COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT* PERMIT** ***April 30, 2019
TO WITHDRAW GROUNDWATER IN THE EASTERN SHORE GROUNDWATER MANAGEMENT AREA

Permit Number: GW0072500
Effective Date: Xxxxxxx XX, 2019
Expiration Date: Xxxxxxx XX, 2034

Pursuant to Section 62.1-256 of the Ground Water Management Act of 1992 (Chapter 25, Title 62.1 of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610-10 *et seq*.), the State Water Control Board (Board) hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Ish Farms, LLC

Facility Ish Farm

Facility Address 30306 Nocks Landing Road

Oak Hall, Virginia 23416

The Permittee's authorized groundwater withdrawal shall not exceed:

11,500,000 gallons per year,
2,700,000 gallons per month.

The permitted withdrawal will be used to provide an agricultural water supply. Other uses are not authorized by this permit.

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

By direction of the State Water Control Board, this Permit is granted by:

Signed_____ Date _____

Director, Office of Water Supply

This permit is based on the Permittee's application submitted on December 14, 2017, and subsequently amended to include supplemental information provided by the Permittee. 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)	Screen Intervals	Aquifer*	Latitude	Longitude	Datum
Well #1	100-01502	300	270-300	Lower Yorktown-Eastover	37° 55' 18.3180"	75° 32' 28.0248"	WGS84
Well #2	100-01503	300	270-300	Lower Yorktown-Eastover	37° 55' 17.8824"	75° 32' 28.4136"	WGS84
Well #3	100-01504	300	270-300	Lower Yorktown-Eastover	37° 55' 17.3244"	75° 32' 28.6908"	WGS84
Well #4	100-01505	300	270-300	Lower Yorktown-Eastover	37° 55' 16.8936"	75° 32' 28.9282"	WGS84
Well #5	100-01506	300	270-300	Lower Yorktown-Eastover	37° 55' 15.9384"	75° 32 29.5980"	WGS84
Well #6	100-01507	300	270-300	Lower Yorktown-Eastover	37° 55' 15.5748"	75° 32' 29.8176"	WGS84
Well #7	100-01508	300	270-300	Lower Yorktown-Eastover	37° 55' 15.1500"	75° 32' 30.0264"	WGS84
Well #8	100-01509	300	270-300	Lower Yorktown-Eastover	37° 55' 14.4012"	75° 32' 30.4116"	WGS84

*Aquifer was estimated based on the USGS Eastern Shore Hydrogeologic Framework and will be verified or updated using site-specific geophysical data collected as required by the permit.

2. Any actions that result in a change to the well operation, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department) 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. 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 1	100-01502	272
Well 2	100-01503	272
Well 3	100-01504	272
Well 4	100-01505	272
Well 5	100-01506	272
Well 6	100-01507	272
Well 7	100-01508	272
Well 8	100-01509	272

*Max pump settings were estimated based on the USGS Eastern Shore Hydrogeologic Framework. Following the collection of the geophysical log data required by this permit, updated site-specific maximum pump setting depths will be provided by the Department to replace these estimated limits.

C. Reporting

1. Water withdrawn from each well shall be recorded monthly at the end of each month and reported to the Office of Water Supply, 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. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
Well 1	100-01502	Water Use
Well 2	100-01503	Water Use
Well 3	100-01504	Water Use
Well 4	100-01505	Water Use
Well 5	100-01506	Water Use
Well 6	100-01507	Water Use
Well 7	100-01508	Water Use
Well 8	100-01509	Water Use

D. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received [*date*] 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 a detailed description of their leak detection and repair program activities and documentation to the Department that these activities have been conducted. This documentation shall include frequency of the activities completed and the findings and results of the activities during the first year of the permit term. 9VAC25-610-100.B.1.b,2.b,or 3.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 a 12 month audit of the total amount of groundwater used in the distribution system and the separate amounts used for drinking and cooling. This audit report shall include the flock cycle start and end dates during the year, and any necessary changes to the leak detection and repair program or operations that affected water use. 9VAC25-610-100.B.1.b,2.b,or 3.b

4. A report on the plan's effectiveness in maintaining or reducing water use and a summary of proposed revisions to the WCMP to address any elements that can be improved 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. A summary of the operation of the cooling system for the houses during the report period including what months the cooling system was operated;
    c. Evaluation of the leak detection and repair program with a summary of any significant leaks found and repaired; and
    d. A summary of the flock cycles and overall water use patterns for each year covered by the report.

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 DEQ upon request.

E. Mitigation Plan

The Mitigation Plan approved on June 18, 2018 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. 9VAC25-610-110.D.3.g

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 DEQ 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 Board 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

Pursuant to 9VAC25-610-140.B and C, the following Special Conditions apply to this permit in order to protect the public welfare, safety, and health or conserve, protect and help ensure the beneficial use of groundwater.

A. Geophysical Log Data Collection

By March 31, 2023, a complete suite of geophysical logs (Spontaneous Potential, Single Point Resistance, 16/64 Short and Long Normal, Natural Gamma at a scale of 20 ft per inch) shall be obtained from at least two boreholes at the locations and depths approved by the Department during the coordination process. Given the unknown hydrogeology at the site and the known potential for significant horizontal variability, additional geophysical logs may be required as determined by the Department during the drilling work to assess the well field area. An electronic and hard copy of the geophysical logs shall be submitted to the Department within 30 days of collection to allow determination of the top and bottom of the aquifer in use. 9VAC25-610-140.C

At least two months prior to the scheduled geophysical logging, the Permittee shall notify the Department of the drilling timetable to receive any further guidance needed on performing the geophysical logging and to allow scheduling of Department staff to make a site visit during the drilling of the borehole and/or the geophysical logging. Geophysical log data collected without the oversight of the Department will not be accepted.

B. Pump Intake Determination and Reset

Within 90 days of notification of the maximum pump setting depth as determined by Department staff based on new geophysical log data obtained by the Permittee as required by the permit, the Permittee shall submit documentation from a certified well provider, or other source as accepted by the Department, that the pump intake for each production well is set above the setting stated in the notification.

C. Meter Installation Verification/Correction

If notified by DEQ through an inspection report that meters meeting the requirements set forth in Part III Condition I of this permit have not been correctly installed on each production well in such a manner as to record total withdrawals from the well including both cooling water and drinking water, the Permittee shall correct any identified meter issues within 60 days of notification.

