



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT PERMIT

TO WITHDRAW GROUNDWATER IN THE
EASTERN VIRGINIA GROUNDWATER MANAGEMENT AREA

Permit Number: GWI000563

Effective Date: XXXXXXXX XX, XXXX

Expiration Date: XXXXXXXX XX, XXXX

Pursuant to the Ground Water Management Act of 1992 (Section 62.1-254 et seq. of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610), the Department of Environmental Quality hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Aqua Virginia, Inc.

Facility Nomini Bay Farms

Facility Address Parcel #36F-F

Montross, VA 22520

The Permittee's authorized groundwater withdrawal shall not exceed:

5,000,000 gallons per year,
910,000 gallons per month

The permitted withdrawal will be used to provide a non-municipal public water supply for the Nomini Bay Farms subdivision. Other uses are not authorized by this permit.

The Permittee shall comply with all conditions and requirements of the permit.

By direction of the Department of Environmental Quality, this Permit is granted by:

Signed _____

Scott Morris, DBA, P.E.
Director, Water Division

Date _____

This permit is based on the Permittee’s application submitted on September 18, 2024. The following are conditions that govern the system set-up and operation, monitoring, reporting, and recordkeeping pertinent to the Regulations.

Part I
Operating Conditions

A. Authorized Withdrawal

1. The withdrawal of groundwater shall be limited to the following wells identified in the table below. Withdrawals from wells not included in Table 1 are not authorized by this permit and are therefore prohibited. 9VAC25-610-140 A

Table 1

Owner Well Name	DEQ Well #	Well Depth (ft. bls)	Screen Intervals	Aquifer
Well #1A	196-000232	513.3	357-372, 414-434, 493.3-513.3	Aquia and Potomac
Well #1B	196-00270	510	490-510	Potomac

2. Any actions that result in a change to the status, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department or DEQ) in writing prior to implementing the change and a revised GW-2 Form must be submitted to the Department within 30 days after the physical construction of a well is altered or the pump intake setting has been changed. If changes are a result of an emergency, notify the Department within 5 days from the change. 9VAC25-610-140 C

B. Public Water Supplies

1. Permitted withdrawal limits set forth in this permit are consistent with the requirements and conditions of the Virginia Department of Health (VDH) Waterworks Operation Permit No. 4193675. 9VAC25-610-140 A 5
2. The Permittee shall submit copies of an updated Waterworks Operation Permit and the associated Engineering Description Sheets to the Department within 30 days of receipt from the Virginia Department of Health. 9VAC25-610-140 C

C. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140 A 6
2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)
Well #1A	196-00232	340
Well #1B	196-00270	340

D. Reporting

1. Water withdrawn from each well shall be recorded monthly at the end of each month and reported to the Department, in paper or electronic format, on a form provided by the Department by the tenth (10th) day of each January, April, July and October for the respective previous calendar quarter. Records of water use shall be maintained by the Permittee in accordance with Part III.F, 1 through 5 of this permit. 9VAC25-610-140 A 9
2. The Permittee shall report any amount in excess of the permitted withdrawal limit by the fifth (5th) day of the month following the month when such a withdrawal occurred. Failure to report may result in compliance or enforcement activities. 9VAC25-610-140 C
3. Groundwater withdrawal reports may be submitted electronically through the myDEQ portal at <https://portal.deq.virginia.gov/> or via email to withdrawal.permitting@deq.virginia.gov. Groundwater withdrawal reports may also be mailed to the office address stated below. All other required notifications and submittals shall include facility name and permit number and be submitted electronically to withdrawal.permitting@deq.virginia.gov or mailed to the office stated below, unless otherwise directed in writing by the Department subsequent to the issuance of this permit: Virginia Department of Environmental Quality, Attn: Groundwater Withdrawal Compliance, P.O. Box 1105, Richmond VA 23218.
4. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
Well #1A	196-00232	Water Use
Well #1B	196-00270	Water Use

E. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received September 18, 2024 and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.
2. By the end of the first year of the permit cycle [date] the Permittee shall submit documentation to the Department that the leak detection and repair program defined in the WCMP has been initiated. This documentation shall include activities completed during the first year of the permit term. 9VAC25-610-100 B
3. As soon as completed but not later than the end of the second year of the permit cycle [date] the Permittee shall submit to the Department results of an audit of the total amount of groundwater used in the distribution system and operational processes. This documentation shall include any resulting changes to the leak detection and repair program in the WCMP. 9VAC25-610-100 B

4. A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [date] and ten [date] of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C
 - a. Any new water saving equipment installed or water saving processes adopted;
 - b. WCMP actions taken to reduce the volume of water needed to supply the system;
 - c. Planned short or long term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system or by customers and for reducing the loss of water;
 - d. Results of additional water audits completed;
 - e. Review of water use category (residential, commercial, industrial) per-connection use in municipal systems;
 - f. Evaluation of the leak detection and repair program;
 - g. Description of educational activities completed; and
 - h. Identification of any water reuse opportunities identified.
5. If revisions or additions to the plan are necessary, an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan.
6. Records of activities conducted pursuant to the WCMP are to be submitted to the Department upon request.

F. Well Tags

1. Each well that is included in this permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records, at a minimum, the Department well identification number, the groundwater withdrawal permit number, the total depth of the well, and the screened intervals in the well. Such well identification plates shall be in a format specified by the Department and are available from the Department. 9VAC25-610-140 A 12
2. Well tags shall be affixed to the appropriate well casing within 30 days of receiving the tags from the Department. The accompanying well tag installation certification form shall be returned to the Department within 60 days of receipt of the tags. 9VAC25-610-140 C

**Part II
Special Conditions**

Review of the applicant’s well construction data, facility operations, and Technical Evaluation did not identify a need for water quality or water level monitoring, pump intake reset, or well abandonment conditions in the permit. There are no new wells currently planned for construction during the permit term. Construction of observation wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

**Part III
General Conditions**

A. Duty to Comply

The Permittee shall comply with all conditions of the permit. Nothing in this permit shall be construed to relieve the permit holder of the duty to comply with all applicable federal and state statutes, regulations and prohibitions. Any permit violation is a violation of the law and is grounds for enforcement action, permit termination, revocation, modification, or denial of a permit application. 9VAC25-610-130 A

B. Duty to Cease or Confine Activity

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a permit has been granted in order to maintain compliance with the conditions of the permit. 9VAC25-610-130 B

C. Duty to Mitigate

The Permittee shall take all reasonable steps to avoid all adverse impacts that may result from this withdrawal as defined in 9VAC25-610-10 and provide mitigation of the adverse impact when necessary as described in 9VAC25-610-110 D 3 g and 9VAC25-610-130 C.

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the Department, or any duly authorized agent of the Department, at reasonable times and under reasonable circumstances, to enter upon the Permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the permit conditions, and to inspect any facilities, well(s), water supply system, operations, or practices (including sampling, monitoring and withdrawal) regulated or required under the permit. For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency. 9VAC25-610-130 D

E. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time, any information that the Department may request to determine whether cause exists for modifying or revoking, reissuing, or terminating the permit, or to determine compliance with the permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by regulation or this permit.

9VAC25-610-130 E

F. Monitoring and Records Requirements

1. The Permittee shall maintain a copy of the permit on-site and/or shall make the permit available upon request. 9VAC25-610-130 E
2. Monitoring of parameters shall be conducted according to approved analytical methods as specified in the permit. 9VAC25-610-130 F 1
3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. 9VAC25-610-130 F 2
4. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three years from the date of the expiration of a granted permit. This period may be extended by request of the Department at any time. 9VAC25-610-130 F 3
5. Records of monitoring information shall include as appropriate: 9VAC25-610-130 F 4
 - a. the date, exact place and time of sampling or measurements;
 - b. the name(s) of the individual(s) who performed the sampling or measurements;
 - c. the date the analyses were performed;
 - d. the name(s) of the individual(s) who performed the analyses;
 - e. the analytical techniques or methods supporting the information, such as observations, readings, calculations and bench data used;
 - f. the results of such analyses; and
 - g. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), Environmental Laboratory Certification Program (§ 2.2-1105 et seq. of the

Code of Virginia), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

1. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
2. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.
3. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. 1VAC30-45-20

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Groundwater Withdrawal Regulations. 9VAC25-610-290 and 9VAC25-610-130 G
2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the Department makes a final case decision. This provision shall not be used to extend the expiration date of the effective permit. 9VAC25-610-130 G
3. Permits may be modified or revoked upon the request of the Permittee, or upon Department initiative, to reflect the requirements of any changes in the statutes or regulations. 9VAC25-610-130 G
4. The Permittee shall schedule a meeting with the Department prior to submitting a new, expanded or modified permit application. 9VAC25-610-85
5. A new complete permit application shall be submitted at least 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Department, to continue a withdrawal greater than or equal to 300,000 gallons in any month while an application for a renewal is being processed. 9VAC25-610-96
6. A new complete permit application shall be submitted at least 270 days prior to any proposed modification to this permit that will (i) result in an increase of withdrawal above permitted limits; or (ii) violate the terms and conditions of this permit. 9VAC25-610-96
7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96 C
8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140 C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall

produce volume determinations within plus or minus 10% of actual flows. An alternative method for determining flow may be approved by the Department on a case-by-case basis. 9VAC25-610-140 A 7 b

- a. A defective meter or other device must be repaired or replaced within 30 days.
 - b. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective, generally accepted engineering methods shall be used to estimate withdrawals. The period during which the meter was defective must be clearly identified in the groundwater withdrawal report required by Part I, Subsection D of this permit.
2. Each well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of at least 0.5 inches and be sealed by a removable plug or cap. The Permittee shall provide a tap for taking raw water samples from each permitted well. 9VAC25-610-140 A 7 e

J. Minor Modifications

1. A minor modification to this permit must be made to replace an existing well(s) or add an additional well(s) provided that the well(s) is screened in the same aquifer(s) as the existing well(s), and is in the near vicinity of the existing well(s), the total groundwater withdrawal does not increase, the area of impact does not increase, and the well has been approved by the Department prior to construction. 9VAC25-610-330 B 4 and B 5
2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330 B 6
3. Minor modifications to this permit must also be made to:
 - a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330 B 7
 - b. Allow for change in ownership when the Department determines no other change in the permit is necessary and the appropriate written agreements are provided in accordance with the transferability of permits and special exceptions. 9VAC25-610-320 and 9VAC25-610-330 B 8
 - c. Revise a Water Conservation and Management Plan to update conservation measures being implemented by the Permittee that increase the amount of groundwater conserved. 9VAC25-610-330 B 9

K. Well Construction

At least two weeks prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the Department Well number (DEQ Well #). All wells shall be constructed in accordance with

the following requirements.

