

# Chapter 9

# PUBLIC UTILITY SYSTEM

## PART 1: BACKGROUND

### Section 1: Introduction

The Town of Round Hill utility system experienced very rapid growth from the mid-1990s through 2005, followed by a period of minimal/no growth from around 2005 to 2011, since which the system has experienced moderate growth. Utility system growth has generally been driven by residential development in and adjacent to the Town.

Several initiatives have been completed by the Town that increased quality and capacity of the utility systems. A significant upgrade of the Wastewater Treatment Plant (WWTP) was completed to add enhanced nutrient removal capabilities and to expand the facility to a capacity of 750,000 gallons/day. The Goose Creek and Westlake Water Treatment Plants (WTPs) and associated wells were completed to improve and increase the Town's water supply.

Much of the current water system was provided by Round Hill Associates both as proffered facilities for the Villages rezoning as well as pursuant to a court-ordered Consent Decree with the Town. Under the terms of that Consent Decree, the developer pays reduced or waived availability fees in exchange for providing wells, storage and treatment facilities.

### Section 2: Water System

Refer to Map 9-1 Water System. The current Round Hill water system service area covers approximately 1,700 acres. The service area includes properties within the Town limits and out-of-town properties contained within the JLMA. Approximately 1,509 active water/sewer accounts were served by the water system as of June 2016. The Town's drinking water consistently meets the requirements and maximum contaminant levels (MCLs) as established by the Virginia Department of Health (VDH) and the Environmental Protection Agency (EPA).

The current Round Hill water supply is provided by 12 active groundwater wells that withdraw from the fractured bedrock aquifer(s) in the region. On average, the Town withdraws approximately 200,000 gallons per day. The Round Hill water system treats for disinfection, Methyl Tertiary Butyl Ether (MTBE), iron, and manganese. Pressure and reserves are maintained using the elevated 500,000-gallon Evening Star tank, and the 90,000 gallon Stoneleigh tank.

### Section 3: Wastewater System

Refer to Map 9-2 Sewer System. As with the water system, the wastewater system service area covers approximately 1,700 acres. The service area includes properties within the Town limits and out-of-town properties contained within the JLMA. Approximately 1,424 customers were served by the wastewater treatment plant as of June 2016. The wastewater system consists of an

underground gravity collection system, and five raw wastewater pump stations. All wastewater in the Town system flows and/or is pumped to the Round Hill WWTP where nitrogen and phosphorus are removed.

## PART TWO: UTILITY SYSTEM DEMAND & GROWTH

### Section 1: Water Demand Projections

The growth of Round Hill's water system has been directly correlated with residential development activity primarily in the JLMA. Construction activity has resumed within recent years, and most new water demand will come from developments/projects that are either currently under construction or are in the planning period.

Round Hill's utility service area is set at the Town limits and the JLMA boundary. Most of the area within the service area is either built out or already designated for development. The Town has a reasonable estimate of water system demand using existing water system demand and production data, known development plats and layouts, and reasonable projections for the limited remaining undeveloped areas. The demand estimate is appropriate for the Town's planning purposes over the next several years as build out of the area continues.

Demand is expressed as Equivalent Residential Connections (ERC). Each single family home is equal to one ERC, while higher-demand uses are expressed as multiple ERCs. Based on analysis conducted by the recent Water Planning Study, the water demand of an ERC is approximately 216 gallon-per-day (gpd). This value is based on current demand per ERC in the maximum month plus an additional 20% allowance for possible future increases in residential use per household. This allowance is prudent as current residential use per household in Round Hill is unusually low when compared to other utility systems, likely due to the current system rates. The projected demand is shown below in Table 9-1, using projections from the Water Planning Study along with updated figures on current connections.

<b>Table 9-1 Round Hill Water System: Projected Demand</b>			
	<b>Main Zone</b>	<b>Stoneleigh Zone</b>	<b>Total</b>
2016 Active Connections (ERC)	1,385	136	1,521
Active/Pending Developments	411	0	411
Underdeveloped/Infill Potential	116	5	121
<b>Projected 'Buildout' ERCs</b>	<b>1,912</b>	<b>141</b>	<b>2,053</b>
<b>Water Demand (216 gpd/ERC)</b>	<b>412,992</b>	<b>30,456</b>	<b>443,448</b>