D. Alternative Source Investigation

1. By September 30, 2024 the Permittee shall conduct an investigation of the surficial aquifer (Columbia) to evaluate the ability of the surficial aquifer to provide all or part of the water supply needs for the facility. The investigation shall include water quality and pump test data collected from a surficial aquifer test well constructed on-site with Department oversight to ensure the well is properly screened in the surficial aquifer. A geophysical log shall be obtained from the surficial aquifer test well per Part III.K of the permit unless a geophysical log collected from an existing production well is accepted by DEQ as representing the Columbia aquifer at the test well location. An existing well screened in the surficial aquifer located on or near the facility property may be used where approved by DEQ as an alternative. An existing well must have sufficient well construction information available to verify it is screened in the surficial aquifer and properly constructed in order to be considered.

2. A report on the results of the investigation shall be provided to DEQ by March 31, 2025.

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. 9VAC25-610-130.C

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the Board, the Department, or any duly authorized agent of the Board, 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 Board or Department, within a reasonable time, any information that the Board 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 Board or 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 Board 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,

    f. readings, calculations and bench data used;

    g. the results of such analyses; and

    h. 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.), Environmental Laboratory Certification Program (§ 2.2-1105et seq.), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

a. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.

c. 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 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 Board 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 Board 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 permit application shall be submitted 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Board, 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 permit application shall be submitted 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. 9VAC25610-96

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. 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. An alternative method for determining flow may be approved by the Board on a case-by-case basis.

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 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 Board 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 30 days 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 DEQ Well number. 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 (Spontaneous Potential, Single Point Resistance, 16/64 Short and Long Normal, 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 leakance 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. 9VAC25-610-140.C. The assigned DEQ Well number shall be included on all well documents. 9VAC25-610-140.C

6. In addition to the above requirements, 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 not be required to install the equipment. 9VAC25-610-140.C

7. In addition to the above requirements, 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 not be required to install 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 not be required to install 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:

a. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140.A.11

b. 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

c. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310.B.2

d. 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: GW0072500
Application Date: December 14, 2017

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. Based on the information provided in the application and subsequent revisions, DEQ 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: Ish Farms, LLC
30414 Nocks Landing Road
Oak Hall, Virginia 23416
Phone: (410) 600-5260

Facility Name and Address

Name & Address: Ish Farm
30306 Nocks Landing Road
Oak Hall, VA 23416
Phone: (410) 600-5260

Contact Information:

Name: Muhammad Amjad Parvez, owner
E-mail: amjpar@yahoo.com
Phone: (410) 600-5260

Proposed Beneficial Use:

The proposed use for this withdrawal is for agriculture. Withdrawals will supply a poultry growing operation with water for cooling of chicken houses as well as for direct consumption by poultry.

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	September 7, 2017
Application Received:	December 14, 2017
Permit Fee Deposited by Accounting:	Not Applicable
Notice of Deficiency Sent	February 22, 2018
Response to Notice of Deficiency Received:	March 28, 2018
Request for Additional Information Sent:	April 16, 2018
Response to Request for Additional Information Received:	May 1, 2018
Local Government Ordinance Form Received:	May 1, 2018
Application Complete:	June 18, 2018
Submit Request for Technical Evaluation:	December 18, 2018
Technical Evaluation Received:	February 11, 2019
Draft Permit Package Sent:	April 30, 2019
Submit Draft Permit for Public Notice:	TBD
Public Notice Published:	TBD
End of 30-Day Public Comment Period:	TBD
Response to Public comment:	TBD
Public Meeting or Hearing:	TBD

Application

Application Information

Ish Farm is a poultry farm owned by Ish Farms, LLC and located in Accomack County. Ish Farm has eight poultry houses and eight production wells. All eight houses are 64 ft wide by 560 ft long and were constructed in 2017. All eight wells were constructed in August of 2016 but were not installed under the guidance of Department staff or with geophysical data collected. The farm produces broilers. Additional information on how water is used at the farm is discussed in the basis of need section of the fact sheet.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Accomack & Northampton

County: Accomack County

GWMA/Aquifer: Eastern Shore/ Lower Yorktown-Eastover

Conjunctive Use Source: This system uses no surface water and is therefore not a conjunctive use system.

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:
Poultry farms use groundwater to provide drinking water to the birds as well as to supply water to either misting systems or evaporative cooling pads designed to regulate temperatures in the house and keep the birds cool. Cooling is primarily required in summer.

Water use for poultry farms varies seasonally as well as in response to the poultry life cycle. Generally during winter, fall, and spring, facility withdrawals rise and fall in a predictable pattern every 50-60 days, or the length of time it takes to raise a flock, with increased usage primarily resulting from increased water consumption as the birds gain weight. This water use pattern starts with low water consumption volumes for chick development and peaks in the last 20-30 days as growers seek to maximize adult weight gains. Typically, farms raise around five flocks per year with this cycle repeating each time. During the summer, withdrawal volumes increase due to additional water usage for flock cooling purposes.

Water volumes used for consumption are controlled by a computer system that provides water to the drinker system, which provides access to water for the birds but limits spillage or excess moisture from entering the house. Avoiding excess moisture is critical to bird health and as a result careful conservation of water is already a key tenet of management in a broiler house. The computer tracks water supplied to the drinking system and records the volume. This data was maintained by some farms but in many cases was not recorded long-term. Where available, data from the computer is discussed in the historic withdrawals section of the factsheet.

The cooling systems are operated based on temperature and humidity and while usage is typically restricted to summers, operation of the cooling systems tends to vary between farms. Historically, water supplied to the cooling systems was not metered so very limited data is available on usage.

Water Demand Projection: Water demands are based on estimated drinking and cooling water amounts needed to supply all the system houses. Proposed withdrawal limits were calculated based on the total of both consumption (drinking water) and cooling. Water use for consumption was calculated based on computer data from a comparable farm where a value of 3.79 gallons per bird per flock was calculated.

As no data on volumes used for cooling was available from farms operating on the shore, a procedure for estimating water use for cooling was developed for use based on discussions with industry stakeholders, individual farmers, and a review of available literature. House size and cooling fan capacity were identified as the major variables determining water use for cooling poultry houses. A formula based on 1.6 gallons per year per cubic foot per minute (cfm) of cooling fan capacity was determined to be representative for the Delmarva area poultry industry. The major variable for cooling fan capacity is the width of the house as that provides for the number and size of cooling fans that can be installed. The combined total width of the houses for the facility was used as the basis to estimate cooling water use. The water use calculations are attached. The permit requires metering of the wells to record total water use and actual amounts used for cooling will be collected. A minor amount of around 300 gallons per month total was estimated for house cleaning activities between flocks.

Water demands are not expected to change as the amount requested represents the maximum capacity of the farm and no additional houses are considered in this permit. Therefore, no projections are included for this facility.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand with 6,790,344 g/y for consumption and 4,669,440 g/y for cooling.