1. A well site approval letter or well construction permit must be obtained from the Virginia Department of Health prior to construction of the well. 9VAC25-610-130 A
2. A complete suite of geophysical logs (16"/64" Normal, Single Point, Self-Potential, Lateral, and Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140 C
3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140 A 6
4. The Permittee shall install gravel packs and grout in a manner that prevents leakage between aquifers. Gravel pack shall be terminated close to the top of the well screen(s) and shall not extend above the top of the target aquifer. 9VAC25-610-140 C
5. A completed GW-2 Form and any additional water well construction documents shall be submitted to the Department within 30 days of the completion of any well and prior to the initiation of any withdrawal from the well. The assigned Department Well number shall be included on all well documents. 9VAC25-610-140 C
6. In addition to the above requirements, if required by the permit, construction of a Water Level Monitoring State Observation Well (SOW) requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C
 - b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C
 - c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the installation of the transducer and final hook-up of the equipment. 9VAC25-610-140 C
7. In addition to the above requirements, if required by the permit, construction of a Chloride Monitoring SOW requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater

Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C

- b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C
- c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct final hook-up of the equipment. 9VAC25-610-140 C
- d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the final hook-up of the equipment. 9VAC25-610-140 C

L. Permit Reopening

This permit may be reopened for the purpose of modifying the conditions of the permit as follows:

1. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140 A 11
2. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310 B 1
3. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310 B 2
4. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140 C

**COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY**

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GWI000563

Application Date: September 18, 2024

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. This document provides the pertinent information concerning the legal basis, scientific rationale, and justification for the issuance/reissuance/modification of the Groundwater Withdrawal Permit listed below. Based on the information provided in the application and subsequent revisions, the Department has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address: Aqua Virginia, Inc.
2414 Granite Ridge Road
Rockville, VA 23146
Phone: (804) 749-8868

Facility Name and Address

Name & Address: Nomini Bay Farms
Parcel #36F-F
Montross, VA 22520
Phone: (804) 749-8868

Contact Information:

Name: Devon Ann Scallan
E-mail: dascallan@aquaaamerica.com
Phone: (804) 749-8868

Proposed Beneficial Use: The permitted withdrawal will be used to provide a non-municipal public water supply for the Nomini Bay Farms subdivision with commercial connections. Other uses are not authorized by this permit.

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- The permit reflects the required consultation with and full consideration of the written recommendations of the Virginia Department of Health (VDH).

Staff recommends Groundwater Withdrawal Permit Number GWI000563 be issued as proposed.

Approved:

Scott Morris, DBA, P.E.
Director, Water Division

Date:

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	May 14, 2024
Application Received by DEQ:	September 18, 2024
Permit Fee Deposited by Accounting:	September 9, 2024
Application Review Conducted:	October 1, 2024
Notice of Deficiency Sent:	NA
Request for Additional Information Sent:	NA
Local Government Ordinance Form Received by DEQ:	September 18, 2024
Application Complete:	September 23, 2024
Submit Request for Technical Evaluation:	October 8, 2024
Technical Evaluation Received by DEQ:	October 9, 2024
Draft Permit Package Sent:	
Public Notice Published:	
End of 30-Day Public Comment Period:	
Response to Public comment:	
Public Meeting or Hearing:	
Permit Issued:	

Application

Application Information

Description:

Background / Purpose of Facility:

Nomini Bay Farms is a residential subdivision located in Montross, VA, in Westmoreland County. The groundwater withdrawal is for a non-municipal water supply. Nomini Bay Farms was previously authorized to withdraw 3,700,000 gallons per year (gal/yr), 660,000 gallons per month (gal/mo), and 48,400 gallons per day (gpd) under GW00167EU issued November 1, 2015. This permit expires on October 31, 2025. A permit minor modification was completed on November 17, 2023, to add replacement Well #1B (DEQ Well #196-00270) to replace Well #1 (DEQ Well #196-00222). Well #1 (DEQ Well #196-00222) was abandoned on November 20, 2023. The facility’s currently operational production wells include Well #1A (DEQ Well #196-00232), screened in the Aquia and Potomac aquifers, and Well #1B (DEQ Well #196-00270), screened in the Potomac aquifer.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Northern Neck Planning District Commission

County: Westmoreland County

GWMA/Aquifer: Eastern Virginia GWMA/Aquia and Potomac aquifers

Conjunctive Use Source: No conjunctive use

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:

Groundwater provides the public water supply to the Nomini Bay Farms subdivision in Westmoreland County. The subdivision primarily uses groundwater for drinking water and human health purposes, such as bathing, cooking, dishwashing, sanitation (toilets and lavatories), cleaning, and laundry. A small amount of water is used for non-essential purposes such as vehicle washing, lawn and landscape irrigation, and filling of swimming pools. Some groundwater is periodically used for line flushing (maintenance). The system has one commercial connection. From 2014 through 2023, water system connections increased from 42 to 58, representing an average annual growth rate of 3.8%. The subdivision has approximately 30 vacant residential lots which they expect to build out and connect to the system during the upcoming permit term. The system's water demand is highly seasonal in nature due to increased occupancy in summer months.

Water Demand and Projections:

To project the system's future water demand, the applicant took into consideration the system's expected growth and historical water use trends. The facility expects a higher rate of population growth compared to the larger Westmoreland County area based on the higher-than-average population density within the Nomini Bay Farms subdivision. Based on a historical average annual growth rate of 3.8% over the past 10 years, the water system is expected to build out every available lot within the next 15 years resulting in 30 new connections (for a total of 88). During the last 10 years, the maximum 12-month average water demand per connection was 144 gpd from July 2019 through June 2020. From 2009 – 2023 the maximum rolling 12-month withdrawal occurred at 3,323,900 gallons from October 2009 through September 2010. By multiplying the projected new connections by the maximum 12-month average water demand per connection and by the number of days in a year, then adding that figure to the previously calculated maximum rolling 12-month withdrawal, the applicant reached a figure of 4,900,700 gal/yr, which was rounded up to 5,000,000 gal/yr.

Seasonality has a major impact on the facility's water withdrawal amounts; therefore, the applicant calculated the system's monthly water demand as a percentage of annual water demand and determined the maximum monthly water demand as a percentage of annual demand occurred in June 2011 at 18.4%. By multiplying this factor by the projected annual withdrawal of 4,900,700 gallons, the applicant determined the requested monthly withdrawal limit of 910,000 gal/mo (rounded up from 901,729 gal/mo).

Withdrawal Volumes Requested:

The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Annual:	5,000,000	13,699
Maximum Monthly:	910,000	29,355

Department Evaluation

Historic Withdrawals:

Historic withdrawals from 2009 – 2023 were analyzed. Staff review of the historical groundwater withdrawal data since 2009 determined that the applicant’s calculations of maximum rolling 12-month annual withdrawals and maximum monthly withdrawals are accurate. The maximum rolling 12-month withdrawal volume was 3,323,900 gallons from October 2009 through September 2010 and the maximum monthly water demand was 560,400 gallons in July 2010.

Analysis of Alternative Water Supplies:

There are 50 active public water supply systems in Westmoreland County, all relying on groundwater. Connecting the system to nearest existing water system (Bushfield Public Water Supply) was evaluated as a potential alternative water supply. The system consists of one production well serving 29 residential connections. The existing system is not adequately sized to meet the demands of both the Bushfield and Nomini Bay systems. Upgrading the Bushfield water system to accommodate Nomini Bay Farms would require increased source and storage capacity, as well as the high cost of installing and maintaining an interconnection between Bushfield and Nomini Bay Farms. As such, interconnections with other nearby public water supply systems are not a suitable source of water supply.

Another potential alternative water source is surface water. Two surface water sources, the Potomac River and nearby smaller streams and tributaries, were assessed for feasibility. Between water quality concerns and brackish water necessitating reverse osmosis treatment, in conjunction with the high cost of surface water treatment, nearby surface waters are not a suitable source of water supply.

In the subdivision there are four aquifers present, the Surficial, Piney Point, Aquia, and Potomac aquifers. The thickness and hydraulic properties of the Surficial aquifer vary widely over relatively small areas and is vulnerable to contamination. Based on this, the Surficial aquifer is not considered a viable alternate source. The Piney Point and Aquia aquifers may be thick enough to provide small quantities of potable water. However, due to substantial heterogeneity and prevalence of silts and clays, the generally low yields of these aquifers in this area would likely not provide sufficient quantity for the entire community water system.

Public Water Supply:

Nomini Bay Farms operates under the Virginia Department of Health (VDH) Waterworks Operation Permit (WWOP) #4193675, issued December 30, 2010, with a design capacity of 48,400 gallons per day. The permit includes Well #1A and Well #1 as water sources but does not include newer well, Well #1B. VDH is aware of the construction of Well #1B and issued a Waterworks Construction Permit for it to be added as a source. The applicant submitted a Statement of Substantial Completion for Well #1B to the VDH Office of Drinking Water (ODW) on September 8, 2023, which was subsequently approved by the VDH ODW.

Water Supply Plan Review:

Nomini Bay Farms is included in the Northern Neck Regional Water Supply Plan (2010). Water Supply Plan demand projections for the facility were not included in the Plan and could not be considered in the evaluation of the permit request. The Water Supply Plan states that existing sources for the region were projected to meet demands for the Planning Period of 2007 to 2107.

Department Recommended Withdrawal Limits:

Staff review of historical data and the applicant’s estimated population growth leading to new connections confirmed that the requested withdrawal limits align with the facility’s demands in times of peak need. The Department concludes that the requested withdrawal limits of 5,000,000 gal/yr and 910,000 gal/mo are acceptable.

The Department recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Annual:	5,000,000	13,699
Maximum Monthly:	910,000	29,355

Technical Evaluation:

Aquaveo, LLC performed a technical evaluation of the application for the Department based on the VAHydro Groundwater Eastern Virginia Model (VAHydro-GW-VCPM). The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause salt-water intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria. Aquaveo, LLC also evaluated water levels in the Eastern Virginia Model compared to measured field values.

The Department concluded that the proposed withdrawal satisfies the technical evaluation criteria for permit issuance. A summary of the results of the evaluation and the AOIs for the Aquia and Potomac aquifers are provided in the Technical Evaluation (Attachment 1).

