QUONOCHONTAUG CENTRAL BEACH FIRE DISTRICT COMPREHENSIVE PLAN

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1. OVERVIEW

Quonochontaug Central Beach Fire District (QCBFD or Central Beach) was incorporated in 1930. Since then, the governance has changed to now include five standing committees, one of which is the Long-Range Planning Committee (LRP). As its name suggests, LRP's mandate is to focus on longer-term initiatives which will guide QCBFD's development and protect its assets through the balance of its first century and beyond.

Known as the Comprehensive Plan, the following is the first such plan to be published by QCBFD and it covers community issues across a variety of disciplines. The issues and recommendations to be addressed were determined to be relevant to the participants in the planning process at the time of development; however, it is acknowledged that priorities and issues change, so to remain relevant, the Plan is meant to be a living document which will adjust to the needs of the community through time.

In 2020, QCBFD began working on this Comprehensive Plan. As an overview, a comprehensive plan identifies what a community looks like now, what the residents believe it should look like in the future, the path to achieving that future state and why it should be pursued.

The Comprehensive Plan Working Group, with the help of the broader QCBFD community, held multiple community-wide and targeted group visioning sessions and interviewed subject matter experts both within and outside of the community. It then researched, analyzed and synthesized the gathered information and compiled it into this proposed Comprehensive Plan. It is estimated that over 75% of QCBFD households participated in the visioning sessions and/or interview phases of the process.

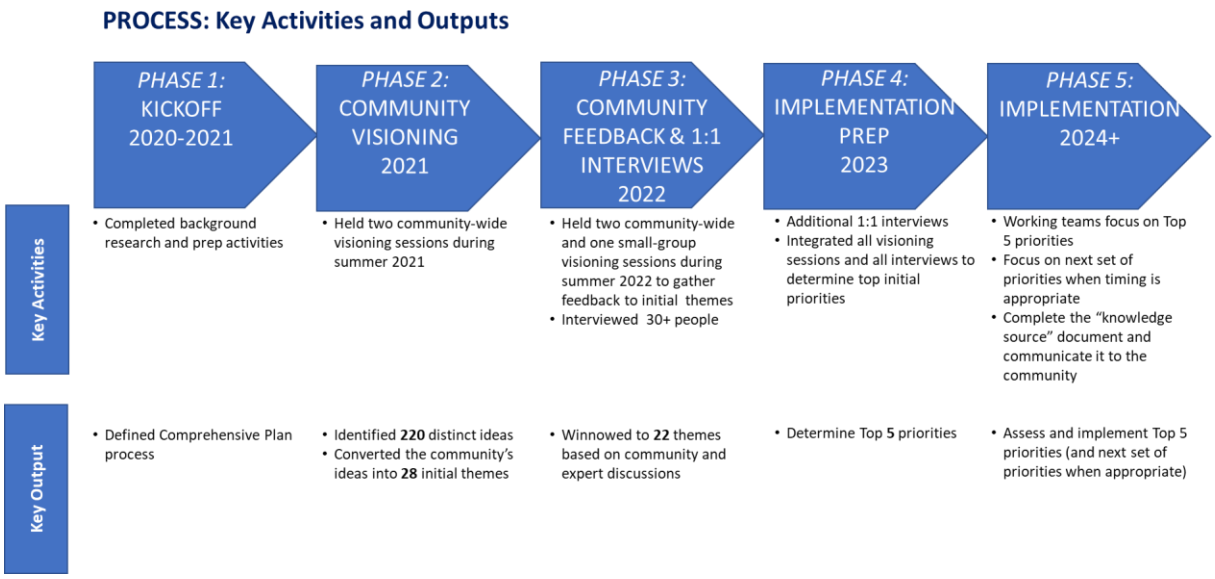
QCBFD Community Session: 2021

QCBFD Community Session: 2021

Throughout these discussions, a few ideas emerged as consistent themes and these have been identified as the Guiding Principles. LRP has attempted to incorporate these throughout the analyses and recommendations. The Guiding Principles are:

- Environmental Sustainability: Abundance of natural resources is a key QCBFD characteristic and we should do everything we can to protect those natural resources so the community can continue enjoying them.
- Infrastructure: Adequate infrastructure is critical to QCBFD's long-term viability.
- Communications: Strive for communication that is inclusive, continuous, transparent, honest and collaborative.

Comprehensive Planning Process:



Key Accomplishments During Comprehensive Planning Process:

2021:

- Held community-wide sessions to identify QCBFD's strengths, weaknesses, opportunities, and threats (SWOT analysis)
- Assessed outputs from the community-wide feedback sessions and developed draft themes

2022:

- Completed small-group and community-wide feedback sessions on emerging themes
- Completed 30+ interviews with community members and outside experts, as well as follow-up analyses on items identified during the interviews. These interviews included past/present BoG members, various committee leaders/members, community youth, community newcomers, Charlestown officials and environmental experts
- Integrated the findings to create a draft that was used for additional community feedback in 2023

2023-2025:

- Launch workstreams for Top 5 priorities
- Complete the Comprehensive Plan

2026+:

- Launch workstreams for additional priorities, as needed

The development of this Plan was built on feedback from the community itself, a ground-up effort reflecting a community-guided approach to identifying issues critical to QCBFD success. However, this is only the beginning. Refining the concepts, understanding the implications and designing appropriate and actionable steps for each priority is an imperative. Thus, the investment has been to set the foundation for the next phases of analysis and execution. Again, priorities and issues change, so to remain relevant, this Plan must adjust to the needs of the community through time.

The QCBFD Board of Governors is grateful for the countless hours invested by the members of Long-Range Planning, other volunteers and community members who participated in the development of this Plan. We hope it will be a valuable resource for future generations of Quonnie residents.

2. HISTORY

According to the Charlestown Historical Society, the coastal habitat of Quonochontaug provided a summer home for the people of the Niantic Tribe for thousands of years. Quonochontaug is an Indigenous American name that means “home of the blackfish,” a species still abundant in the waters off its rocky shore.

Quonochontaug Neck is located in Rhode Island approximately 42 miles southwest of Providence. It extends south from US Route 1. According to the U.S. Geologic Survey, US Route 1 geologically defines the broad glacial moraine created by the retreating glaciers of the Ice Ages between 20,000 and 11,000 years ago. At that time, the sea level was much lower, and the coastline was located many miles further south from current conditions. As the glaciers

melted and retreated, large deposits of sand and rock debris were left behind creating a sandy and boulder strewn beach and carving out the ponds which now include Quonochontaug and West Ponds.

The coastal habitat of Quonochontaug and the surrounding area provided a summer home for the people of the Narragansett and Niantic Tribes for thousands of years. They developed a subsistence economy based on agriculture and the rich natural resources of the area. Their daily life along all of Charlestown's coastal ponds was shaped by an abundance of shellfish and a cooler home during the summer months.

History: Colonial Times Through Early 1900s

In 1659, Thomas Stanton settled on the land, established a trading post and was given a large tract of land by the Sachem Ninigret, called "Quonocontoge Neck", in exchange for the safe return of an Indigenous princess. The Stantons prospered, as did other early families in this area, such as the Sheffields, Babcocks, Pendletons and Champlins, and developed large farmlands known as plantations. Slavery was not uncommon, with Indigenous tribespeople, West African slaves, apprentices and indentured servants being used to maintain these farms.

While much of the Quonochontaug Neck was home to large farm tracts through most of the 1600s through early 1800s, by the late 1800s the area had become a summer tourist destination. By 1895, cottages and hotels lined the Quonochontaug breachway and West Beach. At the same time, while less developed, Central Beach had 10-12 cottages, most along the beachfront.

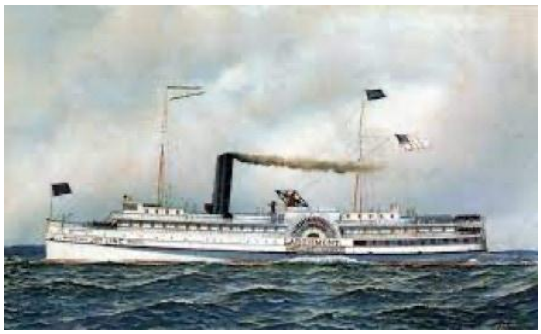
Quonochontaug was the site of an iron mining operation financed by Thomas A. Edison in the 1880s. Iron particles existed in the form of black sand on the beach, and they could be separated out with magnets and melted to produce iron. The venture failed after cheaper iron was later discovered.

Rhode Island's maritime commerce first developed in the 1600s, while the state was still an English colony, and mainly focused on agricultural goods. By the 1700s, trade shifted to the re-export business, which involved exporting products that had been made in Rhode Island using goods that had been imported from other locations. Key products were candles made of spermaceti (a wax-like substance found in sperm whales' heads), twine and cordage, and rum distilled from molasses that came from the Caribbean.

The height of Rhode Island-based maritime trade lasted only through the 1830s. By the mid-to-late 1800s, the export trade was gradually replaced by a new coastal trade aboard steamboats, many of which were passenger vessels.

The area's rocky shores created hazards for sea-faring vessels, including collisions, groundings, and debilitating storms resulting in loss of vessels, cargo and lives. In 1892, the U.S. Coast Guard built a life-saving station in Quonochontaug along the breachway to help ships that had difficulty navigating the terrain. The Quonochontaug life-saving station operated until 1937.

One of the worst maritime disasters in New England's history occurred in the Block Island Sound on February 11, 1907, just off the coast of Quonochontaug. The sinking of the *SS Larchmont*, a wooden side-wheel steamship traveling from Providence, RI to New York City, is often described as the "*Titanic* of New England." The *Harry Knowlton*, a heavily loaded three-masted coal schooner, plowed into the *SS Larchmont*, ripping a large hole in the passenger ship. All seven of the Harry Knowlton crew members survived when their lifeboat landed near the U.S. Coast Guard's Quonochontaug Life-Saving Station. The passengers and crew of the *SS Larchmont* were not as fortunate; of the approximately one-hundred-fifty-six passengers and crew members - the exact number is unknown since the passenger list went down with the ship - only seventeen survived.


U.S.S. Larchmont

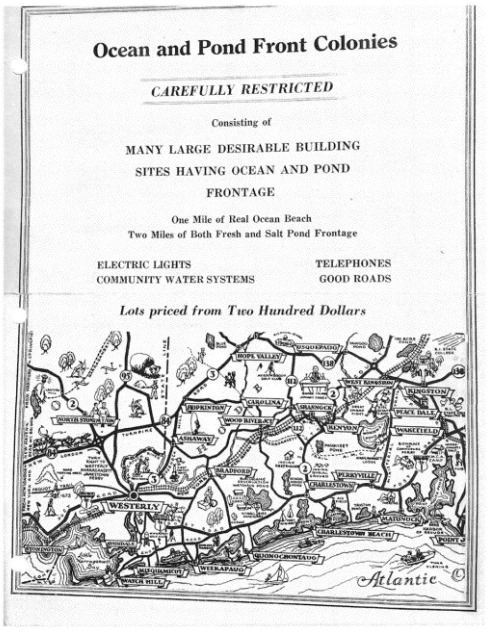
The Founding of Central Beach

In the late 1800s, Quonochontaug was home to summer boarding houses and large hotels. Local farmers started selling lots along the ocean on the Neck. By the early 1920s, Howard Thorp, a resident of nearby Westerly, started buying up large tracts of land from the farming families on the Neck. He purchased 17 acres from Briggs/Sheldon/Hoxsie, as well as 6 acres from Helsten, land from Brown, and 3 parcels from Burdick. In 1924 he purchased 45 acres of the Sheffield Farm in Central Beach, originally purchased by Thomas Stanton in 1685. From these purchases Thorp started to develop what his vision was for the seaside communities that would become East and Central Beaches. His purchases continued through the 1940s, taking advantage of low property prices and the impact the depression had on local farmers and property owners, sometimes purchasing lots for $20 or less.

On April 11, 1930, the State of Rhode Island General Assembly approved the formation of the Quonochontaug Central Beach Fire District. Thorp was the first QCBFD Moderator and held that role for 20 years. Thorp, operating as H.E. Thorp & Son with his son Nelson and later with

partner Roger Trainer, and later still with grandson Neil continued to manage most sales and rentals within the community for decades.

During this time, Thorp continued to sell and rent properties within the beach communities, all with restrictive covenants that provided him with the first right of refusal, specified restrictions regarding to whom properties could be sold, the types of structures that could be built and how the property could be used. He maintained tight control of the community's development and, in the event of any breach of the covenants, required that the property revert to his ownership.



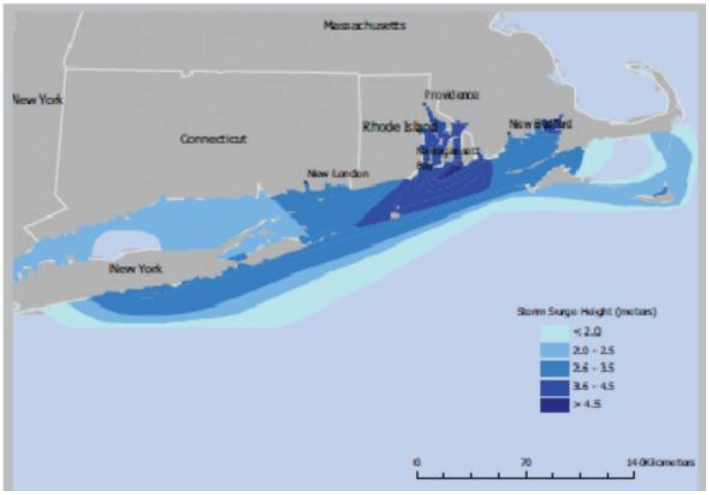
Sears Roebuck Cottage (before 1938 hurricane)

Natural Disasters

Quonochontaug has experienced catastrophic storms throughout its history. As far back as 1638, mention is made of a great storm which lashed the New England Coast with its fury and pushed the tide fourteen feet above the level of the usual spring tides. Another great storm was the gale of Sept. 23, 1815, which inundated the countryside for miles and did much damage to the fields and meadows. The great hurricane of 1869 caused much damage, due more to the wind than the sea.

On December 30, 1912, and again on January 3, 1913, record-setting Nor'easters ravaged the East Beach coastline destroying approximately a dozen summer cottages, many of which were swept out to sea, and the beach was shortened by twenty feet.

But what will go down in history as the greatest storm to ever visit these shores occurred on September 21, 1938, when a devastating hurricane, named Great New England Hurricane, swept over the New England coastline, leaving in its wake untold destruction to life and property. It arrived at the same time as the autumnal equinox high tide and it achieved maximum wind strength of 121 miles per hour. That combination created massive destruction. With reports of 100 foot waves, more than 100 cottages were totally destroyed or irreparably damaged. Henry Morris, volunteer firefighter and a builder in the area, as well as owner of the Pine Lodge Motel on Route 1, was awarded a Carnegie Medal of Valor for rescuing several individuals from Quonochontaug Pond across the breachway during the storm.



1938 Hurricane: Storm Surge (in meters; 1 meter = 3.3 feet)


The Evening Bulletin

EMERGENCY EDITION

HURRICANE KILLS AT LEAST 125 IN STATE; 29 DEAD, 52 MISSING IN WESTERLY; LOSS PUT IN MILLIONS

WESTERLY AREA TOLL IS 29 DEAD AND 52 MISSING

Many Cottages at Beaches Swept Into Ocean Carrying Occupants to Death

As Hurricane-Swept Wave Flooded Providence

FLOOD WATERS SWEEP CENTRE OF PROVIDENCE

Roofs Blown Off, Communications Cut, Power Dead, Traffic Stalled

BRIDGES OUT, BOATS ARE WASHED ASHORE

RULES LISTED IN PROCLAMATION

BRITON, HITLER CONFER: CZECH

HURRICANE CASUALTIES KNOWN DEAD IN RHODE ISLAND

1938 Hurricane: Providence Journal

Since then, severe storms, nor'easters and hurricanes have continued to ravage the RI coastline including Central Beach and the rest of Quonochontaug. In 1954, Hurricane Carol

destroyed many cottages, and significantly damaged others. Stories of those who weathered the storm and survived have become part of the local lore. Other major storms have followed throughout the years, such as Hurricane Donna and Super Storm Sandy. All of these storms have reshaped the landscape and have prompted many of the resilience interventions Quonochontaug has implemented.