Period of Withdrawal	Actual Volume (gal.)	Volume in MGD
Maximum Monthly:	2,624,000	0.0875
Maximum Annual:	11,460,000	0.0314

DEQ Evaluation

No record of historic withdrawals was available for this facility as the facility was recently constructed the withdrawals were not metered. Refer to the attached Water Use Calculations for more information on how water use was estimated.

Analysis of Alternative Water Supplies: The Eastern Shore of Virginia is an area primarily served by groundwater with the majority of withdrawals coming from the three confined Yorktown-Eastover (Upper/Middle/Lower) aquifers. There is limited surface water availability with the majority of streams being too small to supply sufficient water for most purposes, larger water bodies are typically tidally influenced, and water quality concerns have limited the development of these sources. Withdrawals from the surficial aquifer, or water table, are one viable alternative to withdrawals from the confined system. While withdrawals from the surficial aquifer can present additional water quality challenges in the form of iron forming bacteria and increased vulnerability to surface contaminants, it may be viable in some locations where capacity and quality are sufficient. In general, drinking water for poultry must be of higher quality than the cooling water. In most cases, site-specific data will be necessary to determine the viability of the surficial aquifer and to determine what portions of the use it can supply.

Public Water Supply: The proposed withdrawal does not contain a public water supply component.

Water Supply Plan Review: A Water Supply Planner coordination request was sent on September 10, 2018 and a response was received on January 9, 2019. The response noted several key items.

The Accomack County Regional Water Supply Plan (Plan) includes irrigating agricultural facilities using both groundwater and surface water, with current permitted amounts sufficient to meet demands into 2040. The plan, however, does not include existing poultry farms in their assessments. While the seafood industry could also show future growth in the region, Section 4.0 of the ANPDC Groundwater Management Plan details industrial water for seafood and poultry processing, noting over 90% of industrial groundwater usage is related to poultry processing. WSP Staff note existing water quality concerns for surface waters and no significant water surpluses or sources in Accomack County to serve as alternative sources. Additionally, WSP staff reviewed the current alternatives under consideration, such as water table wells, and noted that the ability of the National Resources Conservation Service's (NRCS) Environmental Quality

Incentives Program (EQIP) program to fund such efforts is currently unknown. The current lack of inclusion of poultry in the region's plan, existing water quality and alternative source concerns, and the unknown status of funding for alternative development underlines potential regional resource concerns to be addressed in future planning efforts.

DEQ Recommended Withdrawal Limits: The recommended withdrawal limits are based on the total of both consumption (drinking water) and cooling. Water use for consumption was evaluated based on a calculated gallon per bird per flock amount from a comparable farm. The consumption data for a flock from a comparable farm was provided and DEQ staff reviewed the data and determined it provided a reasonable basis for estimating monthly and annual consumption for the facility.

DEQ staff evaluated the volumes requested for cooling and determined they were accurately calculated using the procedure discussed in more detail above. Given the lack of data available for evaluating poultry water use, DEQ believes the methods employed are conservative enough to provide sufficient water for the farm to continue operation while still providing a reasonable limit for the permits. It is expected that as more metered data becomes available, withdrawal limits may be reduced in cases where actual water use is significantly lower than the permit limits.

Withdrawal limits were rounded to nearest hundred thousand in accordance with DEQ's April 6, 2015 "Rounding Memo". DEQ recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application.

Period of Withdrawal	Actual Volume (gal.)	Volume in MGD
Maximum Monthly:	2,700,000	0.0900
Maximum Annual:	11,500,000	0.0315

Technical Evaluation:

Aquaveo, LLC performed a technical evaluation of the application for the Department based on the VAHydroGW-ES model. As an aquifer pump test was not performed, the properties from the VAHydroGW-ES model were used to simulate the potential drawdown resulting from the proposed withdrawal. The model uses a base simulation which includes all existing permits (except the applicant wells) operating at their 2017 maximum annual withdrawal limit allowed under the terms of their permit for all Ground Water Management Area (GWMA) permit holders. This base simulation is then executed for 50 years. A second 50-year simulation was then conducted using the VAHydroGW-ES model with the applicant's proposed withdrawals added to the base simulation to simulate drawdown resulting from the applicant's wells using the proposed withdrawal volumes. 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. A summary of the results of the evaluation are provided below and the full technical evaluation is attached to this fact sheet as Attachment 2.

Aquaveo, LLC reviewed and compared simulated 2017 water levels from the reported use to USGS measured water levels in observation wells closest to the applicant's withdrawal for the

same year for the Upper, Middle, and Lower Yorktown-Eastover aquifers. Comparing the VAHydroGW-ES 2017 Historic Use Water Level with the USGS Network Well 2017 Water Level provides a method for judging the accuracy of the VAHydroGW-ES model. They noted that the water levels obtained from the regional observation networks for the Upper, Middle, and Lower Yorktown-Eastover aquifers show from matching very closely to a variation of up to 2 to 5 ft higher or lower than the simulated water levels. Aquaveo also noted that the observed water levels in all three aquifers exhibit yearly fluctuations in water levels of approximately 2 to 4 ft. Water levels simulated by the VAHydroGW-ES do not fluctuate in the same manner because the pumping and recharge simulated in the model for any given year are averaged over the year and entered in the model as the average value for the year. Aquaveo concluded that while there are some variations between the observed and simulated water levels, the fluctuations and general patterns observed in the USGS wells are simulated by the VAHydroGW-ES and the water levels from the two sources are in general agreement. Differences between observed and simulated water levels will be noted and addressed during the next calibration of the VAHydroGW-ES.

The potential for adverse changes to water quality due to increases salinity resulting from the proposed withdrawal was evaluated using transient, density-dependent, SEAWAT simulations using the VAHydroGW-ES. The results indicated that no model cells simulate an increase in chloride concentration greater than 20 mg/L due to the proposed withdrawal. Therefore, the VAHydroGW-ES model results do not indicate the potential for reduced water quality.

The results of the VAHydroGW-ES simulations predict areas of impact due to the proposed withdrawal in the Middle and Lower Yorktown-Eastover aquifers. The Area of Impact (AOI), or the area in which the withdrawal is expected to result in a drawdown of at least 1 foot, extend a maximum distance of approximately of approximately 1.0 and 1.1 miles from the production center for the Middle and Lower Yorktown-Eastover aquifers. As the AOI extends off of the property line, a mitigation plan was required to be incorporated into the permit. The modeled area of impact determines the area for which the facility must mitigate any impacts according to the mitigation plan incorporated into this permit.