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft. bls)
Well #1A	196-00232	Aquia and Potomac	Production	340
Well #1B	196-00270	Potomac	Production	340

Apportionment:

The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation. Apportionment is not required for this permit.

Additional Wells:

Observation Wells:

No observation wells.

Abandoned Wells:

Owner Well Name	DEQ Well #	Aquifer
Well #1	196-00222	Aquia and Potomac

Out of Service Wells:

No out of service wells.

Pump Intake Settings:

Department staff have reviewed available information and made the following determinations regarding the location of the aquifer tops for the following wells: Well #1A (DEQ Well #196-00232), Well #1B (DEQ Well #196-00270), and Well #1 (DEQ Well #196-00222). Information reviewed in this process included ground samples, geophysical logs, and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well #1A, Well #1B, Well #1 (DEQ Well #s 196-00232, 196-00270, 196-00222) (ft/bls)
Surficial aquifer bottom	30
Yorktown-Eastover aquifer	Absent
Piney Point aquifer top	148
Piney Point aquifer bottom	210
Aquia aquifer top	340
Aquia aquifer bottom	485
Potomac aquifer top	485
Potomac aquifer bottom (estimated)	1850

There is no confining unit between the Aquia and Potomac aquifers. Based on this interconnection between the Aquia and Potomac aquifers, the pump intake settings may not be any deeper than 340 feet below land surface (ft/bls) for Well #1A (DEQ Well #196-00232) and Well #1B (DEQ Well #196-00270).

All well pumps are correctly positioned in accordance with 9VAC25-610-140 A 6. The well pump for Well #1A is set at 231 ft/bls and the well pump for Well #1B is set at 152 ft/bls. Well #1A is screened in both the Potomac and Aquia aquifers.

Withdrawal Reporting:

Groundwater withdrawals are to be recorded monthly and reported quarterly. Groundwater withdrawal reports may be submitted electronically through the myDEQ portal at <https://portal.deq.virginia.gov/> or via email to withdrawal.permitting@deq.virginia.gov. Groundwater withdrawal reports may also be mailed to the office address stated below. All other required notifications and submittals shall include facility name and permit number and be submitted via email to withdrawal.permitting@deq.virginia.gov or mailed to the office stated below, unless otherwise directed in writing by the Department subsequent to the issuance of this permit: Virginia Department of Environmental Quality, Attn: Groundwater Withdrawal Compliance, P.O. Box 1105, Richmond VA 23218.

Water Conservation and Management Plan:

A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100 B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system, is incorporated by reference into this permit, and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 2). In addition, the Permit includes conditions requiring the following:

- Documentation that the leak detection and repair program defined in the WCMP has been initiated is due by the end of the first year of the permit term.
- A result of an audit of the total amount of groundwater used in the distribution system and operational processes is due by the end of the second year of the permit term.
- A report on the plan’s effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [date] and ten [date] of the permit term.

Mitigation Plan:

The predicted AOI resulting from the Technical Evaluation could not be defined in the source aquifers (Aquia and Potomac aquifers) because the maximum drawdown estimated from the simulation was less than one foot at the wellbore. A Mitigation Plan was therefore not required for the permit.

Well Tags:

Well tags will be transmitted by the Department after issuance of the final permit.

**Part II
Special Conditions**

Well Abandonments:

Although Well #1A (DEQ Well #196-00232) is screened in both the Aquia and Potomac aquifers and presents a hydraulic connection between two aquifers, there is no confining unit between the Aquia and Potomac aquifers. Since there is an already existing natural interconnection between these aquifers, abandonment of Well #1A (DEQ Well #196-00232) is not deemed necessary during the permit term.

**Part III
General Conditions**

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610.

Public Comment

The following sections will be completed after close of the public comment period.

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions:

Public Involvement during Application Process:

Local and Area wide Planning Requirements:

The Westmoreland County Administrator certified on August 8, 2024, that the facility’s operations are consistent with all ordinances. The Department received this certification on September 18, 2024.

Public Comment/Meetings:

The public notice was published in xxxxxx on XXX. The public comment period ran from xxxxx to xxxxx

Changes in Permit Part II Due to Public Comments

Changes in Permit Part III Due to Public Comments

Attachments

1. **Technical Evaluation**
2. **Water Conservation and Management Plan**
3. **Public Comment Sheet (if warranted)**

**COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY**

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: October 9, 2024

Application /Permit Number: GWI000563

Owner / Applicant Name: Aqua Virginia, Inc.

Facility / System Name: Nomini Bay Farms

Facility Type: Public Water Supply

Facility / System Location: Westmoreland County

The Commonwealth of Virginia’s Groundwater Withdrawal Regulations (9VAC25-610) provide that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdraw groundwater within a Designated Groundwater Management Area (9VAC25-600).

This evaluation determines the:

- (1) **The Area of Impact (AOI):** The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.
- (2) **Water Quality:** The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource.
- (3) **The Eighty Percent Drawdown (80% Drawdown):** The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested withdrawal amount:

Requested Withdrawal Amount	
Fifteen (15) Year Value	NA
Annual Value	5,000,000 (13,699 average gpd)
Monthly Value	910,000 (29,355 average gpd)

Requested Apportionment of Withdrawal:

DEQ Well #	Owner Well #	Aquifer	Percent of Withdrawal
#196-00232	Well #1A	Aquia and Potomac	38%
#196-00270	Well #1B	Potomac	62%

Summary of Requested Withdrawal:

Aqua Virginia, Inc., is requesting groundwater withdrawal limits of 5,000,000 gallons a year and 910,000 gallons a month for a public water supply to the Nomini Bay Farms subdivision in Westmoreland County, Virginia. These numbers were calculated based on a combination of historical trends and predicted future growth rates. Nomini Bay Farms was previously authorized to withdraw 3,700,000 gallons per year, 660,000 gallons per month, and 48,400 gallons per day under GW00167EU issued November 1, 2015. This permit expires on October 31, 2025. The permitted wells have changed since the previous permit was issued due to a permit special condition requiring the abandonment of Well #1 (DEQ Well #196-00222) by December 31, 2023. A permit minor modification was completed on November 17, 2023 to add a replacement well (Well #1B, DEQ Well #196-00270) to replace Well #1 (DEQ Well #196-00222). Well #1 (DEQ Well #196-00222) was abandoned on November 20, 2023.

Production Well(s):

Identification	Elevation	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well #1A DEQ Well Number: #196-00232 Hydro ID: 64603 CEDS ID: 871000001961	Elevation: 29.968 ft (collected by DEQ Hydrogeologist)	Completion Date: 9/24/2004 Screens (ft/bls): 357-372, 414-434, 493.3-513.3 Total Depth (ft/bls): 513.3	231 ft/bls	Aquia and Potomac
Owner Well Name: Well #1B DEQ Well Number: #196-00270 Hydro ID: Not assigned CEDS ID: 871000009620	Elevation: 29.1296 ft (collected by DEQ Hydrogeologist)	Completion Date: 2/13/2023 Screens (ft/bls): 490-510 Total Depth (ft/bls): 510	152 ft/bls	Potomac

Out of Service/Abandoned Well:

Identification	Elevation	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well #1 DEQ Well Number: #196-00222 Hydro ID: 64625 CEDS ID: 871000001962	Elevation: 29.797 ft (collected by DEQ Hydrogeologist)	Completion Date: 2/17/1989 Screens (ft/bls): 345-370, 412-432, 492-512 Total Depth (ft/bls): 517	215 ft/bls	Aquia and Potomac

Geologic Setting:

The Nomini Bay Farms wells (applicant wells) are located in Westmoreland County. The applicant’s production wells are screened in the Aquia and Potomac aquifers. USGS Professional Paper 1731¹, *The Virginia Coastal Plain Hydrogeologic Framework* (VCPHF), is the most recent study discussing the aquifers and confining units of the Virginia Coastal Plain. The study utilized numerous boreholes throughout the Virginia Coastal Plain to interpolate the elevations of the different hydrogeologic units found in the Coastal Plain.

According to the study, the “Aquia aquifer is widespread, generally deep, but relatively sparsely used as a ground-water resource in the Virginia Coastal Plain.” The aquifer is found below the Nanjemoy-Marlboro Confining Unit. The “Aquia aquifer consists of marine, medium- to coarse-grained, glauconitic and fossiliferous quartz sands of the Aquia Formation of late Paleocene age.”

Also according to the study, the Potomac aquifer is the "largest, deepest, and most heavily used source of ground water in the Virginia Coastal Plain." The aquifer is underlain across its entire extent with basement bedrock. The aquifer is found below the Potomac confining zone. The aquifer is primarily composed "of fluvial-deltaic coarse-grained quartz and feldspar sands and gravels and interbedded clays."

The nearest east-west geologic cross section, AD-AD’, from the USGS Professional Paper 1731 is shown in the figure at the end of this report.

Hydrologic Framework:

Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Coastal Plain near the applicant well and identify major discrepancies between regional hydrogeology and site logs interpreted by DEQ staff. The Virginia Coastal Plain Model² (VCPM) framework was constructed by extracting the hydrogeologic unit tops and thicknesses from the VCPHF. The original USGS VCPM was updated and adapted for use in the VA-DEQ well permitting process and is referred to as VAHydroGW-VCPM.

VAHydroGW-VCPM Model:

The following table lists the locations of the applicant production wells within the VAHydroGW-VCPM Model.

VAHydroGW-VCPM Model Grid					
Well	Hydro ID	Well Number	MPID	Row	Column
Well #1A	64603	196-00232	Not provided	20	44
Well #1B	Not assigned	196-00270	Not provided	20	44

The following aquifer top elevations and thicknesses are simulated in the VAHydroGW-VCPM Model at the model cell containing the applicant wells.

¹ McFarland E. R., and Bruce T.S., 2006. The Virginia Coastal Plain Hydrologic Framework: U.S. Geologic Survey Professional Paper 1731. 118 p., 25 pls. (available online at <http://pubs.water.usgs.gov/pp1731/>).

² Heywood, C.E., and Pope, J.P., 2009, Simulation of groundwater flow in the Coastal Plain aquifer system of Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5039, 115 p.