Central Beach Today

Today, Quonochontaug Neck is home to several communities including East Beach and its related Quonochontaug East Beach Association (QEBA), Central Beach and West Beach. Central Beach consists of roughly 115 acres of land, all of which are within the town of Charlestown. With a few exceptions, the boundaries of Central Beach extend from the shoreline (Surfside Avenue) on the west and south, up to and including West Pond (Fresh Pond) to the East, Sea Breeze Avenue and lots on its north side, Bayview Road to the north and West Beach Road to the West. Several lots along West Beach Road north of Sea Breeze, as well some on the south side of Old West Beach Road, also fall within the boundaries of Central Beach.

QCBFD: 2008

Based on discussions with multi-generational residents, it is believed home buyers initially came from inland locations within Rhode Island. Over time, the geography expanded to Connecticut and the Greater New York City area. Buyers of these lots were mainly middle-class blue collar and white-collar families looking to build simple summer cottages near and on the beach. By contrast to former times, buyers today are mainly from professional and business backgrounds. Over the years, many of the old beach cottages have been replaced with larger homes.

According to tax assessor rolls, Central Beach has 212 lots, of which 184 homes have been built and seven are owned by QCBFD. Some families have been homeowners for generations, tracing their roots to the 1930s. There are also numerous cases of siblings, nieces and nephews who have bought or replaced cottage homes with larger, more modern homes that meet coastal construction regulations.

3. GOVERNANCE

QCBFD is a quasi-municipality incorporated under a Charter approved on April 11, 1930 by the General Assembly of the State of Rhode Island. The Charter and associated By-Laws, each as amended, specify a governance structure of a 10-member Board of Governors (BoG). All positions are filled by district volunteers. The provisions of QCBFD's Charter allow for tax assessment and collection to support the operation and maintenance of QCBFD property, including its roads and water system. The community has also agreed to road impact fees assessment for home construction projects. An Annual Operating Budget is prepared and

presented for approval at the Annual Meeting of QCBFD voters, which is held each year on the second Saturday following Labor Day.

The duties, responsibilities and terms of the BoG members are set forth in the QCBFD By-Laws. The BoG is composed of a Moderator, Treasurer, Clerk and seven other Governors, including three members at-large, each elected by the voters of QCBFD. The BoG determines the duties of the Committees and Managers. Through the years, the BoG has enacted a set of Rules and Regulations which cover issues such as construction, use of community water resources, beach and marina use, among others. A link to these rules is provided on the QCBFD community website. (www.quonniecentral.org)

Committees

The following five Committees and several managers have responsibility for specified matters and activities, subject to oversight by the BoG. These responsibilities can also be found on the community's website. (www.quonniecentral.org)

1. **Community Property Committee** is responsible for identifying and managing the real estate of QCBFD such as playground equipment and bulletin boards, landscape maintenance of all QCBFD-owned property, trash and recycling collection and the implementation of civic improvements approved by the Board of Governors. This Committee maintains maps and surveys of QCBFD property boundaries. It is customary for the Chair of this committee to sit on the BoG.

2. **Finance and Budget Committee** is responsible for the preparation of an annual district budget, subject to voter approval, monitoring the financial condition of QCBFD, raising debt to finance QCBFD projects and the preparation and filing of Rhode Island state financial reports. This Committee also works with the Treasurer and Tax Assessors to assist them in fulfilling their duties under QCBFD's Charter and By-Laws. It is customary for the Chair of this committee to sit on the BoG.

3. **Long-Range Planning Committee** looks at a broad array of issues that may affect QCBFD in future years, including the preservation of QCBFD's assets. It is customary for the Chair of this committee to sit on the BoG.

4. **Public Works Committee** is responsible for the operation and maintenance of QCBFD's water supply and distribution system and the maintenance of QCBFD-owned assets such as roads and parking lots. It is customary for the Chair of this committee to sit on the BoG.

5. **Nominating Committee** is appointed by the Moderator prior to each Annual Meeting. The Nominating Committee nominates and recommends to the BoG for their consideration and presentation to voters for election persons to serve as Moderator, Clerk, Treasurer, seven other members of the Board of Governors and two Tax Assessors. The Nominating Committee may also nominate and recommend to the voters for election one or more Assistant Clerks and Assistant Treasurers. All such persons are nominated for one-year terms, not to exceed 5 consecutive years, except the Moderator, who is elected for a single three-year term. The Nominating Committee may also recommend to the Board of Governors people for appointment by the Board as the members and chairs of the QCBFD's Committees (other than the Nominating committee itself) or as Managers.

Managers

In addition to the Committees, the Board of Governors appoints individual Managers to oversee the activities described below:

- **Manager of Ballfield and Playground** oversees the ballfield, basketball court, playground and related equipment and runs weekend softball games on the ballfield.
- **Manager of Beach and Dunes** is responsible for assuring the integrity of the beach and dunes within QCBFD. This includes maintaining the boardwalk, beach access points and issues relating to preservation of the dunes.
- **Manager of QCBFD Marina** oversees the Marina and boat launch located off Sunset Avenue and is responsible for selling and distributing boat stickers.
- **Manager of Merchandise Sales** orders and manages sales of QCBFD logo items, with an objective of raising funds to support Special Events and improvement projects within QCBFD.
- **Police Liaison and Manager of Beach Gate Monitors** has responsibility for communication with the Charlestown Police Department with respect to matters related to QCBFD, as well as staffing and scheduling parking lot gate monitors. This manager does not have law enforcement powers. All emergencies should be reported directly to the Charlestown police by calling 911.
- **Manager of Special Events** coordinates all special events in the community. Historically, these have included opening and closing Picnics, July 4th Parade, scavenger hunt, Quonnie dance, Quonnie social, and sandcastle contest; but events may change over time and all events may not be held every year.
- **Commissioner of Tennis** oversees maintenance and use of QCBFD's tennis courts.
- **Web Manager** is responsible for maintaining the QCBFD website.
- **Email Blast Coordinator** is responsible for sending periodic email blasts to the community regarding district activities and special alerts.

BoG and Committee Meetings are held in accordance with the RI Open Meetings Act (OMA) and are open to the public. Meeting notices are posted on the State website, the Central Beach bulletin boards located at the merchandise shed and beach parking lot, and on the Meetings page and Calendar on the QCBFD website. Agendas and meeting minutes are similarly posted in accordance with OMA requirements.

The following sections reflect the input from the Community Visioning Sessions, interviews with residents and external experts. "Goals" are issues identified by residents which they believe are areas the community should focus on to ensure QCBFD continues to be a thriving community. Each Goal is accompanied by "Actions" which are possible actionable next steps.

Community Leadership

Quonnie has a strong history of community volunteerism. To ensure continued community governance through volunteerism, QCBFD needs to encourage the next generation of stewards to increase their participation. Ideas voiced by residents include starting to engage with community members when they purchase their home in order to welcome them into the community, educating them on how QCBFD operates and its various committees and communicating opportunities for involvement. This would also provide opportunities for new residents to ask questions and connect with other residents.

Goal: Encourage and develop the next generation of Leadership to ensure consistency, continuity and maintenance of QCBFD.

Action: Engage new residents in the governance process by doing educational outreach to new residents when they are welcomed to the community.
Action: Hold an annual open house (online and/or in person) to provide residents with information about QCBFD's charter, by-laws, rules, regulations and the BoG committees' responsibilities and activities.
Action: Create and provide training for new members of Committees and BoG.
Action: Create robust role descriptions for each BoG, Committee and Manager roles.
Action: Create a central digital document storage for key QCBFD procedures used by the community leadership team in order to have continuity with leadership changes.
Action: Create an opportunity for new Managers and Committee members to shadow for a year before serving in an official capacity to support learning and engagement.
Action: Monitor state legislators' initiatives to change government meeting requirements to allow for virtual meetings.

Neighboring Communities and Common Interests
QCBFD could benefit from enhanced relationships with the Town of Charlestown and our neighboring communities. By leveraging our relationships with communities who share our interests, concerns, and resources we may be able to increase our voice in Charlestown decisions.

Goal: Engage in projects of common interest and concern with adjoining and nearby beach communities in South County and Washington County.
Action: Identify local efforts in which QCBFD would want to engage and identify residents to participate in these efforts. QCBFD leaders responsible for such efforts would update QCBFD on a regular basis.
Action: Expand work with Charlestown, Quonochontaug Conservation Collaborative, Salt Pond Coalition and others in a more formal manner.
Action: Appoint a resident to attend more Town meetings to stay abreast of changing legislation and other relevant issues.

Community Structure
The costs and benefits of being a Fire District, and ways to enhance the support structure for management of QCBFD, should be explored. The Comprehensive Plan process identified the need to assess what outside professional help (e.g., financial, legal, administrative) QCBFD may need in the short-term and/or longer-term to support QCBFD management.

A Fire District is considered a special purpose government, with many characteristics of a municipal government, but authorized to handle specific functions or services. The QCBFD Charter provides for taxes on the "real, tangible personal and intangible personal property within the District." Taxes can be used to purchase and procure "implements and apparatus for the extinguishment of fire, and to supply the inhabitants of said district with water for fire, domestic and manufacturing purposes", among other things, including garbage collection, maintenance of roads and public walks and the procurement of safety devices for the beach.

Key Fire District characteristics include:

- Responsibilities of public entities, including following the Rhode Island Open Meeting Act (OMA) and Access to Public Records Act (APRA).
- The option to access various state and federal funding programs and municipal financing rates and terms that are not available to privately owned entities.

Currently the community retains an accounting firm for bookkeeping services, and legal counsel when appropriate for contract analysis, governance and regulatory advice. In addition, the community uses a vendor to operate its water systems. In the future, there may be a need to expand the use of external resources to manage the increasingly complex regulatory environment and/or other aspects of QCBFD oversight.

In the past, residents have discussed, in an ad hoc fashion, whether QCBFD should shift to a homeowners' association or some other governing structure. It would be useful to undertake an assessment of the pros and cons of different governance structures to understand the alternatives available and viability of transition (see below regarding a subsequent project undertaken to address this topic).

Goal: Create a structure to ensure that records and historical information are consistently retained, stored and easily accessible while maintaining compliance with local, state and federal regulations.
Action: Explore the legal requirements and need for archiving past records.
Action: Enhance, as needed, QCBFD's records retention policies. Educate all Managers and Committees on record retention requirements.

Goal: Determine the best management structure for our community based on its needs and, if appropriate, determine whether it is viable to transition.
Action: Evaluate pros/cons of Fire District, Homeowners Association and other potential oversight structures, and the costs of converting, if possible.
Action: Identify what additional outside professional support may be needed by QCBFD (e.g., financial, town manager approach, additional legal assistance, operations).

Based on Governance being identified as a high-priority topic, in 2024-2025 a team undertook a Governance project that revisited the Fire District structure and considered other options, primarily a conversion to a Homeowners Association. The team evaluated the advantages and disadvantages of both with many community members of QCBFD and other communities, as well as experts in the governance field. The team's strong recommendation is to continue as a Fire District. The in-depth assessment can be found at www.quonniecentral.org.

Rules and Regulations

The current rules and regulations, as approved by the BoG and community residents, are for owners, their tenants and guests. The entire set of rules and regulations can be found on the community's website (www.quonniecentral.org).

Goal: On an ongoing basis, ensure the rules and regulations are widely communicated and adequately reflect the outcomes QCBFD wants to achieve.
Action: BoG reviews rules/regulations on an ongoing basis to identify any needed additions, modifications and/or removals.

4. RECREATION FACILITIES

QCBFD has many community recreation facilities including a ballfield, basketball court, two tennis courts, a playground, pond boat storage with a launch area across West Beach Road on Quonnie Pond, the beach, beach bike rack area, a shelter for those checking individuals into the

parking lot and a boardwalk that allows access to the beach without damaging the fragile dune area. In addition, QCBFD leases property to the Quonnie Tennis Club that it uses for four tennis courts, two of which can also be converted to pickleball. Quonnie Tennis Club membership is available, for a fee, to all QCBFD residents.

QCBFD Ballfield (date unknown)

The recreation facilities are managed, and improved as needed, by the Community Property Committee, with support from the Ballfield/Playground, Tennis Court, Marina and Beach and Dunes Managers.

The community input sessions held by the Long Range Planning Committee resulted in many comments about our recreation activities and facilities. Many participants stated the recreational facilities are key QCBFD assets. There were no significant negative comments about existing facilities/activities, but session participants had concerns about beach sustainability and suggestions for new/improved activities and facilities.

Goal: Maintain/Improve recreation facilities as needed.
Action: Continue the maintenance schedule of the ballfield, basketball courts, playground and tennis facilities as recommended by the Ballfield/Playground and the Tennis Court Managers. and support all reasonable suggestions to preserve and/or improve these valuable community assets.
Action: Review the existing playground activity to determine usage by age groups, review playground equipment's safety and usability and develop plan to upgrade and/or replace specific items.
Action: Create an inventory of all recreation assets and include projected timing and cost of upgrades. Convert this into a recreation capital funding plan to build up any needed reserves.
Action: Continue encouraging unstructured sports activities, and support as needed.
Action: Assess the beach bike rack area to determine whether there are enough racks, how to improve access and potential improvements to the parking layout.

Goal: Ensure recreation offerings reflect the community's needs.
Action: Every few years, complete a community-wide survey to capture QCBFD residents' evolving recreation priorities.

Goal: Ensure the boat area accommodates QCBFD residents' infrastructure needs, within CRMC guidelines.
Action: Evaluate whether it is possible to add a swim ladder at the boat dock so individuals who have difficulty walking over the shoreline rocks have access to the pond.

Action: Assess usage of the existing storage racks and determine what types (kayaks vs. paddleboards) should be added or removed, and potential reconfiguring of QCBFD's watercraft space to handle any additions.

5. NATURAL RESOURCES AND ENVIRONMENT

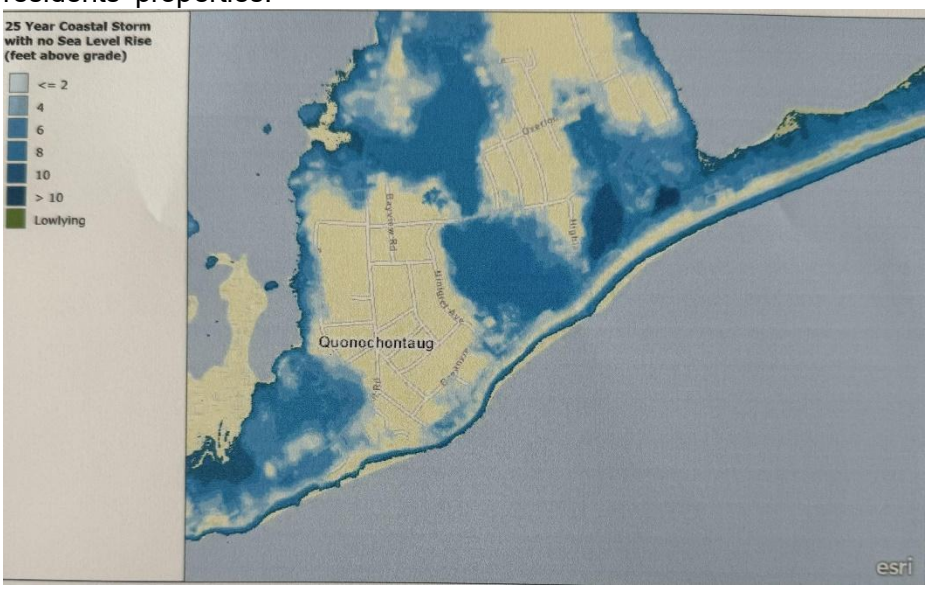
Natural Resources and Environment: Quonnie

QCBFD has a vast number of natural resources, including Quonochontaug Pond, West Pond, groundwater (drinking water), native plants, beaches & dunes and dark skies. QCBFD's natural resources activities fall into two categories:

1) **Adaptation** to the inevitable impact of climate change involving building resilience to increased flooding and volatile weather, in coordination with local, state, and federal efforts.
2) **Mitigation** via the individual and community actions that can be taken to become more environmentally sensitive and sustainable.

Rhode Island's Coastal Resources Management Council (RI CRMC) has developed an interactive program called STORMTOOLS, which shows coastal inundation projections for storm surge and sea level rise for coastal Rhode Island. STORMTOOLS sea level rise scenarios depict how high the water will be above the average height of the daily high tide from the 19-year period between 1983 and 2001. It is estimated there has been between four and five inches of sea level rise in Rhode Island since 2001 (note: the inundation levels reflect still water level, not the wave height). Seasonal high tides, such as moon tides, increase these water levels at least two feet, and storm events have sometimes increased it even more than two feet.