With the inclusion of the proposed withdrawal, the model simulated water levels at 15.9, -3.5, and -41.4 feet msl for the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. The 80% drawdown criterion allows the potentiometric water level (based on the critical surface elevation calculated from the VAHydroGW-ES data) to be reduced to -69.1, -138.5, and -183.6 feet msl in the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. Therefore, the water levels in the VAHydroGW-ES cell containing the applicant wells for each confined aquifer are not simulated to fall below the critical surface. Additionally, no new VAHydroGW-ES cells are simulated to have water levels fall below the critical surface. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

Aquaveo, LLC concluded that the proposed withdrawals meet technical criteria for permit issuance. Maps of the AOIs are included in the attached Mitigation Plan.

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer*	Type	Max Pump Setting (ft. bls)*
Well #1	100-01502	Lower Yorktown-Eastover	Production	272
Well #2	100-01503	Lower Yorktown-Eastover	Production	272
Well #3	100-01504	Lower Yorktown-Eastover	Production	272
Well #4	100-01505	Lower Yorktown-Eastover	Production	272
Well #5	100-01506	Lower Yorktown-Eastover	Production	272
Well #6	100-01507	Lower Yorktown-Eastover	Production	272
Well #7	100-01508	Lower Yorktown-Eastover	Production	272
Well #8	100-01509	Lower Yorktown-Eastover	Production	272

*Max pump settings and aquifer were estimated based on the USGS Eastern Shore Hydrogeologic Framework and will be updated using site-specific geophysical data collected as required by the permit.

Apportionment: Apportionment of withdrawals is expected to be fairly equally spread across all facility wells and the permit does not include apportionment limits.

Additional Wells: There are no Observation wells, Abandoned Wells, or Out of Service Wells known to be associated with the system.

Pump Intake Settings: No geophysical log data were available for this site and therefore aquifer elevation for the tops of the aquifers in use were estimated using the USGS Eastern Shore Hydrogeologic Framework. Once geophysical log data is obtained in compliance with the permit, DEQ geologists will determine the top of the aquifer in use, which will become the pump intake limit above which the pumps must be set. The permittee will have 90 days to ensure all pumps meet the intake limits once notified of the limits by DEQ.

All eight well pump intakes are documented to be set at 150 ft bls.

Withdrawal Reporting: Groundwater withdrawals are to be recorded monthly and reported quarterly.

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.

- A detailed description of the leak detection and repair program activities and documentation to the Department that these activities have been conducted is due by the end of the first year of the permit term.
- A result of a 12 month audit of the total amount of groundwater used in the distribution system

and the amounts for drinking and cooling water, documentation of the flock cycle start and end dates, and any necessary changes to the operation affecting water use is due by the end of the second year of the permit term.

- A report on the plan's effectiveness in maintaining or reducing water use amounts needed, 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 extends beyond the property boundaries in the Middle and Lower Yorktown-Eastover aquifers. Given this prediction, a Mitigation Plan to address potential claims from existing well owners within the predicted area of impact is included in the permit by reference.

Well Tags: Well tags will be transmitted with the final permit.

Part II
Special Conditions

Geophysical Log Data Collection: Geophysical log information is needed to evaluate the top of the aquifer in use and the regulatory permitted pump intake limit, and to determine whether the current pump settings meet regulatory limitations. The Department requires collection of a geophysical log for each new well to be included in a Groundwater Withdrawal Permit. Given the large number of wells associated with poultry facilities, the Department agreed to work with applicants that had constructed wells prior to application to allow for a reduced number of geophysical logs required to represent the wells keeping in mind the need to evaluate lateral variation in the hydrogeology. The Permittee must contact DEQ at least two months prior to scheduling the geophysical logs to allow for Department scheduling.

The collection of geophysical log data requires a borehole to be drilled at least to the depth of the deepest facility well, or an alternative depth at the discretion of the Department, and the logging equipment run down the full depth of the hole. Geophysical logging is to include 16"/64" Normal, Single Point, Self Potential, and Natural Gamma at a scale of 20 feet per inch. Collection of a full suite of geophysical logs and a drillers log is required by March 31, 2023 at two locations and depths approved by DEQ. Additional geophysical log locations may be required by Department staff as warranted depending on site hydrogeology to evaluate lateral variation in the aquifer top elevations. These logs will be used to represent the remaining facility wells. Department staff must be present for the geophysical logging to evaluate the log and well cuttings.

Pump Intake Determination and Reset: Within 90 days of notification of pump intake limits by the Department based on the geophysical data, the permittee shall ensure all pump intakes are set above the identified limits. The Permittee is to notify the Department of the work schedule and to submit written documentation of the pump setting within 30 days of the work.

Meter Installation/Verification: Each well is metered in the central well house. Consumption is metered through the consumption waterers as well and the cooling load per house can be determined from the difference of these two meters. In cases where meters are found to be incorrectly installed or otherwise failing to capture the total water use of each well, DEQ will notify the permittee of such via an inspection report and the permittee shall correct any meter issues within 60 days.

Alternative Source Investigation: The facility is supplied by wells screened in the confined Lower Yorktown-Eastover aquifer. The confined aquifer system on the Eastern Shore is considered to be of higher quality than the surficial (water table) aquifer and is the potable water supply for the majority of the Eastern Shore. The regulation requires the lowest quality water available be applied to the permitted use. While the application states generally that the surficial aquifer would not be viable, site specific investigation is necessary to evaluate the surficial aquifer quality and availability. By September 30, 2024, an alternative source investigation must be completed and the results submitted to DEQ by March 31, 2025 for review and acceptance. The investigation shall provide pump test and water quality data from a test or production well screened in the surficial aquifer on the facility site as well as conclusions on the capability of the surficial aquifer to supply all or part of the water needs for the facility.

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610-10 *et seq.*

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: This facility is not a public water supply so soliciting comments from VDH was not required.

Public Involvement during Application Process:

Local and Area wide Planning Requirements: The Accomack County Administrator indicated on April 24, 2018 that the facility's operations are consistent with all ordinances.

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

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.
- This permit includes a plan to mitigate adverse impacts on existing groundwater users.

Staff recommends Groundwater Withdrawal Permit Number GW0072500 be issued as proposed.