VAHydroGW-VCPM Model Hydrogeologic Unit Information		
Aquifer	Elevation (ft-msl)	Depth (ft-bls)
Surface	22	0
Water Table aquifer (bottom)	-3	25
Piney Point (top)	-119	141
Piney Point (bottom)	-173	195
Aquia (top)	-307	329
Aquia (bottom)	-401	423
Potomac (top)	-451	473
Potomac (bottom)	-2196	2218

Note: ft-msl = feet above mean sea level

Groundwater Characterization Program Recommendations:

Department staff have reviewed available information and made the following determinations regarding the location of the aquifer tops for the following wells: Well #1A (DEQ Well #196-00232), Well #1B (DEQ Well #196-00270), and Well #1 (DEQ Well #196-00222). Information reviewed in this process included ground samples, geophysical logs, and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well #1A, Well #1B, Well #1 (DEQ Well #s 196-00232, 196-00270, 196-00222) (ft/bls)
Surficial aquifer bottom	0-30
Yorktown-Eastover aquifer	Absent
Piney Point aquifer top	148
Piney Point aquifer bottom	210
Aquia aquifer top	340
Aquia aquifer bottom	485
Potomac aquifer top	485
Potomac aquifer bottom (estimated)	1850

Comparison of the Hydrogeologic Framework and Geologist Report:

The VCPMF identifies the top and thickness of the Aquia aquifer at an elevation of 329 ft-bls and 94 feet thick at the cell containing the applicant wells, respectively. The top elevation and thickness of the Aquia aquifer given by DEQ staff are 340 ft-bls and 145 ft thick, respectively. The top elevation of the Aquia aquifer identified by the VCPMF is 11 feet higher than, but in general agreement with the value identified by DEQ staff. The thickness of the Aquia aquifer identified by the VCPMF is 51 feet thinner than the value provided by DEQ staff, also indicating general agreement.

The VCPMF identifies the top and thickness of the Potomac aquifer at an elevation of 473 ft-bls and 1,745 feet thick at the cell containing the applicant wells, respectively. The top elevation and thickness of the Potomac aquifer given by DEQ staff are 485 ft-bls and 1,365 ft thick, respectively. The top elevation of the Potomac aquifer identified by the VCPMF is 12 feet higher than, but in general agreement with the value identified by DEQ staff. The thickness of the Potomac aquifer identified by the VCPMF is 105 feet thinner than the value provided by DEQ staff, also indicating general agreement.

Pump Intake Elevation:

Virginia regulations specify that well pump intakes must be placed at or above the top of the source aquifer. The pump intake for production well Well #1A is above the top elevation of both the Potomac aquifer and the Aquia aquifer. Since Well #1A is screened in both aquifers this well is in compliance of the pump intake elevation with the limits specified by regulation for the Aquia aquifer and Potomac aquifer. The pump intake for well Well#1B is in compliance of the pump intake elevation with the limits specified by regulation³.

Water Level Comparison:

The *Virginia Coastal Plain Model (VAHydroGW-VCPM) 2022-2023 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report (the 2022-2023 report) and modeling files⁴ provide two sets of simulated potentiometric water surface elevations. These water elevations are based upon, 1) the reported withdrawal amount of wells in the VAHydroGW-VCPM model ("the reported use simulation") and, 2) the total permitted withdrawal amount for wells in the VAHydroGW-VCPM model ("the total permitted simulation"). USGS regional observation network well water levels were compared to the water levels in the 2022-2023 report in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends. In the tables below, simulated water levels from the year 2022, from the reported use simulation, were compared to USGS measured water levels for the same year. For comparison, the total permitted simulated water levels are also reported. The total permitted water levels are taken from the end of the 50-year total permitted simulation and represent simulated water levels, 50 years from present, if all GWMA wells were to pump at their total permitted amount.

The USGS regional observation network wells closest to the applicant wells are shown in Figure 1 and listed in the following tables. The depth of these wells corresponds with the Aquia and Potomac aquifers. The distances from the applicant wells to the USGS wells are also given in the tables. The VAHydroGW-VCPM row and column containing the USGS wells are also given. The water levels obtained from the regional observation network wells are shown in Figures 2 through 4. These figures also show the water levels from the reported use VAHydroGW-VCPM simulation for the cell containing each USGS well. The 2022 annual average water levels observed in the regional observation network wells are given in the following tables.

The water level graph for the well in the Aquia aquifer (53M 1) shows a steady decline in water levels from the time of the earliest available records (1997) to the present. The VAHydroGW-VCPM simulated reported use water levels are within 5 to 10 feet of the USGS observed water levels and are therefore in general agreement.

The water level graph for the first well in the Potomac aquifer (55P 5) also shows a steady decline in water levels from the time of the earliest available records (1974) to the present. The VAHydroGW-VCPM simulated reported use water levels are within 10 feet of the USGS observed water levels and are therefore in general agreement.

The water level graph for the second well in the Potomac aquifer (55N 2) also shows a decline in water levels from the time of the earliest available records (1999) to the present. The VAHydroGW-VCPM

³ 9 VAC 25 610 140.A.5. "The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a ground water source or lower than the bottom of an unconfined aquifer that a well utilizes as a ground water source;

⁴ Refer to "Virginia Coastal Plain Model (VAHydroGW-VCPM) 2022-2023 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use" at <http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterCharacterization/ReportsPublications.a.spx>

simulated reported use water levels for this well were up to 10 feet lower than the USGS observed water levels but in the last several years have been within 5 feet of the USGS observed water levels and are therefore also in general agreement.

Aquia Aquifer	
Measurement	Well 53M 1
Distance from nearest applicant well (miles)	29.4
Elevation (ft-msl)	89
VAHydroGW-VCPM Row	29
VAHydroGW-VCPM Column	16
VAHydroGW-VCPM Cell Elevation	104
USGS Regional Well 2022 Average Water Level (ft-bls)	76.9
USGS Regional Well 2022 Average Water Level (ft-msl)	12.1
VAHydroGW-VCPM 2022 Reported Use Simulated Water Level (ft-bls)	84.7
VAHydroGW-VCPM 2022 Reported Use Simulated Water Level (ft-msl)	19.3
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	89.3
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	14.7

Potomac Aquifer		
Measurement	Well 55P 5	Well 55N 2
Distance from nearest applicant well (miles)	10.9	16.1
Elevation (ft-msl)	24	141
VAHydroGW-VCPM Row	16	28
VAHydroGW-VCPM Column	34	30
VAHydroGW-VCPM Cell Elevation	0	113
USGS Regional Well 2022 Average Water Level (ft-bls)	79.1	176.0
USGS Regional Well 2022 Average Water Level (ft-msl)	-55.1	-35.0
VAHydroGW-VCPM 2022 Reported Use Simulated Water Level (ft-bls)	44.2	148.0
VAHydroGW-VCPM 2022 Reported Use Simulated Water Level (ft-msl)	-44.2	-35.0
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	57.3	157.6
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	-57.3	-44.6

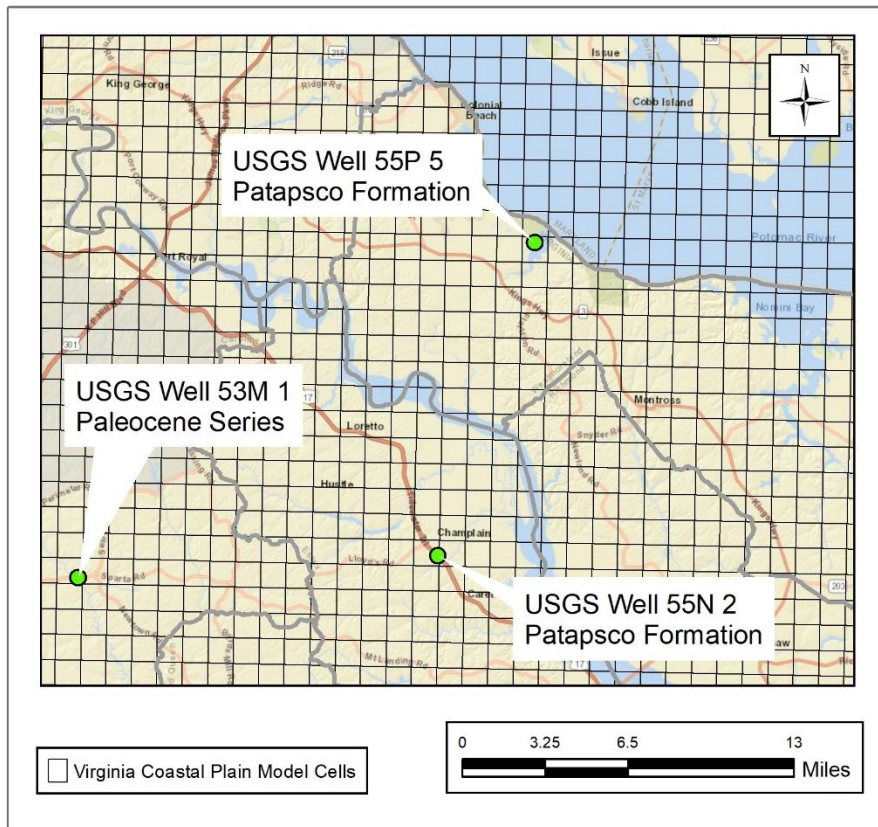


Figure 1. Nearest USGS regional observation network wells.

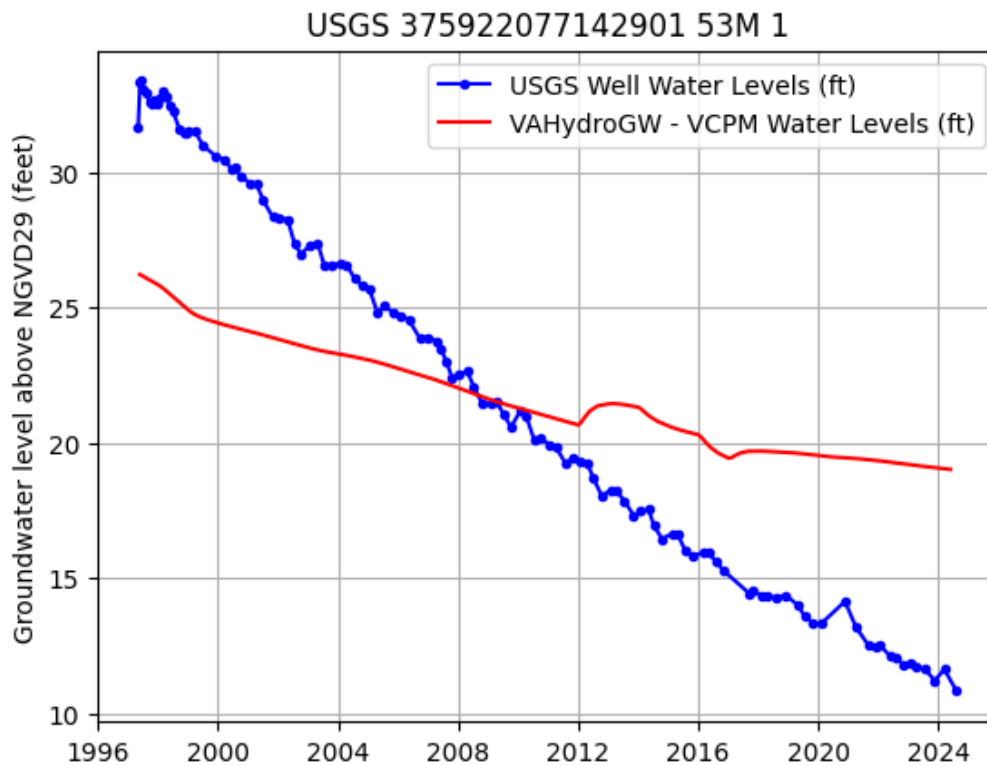


Figure 2. USGS Regional Observation Well 53M 1, Aquia aquifer water levels (Paleocene Series) recorded from 1997 to present (well depth 110.75 ft bls, land surface 89 ft msl) and VAHydroGW-VCPM reported use water levels.