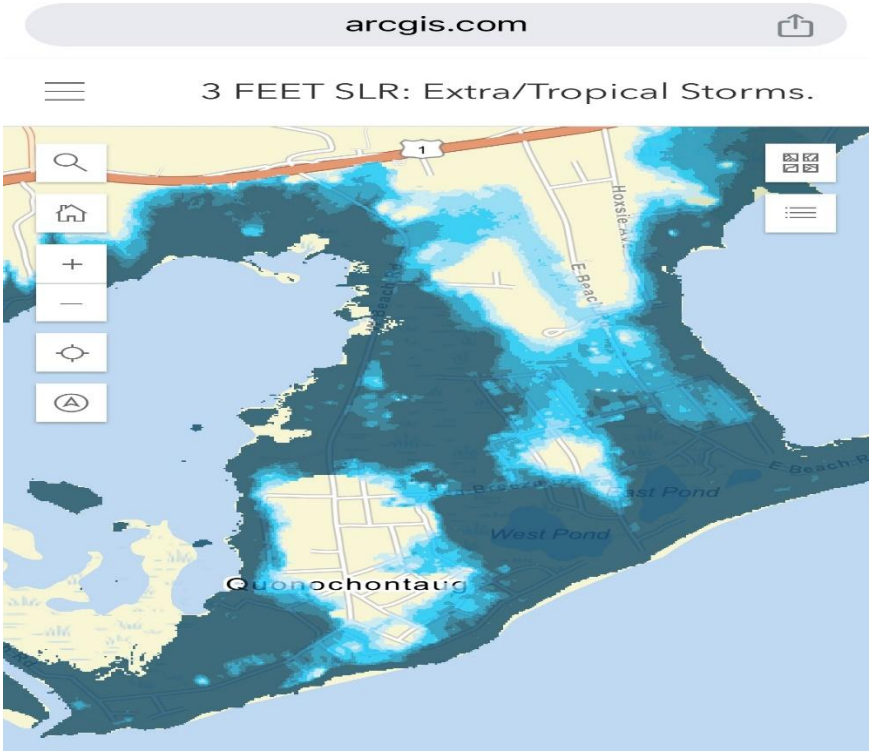
Furthermore, under current conditions, a 25-year coastal storm is predicted to impact many residents' properties.



https://stormtools-mainpage-crc-uri.hub.arcgis.com/

Looking forward, the latest projections from the National Oceanic and Atmospheric Administration (NOAA) indicate a three-to-five foot (36-60 inches) sea level rise by the year

2050, which would permanently flood many communities. If NOAA predictions are correct, it will have a profound effect on QCBFD, especially if combined with a 25-year flood event, as seen in the visual below.



https://stormtools-mainpage-crc-uri.hub.arcgis.com/

(note: anyone can run scenarios with the interactive CRMC STORMTOOL mapping capability, which can be found at https://stormtools-mainpage-crc-uri.hub.arcgis.com/).

Quonochontaug Pond

Charlestown's salt ponds, including Quonochontaug (Quonnie) Pond, represent an ecosystem of diverse habitats consisting of barrier beaches, salt marshes, intertidal flats, lagoons and adjacent shorelines with tributary streams and ponds. The relatively shallow salt ponds are fed by freshwater from springs and streams and by seawater through narrow breachways. This confined area and relatively slow flushing keeps the salt and nutrient concentrations ideal for salt marshes, eelgrass and phytoplankton, which in turn support the spawning and growth of a variety of fish and shellfish sheltered from being swept out to sea. It also makes Quonnie Pond vulnerable to water quality and habitat degradation from human uses, including contamination from sewage and use of chemicals near the ponds or their wetlands.

Groundwater is the main source of nitrogen entering into our coastal ponds. 80% of the nitrate (nitrogen + oxygen) is due to QCBFD's Onsite Wastewater Treatment Systems (OWTS) (aka septic system); 20% is due to fertilizer usage. Large inputs of groundwater, coupled with low flushing rates into the ocean, create a very valuable estuary, habitats for fish, shellfish, birds and other species. If our groundwater contains too much nitrogen, our salt ponds become particularly susceptible to eutrophication and bacterial contamination. (eutrophication is the excessive enrichment of water bodies with nutrients, primarily nitrate and phosphorous). Eutrophication is detrimental because it can cause harmful algal blooms, lower dissolved oxygen levels and create dead zones that harm aquatic life. The continued upgrade of our

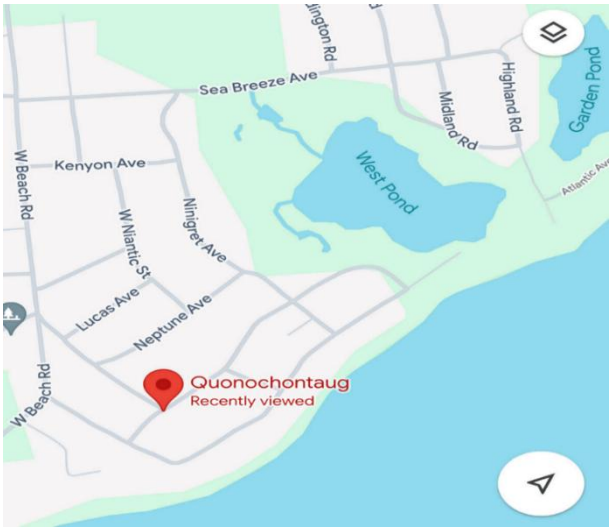
OWTS to denitrification systems, the reduction of lawn fertilizer usage and coastal feature setbacks will significantly protect and enrich our coastal environment.
Quonnie Pond is connected to Block Island Sound through the Quonnie Breachway, which is accessed from West Beach Road. Bordering the southern end of this breachway are a number of private homes (not part of QCBFD), some with docks located in the channel.

The Quonnie Breachway, constructed in the early 1960s, is a state-maintained navigation channel. The responsibility for maintenance is shared by the RI Department of Environmental Management (RIDEM) Division of Fish and Wildlife and the RI Coastal Resources Management Council (CRMC). A few years ago, the area north of the Quonnie Breachway was dredged for the first time since the breachway's construction. CRMC believes the dredging should enhance the eelgrass beds and improve navigation and recreational access for users of Quonnie Pond.

Quonnie Pond's salt marshes had been declining in prior years, so after completing the dredging project, native grasses were planted and natural drainage channels to mimic the natural hydrology of the salt marsh were added. CRMC believes these restored salt marshes should improve Quonnie Pond's resilience to the effects of environmental change and sea level rise.

QCBFD has private access to Quonnie Pond at the boat launch located along Sunset Drive. At that location, QCBFD residents have small boats, rowboats, kayaks and paddleboards. QCBFD maintains the physical structures, such as kayak and paddleboard storage areas, a dock and a parking lot. The location is registered as a Marina with the State of Rhode Island and is required to comply with a variety of associated rules and regulations. The mooring locations a short distance from the Marina are available through the Town of Charlestown. The mooring tackle is owned by, and the responsibility of, the individuals who rent the locations.

West Pond (aka Fresh Pond)
West Pond is a body of fresh water in the QCBFD community. It is bounded by properties along Ninigret Avenue, Sea Breeze Avenue, Upland/Midland/Highland Roads and QCBFD's beach parking lot. Both QCBFD and Quonochontaug East Beach Association (QEBA) have homes that surround Fresh Pond, and it is located near both QCBFD's and QEBA's water supplies.



According to a 2010 U.S. Geologic Survey report, West Pond contributes to the QCBFD and QEBA well-field recharge primarily from pond surface outflow and drainage to the water table at the north margin of the pond. The primary recharge area lies to the north of West Pond rather than directly through the sediments of the pond bottom. Because West Pond does contribute to the well recharge area, it is important to maintain good water quality in the pond.

West Pond is also located close to the beach, so there is a risk that if there is a severe storm enough saltwater will push across the parking lot and enter West Pond. Because saltwater is denser than freshwater, it typically settles below. According to the U.S. Geological Survey, under natural conditions the seaward movement of fresh water prevents saltwater from encroaching on freshwater coastal aquifers. However, groundwater pumping can reduce freshwater flow toward coastal areas and cause saltwater to be drawn toward freshwater aquifers.

QCBFD has had saltwater enter West Pond after severe storms, but to date the saltwater has not entered the community's drinking water supply. However, there is no guarantee that it will continue to be the case as sea levels rise and storms become more severe.

Goal: Ensure the condition of West Pond does not negatively impact QCBFD's drinking water source by maintaining good water quality in the pond.
Action: Identify actions needed to reduce the probability of ocean saltwater entering West Pond and impacting freshwater quality during large storms.

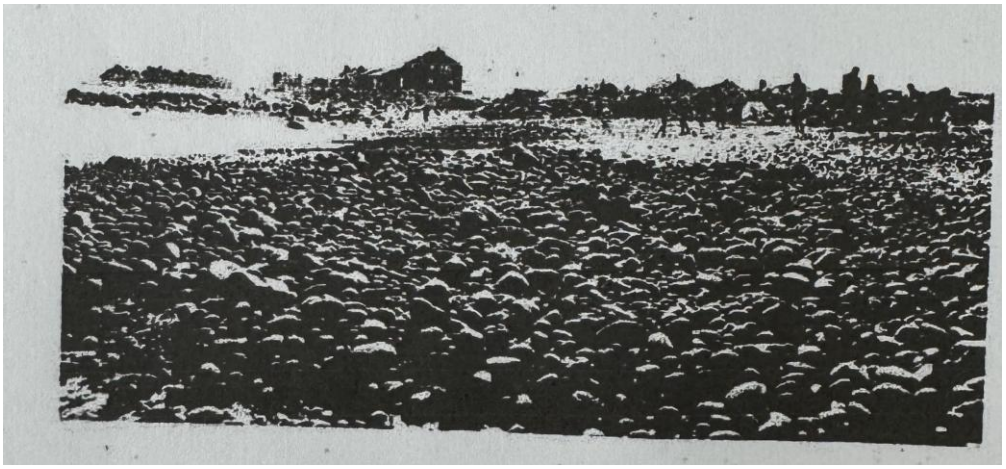
Beach and Dunes
Coastal flooding is typically from intense rainfall or the result of storm surge and wind-driven waves, which erode the coastline. These conditions are produced by hurricanes and tropical storms during the summer and fall, and nor'easters and extra-tropical storms during the winter and spring.

In Charlestown, coastal flooding occurs south of US Route 1. The coastline is altered most during large storms such as nor'easters and extra-tropical storms. High waves wash away or damage dunes that protect inland property. Narrow barrier beaches such as QCBFD's can dramatically shift position. Low-lying coastal areas in close proximity to the shore are then exposed to the threat of flooding from storm surges and rainfall. The RI CRMC has determined that the barriers of the south shore from Watch Hill to Point Judith, which includes Charlestown, are generally eroding at a higher rate than other shorelines along the Rhode Island coast due to their exposure to ocean forces.

After Hurricane Carol in 1954, QCBFD's beach suffered a large wash-out of its beachfront and parking lot. According to Seward Pomeroy's 1977 "Erosion at Central Beach" analysis, efforts subsequent to Hurricane Carol mainly focused on protecting the parking lot from future wash-out and the eastern end of the QCBFD beach, which had been under up to three feet of water during the hurricane, from the potential impacts of future storms. To achieve this, QCBFD decided to build install boulders to act as a seawall that was three feet higher than the parking lot's surface.

However, this seawall created unintended negative consequences because when waves hit a vertical obstruction, part of the energy is directed downward, pulling out the sand. With the sand gone, it is impossible to naturally rebuild the beach later when gentler tides occur. By

1967, the beach was mainly pebbles, and by 1977 the beach disappeared almost completely; only at low tide did a narrow strip of beach remain.



QCBFD Beach: 1967

In 1979, QCBFD removed the seawall, but that left the parking lot unprotected and there was concern that during severe storms sea water could wash into West Pond and contaminate QCBFD's drinking water. In 1987, Pieter Schipper wrote a report that described why the initial snow fences and beach plantings (Rosa Regosa and beach grass) had been installed, and he also developed a case for why QCBFD needed to install additional snow fencing and beach plantings.

Snow fences are used as sand catchers. They are installed in a zigzag fashion to reduce the energy of the water so it does not erode the beach as much as before. Rising sea level will constantly roll back the beaches. The more sand accumulated via snow fences, the slower this erosion process becomes. Most years, there is a natural cyclical weather pattern of aggressive winter storms that create beach erosion and the return of the sand during the spring and summer.

Beach grass helps create dunes because its bushy structure is an excellent sand catcher. Beach grass can continue to flourish while being covered in up to eight feet of sand. Although a severe storm may carry off most of the beach sand, a healthy dune will limit the amount of destruction. Currently, there are three rows of snow fences visible on our beach and beach grass that was replanted after Superstorm Sandy destroyed most of it.

QCBFD Beach: 2022

QCBFD Beach: 2022

Goal: Maintain a healthy sandy beachfront.
Action: With the assistance of coastal experts (federal, state, academic) understand the specific dynamics affecting the QCBFD beachfront and construct a plan appropriate for this location in a changing environment.

Dark Skies
Although from space one sees bright lights along the East Coast between New York and Boston, there is an exceptionally dark nighttime corridor in Rhode Island. Dark night skies are valued by amateur astronomers as well as casual stargazers. They are also important for the wildlife population. Nearly half of the species on Earth are nocturnal, and the absence of night light, natural or otherwise, is a key element of their habitat. Many species rely on natural patterns of light and dark to navigate, nest, mate, hide from predators, and cue behaviors. Adding artificial light to natural habitat may result in substantial impact to certain species.

Charlestown's dark skies are a valuable natural resource, and in 2010 the Town of Charlestown enacted Dark Skies ordinance for commercial areas to protect its dark skies for purposes of astronomy, tourism and general enjoyment, as well as to protect its residents and wildlife and the surrounding environment from the effects of light pollution. The ordinance also promoted energy efficient and sustainable lighting practices while permitting reasonable uses of outdoor

lighting for security, productivity and commerce. Although this ordinance was developed specifically for commercial entities, the Town of Charlestown believes there is great value to incorporating these guidelines within communities and at individual homes.

Goal: Reduce QCBFD's nighttime lighting as much as possible.
Action: Work with other organizations focused on Dark Skies (e.g., Weekapaug Green, Salt Ponds Coalition, Quonochontaug Conservation Collaborative) to educate residents on Rhode Island's Dark Skies initiative and ways to reduce their individual nighttime light usage.
Action: Assess the characteristics of the existing QCBFD street lighting and determine what alternatives may be available that reduce the amount of nighttime light.
Action: Educate residents about our unique stargazing location and the negative effects that occur to the environment and sky viewing by using bright nighttime lights for landscaping and other purposes.
Action: Educate residents to turn off their outside lights whenever possible. If residents want to use nighttime lights, educate that downward-facing lower wattage lights and motion detection lights minimize their personal light pollution.

Landscaping
Research has demonstrated that greenery helps to capture carbon dioxide, a greenhouse gas which heats the planet and contributes to climate change. This vegetation includes not only trees but a wide variety of bushes and native plantings that require less water.

Another advantage of respecting and maintaining greenery is that many native plantings can contribute to a healthy natural ecosystem by attracting pollinators such as butterflies and bees. Wild bee pollination is fundamental to the reproduction of most wild plant species and is key to securing adequate yields in approximately 85% of food crops. Over the years, there has been a decline in the number of bees and other pollinators, mainly due to climate change and increased pesticide use.

Goal: Educate QCBFD residents on landscaping best practices.
Action: Educate residents on the negative impact of pesticide usage.
Action: Provide Charlestown's list of preferred native plants and pollinator-friendly plants, and communicate their positive attributes.
Action: Educate residents about Charlestown Recommended Landscaper Process and encourage residents to choose vendors that utilize the process.

Energy
Locally and globally there has been much discussion about the steps necessary to reduce both fossil fuel usage and greenhouse gas emissions. Historically, much of Charlestown has used oil, gas or propane for heating homes. Oil produces the most greenhouse gas emissions. Gas and propane are also large greenhouse gas emitters.