### Section 2: Wastewater Demands

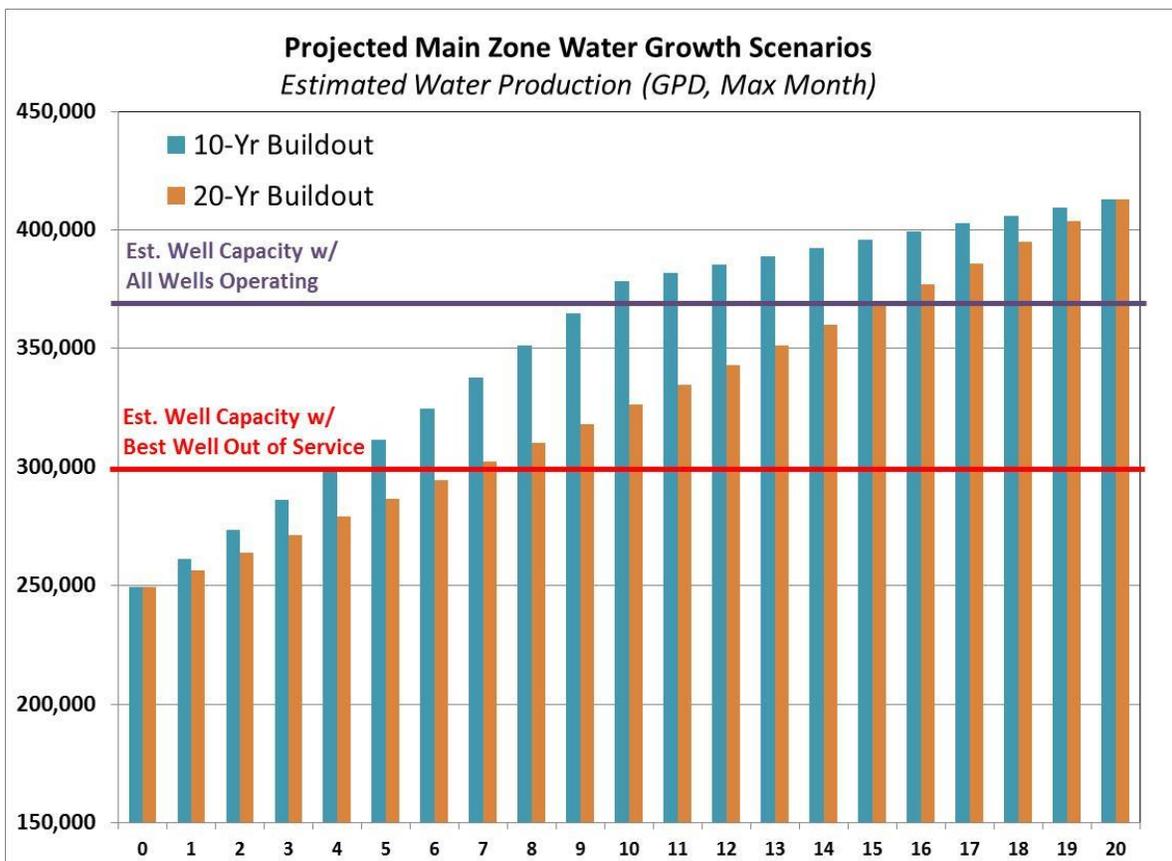
In general, wastewater flows are expected to increase proportionally to water system demands. Based on historical analysis of the past four years, the maximum monthly flow at the Wastewater Treatment plant is approximately 130% of the maximum month water demand. Given the 443,448 gpd demand projection shown above, the wastewater flow demand in the

maximum month would be 576,482 gpd. This is equal to 77% of the design capacity of the WWTP, and so the current treatment system is sufficient to accommodate expected growth as documented in Section 1 of this chapter.

### Section 3: Buildout Scenarios

The Water Planning Study considered two scenarios to assess water production capacity, one in which the remaining buildout occurs over the next 10 years, and another where buildout takes 20 years. In each scenario, the initial demand per household is set at the current demand of 180 gpd, with a 20% increase in per-household use phased in over a 20 year period so that after 20 years the per-household demand is 216 gpd. Updated versions of these scenarios are shown below.

Overall, the need for additional water production capacity in the Main Zone is considered a high priority. Depending on the actual growth rate for new homes, with a single high-capacity well out of service the Town may be unable to safely keep up with necessary maximum month water production within 5 to 10 years. In addition, available excess capacity gives operators the ability to prioritize operation of higher water quality wells, take wells out of service for maintenance, and operate the system more efficiently, which can have positive impacts to water quality and other aspects of operation.



## **PART THREE: OPPORTUNITIES & CHALLENGES**

### **Section 1: Age of Systems, Facilities and Buildings**

Several utility facilities are aging, and not only should their condition be monitored but their eventual replacement or rehabilitation should be considered in a Capital Improvement Plan (CIP). Of particular concern are the Evening Star WTP and the Well 719 building.