Attachments

1. **Technical Evaluation**
2. **Water Conservation Plan**
3. **Mitigation Plan**
4. **Water Use Calculation Worksheet**
5. **Public Comment Sheet (as needed)**

Approved: _____
Director, Office of Water Supply

Date: _____

ISH farms Water Conservation Management Plan

4/26/2018

Permit #:GW0072500

Facility Site Address 30306 Nocks Landing Road, Oak Hall, Va. 23416
Mailing Address: 30414 Nocks Landing road, Oak Hall, Va. 23416

Owner: Muhammad A. Parves

Site Contact: Muhammad A. Parves Phone: (410)600.5260

General Overview & System Information

- Conservation Plans require 24 hour a day Monitoring with the goal of always reducing unneeded water flow through the poultry system.
- Ish Farms has 8 poultry house and 8 wells that are in the center row of the most inbound of the houses, All well lines run into the central well house where gauges pressure controls or Switches control the operation of each well. Lines run from the well house to individual houses and either tee off to cooling/consumption or two lines run from each well house to each poultry house control room each house will house 40,700 birds per flock for a total farm flock of 325,600
- Cooling is done through 6" recirculating cooling pads with back up foggers for dire emergency. Cooling is only used in the last three weeks of production. Cleaning equipment is done from a separate wagon sources pressure tank (small and use is less than 300 gallons a month.
- All water devices; drinkers, recirculating cool pads, foggers are state of the art water saving devices.
- Sequence of operation for Tunnel fans, 6" recirculating cooling pads, foggers; Primary Cooling is provided with tunnel fans with set point set and controlled by Bird producer (Tyson) set point is 86° (This number is proportional according to inside temperature and humidity) Cooling pads set point @92° only after the 24th day growth cycle emergency foggers setpoint 102° only on day 36-50 of the growth cycle (maximum fogger operation is 14 days in growth cycle) Cooling is only used in the last three weeks of production. Cleaning equipment is done from a separate wagon sources pressure tank (small and use is less than 300 gallons a month)
- Foggers are controller by Growers programing and are not allowed to be changed by the farmer as the moisture is detrimental to the flocks health. There fore it is only used in emergency high temperatures situations.
- General cooling is done by the transfer of cooler air through the tunnel fans without cooling pads (Stage 1) Additional cooling needed after a 10-12 degree differential calls for recirculating cooling pads. (Stage 2) Foggers only during last two weeks of growing system with set point over 100 degrees.
- Overall health of flock is reduced by excessive cooling and is controlled by the growers programming
- Modern poultry houses produce no waste water as any waste is caught in the litter and removed at the end of the flock and removed as part of the litter.

The only run off in modern houses is storm water house shed water off the roofs into swales that run to a storm water sediment pond
- No Plans for future expansion

Section 1: Water Savings Equipment and Processes

- Cooling and drinking water is routed through automated controls that monitor the flow. With alarms for high flow or usage, cooling water is determined by temp and air flow, water for consumption is determined by the flock itself. All Water lines inside of each house and through the well house are inspected 3 times in a 24 hour shift and repairs are made immediately. Heat is the main factor in increased cooling and the operator must use as little cooling as possible as this if detrimental to the health of the flock. Interior piping is PVC and inspected 3 times in 24 hours. Transmission lines bringing water to the houses are buried at depths typically 3 feet. Inspection shall include transmission lines underground by site, and comparison of meter readings that would indicate excessive water use. All equipment in this farm is stat of the art water with conservation in mind.

Section 2: Water Loss Reduction Program

- Walk arounds are done every 8 hour shift with visual inspection and repair of even the smallest leaks before further inspections. Seals, drinker, hoses and piping is included in this inspection. Inspection is recorded per shift. Grower has industrial repair from vendors on "Just in Time" call. Inspection results are turned over to following shift and day manager will record results immediately.
- Weekly meter reading shall be logged and compared to previous readings for unsual readings.

Section 3: Water Use Education Programs

- All personnel will be trained by equipment manufactures or their representatives. New equipment proprietary to the industry by our large poultry vendors in the area, magazines and trade professionals.
- Water conservation training shall be given by the owner to all staff at no less than quarterly and upon new hire or transfer from other site. This shall include the importance of conservation through inspection, proper maintenance of all water bearing equipment including meters, valves, connections, recirculating cooling pads and daily site inspection for inside of the poultry house and thorough site inspection, looking for changes to anticipate underground utilities that include water transmission lines. This training shall also include looking back at readings that would indicate a unusual water increase other than flock growth.

Section 4: Evaluation of Potential Water Reuse Options

- Recirculating cooling pads are used, essentially water is deposited into the sump and then reused for cooling purposes through the cooling pads until evaporation lowers sump level and make up water is introduced and cycles until evaporation happens again.

Section 5: Water Use Reductions during Drought or Water Use Emergencies

- Usage during the four stages of the regional water supply are as follows and actions are listed after each.
- Check for regular operations that may not be operating at optimal usage.
- Normal; monitoring of usage with conservation of total with draw numbers always in mind of reduction issues, are our water usage normal in Cooling pads?
- Watch; prepare for 5% reduction by increasing water conservation ie: more frequent inspection of all water bearing devices, more frequent inspection of underground utilities. Contact flock administrators (Tyson) to reduce cooling usage should a drought warning become Monitoring of any onsite alternatives; levels of sediment ponds. Prepare for the drought warning with alternate water sources , prepare water equipment to more water from alternate sources (Ponds).
- Warning; contingency plans discussed in the watch stages would be put into place with targets of reductions to be between 5-10%. Contact should be made with Tyson for Harvest dates or replenishment of next flock for delay.
- Emergency; all plans for reduction would be required no longer volunteer. Water conservation should be made constantly through inspection repair and reduction.

Section 6: Water Use Restrictions during Drought or Water Use Emergencies

If the local governing body or the director of the DEQ declares mandatory water use reductions during water shortage emergencies, the owners of Ish Farms will comply with the water usage restrictions that are imposed

MITIGATION PLAN

DEQ GROUNDWATER WITHDRAWAL PERMIT NO. GW0072500

OWNER NAME: Ish Farms LLC

FACILITY NAME: Ish Farms LLC

LOCATION: 30414 Nocks Landing Road

INTRODUCTION

On 12/14/2017 Ish Farms LLC submitted a Groundwater Withdrawal Permit Application to the Virginia Department of Environmental Quality (DEQ) to withdraw groundwater. Groundwater withdrawals associated with this permit will be utilized grow poultry and cooling of same.

The purpose of this Mitigation Plan is to provide existing groundwater users a method to resolve claims that may arise due to the impact of the withdrawal from Ish Farms LLC well field. Predicted drawdown of water levels due to the withdrawal(s) from the Yorktown Eastover aquifer(s) are shown in the attached maps(s).

Modeled impacts, as shown on the attached maps, extend beyond the boundary of the Ish Farms LLC facility. Due to these findings, Ish Farms LLC recognizes that there will be a rebuttable presumption that water level declines that cause adverse impacts to existing groundwater users within the area of impact are due to this withdrawal. Claims may be made by groundwater users outside this area; however, there is a rebuttable presumption that Muhammad A. Parez/Ish Farms LLC has not caused the adverse impact. Ish Farms LLC proposes this plan to mitigate impacts to existing users and excludes impacts to wells constructed after the effective date of this permit.