Rhode Island is a member of the Regional Greenhouse Gas Initiative (RGGI), a market-based program to reduce carbon emissions from electricity generation in 12 Northeastern and Mid-Atlantic states. In 2022, about 16% of Rhode Island's in-state electricity came from renewable energy sources (solar, wind, hydro), but Rhode Island has set the goal of obtaining 28% of its power supply from renewable resources by the end of 2024 and 100% by the end of 2033.

Individual homeowners in Rhode Island are able to sign up with utility providers to make sure their power comes from renewable sources. In addition, both Rhode Island and the federal government provide tax incentives for homeowners to install solar panels as a way to help

people reduce their energy costs while also helping the environment by reducing greenhouse gases.

Heat pumps are another way for homeowners to reduce their energy usage. They have gained widespread usage globally, and are now gaining traction within the U.S. In 2022, for the first time, heat pumps topped gas-powered furnaces in total units sold in the U.S. (4.3 million heat pump units versus 3.9 million natural gas furnaces). Heat pumps work by extracting heat from the air, ground, or water and transferring it inside a building for heating and to the outside for cooling. Because heat pumps transfer heat rather than generate it, they're more efficient than conventional heating systems like boilers, furnaces, and electric heaters. Compared to oil-fuel systems, ground source heat pumps are three times more efficient, while air source heat pumps can reach up to 50% greater efficiency.

Goal: Encourage residents to reduce their carbon emissions.
Action: Educate residents on greenhouse gas emission rates from the various household energy options (oil, gas, propane, electricity).
Action: Educate residents on positive environmental attributes and cost savings of installing energy-efficient technology.

Lawn Mowers and Leaf Blowers
During the Comprehensive Plan visioning sessions, many residents stated they want lawn care companies to reduce their noise level. Currently, the vast majority of QCBFD residents use lawn service companies that operate gas-powered mowers and blowers, yet battery-operated options, although currently more expensive than gas-powered, emit less greenhouse gas and are quieter to operate.

A 2017 study by the California Resources Board concluded that one hour of operating a gas-powered leaf blower was equivalent to driving a Toyota Camry sedan about 1,100 miles. The noise from commercial gas-powered leaf blowers has been measured by Harvard University researchers at 85 decibels, well above the 70 decibels maximum in Rhode Island's residential areas.

Goal: Reduce QCBFD's greenhouse gas emissions and noise pollution from landscaping services.
Action: Evaluate the benefit of contacting existing local landscaping service providers to determine their interest in converting to battery equipment.
Action: Distribute to QCBFD residents Charlestown's list of environmentally friendly mowing services that use battery equipment.

Natural Resources & Environment: Quonnie Neck
Although QCBFD is doing a lot of work specifically for the QCBFD community, a recently launched volunteer organization – Quonochontaug Conservation Commission (QCC) – is bringing together environmentally-focused volunteers from across Quonnie's East, Central and West Beach communities, as well as various environmental groups such as Salt Ponds Coalition to take a broader geographic approach for environmental initiatives. QCC's mission is to raise awareness of the natural wonders and resources the entire Quonnie Neck enjoys, and it focuses on communicating conservation-related information and holding environmental educational events to benefit the entire Quonnie Neck region's residents.

QCC's work is organized into five main areas:

- Quonnie Gardens and Landscapes: Promotes native plantings, non-toxic and organic gardening and pest control. It communicates the importance of maintaining or creating habitats for birds, butterflies, bees, and all pollinators. It also encourages composting and has helped launch a composting program.
- Wildlife and Habitat: Fosters understanding about the vital components of flora and fauna that make these ecosystems and landscapes function.
- Dark Skies: Addresses the issue of light pollution by recommending simple steps such as downward casting LED streetlamps and motion sensor switches, to increase visibility of the sky and stars for cultural and education purposes, as well as to facilitate habitat and migration.
- Sustainable Building & Clean Energy: Researches and shares best practices in green building and energy efficiency in the home and raises awareness about Rhode Island residents' ability to get electric power from renewable energy options such as wind, solar and hydro sources.
- Water Quality and Conservation: Promotes awareness and urges conservation practices including lawn watering, length of showers, and rain barrel and other water collection strategies. QCC has distributed water conservation placards for both residents and renters to raise awareness about being "water smart."

Wetlands and Coastal Buffer Zones
In Rhode Island, Buffer Zones are areas of undeveloped, native vegetated land adjacent to freshwater wetlands and our coastal shoreline. They provide a natural transition zone to reduce the impact of adjacent development, help reduce the effects of human disturbances, provide habitat for wildlife, reduce the transport of nitrogen into our aquatic environments and prevent coastal erosion. Wetland and Coastal Buffer Zones are regulated by the RI DEM and CRMC and they are extremely sensitive to lawn fertilizers and pesticide applications. Buffer Zone widths range from 15-200 ft and vary based upon a tiered approach, depending on specific regional conditions and lot size. Much of the development in QCBFD occurred prior to these regulations and past property intrusions into our wetlands and coastal zones are grandfathered. Enforcement may be required upon the application of certain state and local permits. Without an adequate Buffer Zone, runoff of lawn fertilizers will significantly degrade adjacent water bodies and is a great concern to the preservation of our natural resources.

Goal: Maintain robust Buffer Zones to help preserve the bodies of water.
Action: Educate QCBFD community on the importance of Buffer Zones and specific actions they can take to maintain them, especially as it relates to lawn fertilizers and pesticide applications.

Wildlife
Quonnie Neck continues to have abundant and diverse wildlife. Some of the current species seen around Quonnie Neck are mink, fisher cat, bobcat, red fox, bats, coyote, deer, harbor seals, ospreys, groundhogs and possum.

Natural Resources & Environment: Beyond Quonnie
When Charlestown developed its 2020 Comprehensive Plan, it placed a large emphasis on maintaining the town's natural resources. The town's' Comprehensive Plan stated "Charlestown's abundant natural resources shape the town's rural character while providing a high quality of life for its residents and a source of great attraction for its visitors. Its beaches and coastal ponds, rivers, streams and many freshwater ponds provide habitat for fish and

shellfish and many recreational opportunities. Its wetlands provide unique ecosystems and flood control…its aquifers provide the only source of drinking water." The town Comprehensive Plan continued "protection and enhancement of natural resources is critical to sustaining the vitality of the community, as well as its tourist and recreation based economy."

Charlestown's emphasis on natural resources was echoed by our QCBFD interviewees and visioning session participants, who confirmed natural resources are one of the most-cherished QCBFD assets, and the community should do everything in its power to be strong guardians.

In 2010, Rhode Island Special Area Management Plan (SAMP) completed research that concluded there have been demonstrable changes in air temperature, ocean temperature, sea level, storminess and precipitation across national, regional and state levels. The primary concerns with sea level rise in the RI Ocean SAMP area are erosion, flooding and loss of coastal habitat and beaches. Sea level rise will reduce the effectiveness and decrease the life of existing coastal structures such as seawalls, docks, roads and bridges.

Rhode Island is part of an accelerated sea level rise "hotspot." The observed sea level rise in Rhode Island is higher than the global average. This is consistent with a regional trend along the entire North American Atlantic coast between the Canadian Maritimes and North Carolina.

Geographic Scale	Historic Sea Level Rise	Annual Rate of Sea Level Rise	Annual Rate – Recent Acceleration
Global Average	1901-2010: 7.48 inches (0.19 meters)	1901-2010: 0.07 inches (1.7mm)/yr	1993-2017: 0.12 inches (3.1mm)/yr
Rhode Island	1930-2017: 10.0 inches (0.25 meters)	1930-2017: 0.11in (2.75mm)/yr	1986-2017: 0.16 inches (3.98mm)/yr

Rhode Island Coastal Resources Management Council Shoreline Change SAMP 2018 Volume I, Chapter 2, Page 4

Sea level rise is just one of many climate change variables for which Rhode Island has exhibited larger increases than the overall global average.

Climate Change Variable	Geographic Scale	Observation of Recent Change
Air Temperature	Global	Global mean temperature has increased 0.74°C (1.33°F) over the last 100 years
	U.S. Northeast	Since 1900, the annual mean temperature has risen 0.83°C (1.5°F)
	Rhode Island	Average annual temperature rose 0.94°C (1.7°F) from 1905 to 2006
Ocean Temperature	Global	The ocean has been warming consistently over the past 50 years, with 2007 the warmest year on record (note: based on data through 2010)
	U.S. Northeast	Annual average temperatures in the waters off the southern New England coast have

		increased by about 1.2°C (2.2°F) since the 1970s
	Rhode Island	In Narragansett Bay, sea surfaces temperatures have risen 2.2°C (4.0°F) since the 1960s
Storminess	Global	The severity of tropical cyclones has increased since the 1970s
	U.S. Northeast	The severity of tropical cyclones in the North Atlantic has increased

Rhode Island Special Area Management Plan 2010, page 173

In 2015, the EU and 194 countries, accounting for over 98% of greenhouse gas emissions, ratified the Paris Agreement, which is an international treaty on climate change. The Paris Agreement's overarching goal is to keep the rise in mean global temperature to well below 2°C (3.6°F) above pre-industrial levels, and preferably limit the increase to 1.5°C (2.7°F), recognizing that this would substantially reduce the effects of climate change.

Global emissions need to be reduced by 43% by 2030 for the world to achieve the Paris Agreement's goal. To help in that effort, over the past few years the Intergovernmental Panel on Climate Change (IPCC) has released reports that include potential actions industries and countries can pursue to limit global warming. These recommendations have been endorsed by the UN and other global governmental organizations.

While the large-scale initiatives included in the IPCC's recommendations will need to be undertaken at the country and region level, there are many climate change activities that can be pursued by state and local (e.g., QCBFD) entities that can positively impact that community's natural resources. While there are limits to what one individual or community can do, a general consensus has emerged that we all can do something. For QCBFD, the key actions it can pursue to positively impact its natural resources and environment were included in the first part of this Natural Resources & Environment section.

6. INFRASTRUCTURE

For QCBFD, Infrastructure encompasses water distribution system, roads, fire protection, community property, lights and communications. The community also has utility lines, but these are owned and controlled by the power company.

The Public Work Committee is responsible for the operation and maintenance of QCBFD's water supply and distribution system, and the maintenance of QCBFD-owned roads and parking lots.

The Community Property Committee is responsible for identifying and managing QCBFD's real estate assets, landscape maintenance of all QCBFD-owned property, trash and recycling collection, implementation of civic improvements approved by the Board of Governors and maintaining maps and surveys of QCBFD property boundaries.

QCBFD communications responsibilities are mainly divided between the website manager and e-blast coordinator, with certain other communications through US mail.

Water System

During the 1920s, the QCB lots that Howard Thorp sold had deeds that contained provisions for access to water lines to the properties. In 1930, QCB voted to form QCBFD. The enabling legislation includes provisions, among other things, for the right to "construct and maintain its own water works, mains, and other necessary apparatus for supply water within its limits for fire, domestic and manufacturing purposes". At that time, the water system was operated on a seasonal basis.

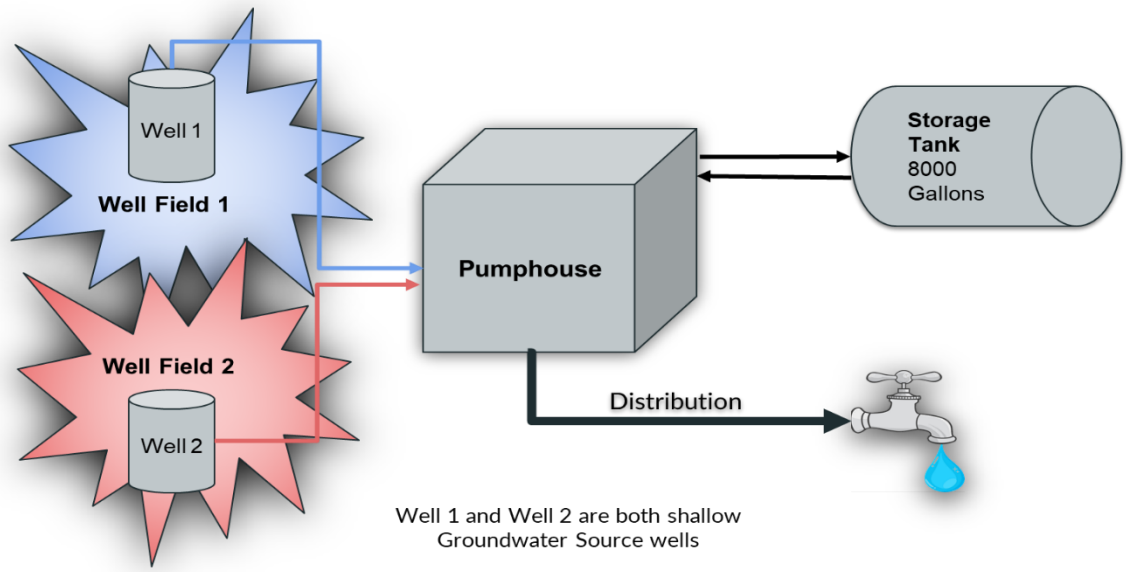
In 1948, QCBFD agreed to acquire the water system properties from Thorp. At that time the system's well and pump house were in the area that is now the playground and ball field. In 1948-1949, Well #1 was created and a new pump house was constructed in the current wellfield north of Seabreeze Avenue. In 1965, Well #2 was added in the same area approximately 100 feet west of Well #1.

Key actions that have occurred since 1980 include:

- 1982: The seasonal distribution system was converted to a year round system; PVC pipe was laid for the distribution system.
- 1990: Two hydropneumatic storage tanks were added to allow for water storage: 1,775 gallons each (1,000 gallons usable storage per tank).
- 1997: Pumphouse enlarged to allow for calcite pH adjustment system.
- 1999: Hydropneumatic tanks relined.
- 2008-2010: Major water system upgrade:
    - 8,000 gallon storage tank installed with UV lamp to recirculate and sterilize water in storage tank.
    - Control panel for seamless well pump duty cycle control and improved online remote monitoring.
    - Upgraded water system pH and corrosion control treatment.
- 2022-Present: 4-Log chemical disinfection (chlorination) system implementation
- 2022-Present: Water treatment plant upgrade and expansion, including green sands filtration implementation

Key components of the QCBFD-managed Water System include two wells, one pump house, one storage tank and a water distribution system. In addition, many owners have personal wells that provide water for their sprinkler system and/or pool.

High-level overview of the current QCBFD water system:



Wells

QCBFD has two wells – Well #1 was constructed in 1948-1949 and Well #2 was constructed in 1965. Well #1 provides most of QCBFD's drinking water because Well #2 has a higher iron concentration. In 2008, QCBFD undertook a $250K+ capital improvement of its wells and storage system because the community wanted to ensure consistent water availability during peak season.

Until August of 2019, QCBFD had several positive coliform samples, as did East Beach, but these all cleared spontaneously. However, in mid-August 2019, the two wells and distribution samples returned Total coliform+ (TC+) and Well #2 was E Coliform+ (EC+). The E coli in Well #2 triggered a Boil Water Advisory and the recurring TC+ samples triggered a Level 2 Assessment. QCBFD was on a boil water advisory for 11 months - from August 2019 through July 2020. Based on findings during the Level 2 Assessment, RIDOH required QCBFD to install a 4-log chemical disinfection system which can be monitored in real time. This new system will include water sanitization with chlorine, and sand filters to remove iron and manganese.

Pump House

The pumphouse was enlarged in 1997 to accommodate a calcite pH adjustment system. In 2025, QCBFD began to enlarge the pump house again, this time to allow room for the filtering and disinfection equipment needed for the 4-log chemical disinfection system. It will also be made secure with fencing and outdoor lighting. Plans include enough space for future installation of devices to remove PFAS and PFOS, so called "Forever Chemicals." Currently, neither state nor federal agencies have developed guidelines for these pollutants, but there is an expectation that standards will be implemented at some point.

Distribution System

The QCBFD water distribution system's pipes and mains were initially installed in the 1950s and upgraded in 1980s to accommodate year-round usage. Water distribution occurs through a

two-mile network of PVC pipes of varying diameters that is laid out in a tree branch fashion. There are blow-offs at various locations to flush the system. At the low point on Ninigret just before the intersection with Surfside, there is a pit with a pump to remove rainwater or stormwater from the road and direct it under the remainder of Ninigret, under Surfside and through the east side of the property at 153 Surfside to the beach.

QCBFD water distribution also includes four bubblers and spigots. They are located at the driveway to the pump house, the ballfield near the backstop, the playground and the beach parking lot block.

