ENVIRONMENTAL PARTNERS
— An Apex Company —

June 29, 2023

Heads of Departments
Town of Oak Bluffs
56 School Street
Oak Bluffs, MA 02557

RE: Information for Review and Immediate Consideration
Oak Bluffs Drinking Water Supply Capacity and Resiliency

Dear Department Heads of Oak Bluffs,

The Oak Bluffs Water District (District) has entered into a contract with Environmental Partners (EP), a local consulting engineering firm, to develop a Water System Master Plan (WSMP) evaluating the Town's water distribution system. This document will provide a comprehensive evaluation of Oak Bluffs' current drinking water distribution system including:

- Descriptions of current system infrastructure
- Analyses of current and projected water supply and demand
- Evaluation of the current distribution system and storage capacity
- Water rate study
- Capital Improvement Plan (CIP) with a timeline of prioritized recommendations and their estimated capital costs.

The WSMP is a very detailed endeavor that will take months to complete. However, the District is experiencing immediate issues with meeting system demands that we must bring to your attention now. We have real concerns with our ability to supply safe drinking water to our customers as we enter into the summer months, which we need your help to mitigate.

Background

The District has five drinking water supply wells (Wells 1 through 5) and one water storage tank. The District's current Water Management Act permit coupled with the current configuration and design of the Well 4 pump station does not allow Wells 4 and 5 to pump water at the same time, which limits the District to operating a maximum of four wells at one time. During the summer months, demands for water are at their highest as you can imagine due to parks, irrigation, and an influx of seasonal customers straining the system. Keeping up with demand has always been a challenge, however water usage in the early morning hours has been so uncontrolled that the District is unable to provide enough water to keep up with the need.

Supply and Demand

Figure 1 on the following page shows actual water system data recorded last summer on August 8, 2022. Shown in purple is the total water being produced with all 4 wells running at full capacity (between 2,750 and 3,150 gallons per minute) (gpm). The blue area represents how much water customers used throughout the day, referred to as the system "demand". The system demand is highest in the early morning as irrigation systems are active, businesses begin to resume activity, and people start taking showers. The system demands reached over 4,000 gpm that morning, far exceeding the production capacity of the wells.

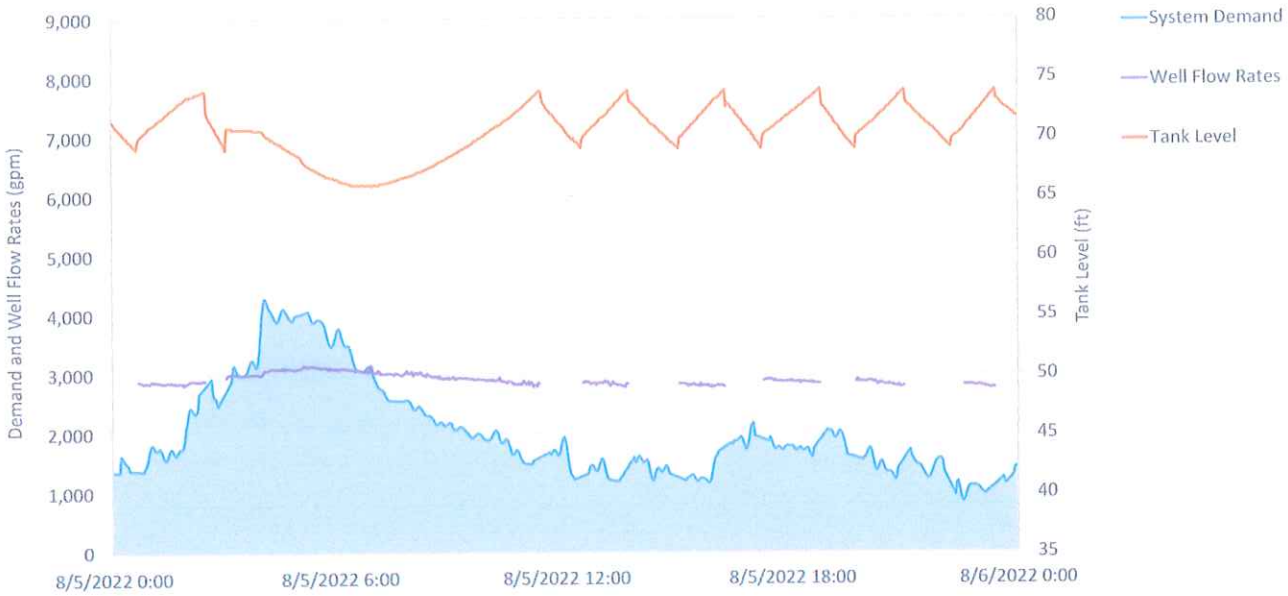
The orange line shown in Figure 1 represents the water level in the Oak Bluffs water storage tank. Water storage tanks serve an important role within a water distribution system by providing stable water pressures for customers and maintaining a reserve of water for use in emergencies and in periods of high demand. Water tank levels are typically controlled by turning wells on and off when the tank reaches certain levels. This cycle allows new water to repeatedly enter the tank, preventing the water in the tank from becoming stagnant.