CLAIMANT REQUIREMENTS

To initiate a claim, the claimant must provide written notification of the claim to the following address:

Contact Name Muhammad A. Parez
Title Owner
Permittee Name Ish Farms LLC
Address 30414 Nocks Landing Road,
City, State Zip Code Oak Hall, Va. 23416

The claim must include the following information: (a) a deed or other available evidence that the

claimant is the owner of the well and the well was constructed and operated prior to the effective date of the permit; (b) all available information related to well construction, water levels, historic yield, water quality, and the exact location of the well sufficient to allow Ish Farms LLC to locate the well on the claimant's property; (c) the reasons the claimant believes that the Ish Farms LLC withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

Ish Farms LLC will review any claim within **five (5) business days**. If Ish Farms LLC determines that no rebuttal will be made and accepts the claim as valid, Ish Farms LLC will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, Ish Farms LLC will notify the claimant that (a) the claim is denied **or** (b) that additional documentation from the claimant is required in order to evaluate the claim. Within **fifteen (15) business days** of receiving additional documentation from the claimant, Ish Farms LLC will notify the claimant (a) that Ish Farms LLC agrees to mitigate adverse impacts or (b) the claim is denied. If the claim is denied, the claimant will be notified that the claimant may request the claim be evaluated by a three (3) member committee. This committee will consist of one (1) representative selected by Ish Farms LLC, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and Muhammad A. Parez.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to Ish Farms LLC. Within **five (5) business days** of receipt of such notification, Ish Farms LLC will notify the claimant and claimant's representative of the identity of Ish Farms LLC representative and instruct the representatives to select a third representative within **ten (10) business days**. Representatives should be a professional engineer or hydrogeologist with experience in the field of groundwater hydrology. Ish Farms LLC agrees to reimburse the members of the committee for reasonable time spent, at a rate prevailing in the area for experts in the above listed fields, and for direct costs incurred in administering the plan. The claimant may, at his or her option, choose to provide the reimbursement for the member of the committee selected by the claimant and up to half of the reimbursement for the mutual representative.

Within **ten (10) business days** of selection of the third representative, the committee will establish a **reasonable deadline** for submission of all documentation it needs to evaluate the claim. Both the claimant and Muhammad A. Parez will abide by this deadline.

Within **fifteen (15) business days** of receipt of documentation, the committee will evaluate the claim and reach a decision by majority vote. The committee will notify the claimant regarding its decision to (a) deny or (b) approve the claim. If the claim is approved, Ish Farms LLC will mitigate the adverse impacts within **thirty (30) business days** of making the decision or as soon as practical. If the claim is denied by the committee, Ish Farms LLC may seek reimbursement from the claimant for the claimant's committee representative and one half of the

3rd representative on the committee.

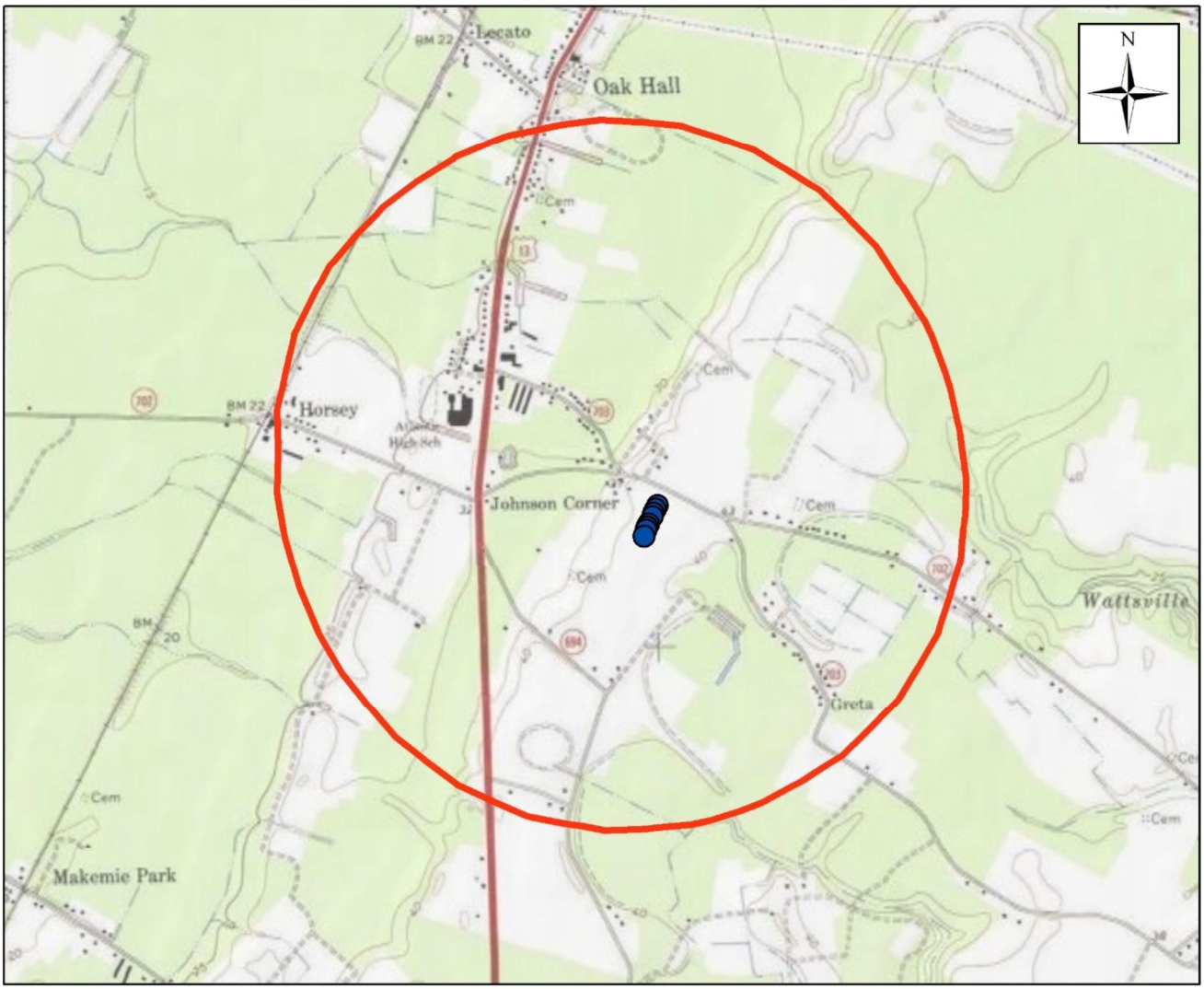
If a claimant within the indicated area of impact indicates that they are out of water, Ish Farms LLC will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. Ish Farms LLC reserves the right to recover the cost of such emergency supply if the claim is denied by Ish Farms LLC or found to be fraudulent or frivolous. If Ish Farms LLC denies a claim and the claimant elects to proceed with the three (3) member committee, will continue the emergency water supply at the claimants request during the committee's deliberations, but reserves the right to recover the total costs of emergency water supply in the case that the committee upholds the denial of the claim. Similarly, Ish Farms LLC reserves the right to recover costs associated with the claim process if a claim is found to be fraudulent or frivolous.