Goal: Reduce risk of future TC+ and/or EC+ test results and Boil Water Advisories.
Action: Work with third party water system manager to clearly define and implement water system (well field, pump house and water distribution) preventive care best practices.

Goal: Ensure QCBFD's water system is in good physical shape.
Action: Create water infrastructure plan that defines current-state physical plant and water distribution system.
Action: Develop a maintenance plan for current infrastructure.
Action: Develop a long-term plan to easily determine when to upgrade parts as they near their end-of-life date.
Action: Develop a plan to build financial reserves to cover expected costs.

Sprinkler Systems
Some owners have private wells they use for sprinkler systems. These wells take water from the same aquifer QCBFD uses to provide water to residents' homes. Many private well owners utilize conservation efficiency actions such as setting timers to only water overnight when the least amount of water evaporates, ensuring sprinklers do not water the roadway and installing monitors to prevent watering when it is raining or the soil is adequately saturated. However, there are still some private well owners that do not utilize these various conservation methods, which would then lead to a larger-than-necessary drawdown from the aquifer.

Goal: Ensure private sprinkler systems do not impact QCBFD aquifer's ability to provide enough water for the community.
Action: Create education materials for QCBFD owners on how to maximize conservation efficiency of their sprinkler systems.

Roads
The Public Works Committee oversees QCBFD's 2.3 miles of private roads. Those roads are repaved every 6-8 years. The repaving process is a "chip & seal" approach. This involves stone and oil being applied but does not remove the existing surface.

QCBFD has installed speed bumps throughout the community. Speed bumps have typically been installed on an ad hoc basis. In addition, the dimensions of the installed speed bumps vary greatly, which has created an issue for a variety of vehicles.

Central Beach owns the roadways to a 40 foot width generally measured as 5 feet inside the telephone poles to across the opposite side of the street or 35' from the utility pole line. The road surface, however, averages approximately 20', thus QCBFD property extends beyond the road surface by approximately 10' on either side, though that may vary from location to location due to the migration of the road surface across the 40' right-of-way. QCBFD limits the use of its

unpaved roadway, thus the moving of mailboxes or other plantings located on this property must be done in cooperation with QCBFD. Further, QCBFD has the right to disturb and not replace any plantings, boulders or improvements within these road boundaries in the course of maintaining the roads and its water system.

Property owners are required to maintain all trees, shrubbery, grasses and other improvements and/or fixtures within the unimproved section of QCBFD's rights-of-way adjoining their property in a manner to prevent unsafe or dangerous conditions. This includes the removal, by the property owner, of any obstruction that impairs safe or free movement on QCBFD roads and maintenance of adequate sight lines at corners for safety, specifically including all trees overhanging QCBFD roads, to a height of no less than 13.5' to provide access to fire equipment. Common obstacles on the unimproved section of QCBFD roads include elevated pavers, boulders, trees and overgrown shrubs.

From time to time, the Public Works Committee identifies locations where owners have placed obstacles which encroach on QCBFD property, hindering emergency vehicles' and residents' ability to navigate community roads. However, this review should be updated in conjunction with DCFD in order to ensure safe passage of emergency vehicles throughout QCBFD.

Considering the importance of groundwater recharge, the availability of property on the shoulders of our roadways and puddling on our roads, the installation of small-scale infiltration basins could be considered by the Public Works Committee. Small-scale infiltration basins are stormwater management systems constructed with highly permeable components designed to both maximize the removal of pollutants from stormwater and to promote groundwater recharge. Pollutants are treated through settling, filtration of the runoff through and biological and chemical activity. Installation could occur during road resurfacing construction.

Goal: Ensure QCBFD and DCFD can easily navigate QCBFD roads.
Action: Study QCBFD roads as they relate to fire truck, EMS access, biker and pedestrian usage.
Action: Study the feasibility of installing small-scale infiltration basins to help with stormwater management.

Goal: Ensure the integrity of QCBFD dominion over the unimproved roadways.
Action: Assess whether any speed reduction infrastructure (and what type) is needed in the community. Ensure any speed reduction infrastructure installed is of uniform dimensions niform across the community.
Action: Study impact of residents' encroachment on QCBFD rights-of-way and other QCBFD property.
Action: Communicate changes permitted to be made by residents on unimproved QCBFD rights-of-way.

QCBFD Lighting
QCBFD has seventeen streetlights. Over the past few years, all have been upgraded to LED lights, which greatly improves energy efficiency while providing enough light for security. The intensity of these lights can be adjusted by QCBFD. There are two roads on which the lighting is not owned or controlled by QCBFD: Sea Breeze and West Beach Road. Both of those sets of lights are owned and controlled by Charlestown because they are on town roads.

QCBFD does not regulate residents' various house and property lights. Currently, QCBFD does not regularly communicate to owners the special dark skies situation that exists along our coastline. The result is that some owners use bright outside lights throughout the night, which leads to light pollution and negatively impacts Dark Skies.

Goal: Maintain QCBFD lighting with energy-efficient and low-lighting technology that also helps ensure community safety.
Action: Review lighting level currently utilized by all QCBFD street lighting to determine whether it is adequate or excessive and could be reduced.

Utility Lines
All QCBFD power lines are on poles, except a section between number 153 and number 109 Surfside Avenue; that section is underground. Most of the newer houses have put the wires from the road to the house underground. There has been a study completed about whether to bury all QCBFD utility lines. Data from Rhode Island Energy (RIE) shows that power outages since 2012, including during Superstorm Sandy, mainly occurred outside of QCBFD. Furthermore, severe storms usually occur during the off-season months and the power coming down West Beach Road is sometimes proactively turned off by RIE as a precaution. For a variety of reasons, QCBFD decided not to pursue putting power lines underground community-wide. However, individual homeowners can pursue it on their own, but must get approval by the Board of Governors because it will utilize part of QCBFD's setback.

Fire Protection
Currently, fire protection is contracted out to Dunn's Corner Fire Department (DCFD). The fire protection contract is the second largest budget item (only the water upgrade project is currently a larger item). DCFD is the Fire Department located closest to QCBFD, but an assessment is undertaken when the contract is near expiration to determine whether DCFD or a different fire department is the best option for providing the community with fire protection.

Public Works Committee is the main group that works with DCFD on fire protection activities. It is DCFD's responsibility to maintain QCBFD's fire-readiness, but DCFD needs support from Public Works Committee to perform preventive care and ensure full access to properties and fire-fighting items.

When battling a fire within QCBFD, the DCFD can refill its portable tanks from cisterns located near the Grange. Non-DCFD fire trucks that help battle a QCBFD fire would need to get their water from a fire hydrant to fill their portable tanks, which are then driven to the fire. The nearest fire hydrant is at Shelter Harbor Inn. In the past, there has been discussion whether QCBFD and QEBA should co-install a water tank near the community so DCFD has closer water access during firefighting.

Currently, DCFD drives around QCBFD on a regular basis to be comfortable with all the obstacles (e.g., trees, bushes, rocks) that are in the community, and has a list of obstacles they would like removed. At the same time, QCBFD Public Works Committee has created a list of obstacles that should be removed. The two groups should work together on an ongoing basis to create an integrated list that meets both groups' needs.

Goal: Public Works Committee and DCFD consistently coordinate on emergency-related and maintenance activities.
Action: Public Works Committee and DCFD work together to create a master list of fire protection activities that need to be done on a regular basis, as well as timing for each activity.

Action: Monitor wear-and-tear on fire protection equipment to identify needed maintenance.
Action: Assess whether a water storage tank, either independently or in coordination with East Beach, is a feasible alternative.

Trash and Recycling Removal
QCBFD provides trash and recyclable collection via a third-party. The trash vendor has a multi-year contract that is re-bid at the expiration of its term. Overall, residents are satisfied with the service QCBFD receives from the current vendor. QCBFD should continue to ensure recyclables are picked up separately from trash.

Goal: Maximize residents' recycling rate.
Action: Continue educating QCBFD community on what items are and aren't recyclable. This can be done in conjunction with other Quonnie Neck organizations' recycling education efforts.

Communications
Currently, QCBFD uses paper mailings, a website, e-blasts and postings on several community bulletin boards to communicate with the community. The current communications methods have become piecemeal approaches to communicating valuable information, with individual people leading each type of communication, including:

- Webmaster maintains the QCBFD website.
- The Email Blast Coordinator sends a weekly Wednesday email from July 4th to Labor Day, periodic email blasts from the Moderator, Committee Chairs and Managers to the community regarding district activities and special alerts and emergency QCBFD alerts on an as-needed basis.
- Spring Packet Coordinator distributes a packet each May that contains information for all residents about the coming summer. It typically includes beach and pond passes, beach sticker, detailed calendar of community-wide events, a letter from the Moderator, current rules and regulations, trash and recycling information, and sometimes includes flyers from the Quonochontaug Historical Society and/or Quonochontaug Conservation Collaborative.

During visioning sessions, potential upgrades to QCBFD's current communication approach were identified that could yield a better communication experience while requiring minimal cost. This would also create a good opportunity for younger, more tech savvy QCBFD residents to get more involved with volunteerism.

Goal: Enhance QCBFD residents' community knowledge and connectedness.
Action: Assess community communication needs, the types of information being distributed, how it is currently communicated, optimal way for each type of communication to be sent and the time and cost needed if pursue an integrated comprehensive communication plan.

Goal: Centralize and secure owner information.
Action: Assess whether to consolidate the current setup of standalone databases (e.g., QuickBooks, Excel tax database, eblast contacts) into a single database of all resident information from which can pull needed information for various activities.

7. WATER

The Quonochontaug neck has adequate access to water that can sustain future households based upon the current situation of seasonal occupancy driving demand. The current water

systems of QCBFD and QEBWA have wells with adequate water resources and controls to serve this seasonal community under average rainfall conditions. Drawdown controls may be required to reduce the amount of water delivered to households during drought conditions.

This Water section analyzes the balance between our water source and the competing elements of water demand and suggested avenues of management to ensure we can provide adequate potable water to our communities. It outlines the ways in which QCBFD has developed and currently manages and protects this resource, including a brief history and planned water system upgrade project designed to position the system for the future. It also summarizes the dynamics of our watershed as framed by the Urish Study and highlights the short-term seasonal trends as well as the longer-term 15-year trend.

This section's objective is to identify long-term risks to the quantity and quality of water available. It analyzes trends in water usage in households serviced by QCBFD and Quonochontaug East Beach Water Authority (QEBWA) water systems and the potential risks from competing usage of water from vegetation and irrigation. It also identifies trends in water quality with respect to various contaminants such as nitrates, PFAS and saltwater intrusion.

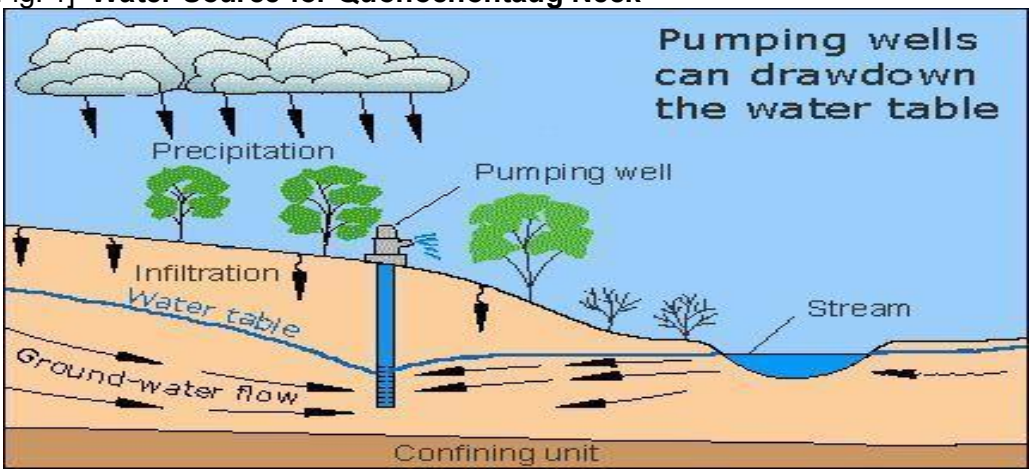
Key take-aways include the need for ongoing vigilance, investigation, monitoring and ongoing education and communication to ensure ongoing availability of ample drinking water to QCBFD residents. Further demographic investigation and analysis is recommended to better anticipate how emerging trends in the makeup of our constituents may impact future water usage.

Where Our Water Comes From And How It Is Consumed

A Hydrologic Budget is an input/output equation that takes into account all water flowing into, out of, and stored within a defined area, such as a watershed or aquifer. Water availability in QCBFD can be described via Hydrologic Budget. The dynamics of this system were studied and described in a 2000 study by Dan Urish, Hydrologist URI (hereafter referred to as the "Urish Study").

Hydrologic Budget Input: The only input source for the Quonochontaug neck is precipitation, which varies on both an annual and seasonal basis. The precipitation that is absorbed by the soil in the watershed then percolates into the groundwater, which is the source for the Quonochontaug Neck public and private well water. No water sources exist outside the watershed.

[Fig. 1] **Water Source for Quonochontaug Neck**

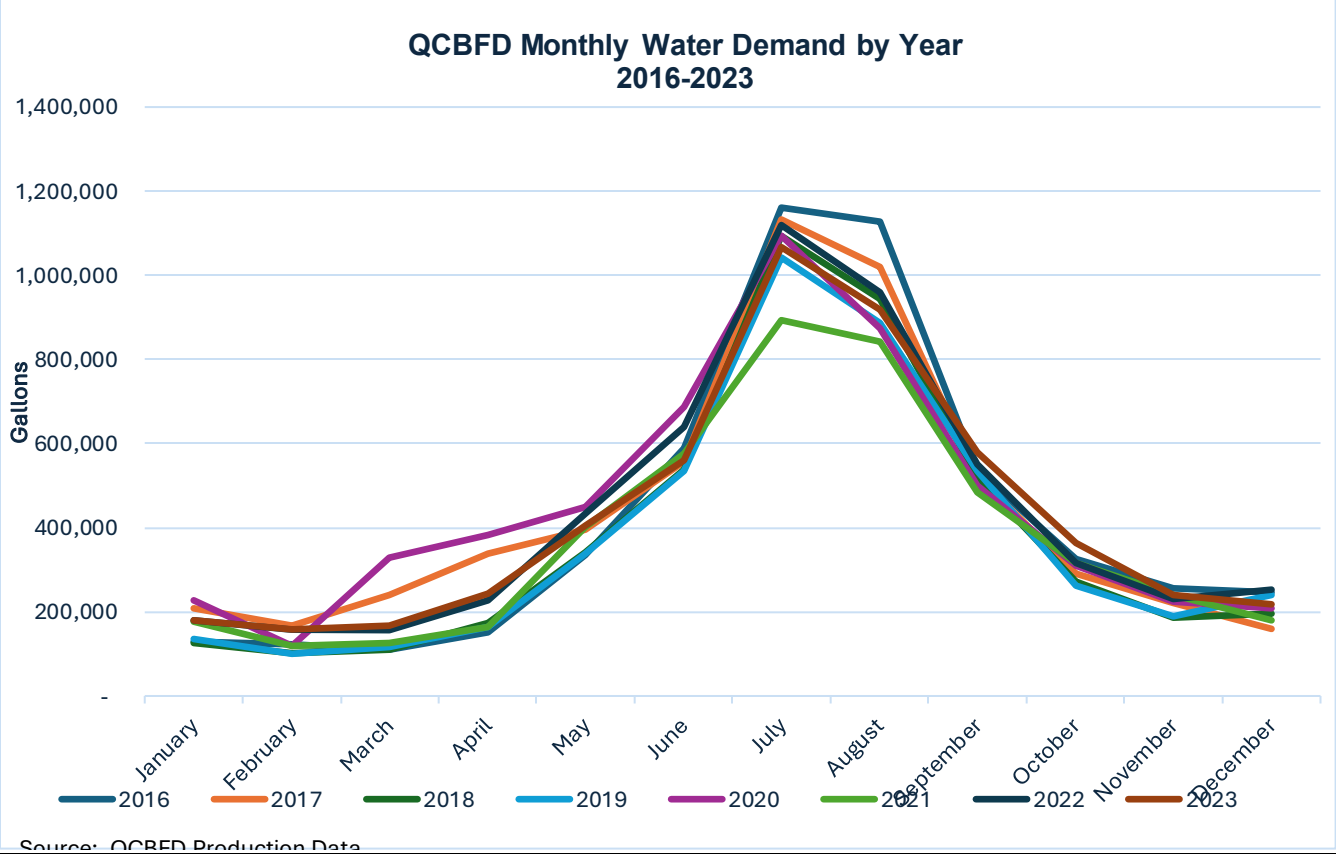


Hydrologic Budget Output:
Output encompasses the types of demand and usage of water.