### **Section 2: Water Production Capacity**

The Town has already begun a well exploration effort to address the potential shortfall in capacity at buildout as identified above. Adding water capacity will not only ensure supply at buildout, but will provide necessary reserve production for operational flexibility and maintenance.

### **Section 3: Water Storage Tank System**

The Evening Star Tank is currently the only storage tank in the Main Zone, providing 500,000 gallons of storage. Maximum month daily projected production is estimated at 413,000 gallons per day as determined previously. The existing Evening Star Tank has sufficient capacity to meet the expected minimum storage requirements of the system, but a “single tank system” represents a significant risk point to the Town. The Evening Star Tank is currently in need of interior and exterior renovation, requiring it to be offline for an extended period of time. The presence of a second storage tank in the Main Zone would greatly facilitate maintenance activities, improve system reliability/redundancy, and potentially improve peak flow pressures and available fire flows in certain portions of the system. Additional storage volume would also provide the Town with improved operational flexibility.

The Town has begun engineering for a second water tank in the Main Zone. A site has been identified and acquired that would address not only redundancy with the Evening Star Tank, but also fire flow concerns and single-pipe vulnerability impacts south of the Route 7 Bypass.

### **Section 4: Single Pipe Vulnerabilities**

Most of the Round Hill distribution system is sufficiently looped to provide improved fire flows and to minimize the risk of extended outages in the event of a line break or isolation for maintenance. However, there are five significant areas of the system where a single pipe is responsible for connection to the rest of the distribution system. As the system ages, the risk of failures of older piping and water system appurtenances will increase. The reduction of risk associated with multiple single line connections with older piping within the system are considered the highest priority items.

## Section 5: Wastewater System

The current WWTP design capacity of 750,000 gallons appears to be sufficient to accommodate the planned growth in the Town's utility system, as projected in Section 2 of this chapter. Peak flows due to infiltration and inflow (I&I) have the potential to disrupt treatment efficiency, so the Town should continue to monitor the system to assess the levels of I&I in the system. Where appropriate, investigations and corrections should be made to identify and eliminate potential sources of I&I where practical.

The performance of the WWTP should be monitored over time to ensure that it remains capable of adequately treating the wastewater in accordance with the Town Discharge Permit. Changes to the permit over time may require evaluation and modification or upgrade of treatment systems or components. As equipment ages, unit processes should be evaluated and equipment should be upgraded, replaced, or refurbished as appropriate.

The gravity collection system and wastewater lift stations should be monitored over to ensure that they operate properly and that flows remain manageable. Pump upgrades may be necessary to increase capacity, particularly at the Rt. 7 pump station which pumps almost all of the wastewater in the system, but has a pump capacity that is less than the WWTP.

-9-

# Public Utility System

## Goals, Objectives & Strategies

**Goal 1: To provide drinking water for the Round Hill community that is safe, reliable and sustainable**

- a. Objective: Provide water that is safe to drink and meets or exceeds customer expectations for quality.
  1. Strategy: Maintain strict compliance with state water quality standards and testing regimen.
  2. Strategy: Perform testing beyond state requirements to better understand and diagnose local quality issues such as water hardness and secondary contaminants.
  3. Strategy: Consider operations strategies and capital improvement projects to eliminate secondary contaminants and hardness where cost-effective and providing a significant improvement in customer satisfaction.
  4. Strategy: Closely monitor groundwater sources known to be under the influence of Methyl Tertiary Butyl Ether (MTBE), and to not accept any new groundwater sources with MTBE levels above 5 parts per billion without specific treatment.
  5. Strategy: Educate customers regularly about the quality of their water and how to report water quality concerns.
- b. Objective: Minimize the risk of service interruptions and guarantee water service to the maximum number of customers in the event of system failures or drought.
  1. Strategy: Build a new southern water tank as recommended by the 2015 Water System Planning Study.
  2. Strategy: Add loop connections where possible to reduce single point of failures in the water distribution system.
  3. Strategy: Track water connections, usage and well production to monitor system supply and demand continuously, and establish water restrictions as necessary in times of drought or system outage.

- c. Objective: Secure and maintain adequate and sustainable water supplies to serve current and projected growth in Round Hill
  - 1. Strategy: Participate in regional water supply plan studies.
  - 2. Strategy: Forecast future needs by regular updates to town water system study.
  - 3. Strategy: Develop new water resources to meet 100% of projected service needs for the maximum month at buildout with the highest producing well offline.
  - 4. Strategy: Encourage water conservation through promotion of high-efficiency plumbing fixtures, rain collection and reuse systems, landscaping design, and consumer educational materials.