If it is determined by the committee or shown to the committee's satisfaction that a well operating under a mitigation plan similar to Ish Farms LLC Plan other than those owned and operated by has contributed to the claimed adverse impact, Ish Farms LLC share of the costs associated with mitigation will be allocated in proportion to its share of the impact. Such a determination shall be made by the committee after notification of the third party well owner, giving the third party well owner opportunity to participate in the proceedings of the committee.

PLAN ADMINISTRATION

Nothing in the Plan shall be construed to prevent the Department of Environmental Quality Staff from providing information needed for resolution of claims by the committee.

Ish Farm
Area of Impact - Middle Yorktown-Eastover Aquifer



Ish Farm Wells

Middle Yorktown-Eastover Aquifer Area of Impact

0 1,000 2,000 4,000 Feet

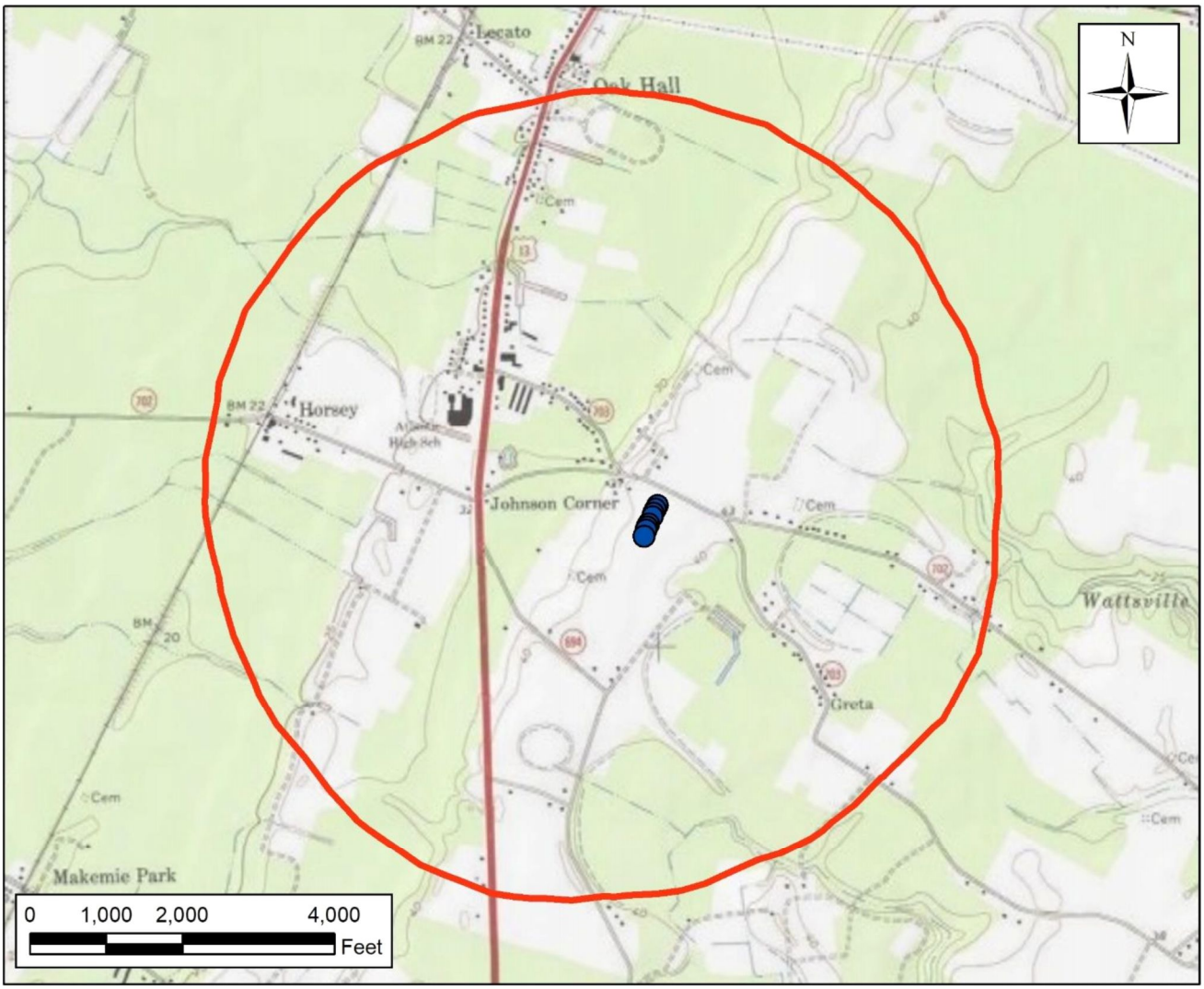
Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 11,500,000 gallon per year (31,506 average gpd), 50 year, Lower Yorktown-Eastover withdrawal using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 1.0 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply December 14, 2018

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Ish Farm
Area of Impact - Lower Yorktown-Eastover Aquifer



Ish Farm Wells

Lower Yorktown-Eastover Aquifer Area of Impact

Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 11,500,000 gallon per year (31,506 average gpd), 50 year, Lower Yorktown-Eastover withdrawal using the VAHydroGW-ES.
Maximum radius of one foot drawdown (Area of Influence) extends approximately 1.1 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Ish Farms LLC GW0072500

Section-1 Applicant Information

Applicant Is Ish Farms LLC

Section 2- Facility information

Virginia Pollution Abatement Permit VPG 250125.

this permit Was originally in the Name of Ish Farms- WTK LLC. WTK LLC was the builder and we are in contact with DEQ tidewater office Robert Smithson Jr. to have the name on the VPA permit changed. Mr. Smithson stated that the WTK LLC will be removed from the permit and Ish Farms LLC will be the sole name on the permit. Because the permit is not changing there will be no reissue of paper work permit. The change will be made in the DEQ database only.

Section-5 Requested Withdrawal amount

Meters mentioned are on one mechanical meter on each well line as it leaves the Well House to each house (each well will be metered independently for each house), there are meters in each house's control room metered through the PLC controls for consumption.