1. Water that is lost or consumed before it can percolate to groundwater.
   - Vegetation: By means of evapotranspiration or ET, the varieties of vegetation on the neck utilize approximately 50% of all precipitation before it can percolate to groundwater.
   - Runoff: This is a small percentage of water that runs off the surface, primarily to lower elevations, such as the ocean and the ponds.

2. Water that is pumped from our groundwater.
   - Household Usage: Water that is pumped from groundwater and delivered, via our water system, to households for internal everyday use.
   - Irrigation wells: Irrigation wells pump water from the groundwater; this is the same groundwater source as for our community wells.

[Fig. 2]



Seasonal Trends: QCBFD is primarily a seasonal community with a consistent year-round population estimated at approximately 20%. These demographic characteristics drive water usage accordingly.

[Fig. 3] **Urish, Annual Hydrologic Budget, Expanded Table**

Stats	P-Rain inches	P-Rain Mil Gal.	ET Mil Gal.	RS Runoff Mil-Gal.	RG to Ground Water Mil Gal.	RG Recovered TO WellS Mil Gal.	Septic Recharge In ZOC * Mil Gal.	Total well H20 available Mil Gal.	QCB Usage Mil Gal.	EBWA Usage Mil Gal.	Total Usage Mil Gal.
Urish,p8									Urish, Avg. 1993-1999		
p23,p24	44.7	125	65.2	8.4	60	15	1.15	16.15	6.15	3.2	9.35
									NWSI, Avg. Usage 2016-2023		
AVG.	44.7	125	65.2	8.4	60*	15	1.15	16.15	4.96**	2.5***	7.5
1/7 yrs.	37.6	105	65.2	8.4	30.1	7.7	1.15	8.85	4.96**	2.5***	7.5

KEY

HYDROLOGIC BUDGET-[P = ET + RS + RG] Urish, p8

P-Precipitation
ET-vapotranspiration
RS- Runoff
RG- Water percolationg to Groundwater

Recovered RG available to the Wells for usage (25% of available groundwater)

* Million Gallons per inch of Rainfall extrapolated from Urish calculations 60/21.4 = 2.8 Million Gallons per inch
** 4.96, 8 Year Average water usage 2016-2023, APPENDIX_ N.W.S.I
***Water Usage QEBWA 2016-2023, APPENDIX_ n.w.s.i.

Urish original metrics
Updated Water usage NWSI Avg. 2016 -2023

Water Usage Changes

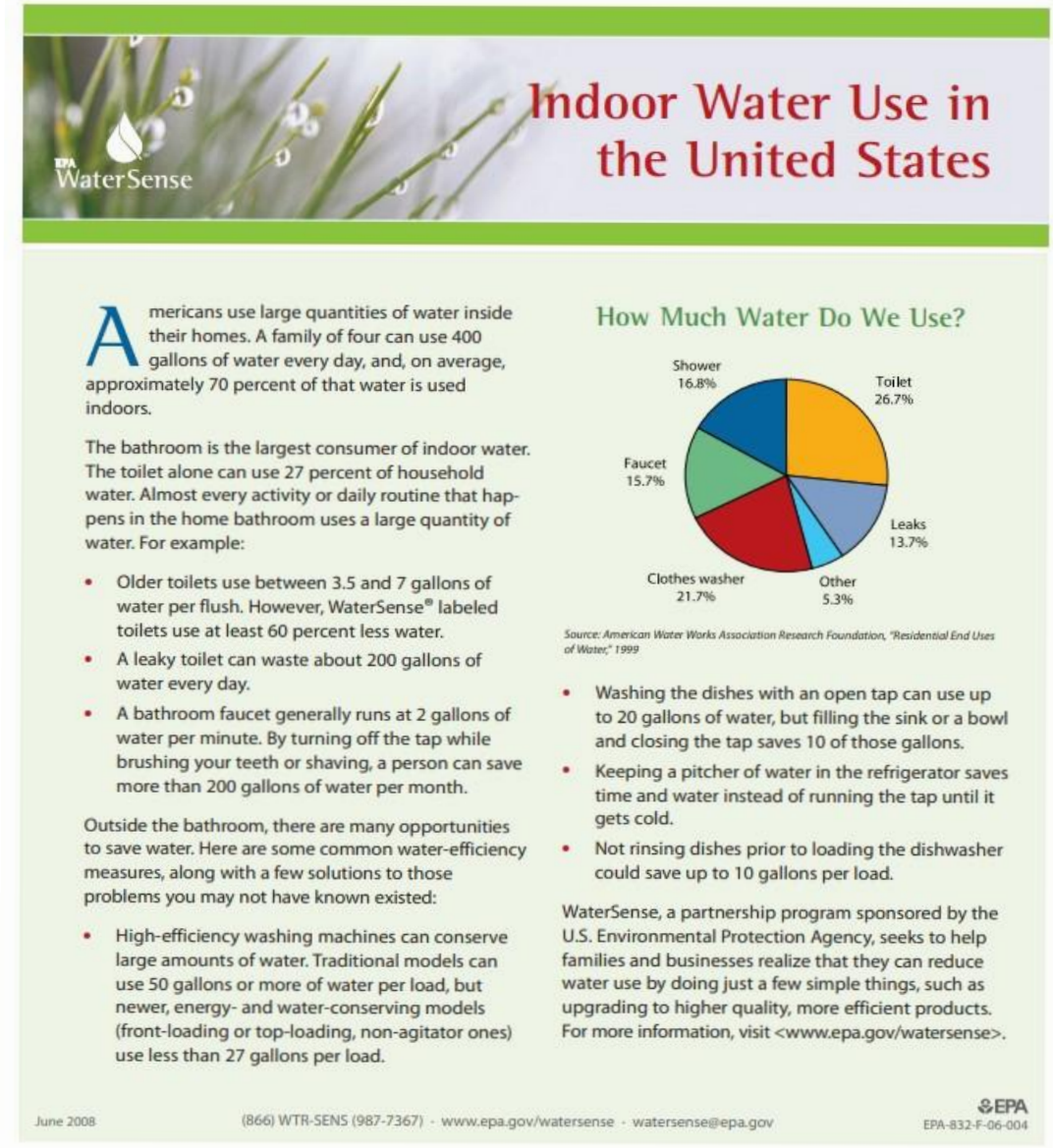
Direct Internal Household Usage

Over the period 2010-2023, annual water usage from households served by both QCBFD and QEBWA has diminished by approximately 20%, resulting from the adoption of more efficient appliances. [Fig.5] This is in alignment with a reduction of 22% in US average household water consumption between 1999 and 2016. The most significant change arises from the adoption of 1 gallon flush toilets. According to the EPA, toilets are responsible for 30% of household water usage. Since 1992 toilets have been regulated to use 1/3 the volume of water. Also, other water saving appliances such as dishwashers, washing machines, faucets and showerheads with aerators and attenuators contribute significantly as well. [Fig. 4]

These water saving appliances have been ushered into QCCBFD via the wave of new builds, upgrades and remodels or on-boarded to households due to natural obsolescence cycles. The next stage of opportunity will be the adoption of WaterSense habits that are outlined in the EPA WaterSense publication ([Fig 4] is an overview). Their adoption can be enhanced through community education and messaging to engender a collective consciousness that supports sustainable water use.

It is also assumed the decline in average annual demand results from QCBFD's water conservation actions such as prohibiting the use of water from the community system for car washing, power washing, pools, and sprinkler/irrigation systems and limiting garden uses to hand-held hoses only.

[Fig. 4]. **EPA WaterSense Publication**



WaterSense

Indoor Water Use in the United States

Americans use large quantities of water inside their homes. A family of four can use 400 gallons of water every day, and, on average, approximately 70 percent of that water is used indoors.

The bathroom is the largest consumer of indoor water. The toilet alone can use 27 percent of household water. Almost every activity or daily routine that happens in the home bathroom uses a large quantity of water. For example:

- Older toilets use between 3.5 and 7 gallons of water per flush. However, WaterSense® labeled toilets use at least 60 percent less water.
- A leaky toilet can waste about 200 gallons of water every day.
- A bathroom faucet generally runs at 2 gallons of water per minute. By turning off the tap while brushing your teeth or shaving, a person can save more than 200 gallons of water per month.

Outside the bathroom, there are many opportunities to save water. Here are some common water-efficiency measures, along with a few solutions to those problems you may not have known existed:

- High-efficiency washing machines can conserve large amounts of water. Traditional models can use 50 gallons or more of water per load, but newer, energy- and water-conserving models (front-loading or top-loading, non-agitator ones) use less than 27 gallons per load.

How Much Water Do We Use?

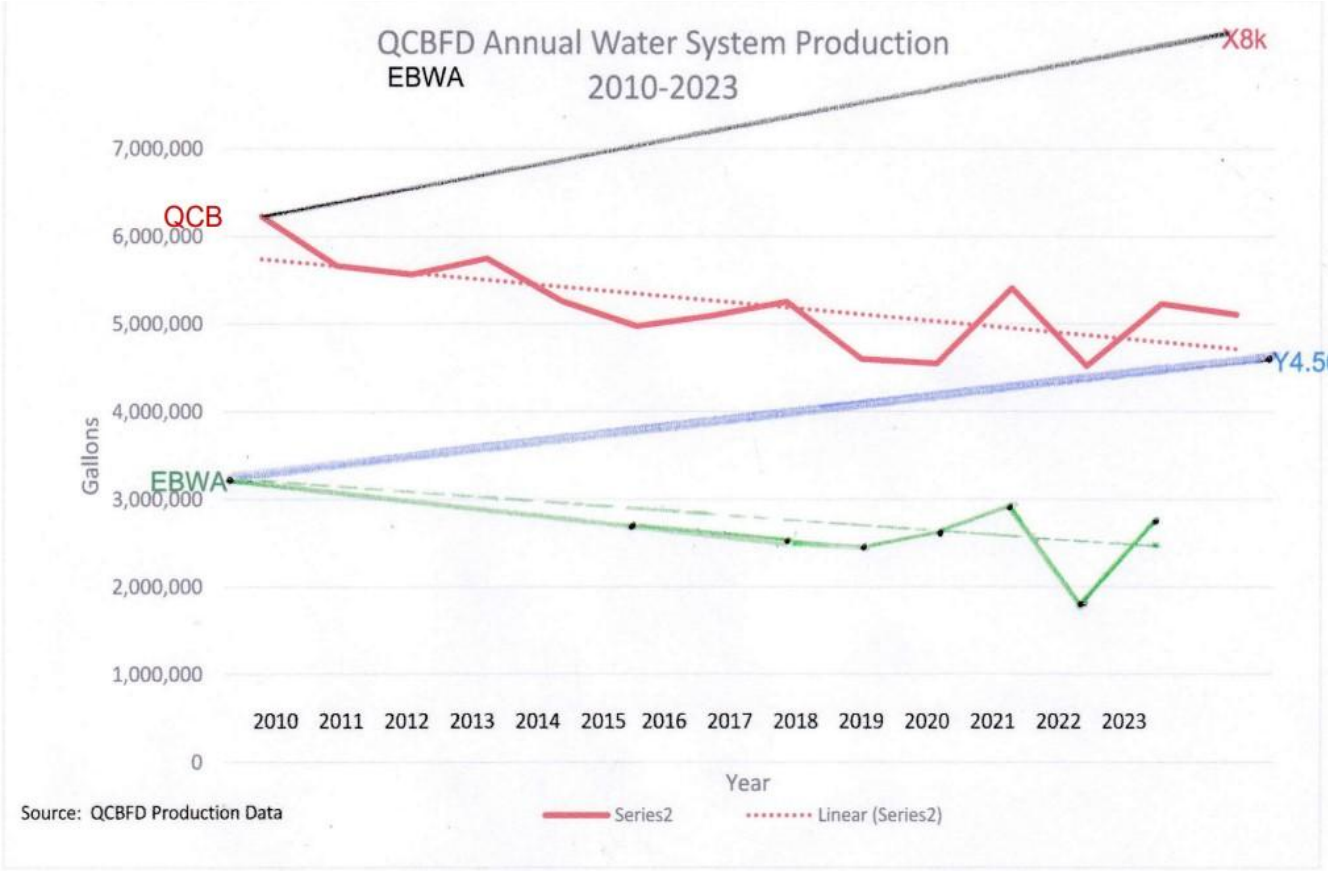
Source: American Water Works Association Research Foundation, "Residential End Uses of Water," 1999

- Washing the dishes with an open tap can use up to 20 gallons of water, but filling the sink or a bowl and closing the tap saves 10 of those gallons.
- Keeping a pitcher of water in the refrigerator saves time and water instead of running the tap until it gets cold.
- Not rinsing dishes prior to loading the dishwasher could save up to 10 gallons per load.

WaterSense, a partnership program sponsored by the U.S. Environmental Protection Agency, seeks to help families and businesses realize that they can reduce water use by doing just a few simple things, such as upgrading to higher quality, more efficient products. For more information, visit <www.epa.gov/watersense>.

June 2008 (866) WTR-SENS (987-7367) · www.epa.gov/watersense · watersense@epa.gov EPA EPA-832-F-06-004

[Fig. 5] **QCBFD Annual Water System Production**



Note: The increase in 2020 is assumed to be related to increased QCB population resulting from Covid-19

X8k Urish Estimate of QCB Water Usage @ 184 households
Y5.46k Urish Estimate of EBWA Water Usage @ 125 households

Goal: Continue the trend in reduction of household water usage.
Action: use educational materials as described above to educate the community on the avenues available to reduce personal household water consumption

Competition for Groundwater

Private Irrigation Systems
Over the 15-year period 2005-2020 a sample study within QCBFD revealed that out of the homes within the sample set of sold homes, irrigation systems had been installed in 82% of upgrades and new builds.

The Charlestown Resilience Report highlights concerns as to whether aquifers can support current population densities, let alone buildouts, and acknowledges that during drought, lawn sprinklers can result in water shortages. It further highlights evaluating the need for conservation measures restricting watering of lawns.

Currently, 41 private well landscape irrigation systems use water from QCBFD's 60 million gallons of groundwater access, 9 systems in the Zone of Contribution (ZOC) directly draw water from the 15 million gallons available to the wells and 16% of the water used during the 4 summer months.(3.14 Mil. gal.). Currently private irrigation systems are estimated to use approximately 500,000 gallons or 3% of the water available to our wells. Based on the 2005-2020 new build growth trend, this would raise usage to approximately 7% in 15 years.

Vegetation
Vegetation intercepts and absorbs 50% or more of our water (precipitation) before it reaches groundwater and our wells. This process is called Evapotranspiration or ET. Vegetation usage volume stays constant but the percentage increases during drought conditions. Most established species are adapted to take what they need in an environment with seasonally variable rainfall patterns. Mature trees (30+ feet) remove via ET an average of 75 gallons per day in the summer months. This is equivalent to 3.5x the net average usage of a person. Mature trees root systems develop to access groundwater. Other types of vegetation – shrubbery and native plantings – tend to require less water than mature trees. Lawns are also considered to be vegetation, and their water usage was described above in the "Private Irrigation System" section).

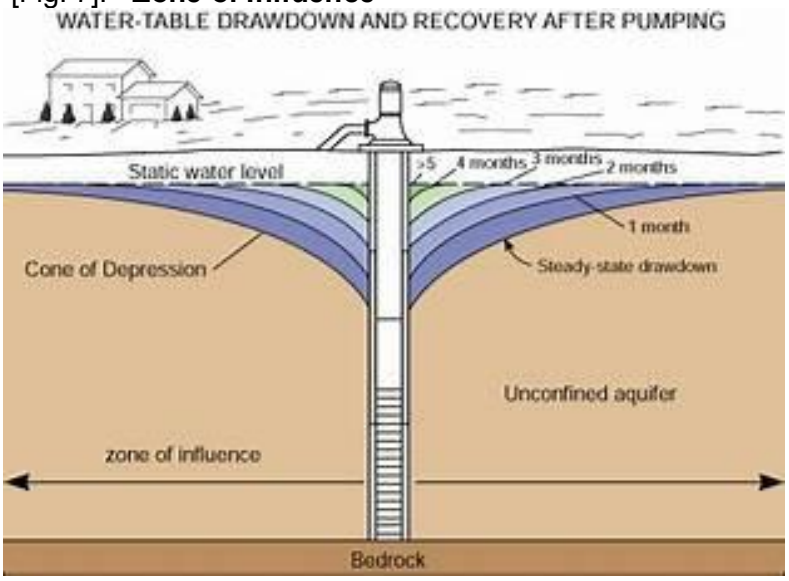
Goal: Ensure irrigation systems and landscaping are not negatively impacting water quantity.
Action: Work with groups such as the Town of Charlestown and Quonochontaug Conservation Collaborative to explore landscaping alternatives that reduce water demand.
Action: Educate residents on the water usage impact of irrigation systems and landscaping.

