

Ground Water Process

- On April 10, 2023, I wrote a letter to DEQ advising them that our groundwater withdrawal exceeded the current permit.
- DEQ began updating our groundwater withdrawal permit.
 - This permit considers ALL potential construction that could take place **until August 26, 2038**.
 - There is a 40-unit condominium unit at Commonwealth that is under permit.
 - We have 9 of 21 houses built in the Jefferson Street area.
 - Coastal Square is estimating 465 units with mixed residence and retail.
 - Two parcels within the Town could easily accommodate 183 homes, given the 10,000-square-foot lot size limitation.
 - These projects total 700 new water meters and associated usage.
 - The permit also requires a technical report from an independent source. Britt McMillan from Arcadis agreed to serve in this capacity. Arcadis supports the Accomack County Ground Water Committee, which has enormous local knowledge concerning our aquifer.
 - Mr. McMillan determined that the aquifer could easily withstand this withdrawal.
 - A resident requested we retain a hydrogeologist, but Mr. McMillan explained the difference between a hydrogeologist and a hydrologist and their overlapping services and knowledge.
 - Salt intrusion has been a consistent worry, and Mr. McMillan described any intrusion as negligible. His final sentence reads, "... there is no reason to believe the additional customers will result in a significant increase in chloride levels in the Town wells."
- In March 2023, DEQ published two ads asking residents to respond if they wanted a public hearing regarding the permit. Eight people responded, which is below the threshold to hold a DEQ hearing.
- In June 2023, the Town retained Southern Corrosion as a preventative maintenance contract for the water tower. The agreement requires the tower to be washed every other year, all moving or non-moving parts evaluated every year, and the tower painted every seven years. These services are an equal annual fee.
- In January 2024, DEQ issued Onancock its groundwater permit, allowing up to 120,000,000 annually.
- In May 2024, the Town contracted with Systems East to install a new control panel to monitor the tower, flow, auto-dialer (alarm), and generator start-up. The panel also calibrates the well flow.
 - The new control panel discovered that one pump is undersized and overused. We are replacing it immediately.
 - HRSD or ANEC tripped the transformer that controls well #9. Our insurance company replaced that pump and motor with 40% more capacity at no cost. We can pump 240 more gallons per minute at minimal cost based on calibration.
- In 2023, we entered into a preventative maintenance agreement with CAT, which oversees the generator at the water tower and wells.

- The Town retained DBF, an engineering firm that initially designed the well and chemical system to verify that the infrastructure could withstand the additional use.
 - The engineer's report agrees with the impact on the aquifer with Arcasis'.
 - With a minimum of 385 gallons per minute (running 24 hours per day), the town has sufficient well capacity for an additional 700 users. Given the flow capacity, our wells would need to run only 11.2 hours daily.
 - They do recommend new tower heaters.
 - The report's final sentence reads, "The Town has a well-maintained and operated water treatment system. Any possible upgrades would be to make a more operator-friendly system."

The Town followed every step required for a new permit to ensure the system could handle the additional use. Please remember that all of these are multi-phase projects and will take years to come to fruition, if they do at all.



ARCHITECTS • ENGINEERS • SURVEYORS

November 18, 2024

Town of Onancock
15 North Street
Onancock, Virginia 23417

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Attn: Mr. Matt Spuck
Town Manager

Re: Onancock Water Treatment System Evaluation
Town of Onancock
Accomack County, Virginia
DBF #1977A010

Dear Mr. Spuck:

Davis, Bowen & Friedel, Inc., (DBF) is pleased to provide this desktop evaluation of the Town's Water Treatment System; existing Well Building and Chemical Treatment Building located at 10 Hartman Avenue. The system is working well at this time, the Town wants to ensure the existing equipment is suited for any modifications/improvements that could be made to improve operations. The purpose of this evaluation is to determine if the Town's well and chemical systems are in a condition to accommodate an additional 700 dwellings and if not, what improvements would be recommended. The 700 additional dwellings are derived from the Virginia Department of Environmental Quality (DEQ) groundwater withdrawal permit application which requires an estimate of new connections over the next fifteen (15) years from the time of application that could connect to the Town's water system.

The evaluation below will focus on groundwater production wells, water storage, and treatment equipment/operations.

WATER SUPPLY (GROUNDWATER PRODUCTION WELLS)

The Town currently utilizes three (3) shallow groundwater wells (Wells 7, 8 & 9) located in an unconfined groundwater aquifer known as the Middle Yorktown-Eastover Aquifer as its sole source of water. Well 7 and Well 8 were originally installed in late 2004 while Well 9 was installed in early 2005 with all three being put into production in early 2005. The table below provides a summary of the wells as provided by the Town per the new pump manufacturers specifications and new Systems East control panel.