**Goal 2: To provide wastewater treatment for the Round Hill community that is reliable, sustainable and environmentally sound.**

- a. Objective: Operate and maintain the existing wastewater treatment plant.
  - 1. Strategy: Evaluate upgrades to the existing system to improve operations reliability such as remote sensing and control.
- b. Objective: Recommend that the Town not expand wastewater system capacity beyond the current State mandated limits.
  - 1. Strategy: Forecast future needs via regular updates to the water planning study, and monitor current treatment capacity and demand continuously.
  - 2. Strategy: Prevent extensions of the system that will exceed current capacity at buildout.
- c. Objective: Protect the Round Hill environment through sound operations practices and improvements as necessary.
  - 1. Strategy: Investigate sources of infiltration and inflow (I&I) and reduce where cost-effective.
  - 2. Strategy: Maintain strict compliance with state wastewater effluent and discharge standards.
  - 3. Strategy: Use monitoring, enforcement and most importantly public education, to discourage the introduction of substances to the system that are harmful to treatment systems and the environment.

**Goal 3: Maintain and protect utility capital and financial assets to guarantee future service and protect Town taxpayers as bond guarantors.**

- a. Objective: Establish fair water and wastewater rates that fund operations and future capital improvements.
  1. Strategy: Maintain a written fiscal policy that establishes financial reserve guidelines and other key financial targets. Monitor town performance against these targets at least annually.
  2. Strategy: Set water and wastewater rates in accordance with a prepared rate study updated at least once every five years and more often if town boundaries are adjusted or other key financial conditions change.
  3. Strategy: Use debt financing for large capital improvements to distribute their costs across the useful life of the improvement
- b. Objective: Ensure town taxpayers as owners of the utility system and guarantors of Town debt are financially protected.
  1. Strategy: Account for the under-payment of availability fees by Consent Decree connections and the guarantee of town property taxes on utility debt when setting water and wastewater rates.
  2. Strategy: Limit the maximum out-of-town rate differential to 50%.
  3. Strategy: Consider Revenue Bonds as an alternative to General Obligation Bonds when financing new capital projects.
- c. Objective: Implement capital improvements that sensibly expand and upgrade the utility systems.
  1. Strategy: Maintain a 5-Year Capital Improvement Plan showing all current and upcoming capital projects and their sources of funding.
  2. Strategy: Perform a cost-benefit analysis on improvements and upgrades.
  3. Strategy: Maintain key assets, for example regular tank inspections and painting, to maximize their useful life.

- d. Objective: Operate the system in a cost-efficient manner and establish reasonable billing policies.
1. Strategy: Avoid sole source acquisitions and reevaluate equipment and service providers periodically.
  2. Strategy: Periodically reevaluate staffing levels and roles and responsibilities, and establish compensation in accordance with market studies of our employment peers.
  3. Strategy: Share personnel and resources where cost-effective with the Town General Fund, such as office personnel, public works employees, facilities such as Town Office and vehicles. Use generally accepted accounting methods and record-keeping to appropriately assign costs to each Fund.
  4. Strategy: Establish billing processes and communications that are clear and understandable by customers. Institute shutoff and leak adjustment policies that balance the financial obligations of the system with consideration for individual circumstances.
- e. Objective: Review the inventory of utility system assets and either sell or transfer to the General Fund any properties that no longer are required to provide utility service and are not planned for any future utility system use.
1. Strategy: Consider the sale of the large reservoir site while retaining any easement rights for possible water sources.
  2. Strategy: Investigate the division of the Wastewater Treatment Plant and Sleeter Lake Park sites that best provides for independent operations of each.
  3. Strategy: Review any other utility sites that are currently not in operations, including sites of abandoned wells and other properties associated with previous water supply infrastructure for their future utility to the system.

**Goal 4: Ensure that extensions of utility services are supported by current water and sewer capacity and compatible with the Town’s land use goals and objectives.**

- a. Objective: Make utility extension decisions which are compatible with land use objectives.
1. Strategy: Maintain utility financial health so that it is not dependent on new sources of revenue.
  2. Strategy: Do not guarantee utility service in the JLMA unless it is shown to be compatible with the objectives of the Comprehensive Plan.

- 
- b. Objective: Ensure new development does not burden existing system users.
1. Strategy: Enter into water and sewer supply fee and construction agreements with new developments in the JLMA that require additional capacity demands.
  2. Strategy: Require flow projections for major commercial and mixed-use development in the service area, including the Eastern Commercial District, avoiding uses that have demand exceeding current allocations.
  3. Strategy: Will-serve letters should include provisions that do not guarantee service if capacity is not available at time of connection.