[Fig. 6] **Wellhead Protection Area: QCBFD and QEBWA**

Figure 4. Wellhead Protection Area for the QEBWA /CBFD wells.

Note: the RIDOH Wellhead Protection Area shown above is synonymous with the ZOC as described by Urish p 18 figure 8 and also defined as the Zone of Influence in [Fig. 7] below.

[Fig. 7]. **Zone of Influence**



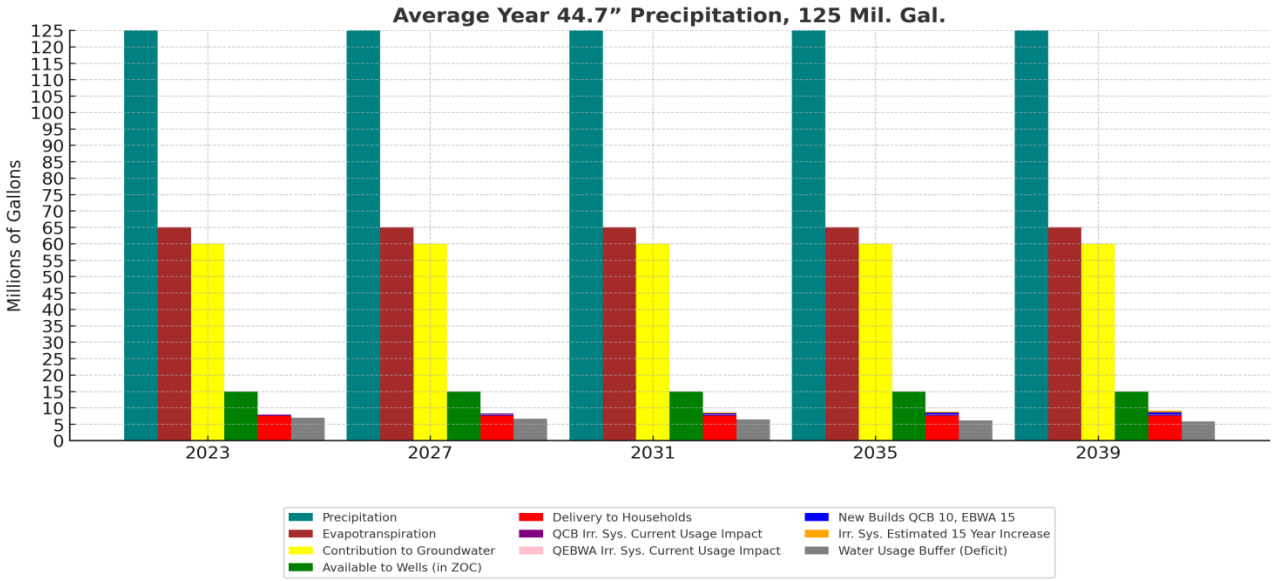
Goal: Encourage residents to undertake water conservation measures that include irrigation systems and landscape alternatives.
Action: Educate residents on water availability and various personal decisions that can lead to less drawdown of the community's water.

Drought Risk

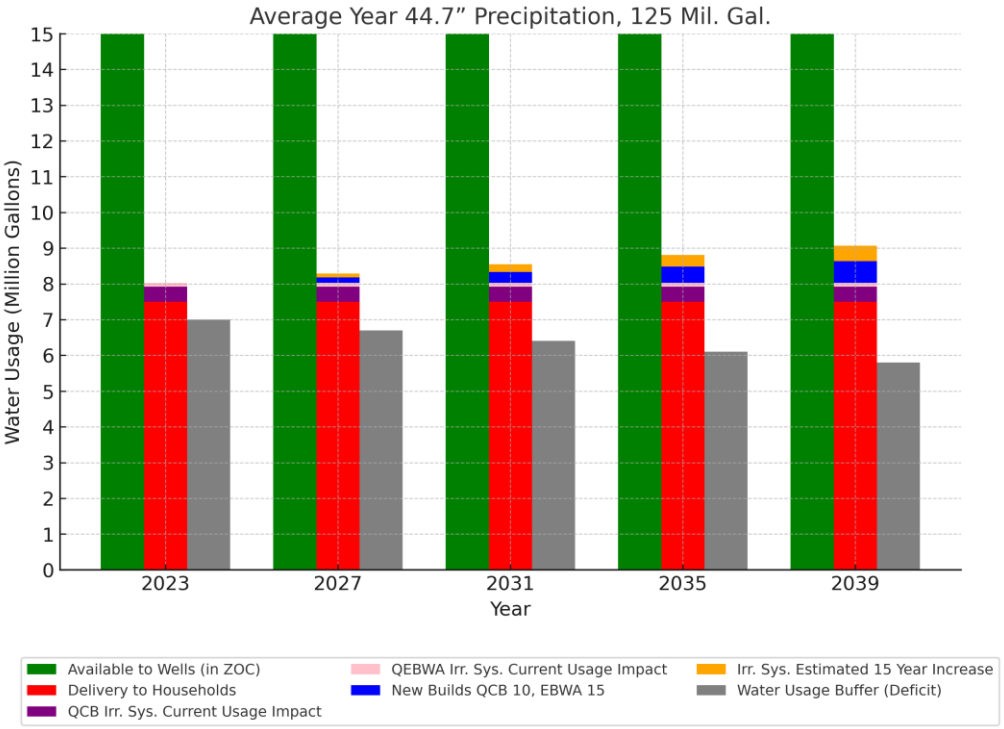
The Urish Study details both average and drought scenarios for QCBFD and QEBWA water availability. On average, water availability is in the range of 15 million gallons as compared to a current combined average household usage in the range of 7.5 million gallons. When viewed in the context of combined QCBFD and QEBWA demand, the shared wellfield reservoir is currently sufficient to meet the needs of the two water systems. However, under existing household usage, in certain circumstances annual demand may exceed supply. These situations include seasonal short duration spikes in demand combined with drought (assumed in the Urish Study to occur every 7 years). This deficit would likely occur during the summer when precipitation is minimal and demand is at its maximum. Risks of well drawdown at times of limited supply (drought) will negatively impact water quality and may increase QCBFD's vulnerability to saltwater intrusion.

[Fig. 8 and Fig. 9] below are estimates of the impact of increasing future demand upon the water available to our wells during years of average annual rainfall of 44.7 inches.

[Fig. 8] **Water Availability: Impact of Future Demand (overall)**

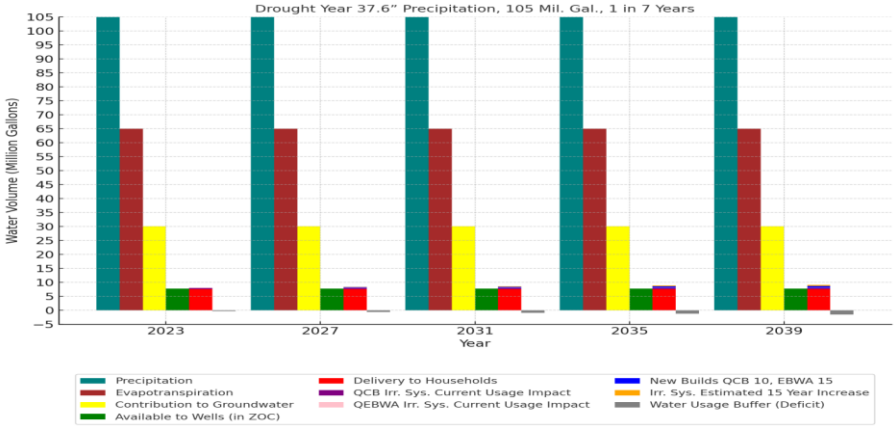


[Fig. 9] **Water Availability: Impact of Future Demand (starts at ZOC level)**

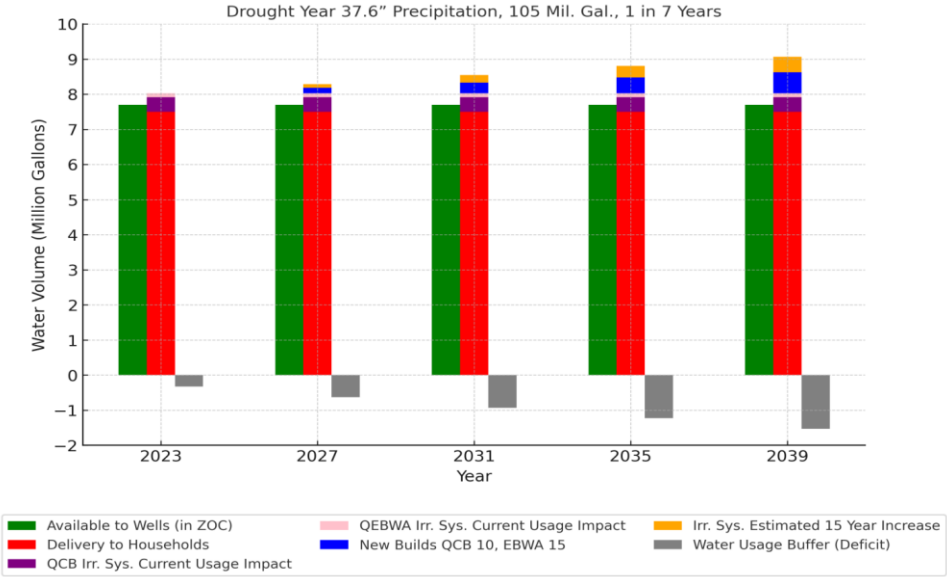


[Fig. 10 and 11] show the same information during drought years of 37.6 inches indicating that there may be a possible shortfall in water availability.

[Fig. 10 **Water Availability: Impact of Future Demand (overall) – Drought Year**

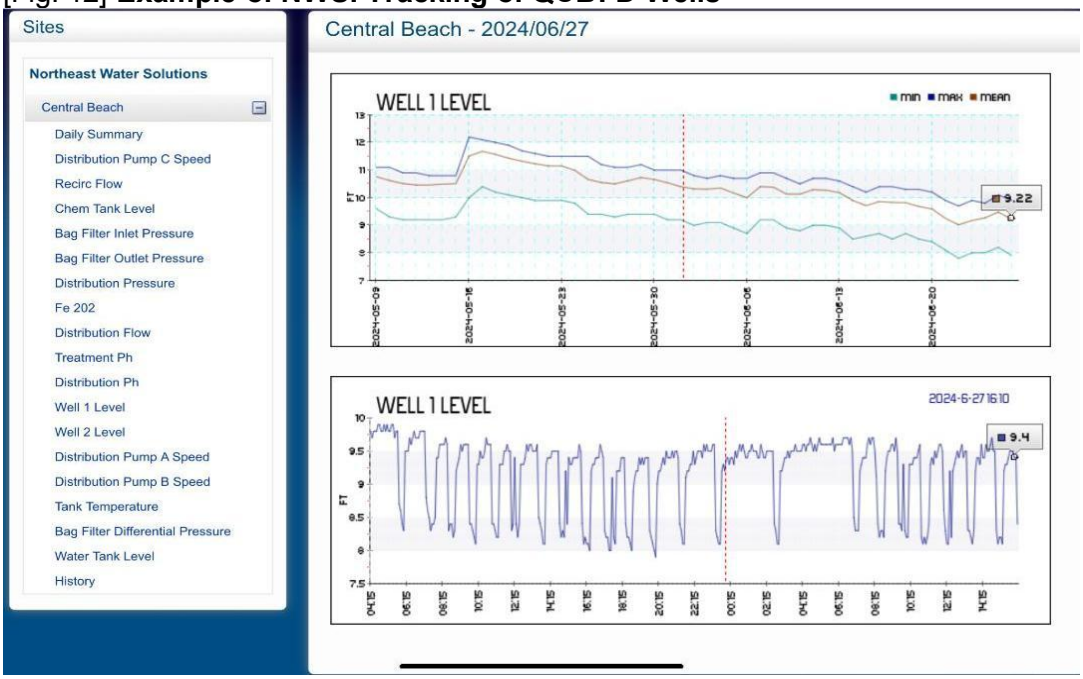


[Fig. 11] **Water Availability: Impact of Future Demand (starts at ZOC level) – Drought Year**



As an immediate mitigant to an approaching supply deficit, the Urish Study recommends that QCBFD appropriately manages water delivery at the wellhead via our existing drawdown controls. Urish emphasizes this repeatedly in his report and summary letter to QCBFD. These controls are implemented by our well operator NWSI using real time and trend data. An example of one of the many QCBFD well parameters tracked on a short-term and long-term basis by our well operator NWSI is illustrated in [Fig.12]

[Fig. 12] **Example of NWSI Tracking of QCBFD Wells**



Other actions currently available to affect usage include:

- Installation of automated or remote alert/control water shutoff devices that can be installed in the home and prevent water loss due to frozen pipes or other leaks and the associated damage
- Upgraded irrigation technology which optimizes water efficiency, for instance avoids watering when the ground is already saturated.

Goal: Create awareness in the QCBFD community that there will be an increase in water usage due the addition of households to the system as well as possible additional irrigation systems installed as residents renovate and/or rebuild their homes.
Action: Continue with available educational materials and messaging

<u>What Can Impact QCBFD Water Quality</u>
With respect to current quality parameters monitored at the state and federal level, the QCBFD Water System Upgrade Project is designed to address potential issues identified by the Rhode Island Department of Health ("RIDOH"), further discussed below. Also, the state of RI monitors and produces an annual report of the QCBFD water system quality. Notably, QCBFD, as a matter of practice, measures and reports water quality characteristics more frequently than required by regulation.

PFAS
In 2022 and 2023, QCBFD PFAS6 well measurements ranged from 10-12NG/L. This exceeds the EPA's proposed standard for PFAS6 contamination of 4NG/L. and will require action.

The new federal regulations require public water systems to monitor for PFAS6 and have set 2027 as the year by which it needs to complete initial monitoring and then will be required to do ongoing monitoring. Public water systems then have until 2029 to implement solutions that reduce these PFAS6 to levels of compliance. QCBFD will likely have to adopt one of the

emerging technologies to treat its water for PFAS6 contamination. The Water System Upgrade Project includes space within the expanded pump-house for PFAS filtration equipment.

QCBFD may have limited control over the sources of PFAS. Small amounts can be contributed to local groundwater from personal care products rinsed in washing and ending up in OWTS. Most other PFAS contaminates originate in trash or recycling and end-up in landfill locations. Major contributors of PFAS are industry hazardous waste sites, military bases, dumps and landfills and fire stations. According to an exhaustive RI study by RIDEM, no sites of concern or immediate remediation have been identified within four miles of QCBFD

As PFAS have come under increased scrutiny, many more sources of environmental contamination have been identified. However, their relative contribution to human uptake needs to be quantified. Major avenues of human consumption are ingestion and inhalation. Synthetic fiber, garments, carpets, bedding, curtains, etc. will shed particles into the air we breathe. Many of our food sources and their packaging contain PFAS.

Goal: Help our community reduce contribution of PFAS to our groundwater and water delivered from our water system.
Action: Circulate educational materials on local sources of PFAS contaminants.
Action: Implement required water system mitigation technology.