The Oak Bluffs wells are programmed to turn on when the storage tank level drops to 69 feet and off when the tank level reaches 74 feet. However, during the morning when the wells are unable to supply enough water to meet the system demand, the level of water in the tank continues to decline below 69 feet. Eventually, later in the day, the system demands subside and the tank is able to fill again. A tank that is emptying uncontrollably can result in:

- Water pressures dropping beyond safe limits and risking groundwater contamination;
- Water pressures dropping too low to fight a fire;
- Inadequate reserve water volume to fight a fire, regardless of pressure.

Figure 1 indicates that the Oak Bluffs' water system is being pushed beyond its limits, leaving no room for an emergency.

Figure 1: August 5, 2022 – Water System Data



Resiliency

An equipment failure, significant drought, or future contamination could result in the loss of a well. Should this occur in the summer, the scenario that we are currently dealing with would be greatly exacerbated, likely resulting in a water supply emergency and/or boil order due to loss of water pressure in the system.

A fire could also substantially increase demands on the water system. Several buildings in Oak Bluffs require at least 3,000 gpm of additional supply to adequately fight a fire. To demonstrate the potential impacts of a fire in the summer, Figure 2 on the following page shows what would have happened if there had been a fire on August 5, 2022. The water in the tank would rapidly decline as the combined system demands and fire demands substantially outpace the capacity of the wells.

Figure 2: August 5, 2022 – Theoretical Fire Event

Our neighbors Tisbury and Edgartown are also tight on water supply and likely would be unable to provide emergency water to Oak Bluffs in the event of a summer fire emergency to help offset this scenario.

Implications for Water System Customers

Typically customers who live at higher elevation, such as on a hill will experience lower water pressures than customers who live at lower elevations such as a valley. There are currently locations in Oak Bluffs with high elevations that experience low pressures due to current tank levels. EP's hydraulic modeling efforts indicate that if the fire event shown in Figure 2 were to occur, some customers may experience pressures as low as 5 psi. For reference, the minimum allowable pressure under a fire emergency is 20 psi according to MassDEP, while the standard minimum under normal conditions is 35 psi. When pressures drop below 20 psi, there is a risk of untreated and potentially contaminated ground water entering the distribution system.

Long Term Recommendations

EP will likely recommend additional well(s), another tank, or both in the WSMP. Increasing water storage to offset peak demands can significantly stabilize tank levels during summer months and throughout the year, and adding supply redundancy offsets the risk and consequence of losing any individual well. This is particularly important with the multitude of developments that are currently being proposed to be built within Town, which will require additional water to support. However, these projects will take significant time to plan, design, and construct. Therefore, significant action must be taken now to reduce system demands in the meantime.

Immediate Conservation Needs

We must stress the importance of water conservation, particularly during these summer months. There are already mandatory water bans in effect annually June through September, with signs posted to notify residents. However, these bans are largely ignored, which is a threat to our ability to provide safe drinking water to the residents and businesses of Oak Bluffs.

In addition to adhering to outdoor watering bans, we need all residents to practice water conservation and protection to allow the Oak Bluffs Water District to provide safe and reliable drinking water. Here are some examples of how to do that:

- Take short showers. A 5 minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.
- Shutting off water while brushing your teeth, washing your hair, and shaving can save up to 500 gallons a month.
- Install water efficient showerheads and other low flow fixtures. They are inexpensive and easy to install and can save up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Use cisterns or rain barrels for outside watering.
- Maximize the use of drought-resistant landscaping, and maximize the use of top soil with a high water retention rate.
- Install rain sensors on all irrigation systems.
- Do not wash vehicles except as necessary.
- Do not wash exterior buildings, parking lots, driveways, and sidewalks except as necessary.
- **Most importantly, wherever possible shift water use away from the morning when demands are at their highest.**

As the situation currently stands, EP would not recommend that additional developments be approved until the District is confident in their ability to provide water under current system demands, assuming the largest source is offline to be conservative. Until peak summer/morning demands can be alleviated or additional supply/storage capacity is added, any additional demands greatly increase the potential for water supply shortages and low pressure events, and contribute to low firefighting capacity throughout Town, which contributes to the risk of loss of property and life.

We appreciate your commitment to supporting the Oak Bluffs Water District in our ability to provide safe, clean drinking water this summer and moving forward. Please feel free to reach out with any questions or comments.

Sincerely,