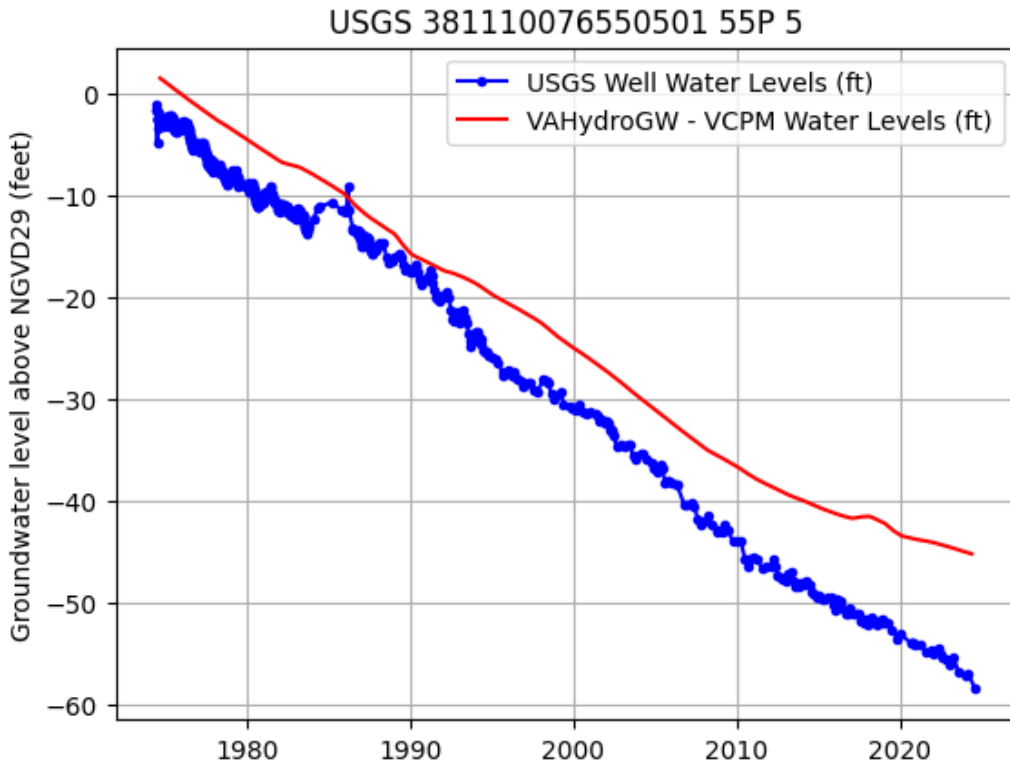


Figure 3. USGS Regional Observation Well 55P 5, Potomac aquifer water levels (Patapsco Formation) recorded from 1974 to present (well depth 471 ft bls, land surface 24 ft msl) and VAHydroGW-VCPM reported use water levels.

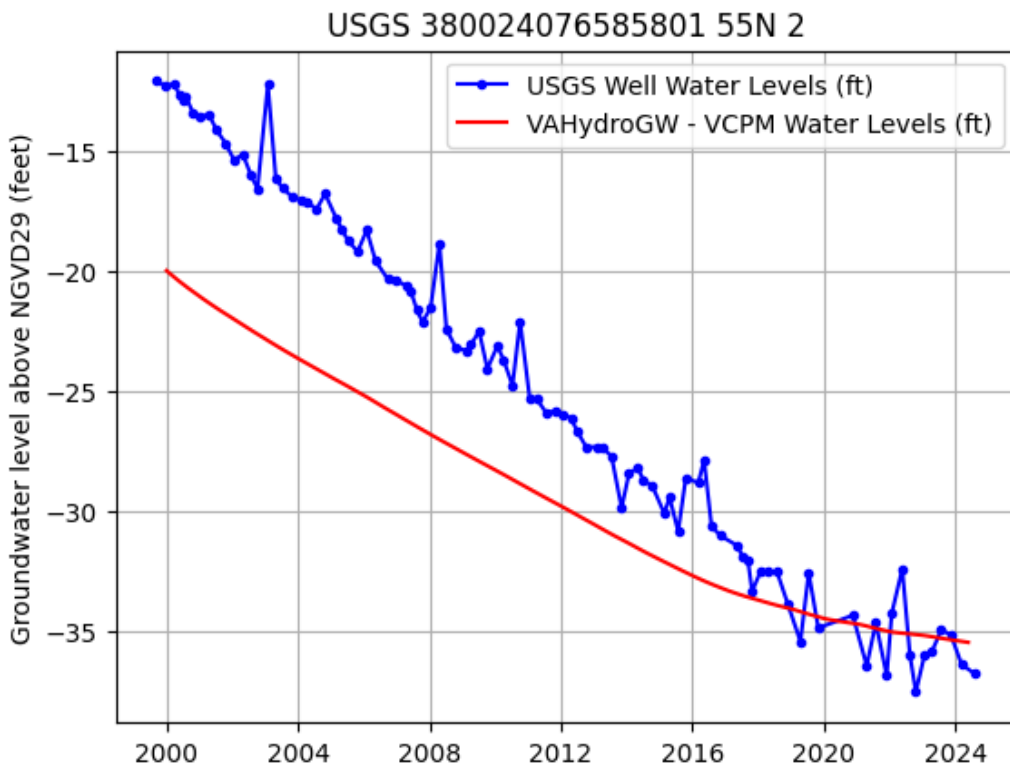


Figure 4. USGS Regional Observation Well 55N 2, Potomac aquifer water levels (Patapsco Formation) recorded from 1999 to present (well depth 516 ft bls, land surface 140.5 ft msl) and VAHydroGW-VCPM reported use water levels.

Aquifer Test(s):

Aquifer testing has not been completed at this facility. There are no nearby aquifer tests available.

The hydraulic properties for the VAHydroGW-VCPM cell containing the applicant wells are shown in the following table.

Hydrogeologic Unit	Horizontal Conductivity (ft/day)	Transmissivity (ft ² /day)	Storage Coefficient	Specific Storage (1/ft)
Surficial (Columbia) aquifer	2	50.0	-	0.000032
Piney Point aquifer	23.1	1,247.4	0.00174	0.000032
Aquia aquifer	109	10,246.0	0.00303	0.000032
Potomac aquifer	5.3	9,215.5	0.00325	0.0000186

Model Results

Evaluation of Withdrawal Impacts:

The magnitude of the proposed withdrawal does not allow for assessment of the area of impact using VAHydroGW-VCPM. The aquifer parameters from the VAHydroGW-VCPM were used to perform a two-dimensional analytical simulation to simulate drawdown due to the requested withdrawal for this technical evaluation. The drawdown in the Aquia and Potomac aquifers resulting from the proposed withdrawal was calculated using Theis (1935) 2-D analytical simulations. The Theis simulation predicts the drawdown in a confined aquifer assuming constant discharge from a fully penetrating well. For the 2-D analytical simulations the following parameters were used:

Model Input Parameters (source: VAHydroGW-VCPM model properties for row 20, col 44):

Aquia Transmissivity	=	10,246 ft ² /day
Aquia Storage Coefficient	=	3.03 x 10 ⁻³
Potomac Transmissivity	=	9,215.5 ft ² /day
Potomac Storage Coefficient	=	3.25 x 10 ⁻³

Withdrawal rate/Simulation Time = 50 years at 5,000,000 gallons per year (13,699 gallons per day). For the 2-D analytical simulations in this analysis, 100% of the withdrawal was simulated in two separate simulations for the Aquia and Potomac aquifers to analyze the worst case scenario where all of the pumping was being withdrawn from one aquifer at a time.

Area of Impact:

The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal. The results from the Theis analytical simulations, with the parameters listed above, do not simulate an AOI in the Aquia or Potomac aquifers because the simulated drawdown at the production wells is less than one foot for both simulations.

Water Quality:

The regional model (VAHydroGW-VCPM) does not indicate any changes to regional flow patterns that would lead to reduced water quality.

80 % Drawdown:

With no area of impact, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated to the Aquia and Potomac aquifers as specified in the Requested Apportionment of Withdrawal table found earlier in this evaluation. The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation.

Conclusion:

The withdrawal requested by Aqua Virginia, Inc. for Nomini Bay Farms satisfies the technical evaluation criteria for permit issuance.

Nomini Bay Farms

Area of Impact - Aquia Aquifer



Simulated drawdown at or exceeding one foot in the Aquia aquifer resulting from a two-dimensional Theis simulation of 50 years at 5,000,000 gallons per year from the Potomac aquifer.