Well No.	DEQ Well Number	Aquifer	Drill Date	Drill Depth (ft)	Screen Interval	Design Flow (gpm)
7	100-01015	Middle Yorktown-Eastover	2004	220	168.3-198.7	245
8	100-01016	Middle Yorktown-Eastover	2004	220	170-200.4	140
9	100-01017	Middle Yorktown-Eastover	2005	220	169.3-199.8	245
Total						530

Using the “Ten States Standards”, the recommended standard for water facility design guidelines, Item 3.2.1.1, Source Capacity, “The total developed groundwater source capacity ... shall equal or exceed the design maximum day demand with the largest producing well out of service.” By assuming that the largest well is not available to support the peak day demand, a water system that is well maintained is reasonably protected from water outages due to equipment failure. In other words, facilities that perform routine and preventative maintenance generally have a lower probability of concurrent equipment failures. The assumption that if the largest well is out of service the system will have the capacity needed to continue to operate without restricting water use while a single equipment failure is repaired. The total of all well capacity is referred to as ultimate well capacity and should not be used to sustain system demand on a regular basis. Although it is not uncommon for a water system to be operated beyond its allowable capacity during short periods, long term continued operation above the allowable capacity compromises the system’s reliability should equipment failure occur. It should be noted that the current system currently operates with one (1) well in service at any given time.

Well 7 or 9 have the largest production capacity thus one of these wells would be considered to be out of service for this exercise.

Utilizing well production reports from the last year, October 2023 through September 2024, the Town’s estimated average water demand per day is 175,550 gallons per day (gpd) with a corresponding maximum day estimated at 208,600 gpd. The Town currently has 714 connections thus this equates to an average day use of approximately 246 gpd/connection with a maximum day use of approximately 293 gpd/connection.

This maximum day demand as stated above corresponds to a flow rate of approximately 145 gallons per minute (gpm) if the pumps were to run 24 hours a day. With an available well production rate of 385 gpm with the largest well out of service as described above, and all other treatment items remaining the same, the Town can meet this demand and results in the wells running for about 9 hours that day.

With an additional 700 connections anticipated in the future, the Town’s future total number of water connections would increase to 1,414. Utilizing the same average and maximum day demands per connection, the Town’s future estimated average water demand per day would be about 347,660 gpd and future estimated maximum water demand per day 413,110 gpd.

Future production well capacity would be evaluated utilizing the same parameters and calculations as were used in the existing production well analysis. With the inclusion of the additional 700 water connections and projected maximum daily demand of 413,110 gpd, the required well production would be 287 gpm if the wells were to operate 24-hours a day. With the available well

production rate of 385 gpm as previously discussed, the Town has sufficient well capacity for the additional 700 water connections.

WATER STORAGE (ELEVATED STORAGE TANK)

The Town owns and operates one elevated storage tank, a 300,000-gallon tank located on Hartman Avenue.

Per Ten States Standards, “Storage facilities should have sufficient capacity ... to meet domestic demands and, where fire protection is provided, fire flow demands.” Based on the typical Fire Prevention Regulations, residential fire requirement of 1,000 gpm for a duration of 60 minutes, or 60,000 gallons of water, will be used for this exercise. Ten States Standards also states that storage capacity can “be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands of the system.” All Town water facilities have emergency backup power and the production from these facilities can be used to reduce the amount of storage required. Therefore, the standby capacity available from the Town’s production facilities is 530 gpm or 31,800 gallons for a 60-minute duration. In addition, the Town’s fire equipment has the pumping capability of between 2,800 and 4,000 gpm between the tanks themselves and the fact that the Town is surrounded by a tidal waterway, from which the equipment can pull water from at a minimum of 2,800 per minute for 60 minutes which equates to 168,000 gallons of additional available volume providing a total of 199,800 gallons of standby capacity. Inclusion of the Town’s 300,000 gallons of storage in the elevated storage tank would equate to the following:

	Demand (gal)	Required Fire Flow (gal)	Required Volume (gal)	Current Storage Tank Volume (gal)	Standby Capacity (gal)	Total Emergency Storage (gal)	Storage Surplus (gal)
Existing Avg. Daily Demand (gpd)	175,550	60,000	235,550	300,000	199,800	331,800	264,250
Future Avg. Daily Demand (gpd)	347,660	60,000	407,660	300,000	199,800	331,800	92,140

Based on this analysis, the Town’s current emergency storage utilizing the existing storage tank, wells, and fire storage equipment is sufficient now and inclusion of an additional 700 connections.