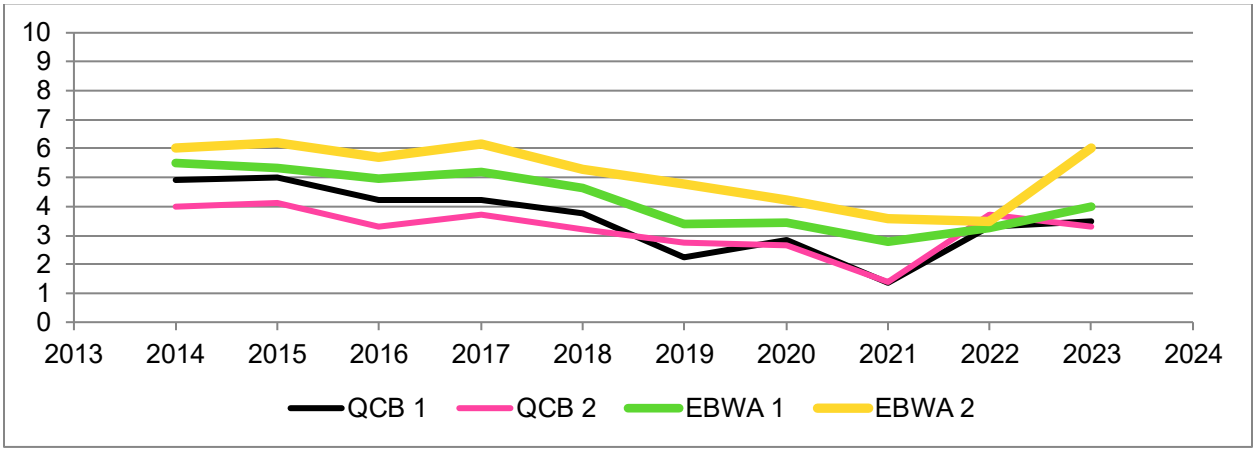
Nitrates
Nitrate levels in QCBFD well water have been variable but have remained below regulatory thresholds averaging below 5 mg/L*.This is the case for QEBWA as well.

Local nitrate contributions to groundwater may be reduced by the transition to modern denitrification onsite wastewater treatment systems (OWTS). N-reducing OWTS are designed to lower the total nitrate concentration in wastewater by about 50% or more for newer systems.

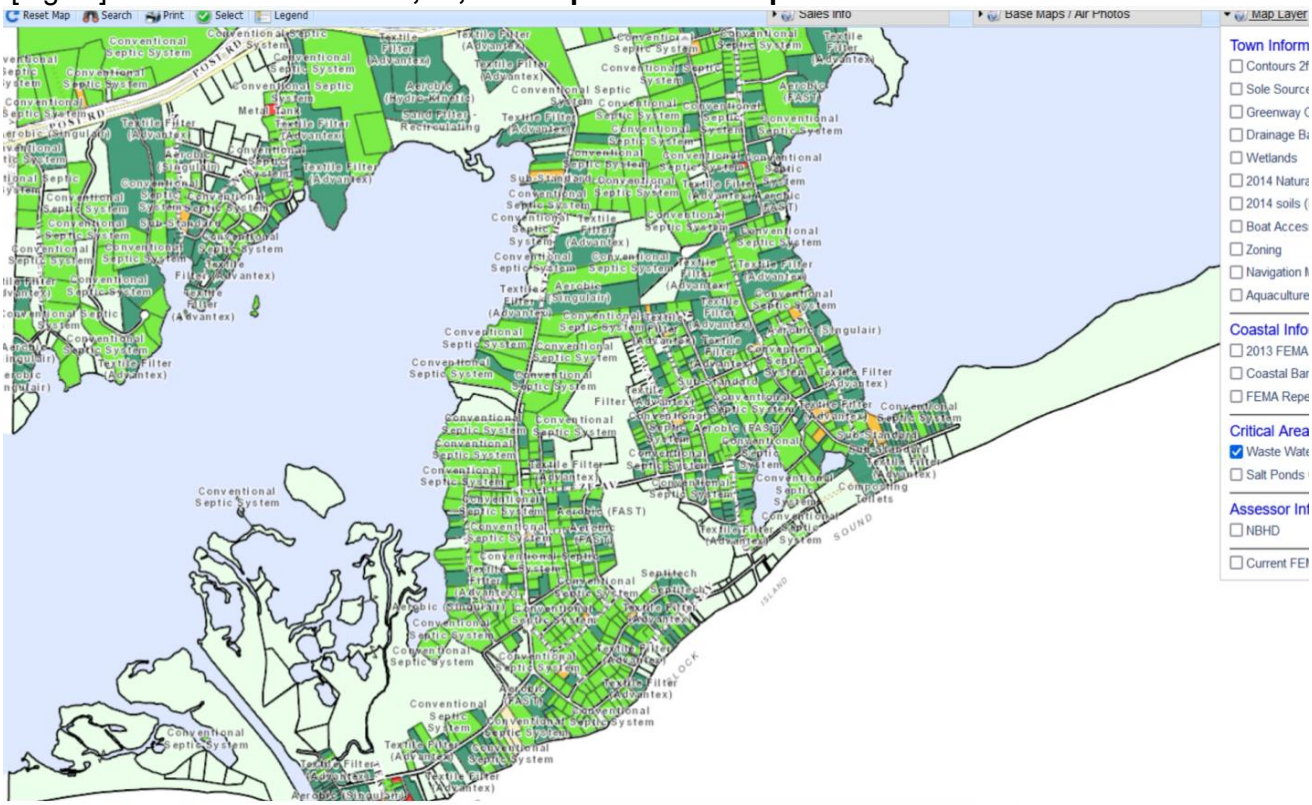
Housing new builds and upgrades since 2011 have driven the upgrades from conventional to N-reducing OWTS. According to Matt Dowling, Charlestown's On-Site Wastewater Program Manager, in 2020 30% of the household units across the Quonochontaug Neck had N-reducing OWTS; 25% in QCBFD and 32% in QEBWA. It is estimated that this has been the major contribution to the annual average nitrate reduction in QCBFD and QEBWA wells from the years 2014-2023, as shown in [Fig. 13].

The other source of nitrates is landscape fertilization. This is occurring on properties both with and without irrigation systems. The average nitrate loading from landscape fertilization represents approximately 20% of groundwater N in high density developed areas such as QCBFD.

[Fig. 13] **NWSI, QCBFD and QEBWA Well Nitrate Levels 2014-2023 in mg/L**



[Fig.14] **Town of Charlestown, RI, GIS Septic Status Map - 2020**



[Fig.15] **OWTS: QCBFD and QEBWA - 2020**

GIS DENITRIFICATION OWTS CONVERSION 2020 QUONOCHONTAUG NECK

Location	Conventional Sys.		Denitrification Sys.		Below Grade Sys.		Total	W/O avail	Grand	%
	In ZOC	Out ZOC	In ZOC	Out ZOC	In ZOC	Out ZOC		Data	Total	Denitrification
CENTRAL WATER SYSTEMS										
QCBFD	59	73	16	29	2	3				
Total		132		45		5	**182**	N/A	182	**45/182= 25%**
QEBWA	75	21	42	12	4	0				
Total		96		54			**154**	N/A	154	**54/154= 32%**
PRIVATE WELL OWNERS										
EAST BEACH	N/A	126	N/A	68	0	0				
Hoxie, SRA, Powaget East Beach, Rd										
Total							**194**	40	234	**68/194= 35%**
EAST BEACH	N/A	52	N/A	10						
Highlands										
Total							**62**	N/A	62	**10/62= 16%**
WEST										
BEACH Rd. + Briarwood										
Total	N.A	37	N/A	12	0	0	**49**	N/A	49	**12/49= 24%**
WEST BEACH										
Total	N/A	17	N/A	16	0	0	**33**	24	57	**16/33= 48%**
QUONNIE NECK TOTALS										
	134	326	*58*	147	*6*	3				
Denite in ZOC	*134*		*58*		*6*					***58/198= 29%***
% Denite total		460		205		5	**670**	64	734	**205/670= 30%**

ETIMATED DENITRIFICATION OWTS IMPACT ON NITRATE LOADING

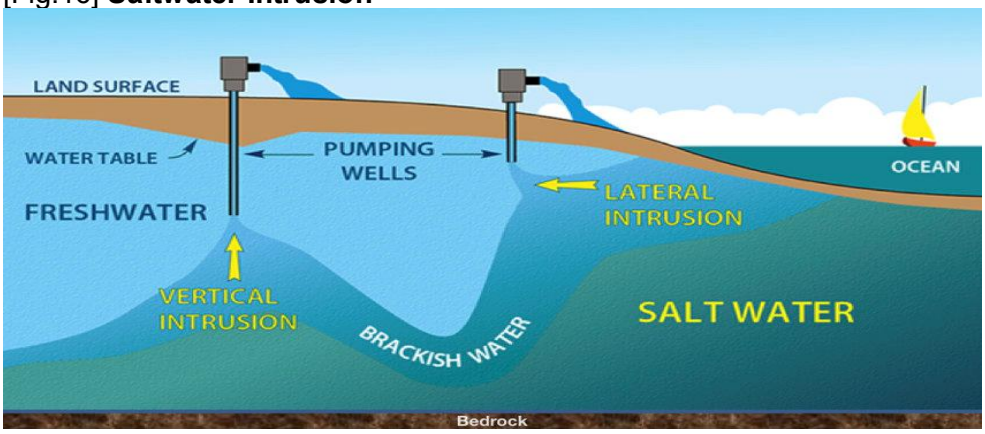
Quadrant	# DnSys.	Reduced N Loading	Conventional OWTS Equivalents	Total Sys.	Nitrate loading Reduction
QCB All OWTS	45	50%	22.5	182	22.5/182= **12.4%**
QCB ZOC	16	50%	8	77	8/77= **10.4%**
QEBWA All	54	50%	26	154	26/154= **17%**
QEBWA ZOC	42	50%	21	121	21/121= **16.6%**
Q NECK Total	205	50%	102	670	102/670= **15%**

Goal: QCBFD further reduces its nitrate levels.
Action: Use educational materials available from Charlestown Wastewater Management to inform homeowners on the benefits of properly maintaining their septic systems and the direct benefits of the reduced use of lawn fertilizers.

Saltwater Intrusion

Saltwater intrusion is the process by which saltwater encroaches into freshwater aquifers, often due human activities like over-pumping. This encroachment can degrade groundwater quality, making it unsuitable for drinking and irrigation. Saltwater intrusion can be mitigated by the proactive use of existing drawdown controls. Urish states that the public water supply wells are far enough from the shoreline and shallow enough that saltwater intrusion is not a potential problem under current pumping conditions.

[Fig.16] **Saltwater Intrusion**



The average expected salt content for shoreline drinking water well is 40Mg/L. The maximum concentration established for potable drinking water is 250Mg/L. According to NWSI and RIDOH data, QCBFD average annual levels for well #1 and well #2 have been below 20Mg/L for 20 years.

Other opportunities to reduce the demand on groundwater and sustain a healthy water table, such as managing vegetation and limiting irrigation, are a significant part of minimizing the threat of saltwater intrusion.

Goal; Prevent saltwater intrusion.
Action: Educate the community that the greatest risk of saltwater intrusion in our water system wells is prevented by our drawdown controls that prevent over pumping.
Action: Educate the community that irrigation wells can contribute to over pumping from our groundwater supply.
Action: Seek guidance from University of Rhode Island or other sources on the process to monitor saltwater intrusion in order to establish baseline data for the Quonochontaug neck.

Other Potential Threats
Further study is required to understand:

- Increases in year round and extended seasonal occupancy
- The implications of sea level rise accompanied by saltwater intrusion and its compromise to low elevation OWTS.
- Environmental changes that could cause perennial drought.
- A 1938 force hurricane that alters coastal geography in a way that compromises the integrity of our wellfield.

These threats may not have an internal solution and could require accessing water off the neck or the installation of alternative independent systems such as cisterns.

Water Recommendations
Water Trade-offs: QCBFD has important decisions to make on how it manages trade-offs in order to protect water resources. The risks may include an increase in population and development, but more likely will come from continued competition from legacy landscaping and lawns fed by irrigation systems demanding a greater proportion of our water resources.

Goal: QCBFD incorporates sustainability requirements of a coastal environment into its activities and decisions.
Action: Develop water management protocols and educations materials to prepare for a potential vulnerable supply situation.
Action: Create a welcome packet for new residents containing information focusing on sustainable practices in a coastal living environment. This communication, as well as other messaging tactics can be communicated to residents on an ongoing basis.
Action: Utilize drought notices during periods of water reservoir stress to encourage water conservation

Changes in Key Demographics
QCBFD occupancy is seasonally variable with summer occupancy usually near maximum capacity per household. For the other nine months of the year, occupancy diminishes substantially. However, currently there is no demographic data to evaluate changes in the

summer and off-season population. It would be beneficial to understand property changes such as property occupancy rates, average house size, number of developed lots and number of homes being used year-round. This data would be helpful in measuring trends that could impact peak, as well as long-term, water demand.

Goal: Help our community better understand the adequate but limited water resources we have and how to adapt to ensure continued potable water availability.
Action: Utilize current educational materials and adapt a simplified version of this document to communicate water information and recommendations.
Action: Continue to measure and track the status of the various factors that impact the sustainability of our watershed and share this information regularly with the community in order to establish a common understanding of our watershed condition and shared responsibility for its protection.

8. COMPREHENSIVE PLAN SUMMARY

The QCBFD community was very engaged throughout the comprehensive planning process. What was consistently communicated was everyone's love of QCBFD and desire for it to remain a vibrant community.

The next phase is to translate the findings from the Comprehensive Plan into implementable initiatives. Some of the Comprehensive Plan's goals were combined to form overarching priorities. QCBFD will start with the most urgent priorities that were identified by the community:

- **Water Quality and Quantity:** Conduct an assessment of water quality and quantity to meet present and future needs, similar to what the 2000 Urish report accomplished.

- **Water Infrastructure:** Create water infrastructure plan that assesses current-state and develops long-term plan to adequately maintain and upgrade the physical plant and water distribution system.

- **Quonnie Neck Collaboration:** Enhance collaboration across Quonnie Neck organizations to create coordinated approach for beach erosion, water, dark skies and other environmental issues.

- **Governance Structure:** Assess advantages and disadvantages of our current Fire District governance structure versus other potential governance structures; study pros and cons of paid professional support for QCBFD.

- **Communication Plan:** Create multi-pronged communication plan to better engage the community, communicate key information, welcome and integrate new residents into the community, better educate all residents on how QCBFD operates and help the community during emergencies.

After those five initial initiatives, the community should focus on additional waves of initiatives. It has taken countless hours of volunteers' time to develop the Comprehensive Plan, and it will take additional time and commitment to successfully complete the various priorities that have been identified. The teams will be comprised of subject matter experts from within and outside QCBFD, as well as other volunteers from across QCBFD. It will take all of us to ensure QCBFD flourishes as it approaches its 100th anniversary.

Although this is QCBFD's first Comprehensive Plan, best practice is to do a high-level review of the plan every 5-10 years to assess the need for updates, while an overall comprehensive planning process should be undertaken every 15-20 years. Applying this best practice will help QCBFD continue to build a long-lasting and strong community for generations to come.

10. APPENDIX: NOTES AND SOURCES

Notes:

Current QCBFD and QEBWA Water Infrastructure

Wells: QCBFD has two wells – Well #1 is the preferred primary water source. Well #2 has a higher iron concentration, which requires removal via additional filtration. QCBFD shares the wellfield with QEBWA, which has two similarly constructed wells within 200 feet of the two QCBFD wells. As of 2025, both water systems are managed by the same well operator – Northeast Water Solutions, Inc. (NWSI). As of 2025, QEBWA services 125 homes and QCBFD services 184 homes.

QCBFD Distribution System:
The QCBFD water distribution system is a two-mile network of PVC pipes of varying diameters that is laid out in a tree branch fashion. A separate report will discuss long range considerations for the distribution system.

QCBFD Water System Upgrade Description:
The QCBFD water system upgrade project was triggered by a mandate from the State of Rhode Island in 2019 to add chlorination due to occurrences of possible e. coliform bacteria. The existing water treatment facility will be modified and expanded by 600 square feet in order to install chlorination equipment and a Green Sand filtration system to remove iron and manganese from the well water. A backwash water drain line, settling manhole, and a Cultec 150XLHD Dry well system will be installed to collect precipitated minerals.

Additional equipment required includes: pump pressure tank, bag filter, backflip preventer, static mixer, chemical metering pumps, chemical day tank with agitator, UV sterilizer, chlorine residual and pH data logger, chlorine residual analyzer and associated fittings and piping. The electrical service will be upgraded to accommodate the additional equipment. A new motor starter and control panel with remote monitoring capabilities will also replace the existing control panel.

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