Simulated drawdown is less than one foot.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning October 9, 2024



Nomini Bay Farms

Area of Impact - Potomac Aquifer

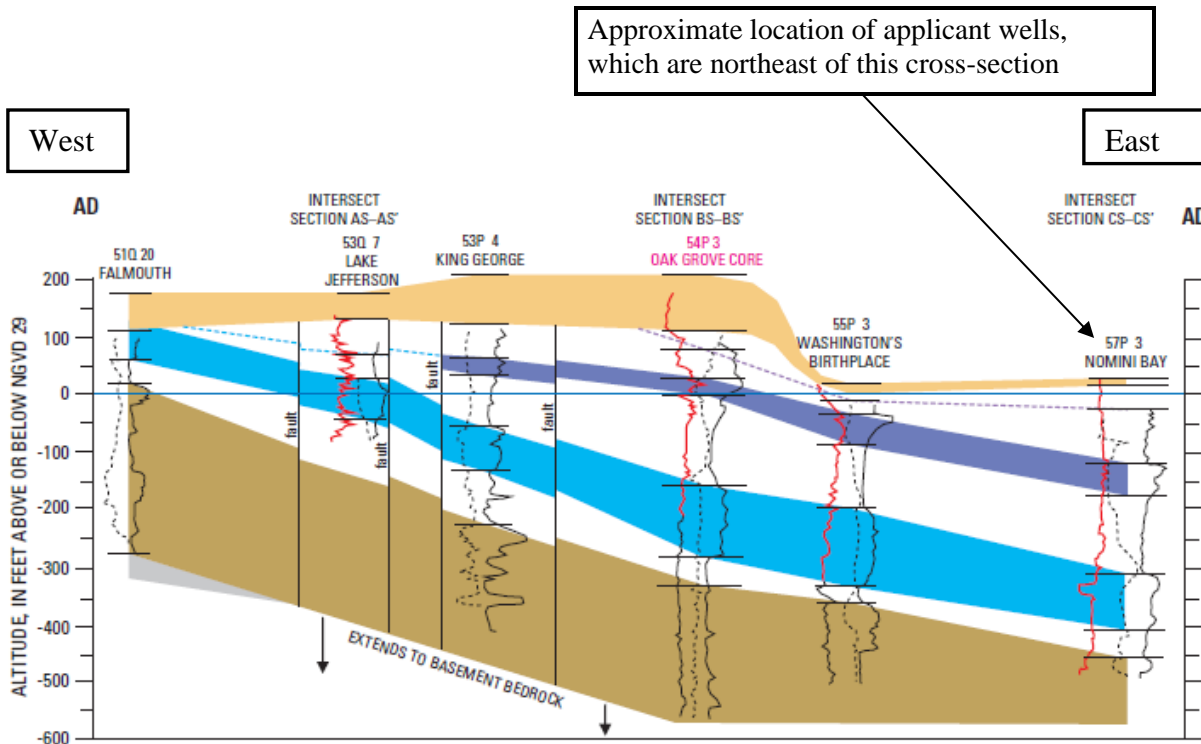


Simulated drawdown at or exceeding one foot in the Potomac aquifer resulting from a two-dimensional Theis simulation of 50 years at 5,000,000 gallons per year from the Potomac aquifer.

Simulated drawdown is less than one foot.

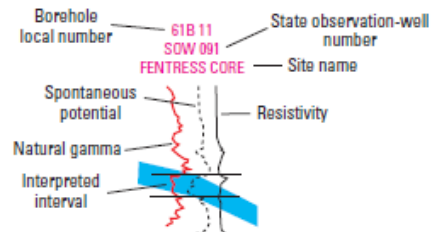
Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning October 9, 2024





EXPLANATION

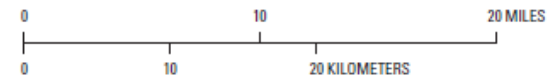
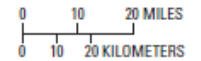
BOREHOLE GEOPHYSICAL LOG
 [Heading in blue indicates lithologic control from detailed cuttings descriptions, and in magenta from core. Heading in black indicates only drillers logs or no lithologic information available.]



[Aquifers are shown by solid colors. Confining units and zones are shown by intervening blank areas following the sequence below. Where adjacent confining units or zones are in direct contact, the top surface of the unit or zone is shown by dashed lines.]

- Surficial aquifer
- Yorktown confining zone
- Yorktown-Eastover aquifer
- Saint Marys confining unit
- Saint Marys aquifer
- Calvert confining unit
- Piney Point aquifer
- Chickahominy confining unit
- Exmore Matrix confining unit
- Exmore Clast confining unit
- Nanjemoy-Marlboro confining unit
- Aquia aquifer
- Peedee confining zone
- Peedee aquifer
- Virginia Beach confining zone
- Virginia Beach aquifer
- Upper Cenomanian confining unit
- Potomac confining zone
- Potomac aquifer
- Basement bedrock

SECTION LOCATIONS



Coastal Plain (2006) Cross-Section AD-AD' from USGS Professional Paper 1731.

WATER CONSERVATION AND MANAGEMENT PLAN



AQUA VIRGINIA NOMINI BAY PUBLIC WATER SYSTEM WESTMORELAND COUNTY, VA

July 1, 2024

Prepared for:

Aqua Virginia
2414 Granite Ridge Road
Rockville, VA 23146

Prepared by:

Stantec
10988 Richardson Road
Ashland, VA 23005
www.Stantec.com

Table of Contents

1	Introduction.....	1
1.1	WCMP Requirements.....	1
2	Overview of Water System	2
2.1	Description of Water Use	2
2.2	System Design and Operation	2
2.3	Proposed / Planned System Modifications.....	2
2.4	Water Usage by Type.....	2
2.5	Water Usage Schedule	2
3	Water-Saving Equipment and Processes.....	3
3.1	Water-Saving Equipment	3
3.2	Water Use Monitoring.....	3
3.3	Billing Incentives.....	3
4	Water Loss Reduction Program.....	3
4.1	System and Customer Metering.....	4
4.2	Unaccounted for Water Analysis	4
4.3	Water System Leak Detection and Repair	4
4.4	Preventive Maintenance	5
5	Water Use Education Program.....	5
5.1	Customer and Public Education	5
5.2	Operator and Management Education	6
5.3	Outdoor Water Use Education	6
6	Water Reuse	6
7	Requirements for Mandatory Water Use Restrictions.....	7
7.1	Drought Stages.....	7
7.1.1	Normal.....	7
7.1.2	Drought Watch	7
7.1.3	Drought Warning.....	7
7.1.4	Drought Emergency	7
7.2	Drought Monitoring and Water Use Restrictions	7
7.3	Declaring Reduction of DRCP Drought Stages.....	9
8	WCMP Effectiveness Reporting.....	10

1 Introduction

On behalf of Aqua Virginia, Inc. (Aqua), Stantec Consulting Services, Inc. (Stantec) has prepared this Water Conservation and Management Plan (WCMP) pursuant to Virginia's Groundwater Management Act of 1992 (Title 62.1, Chapter 25) and corresponding Groundwater Withdrawal Regulations (9VAC 25-610), which require a Groundwater Withdrawal Permit (GWP) for any entity located within either the Eastern Virginia or Eastern Shore Groundwater Management Area (GWMA) that withdraws 300,000 gallons of groundwater or more in any one month. This WCMP has been prepared in conjunction with the GWP renewal application for the Nomini Bay Public Water System (the system) in Westmoreland County, Virginia.

In 2010, Westmoreland County participated in the Northern Neck Planning District's Regional Water Supply Plan (RWSP) that also included the Counties of Lancaster, Richmond, Northumberland, and incorporated Towns of Colonial Beach, Irvington, Kilmarnock, Montross, Warsaw, and White Stone. The RWSP includes a section on Water Demand Management and a Drought Response and Contingency Plan, both of which are components of a WCMP. These sections of the RWSP have been incorporated into this WCMP.

1.1 WCMP Requirements

A complete WCMP must satisfy the minimum requirements of 9VAC 25-610-100. For municipal and non-municipal public water supplies such as the system, the WCMP shall include the following:

1. Where practicable, the plan should require use of water-saving equipment and processes for all water users including technological, procedural, or programmatic improvements to the facilities and process to decrease the amount of water withdrawn or to decrease water demand. The goal of these requirements is to assure the most efficient use of groundwater. Information on the water-saving alternatives examined and the water savings associated with the alternatives shall be provided. Also, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided in the Uniform Statewide Building Code (13VAC-63) shall be identified in the plan.
2. A water loss reduction program, which defines the applicant's leak detection and repair program. The water loss reduction program shall include requirements for an audit of the total amount of groundwater used in the distribution system and operational processes during the first two years of the permit cycle. Implementation of a leak detection and repair program shall be required within one year of the date the permit is issued. The program shall include a schedule for inspection of equipment and piping for leaks.
3. A water use education program that contains requirements for the education of water users and training of employees controlling water consuming processes to assure that water conservation principles are well known by the users of the resource. The program shall include a schedule for information distribution and the type of materials used.
4. An evaluation of water reuse options and assurances that water shall be reused in all instances where reuse is practicable. Potential for expansion of the existing reuse practices or adoption of additional reuse practices shall also be included; and
5. Requirements for mandatory water use reductions during water shortage emergencies declared by the local governing body or water authority consistent with §§15.2-923 and 15.2-924 of the Code of Virginia. This shall include, where appropriate, ordinances in municipal systems prohibiting the waste of water generally and requirements for providing for mandatory water use restrictions in accordance with drought response and contingency ordinances implemented to comply with 9VAC25-780-120 during water shortage emergencies. The water conservation and management plan shall also contain requirements for mandatory water use restrictions during water shortage emergencies that restricts or prohibits all nonessential uses such as lawn watering, car washing, and similar nonessential residential, industrial, and

commercial uses for the duration of the water shortage emergency. Penalties for failure to comply with mandatory water use restrictions shall be included in municipal system plans.

Additionally, facilities with a GWP are required to maintain a record logging the dates that activities required in the WCMP are completed. These logs are to be made available to DEQ staff upon request.

The above enumerated requirements are addressed in each subsequent section of this WCMP.

2 Overview of Water System

2.1 Description of Water Use

The system provides potable water to the residents of Nomini Bay subdivision. The system has 58 active connections as of the date of this WCMP. This water is primarily used for drinking water, bathing, cooking, dishwashing, sanitation (toilets and lavatories), cleaning, and laundry. A small percentage of groundwater is used for non-essential purposes such as vehicle washing, lawn and landscape irrigation, and filling of swimming pools. Some water will be used as needed for flushing water lines.

2.2 System Design and Operation

The system currently utilizes two groundwater wells: Well 1A and Well 1B. The waterworks consists of a 25,000-gallon standpipe, a 2,000-gallon hydropneumatic tank, a hypochlorite feed system, and the distribution system; all with related controls, piping, and appurtenances. Groundwater from each well is treated through the installed sodium hypochlorite feed system for disinfection. The feed system consists of a 20 gallons/day chemical feed pump and a 50-gallon graduated solution tank. The sodium hypochlorite solution is injected into the common well discharge line just downstream of the two well meters. Wastewater treatment and disposal occurs via individual septic systems.