TREATMENT EQUIPMENT/OPERATIONS

A site visit to the Town's water treatment facility at 10 Hartman Avenue was completed along with a discussion with Mr. Victor Talbot, the Town's water operator. Based on this site visit and discussion, it was determined that the Town's existing Well and Chemical Treatment Buildings meet the Town's current needs and could also meet the needs of an additional 700 water connections, however several items were identified whose inclusion would be beneficial for the Town and water operator in regard to efficient operations and accountability. Those items are as follows:

Well Building:

1. Well Maintenance Program - A Well Maintenance program should be implemented as we understand there has been no well maintenance performed since the original installation. This would consist of contracting with a well driller who can routinely clean, test, and make observations of the Town's wells (pumps, motors, screens, capacity, etc.) to keep in good working order as well as identify any issues that can be addressed prior to major breakdowns or failure.
2. Well 8 Evaluation - We understand both Well 7 and Well 9 received new pumps and motors, while Well 8 is still all original equipment, thus it should be further evaluated to determine any maintenance needs.
3. Fluoride Equipment – Use of fluoride has been temporary discontinued due to local licensing issues. Until such a time as that issue is resolved, we suggest storing the chemicals and equipment according to manufacturer standards.
4. Piping/fittings – all piping is ductile iron which is durable, corrosion-resistant, requires little maintenance, and has a lifespan of 50+ years. However, the exterior of the piping was originally painted and is showing some signs of surface corrosion thus it is recommended to re-coating the piping at this time.

Chemical Building:

1. Chemical Feed Pump – The Town only feeds one chemical, Sodium Hypochlorite, for disinfection. Presently one chemical feed pump is installed in the treatment building although there are three (3) available locations, one (1) for each well. We understand the operator has the ability to switch from one well to another with the chemical pump remaining in its current plumbed location. Should the system call for two (2) wells to run, the single chemical feed pump will need to be manually adjusted to meet the chemical demand, or a second pump needs to be added. It is suggested to install a pump in all three (3) locations, one (1) for each well, to provide more efficient operations. This would ensure efficient method of providing chemical with multiple wells operating or switching operation from one well to another.
2. Building Ventilation – Due to the chemical fumes given off from the Sodium Hypochlorite, several items within the Chemical Building have deteriorated; doors, exhaust fan, heater, louvers, structural connections, and electrical items. It is recommended to replace all, specifically with fiberglass doors and fans, as well as ensure the building is properly ventilated for both long term maintenance and safety.
3. Sodium Hypochlorite Day Tank – As water demands increase so will the need for

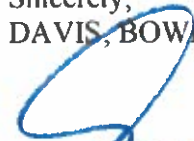
additional chemical and a larger storage tank is recommended to hold the Sodium Hypochlorite. The existing system may be sufficiently sized for the present but having to refill the current day tank from 55-gallon drums is a safety risk. A system can be set up with a larger holding tank with piping and a plumbed in chemical pump to fill the day tank as needed without the operator having to come in contact with the chemical, which is more efficient and less dangerous.

Elevated Storage Tank Area:

1. SCADA - Installation of a Supervisory Control and Data Acquisition (SCADA) system which would monitor, control, and analyze the Town's water treatment system is recommended. While the Town has an alarm system to call out when issues arise, the inclusion of a SCADA system would allow the operator to remotely determine the cause of the issue and possibly correct it without having to come to the site. In addition, the system would be programmed to automate several aspects of the treatment system as well as track data, create reports, and graphs that can be used to analyze and improve the operations of the system.
2. Hour Meters - Inclusion of hour meters on the well pumps control system to assist with evaluation of the wells' performance is recommended. The hour meters would allow the operators to check the actual gallons per minute of each well based on run time and gallons pumped to ensure the performance of the well is not appreciably dropping which could indicate an imminent failure.
3. Tower Heaters – We understand these heaters have stopped working and recommend replacement in lieu of using small space heaters.
4. Yard Piping – No recommendation for change. The yard piping is ductile iron pipe, and as previously stated is good long-lasting pipe. Even with the increase in water connections, there will be no increase of pressure as the system will continue to run as it is today only longer due to the increase in water demand. The groundwater in which the Town utilizes is naturally high alkaline water is generally non-corrosive as well thus there are no concerns with the yard piping between Well Building, Elevated Storage Tank, and water distribution system.

In summary, the Town has a well-maintained and operated water treatment system. Improvements to any water system are possible of which the above-mentioned items would help in providing a more efficient, pro-active, and operator friendly system. If all construction estimated takes place, the Town might consider additional groundwater well production needs to be proactive and remain ahead of any additional potential growth. Should you have any questions, comments, concerns, or would like to discuss this further please give me a call at your convenience.

Sincerely,
DAVIS, BOWEN & FRIEDEL, INC.



Jason P. Loar, P.E.
Principal/Sr. Engineer