the City in the amounts listed below: 1 st violation: Warning, 2 nd violation: $100, 3rd violation: $200, 4th and subsequent violations: $300. Each day of violation shall constitute a separate offense.

a) Violation— Criminal Penalty. Any person who violates any provision of this Section 13.08.090 may be subject to a fine not exceeding three hundred dollars, and each day's violation shall constitute a separate offense. For purposes of this section, the enforcing officers shall be employees of the Water Department designated by the City Manager or if designated, the Managing Director of the Water Department, Police Officers, Animal Control Officers and the Director of the Animal Commission.

b) Violation—Noncriminal disposition.
Whoever violates any provision of this Section 13.08.090 may be penalized by a noncriminal disposition as provided in G. L. c. 40, §21D. Each day of violation shall constitute a separate offense. The enforcing officers shall be employees of the Water Department designated by the City Manager or if designated, the Managing Director of the Water Department, Police Officers, Animal Control Officers and the Director of the Animal Commission. The penalty for each violation shall not exceed three hundred dollars.

APPENDIX B - 2024 – 2025 Drought Status declaration history:

From October 11th, 2024 through May 20th, 2025, Cambridge and the Northeast region of Massachusetts remained in different levels of drought as declared by the state Secretary of Energy and Environmental Affairs. The monthly state drought status updates were as follows;

October 11th, 2024 - Massachusetts Secretary of Energy and Environmental Affairs, increased the drought level for the Northeast Region (Which includes Cambridge) from Level 0-Normal to a level 1-Mild drought.

November 19th, 2024 - Drought level increased from Level 1-Mild to a Level 3-Critical drought.

- *Non-enforceable water ban on non-essential outdoor water use enacted.*

December 6th, 2024 - Drought level remained at Level 3-Critical.

- *Non-enforceable water ban on non-essential outdoor water use remained in effect.*

January 8th, 2025 - Drought level decreased from Level 3-Critical to Level 2 Significant.

- *Non-enforceable water ban on non-essential outdoor water use remained in effect.*

February 7th, 2025 - Drought level increased from Level 2 Significant to a Level 3-Critical

- *Non-enforceable water ban for non-essential outdoor water use remained in effect.*

March 7th, 2025 – Drought level remained at Level 3-Critical drought.

- *Non-enforceable water ban on non-essential outdoor water use remained in effect.*

April 7th, 2025 - City Council Ordains amendment to City Ordinance 13.08.090 to include enforceable drought status water ban regulation

April 9th, 2025 - Drought level decreased from Level 3-Critical to Level 2 Significant.

- *Enforceable water bans for non-essential outdoor water use enacted.*

May 9th, 2025 - Drought level decreased from Level 2-Significant to Level 1-Mild.

- *Enforceable water bans for non-essential outdoor water use remain in effect.*