2.3 Proposed / Planned System Modifications

The system currently has no planned expansion or other system modifications; however, planned expansion is at the discretion of the lot owners. Although it is possible for privately-owned lots to be subdivided, there would likely be few new system connections. All current connections are to lots zoned as single-family residential.

2.4 Water Usage by Type

As part of the GWP application for the system, a breakdown of beneficial uses of groundwater was developed. Of all groundwater used, the vast majority is for residential human consumptive use, which includes drinking water, showers, laundry, cooking, dishwashing, and fire suppression as needed. The remaining water usage includes non-essential activities such as vehicle washing, lawn watering, and swimming pools, except during water shortage emergencies. Some of the system's total water production is used by the homeowner's association for irrigation of common areas. Some water will be used as needed for flushing water lines and backwashing filters.

2.5 Water Usage Schedule

The system service area currently experiences moderate seasonal variations in water demand associated with increased summer water use. The last 14 years of usage data analyzed by Stantec indicate that peaks in usage occur during June-September, whereas in winter months (December- March) usage is lower. During the last 14 years (2009-2023), the months of June, July, August, and September on average accounted for ~46% of the annual usage and reached a maximum of 54% of annual usage in 2010 and 2011. Peak monthly usage, normally in June, July, or September, is on average ~16% of the year's annual production, and in 2009, 2011, 2012, 2016, 2023 reached 18% of the total annual production.

3 Water-Saving Equipment and Processes

3.1 Water-Saving Equipment

On the production side, existing and any new system equipment including pumping and storage components as well as water main piping will adhere to the requirements of the Virginia Waterworks Regulations. Water uses such as distribution system flushing are only performed if required. If practical, water use while flushing will be minimized by regulating valves within the distribution system to increase flow velocities and reduce water use. As equipment is replaced within the system, water saving alternatives will be evaluated and used if applicable. Water savings in treatment and filtration systems, flushing activities, and plumbing fixture upgrades may be possible and will be evaluated. System improvements will be assessed regularly as new technologies become available that will allow water savings, along with providing system operators with continuing education on maintaining the water system and improving water system efficiencies.

On the consumption (customer) side, new construction, maintenance, and renovations must adhere to the Virginia Uniform Statewide Building Code (USBC). The USBC promotes efficient water use by specifying limits on flow rates for plumbing fixtures and public lavatories in new or renovated structures. Through the Water Use Education Program (Section 5 below), Aqua will encourage customers to use water-saving equipment including recommendations to choose fixtures with the U.S. Environmental Protection Agency (EPA) WaterSense label. Manufacturers design and produce innovative water-saving products that earn the WaterSense label by meeting or exceeding EPA criteria for efficiency and performance in specific product categories.

3.2 Water Use Monitoring

The production wells are metered, and water production is recorded on a weekly basis. Accounting for water usage from connected customers allows for greater understanding of usage amounts and temporal patterns and can help a centrally controlled system distinguish between typical water usage fluctuations and potential leaks. All existing active connections are individually metered, and any new connections will also be metered. Sub-metering allows Aqua to account for water usage and to promote water conservation through water use education and demand management.

3.3 Billing Incentives

Aqua issues water bills to all customers monthly. Billing statements to customers can incentivize water conservation behaviors. A recurring and frequent billing statement provides information to the customer concerning base rates for water consumption, and can encourage less water use, as higher usage incurs larger water bills. Including a customer's water use data with each billing cycle will demonstrate how water saving practices such as installing efficient plumbing fixtures have tangible financial benefits. Customers can also identify how certain seasonal non-essential activities such as watering lawns increases water consumption and associated costs.

The current rate structure strategy is to bill customers a base rate for zero gallons and then bill for every gallon used, rounded to the nearest thousand gallons. The cost to the customer is lower for low water use and increases for higher water use. The customer's water consumption is provided on the customer's bill for each billing cycle.

4 Water Loss Reduction Program

Water loss reduction pertains to activities such as promptly identifying and repairing system leaks, maintaining water use monitoring programs, and maintaining a preventive maintenance program to minimize total water losses.

4.1 System and Customer Metering

Monitoring water use is necessary for a successful water loss reduction program. The only viable means of effectively monitoring water use is through the installation of water meters. Water metering and an effective reading system enables operators to pinpoint areas of high water loss. Customer meters are also physically inspected, where operators can detect damaged or faulty meters and make repairs and replacements, as necessary.

Aqua reads well meters on a weekly basis and all customer meters monthly. Customer meters are touchless radio-read, which allow for expeditious analysis of customer water use and notification to system operators of unusual usage patterns (e.g., high water use during off-season, abnormally high usage trends) that could indicate the presence of a leak.

4.2 Unaccounted for Water Analysis

Usage data collected from customer and system meters allows for an accounting of water produced and water consumed. Water system audits are performed by comparing well and customer usage data and analyzing differences to identify major leaks or discrepancies. This analysis aligns with regulatory requirements under 9VAC25-610-100, which mandates a water auditing plan for an annual water loss audit in accordance with the American Water Works Association (AWWA) methodology for water loss auditing. The audit utilizes the most recent version of the AWWA Water Audit Software or another approved methodology that estimates water loss. More frequent water audits will be performed if water use trends indicate potential leaks. System water use will be reviewed during each pumping station visit on each monthly operator's report, the quarterly usage report, and annually during an unaccounted-for water analysis. More frequent reviews may be possible as new technologies such as automation are implemented within the meter reading systems.

4.3 Water System Leak Detection and Repair

When a leak in the system is detected, it will be repaired as quickly as possible, typically within 24 hours. Leaks may be detected through the audit analysis described above, especially in cases where visible signs of a leak are not apparent. Excessive or unexpectedly high monthly customer water usage identified through the monthly billing process can be indicative of leaks and will initiate leak investigation procedures. Metered customers will be responsible for internal plumbing maintenance and leaks (e.g., household piping and fixtures or a larger customer's internal water mains). Aqua can suspend water service in cases of unresolved leaks where the customer is unresponsive or significant water is wasted.

Searches for leaks include walking system lines to look for potential leak indicators such as puddles or wet areas. Electronic equipment is used for subsurface leaks not identified on the surface, including sonic devices. Additionally, simultaneous monitoring at multiple points, isolating valves, and isolating sections of the distribution system are used to help pinpoint exact leak locations.

Aqua operators will inspect all pump station piping for leaks during each visit and operators will notify management of any leaks observed in the pump station or on the distribution system in a timely manner. During monthly meter readings, operators will observe customer piping for leaks and make note of any leaks observed. Observed leaks will then be reported to Aqua's billing staff. Aqua will subsequently notify the customer that a plumbing leak has been observed on their property. Such a notification will generally occur within five (5) business days. Depending on the severity of the leak, the operator may also notify the customer directly.

Upon identification of a subsurface leak not identified on the surface, sonic electronic and electromagnetic leak detection equipment will be used. These methods will be used in conjunction with simultaneous flow monitoring at multiple points, isolation of valves, and isolation of sections of the distribution system to help pinpoint exact leak location(s).

Additionally, Aqua uses an Excel-based water production tracking program to aid in leak detection and GWP limit compliance. Upon entering weekly well production data, the program performs a series of calculations to identify abnormally high water production and to forecast if monthly GWP limit exceedances could occur. The program works by comparing system water production in gallons per day (gpd) to the maximum and average production in the previous calendar year. Instances of production more than 20% higher than the maximum produced in the previous year are highlighted, notifying Aqua of a potential leak. Aqua has utilized this program since April 2019. So far, this program has identified leaks that may have otherwise gone unnoticed at several of Aqua's systems.

4.4 Preventive Maintenance

Aqua will maintain its water production, storage, and treatment facilities and distribution system in accordance with the Virginia Waterworks Regulations and industry standards to prevent leaks. Preventive maintenance will include winterization of all system piping or fittings exposed aboveground that do not yet have connections to prevent freezing, breakage, and subsequent leaks. Customer meters will be replaced at a rate such that a complete system-wide turnover occurs every 15 years, which is consistent with the warranty period on most meters.

System customers will be responsible for conducting preventive maintenance of their plumbing beyond the meter. This includes winterizing their buildings and plumbing systems by draining water lines as necessary to prevent freezing, breakage, and subsequent leaks.

Aqua may provide regular reminders of the requirements for preventive maintenance in customer billing statements issued one to two months before the onset of winter. Aqua operators who observe potential issues associated with lack of maintenance (e.g., unoccupied buildings without appropriate winterization) will notify billing staff. Billing staff will then notify the customer within five business days. Aqua reserves the right to discontinue service to a customer who does not take appropriate actions to prevent leaks or wasting of water.

5 Water Use Education Program

Education of customers and operators is an essential component of an effective water conservation program.

5.1 Customer and Public Education

Public awareness and customer education is essential for an effective conservation program. The goal of a conservation awareness program is to make the customer understand their water sources, the costs of supplying the water to the customer, the problems associated with supplying water, and how changes in consumer behavior can lower the cost of supplying water and thereby lower the cost to the customer. Establishing conservation practices by customers through education and financial benefits can modify long-term water use patterns. Information on water saving practices that will lower costs, including low-flow fixtures, water conservation, and repairing leaks are measures the customers will notice.

Aqua will include in the Consumer Confidence Report mailed to customers in March each year links to Aqua's Water Smart website (<http://www.aquawatersmart.com>) dedicated to water conservation and water saving techniques. Information on the website is updated periodically. The educational information provided addresses the need to conserve, the advantages of water saving devices, information on new water saving devices, and indoor and outdoor water conservation practices. Information may also include outdoor best management practices such as planting drought tolerant and low water use vegetation, efficient irrigation, mulching, limiting turf areas and re-using water where applicable. Links to internet sources of water conservation information such as the EPA WaterSense website (www.epa.gov/watersense) will also be included with the mailings. Aqua will evaluate providing links to educational information sources with all billings. If feasible, the links may be targeted based on the customers water use.

5.2 Operator and Management Education

The water system is maintained by licensed Waterworks Operators. The licensed operators are specifically trained in leak detection and water distribution system repairs and are required to attend a minimum of 16 hours of professional education per two-year cycle to maintain certification. Additional job training specific to water conservation is provided on an as-needed basis. Aqua's operators are made aware that water losses in the distribution system represent lost revenue and should be repaired promptly.

5.3 Outdoor Water Use Education

Landscape irrigation and outdoor water uses can increase water use significantly in the summer months. This trend is observed for water systems that typically have large, landscaped lots or in-ground irrigation systems. Water use may be reduced by modifying the outdoor water use habits of the residents through education. High water use customers and customers of water systems with high summer residential demand would benefit the most. Customers will be provided with links to information sources on Aqua's Water Smart website specific to managing outdoor water use and irrigation practices as the information is periodically updated, such as the following water saving tips:

- Water your lawn only when it needs it. Simply walk across the grass to see if it needs water. If you leave footprints, it's time to water.
- Water in the early morning. Nearly 30 percent of water can evaporate when watering at midday. Don't water your lawn on windy days.
- Deep soak your lawn instead of frequent sprinklings that evaporate quickly.
- Set your lawn mower one notch higher to limit evaporation.
- Check sprinkler heads and valves for leaks and adjust the timer according to seasonal water needs and weather conditions.
- Plant for your climate. Native and drought-tolerant plants might have lower water needs. A local nursery can help you plan a water-wise garden.
- Use mulch around plants and shrubs to save moisture.
- When using a hose, control the flow with an automatic shut-off nozzle.
- Use a broom, instead of a hose, to clean sidewalks and driveways.
- When washing your car, use soap and water from a bucket, along with a sponge and hose with a shut-off valve.
- Disconnect hoses and make sure outdoor water is shut off during cold weather to prevent leaks.
- If you have a swimming pool, get a cover. You'll cut the loss of water by evaporation by 90 percent.
- Eliminate shrub bed irrigation for established landscaping.
- Maintain automated irrigation systems controls to limit overwatering.
- Repair significant leaks quickly to minimize the loss of water.

6 Water Reuse

Currently, no significant water reuse options are available for the system. Most system use is for human consumption, requiring the highest quality and conformance to drinking water quality standards. The Virginia

Department of Health is currently opposed to potable reuse where naturally occurring sources of water are available.

7 Requirements for Mandatory Water Use Restrictions

The system will comply with any mandatory water use restrictions during water shortage emergencies declared by Westmoreland County or the Commonwealth of Virginia. The *Northern Neck Regional Water Supply Plan* (RWSP, 2010) includes a Drought Response and Contingency Plan in accordance with 9VAC 25-780-120.

7.1 Drought Stages

Drought conditions in Virginia are monitored by the Drought Monitoring Task Force (DMTF), which is led by DEQ in conjunction with the State Climatologist. Recommendations for curtailment of water use are a result of drought conditions as reported by the DMTF. The DMTF does not demand the curtailment of water use but advises the waterworks owner on conditions that may warrant concern.

The DMTF has developed a Drought Monitor ranking system, ranging from normal to dry to exceptional drought conditions. Drought conditions vary in severity. Therefore, it is best to classify the actions to be taken with respect to the curtailment of water use and conform those severity levels to the Drought Monitor. Drought stages may be declared by the Virginia Drought Coordinator, localities, or individual water system managers. Drought Emergencies may also be declared for the entire state of Virginia or the Eastern Shore Region by the governor. Depending on the drought severity level, the action taken could range from no action to the most restrictive water conservation measures. Drought severity levels are determined by guidelines contained in Section 9.0: Drought Response and Contingency Plans in the *Northern Neck Regional Water Supply Plan* (RWSP, 2010). The following severity codes are to be followed:

7.1.1 Normal

Normal conditions dictate no special response. During normal conditions, the jurisdiction continues to monitor drought conditions.

7.1.2 Drought Watch

Drought Watch responses are intended to increase awareness to climatic conditions that are likely to precede the occurrence of a significant drought event. During this stage, preparations are made for the onset of a drought event.

7.1.3 Drought Warning

Drought Warning responses are required when the onset of a significant drought event is imminent. Water conservation and drought contingency plans begin to be implemented. Water conservation at this stage would generally be voluntary and may reduce water use by 5 to 10%.

7.1.4 Drought Emergency

Drought Emergency responses are required during the height of a significant drought event. During these times, non-essential uses of water should be eliminated. Mandatory water conservation requirements contained in water conservation and contingency plans are initiated at this stage, and generally result in water use reductions of 10 to 15%.

7.2 Drought Monitoring and Water Use Restrictions

Aqua will monitor drought conditions through Virginia's DMTF and the Drought Monitor, as well as locally through water levels in system production wells as available. In the event of an actual or anticipated shortage of potable water due to climatic, hydrological, mechanical, and/or other extraordinary conditions, Aqua may determine that certain uses of water should be reduced, restricted, and/or prohibited. Aqua will notify the Virginia Department of

Health if it declares any level of drought condition for the system. In the case of a self-declared Drought Emergency, Aqua will also notify the Virginia Emergency Operations Center.

It should be noted that a drought is unlikely to affect the confined aquifer source(s) and Aqua’s water supply. This aquifer system is confined from land surface and therefore receives minimal amounts of direct recharge from precipitation. However, regionally, there may be more water use from the aquifer system during drought periods for additional irrigation and cooling water and when surface water is less available. The aquifer system is more likely to be affected by long-term (decadal) climatic and water use trends. Aqua can independently monitor changing aquifer heads in nearby State Observation Wells (SOWs) through the interactive United States Geologic Survey (USGS) National Water Information System website.

The following sections outline the Drought Stages and Corresponding Actions contained in **Table 9-2** of the *Northern Neck Regional Water Supply Plan (RWSP, 2010)*, and how Aqua will abide by the plan. These use restrictions are short-term compared to the normal full-time water conservation programs outlined in this WCMP and are only implemented during periods of drought when adequate water supply may be threatened.

STAGE	Required Actions
Drought Watch	(1) Initiate weekly monitoring of Drought Monitor website. Aqua to notify public, community, and self-suppliers of Drought Watch via newspaper, public service announcement, notices with water bills. Request voluntary reductions in non-essential water use.
Drought Warning	Voluntary water use reduction. Aqua will notify public, community, and self-supplied sources of Drought Warning. Aqua will request voluntary reduction in the following non-essential water use to meet drought stage target of 10% reduction in water withdrawals (See Note 1)
	(1) Water to wash down streets, sidewalks, walkways, driveways, parking lots, service station aprons, tennis courts, other hard surfaced areas, buildings, and structures, except as required for safety concerns.
	(2) Water to wash automobiles, trucks, trailers, and any other type of mobile equipment, except where required to meet air quality standards.
	(3) Watering of shrubbery, trees, lawns, Bass, plants, and other vegetation.
	(4) Water from fire hydrants for construction purposes or any purpose other than fire suppression or other public emergency
	(5) Water to fill or refill swimming pools.
	(6) Storage facilities to be filled during non-peak times for fire flow (7) Customer not served drinking water in restaurant unless requested
Drought Emergency (includes non-climate emergency impact to water source)	Mandatory water use reduction. Aqua will notify public, community, and self-supplied sources of Drought Emergency. Aqua will implement mandatory water restrictions to reach drought stage target of 15% reduction in water withdrawals for water uses listed under Drought Warning (Also see Note 1)
	Penalties (See Note 2): Violating the DRCP Drought Emergency stage may result in penalties. These penalties, in accordance with the schedule below, are enforced by local ordinance. Aqua cannot enforce penalties of a local ordinance. First offense - Written warning; Second offense - \$50 fine; Third offense - \$100 fine; Fourth offense - \$250 fine and water service suspension.



Note 1: Specific Water Use Reduction Strategies

Urge (or require for Drought Emergency) customers to not use water for outdoor watering with sprinklers or irrigation systems between 10 am and 6 pm, and

- Odd-number addresses – Tuesday, Thursday, and Saturday
- Even-number addresses – Wednesday, Friday and Sunday
- During Drought Warning – watering by hand (with cans, wands, hand-held hoses) allowed any day of the week.

Drought Emergency landscape exception: customers may water first-year foundations, trees, and shrubs up to two hours a day by a hand-held or soaker hose, and new planting of grass within the first 30 days up to one hour a day by any means. Restrictions do not apply to locations using treated wastewater effluent for irrigation.

Note 2: Violation Penalty Enforcement

Aqua Virginia, as a private water utility, is unable to enforce penalties for violations of municipal ordinances.

RULE NO. 10 – DISCONTINUANCE OF SERVICE

- (a) *Service may be discontinued (turned off) by the Company after ten (10) days written or printed notice for any of the following reasons:*
1. *For abusing or tampering by the customer, or others with the knowledge of the customer, with any meters, connection, service pipe, meter cock, seal, or any other appliance of the Company controlling or regulating the customer's service.*
 - i. *If meter removal occurs due to tampering, the customer will be assessed the applicable reconnection charge per the Schedule of Rates & Fees at the time of service restoration, plus applicable costs incurred, including labor and overhead, for any required repairs to the utility's property. Service restoration will occur when the account is paid in full.*
 - ii. *Meter tampering is also a criminal offense and violators will be prosecuted.*
 2. *For failure to provide the Company's employees free and reasonable access to the premises supplied, or for obstructing the way of ingress to the meter or other appliances controlling or regulating the customer's water supply.*
 3. *For non-payment of any account ten (10) days past due for water supplied, or for any fee or charge accruing under these Rules and Regulations and the effective Schedule of Rates.*
 4. *For violation of any rule or regulation of the Company.*
 5. *For failure to comply in any way with the Company's cross-connection and backflow prevention control program.*

7.3 Declaring Reduction of DRCP Drought Stages

As drought conditions dissipate, and water sources are replenished, weekly drought conditions monitoring via **Drought Monitor** will continue.

Aqua will communicate regional retrograde drought condition notices in similar fashion as described above for Drought Watch, Drought Warning and Drought Emergency. Ultimately, as meteorological drought conditions dissipate, Aqua will progress through reduced drought stages (**Table 9-2**) until finally returning to "normal" water use conditions.

Note that the response time for drought impact and recovery for ground water sources is longer than that for surface water reservoirs. This is due to a longer lag time between local climate variation and resulting effects on aquifer recharge, as compared to surface water reservoirs. In general, while the criteria triggering initiation of

drought response measures will likely occur sooner with the on-set of drought for surface water sources as compared to ground water, return to normal conditions will take longer for ground water sources.

8 WCMP Effectiveness Reporting

In compliance with the forthcoming renewed GWP, by the end of years five and ten of the GWP term, Aqua will develop a report on the effectiveness of this WCMP. This will include revisions to those elements of the WCMP that can be improved, and addition of other elements found to be effective based on operations to-date. These reports shall include:

- Any new water-saving equipment installed or water-saving processes adopted.
- WCMP actions taken to reduce the volume of water needed to supply the system.
- Planned short or long-term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system and for reducing the loss of water.
- Results of additional water audits completed.
- Evaluation of the leak detection and repair program.
- Description of educational activities completed.
- Identification of any water reuse opportunities identified.