Sequence of operation for Tunnel fans, cooling pads, foggers; Primary Cooling is provided with tunnel fans with set point set by Bird producer (Tyson) set point is 86° Cooling pads set point @92° only after the 24th day growth cycle emergency foggers setpoint 102° only on day 36-50 of the growth cycle Evaporative cooling pads will be optimized with back up foggers. Nipple waters will be utilized

Section-8 Justification for the amount of withdrawal requested

8 Houses where constructed in 2017 and is in production 560' X 64' with 40,700 birds per house.

Total farm flock is 325,600 broilers 5.5 flocks are expected each year

The Attached Drawing shows Houses and well Locations. One well per house and well is metered in the central well house, Wells are separated in the well house. (each well has its own meter and goes to the corresponding house, these meters are located in one central well house) Consumption is metered through the consumption waterers also. House meter-consumption meter will giving cooling load per house.

Water usage for maintenance/cleaning will come from the individual house and be metered there. The total cleaning Maintenance volume should be less than 300 gallons per month and that being said should be insignificant.

Only broilers are planned at this stage

Equipment usage will be 16 tunnel fans for each house with a total house CFM of 364,800 and farm CFM of 2,918,400 X 1.6 gallons and annual cooling load of 4,669,440 Monthly cooling load of 4,669,440 / 3 =1,556,480.

Primary Cooling is provided with tunnel fans with set point set by Bird producer (Tyson) set point is 86° Cooling pads set point @92° only after the 24th day growth cycle emergency foggers setpoint 102° only on day 36-50 of the growth cycle Evaporative cooling pads will be optimized with back up foggers. Nipple waters will be utilized

Calculations for consumption are as follows

3.79 gallons per bird has been established as the consumption rate from the active Dennis Farm in Parksley Va. 112,617 gallons / 29,700 flock size = 3.791818 gallons per bird over a 50 day life cycle. 20-50 day metered consumption is 97,141 gallons / 29,700 flock size =3.270741 gallons per bird for maximum month flock consumption.

3.791818 gallons per bird X flock size per house 40,700 = 154326 gallons per house per 50 day cycle X 8 houses = 1,234,608 gallons per farm flock 50 day cycle X 5.5 flocks per year = 6790344 gallons per year for Consumption

325,600 flock size X 3.791818 = 1,234,608 gallons a flock X 5.5 flocks = annual flock consumption 6,790,344 gallons

Max monthly flock consumption 1,064,953 X 8 hse=1,064,953

See all calculations below.

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: December 14, 2018

Application /Permit Number: GW0072500

Owner / Applicant Name: Ish Farms, LLC

Facility / System Name: Ish Farm

Facility Type: Agriculture – Poultry Farm

Facility / System Location: Accomack County

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610-110(D) state 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 withdrawal groundwater within a Groundwater Management Area as defined in (9VAC25-600-10 et seq.).

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 portions of any aquifers or the movement of waters of lower quality to areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource as per (9VAC25-610-110(D)(2), and
(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 as per 9VAC25-610-110(D)(3)(h).

Summary of Requested Withdrawal:

General:

In response to the Department of Environmental Quality's (DEQ) Compliance Assistance Framework initiative, a cohort of poultry farms in Accomack County were identified as potentially requiring a groundwater withdrawal permit (GWWP). The farms primarily grow broilers which are processed by several poultry integrators located in the area. These farms use groundwater to provide drinking water to the birds as well as to supply water to either misting systems or evaporative cooling pads which cool the birds. Cooling is primarily required in summer. Most wells associated with poultry farms in Accomack County are screened in either the upper, middle, or lower Yorktown-Eastover aquifers. The use of the Columbia (water-table) aquifer is being investigated by the industry and this aquifer may be used in the future to augment withdrawals from confined aquifers where possible.

Water use for poultry farms varies seasonally as well as in response to the poultry life cycle. Generally during winter, fall, and spring, facility withdrawals rise and fall in a fairly predictable pattern every 50-60 days, with usage primarily resulting from water consumption. This pattern starts with low water

consumption volumes for chick development and maxes out in the last 20-30 days as breeders seek to maximize adult weight gains. Typically, farms raise around five flocks per year with this cycle repeating each time. During the summer, withdrawal volumes increase due to additional water usage for flock cooling purposes. A few farms have additional sanitary and other agricultural uses (crops/other livestock).

Facility Specific:
Ish Farm has eight poultry houses and eight production wells. The houses are: 64 ft wide by 560 ft long. Proposed withdrawal limits were calculated based on the total of both consumption (drinking water) and cooling. Water use for consumption was calculated based on computer data from a comparable farm. Water use for cooling was calculated based on estimates based on house size and cooling fan capacity.

The proposed withdrawal limits, well apportionment, and well construction details are as follows:

Proposed Withdrawal Limits:

Proposed Withdrawal Limits	
Annual Value	11,500,000 (31,506 average gpd)
Monthly Value	2,700,000 (87,097 average gpd)

Due to the well and plumbing configuration, the withdrawal will be apportioned fairly equally between the system wells.

Production Well(s):

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well #1 VDH 16-100-0176 DEQ Well Number: 100-01502 MPID: 375518075322801	Lat: 37° 55' 18.318" Lon: 75° 32' 28.0248" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #2 VDH 16-100-0177 DEQ Well Number: 100-01503 MPID: 375517075322802	Lat: 37° 55' 17.8824" Lon: 75° 32' 28.4136" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #3 VDH 16-100-0178 DEQ Well Number: 100-01504 MPID: 375517075322803	Lat: 37° 55' 17.3244" Lon: 75° 32' 28.698" Datum: WGS94 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover

Owner Well Name: Well #4 VDH 16-100-0179 DEQ Well Number: 100-01505 MPID: 375516075322804	Lat: 37° 55' 16.8936" Lon: 75° 32' 28.9282" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #5 VDH 16-100-0180 DEQ Well Number: 100-01506 MPID: 375515075322905	Lat: 37° 55' 15.9384" Lon: 75° 32 29.598" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #6 VDH 16-100-0181 DEQ Well Number: 100-01507 MPID: 375515075322906	Lat: 37° 55' 15.5748" Lon: 75° 32' 29.8176" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #7 VDH 16-100-0182 DEQ Well Number: 100-01508 MPID: 375515075323007	Lat: 37° 55' 15.15" Lon: 75° 32' 30.0264" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover
Owner Well Name: Well #8 VDH 16-100-0183 DEQ Well Number: 100-001509 MPID: 375514075323008	Lat: 37° 55' 14.4012" Lon: 75° 32' 30.4116" Datum: WGS84 Elevation: 40 ft msl (topo)	Completion Date: 8/1/2016 Screens (ft-bls): 270-300 Total Depth (ft-bls): 300	150	Lower Yorktown-Eastover

Geologic Setting:

The Ish Farm wells (applicant wells) are located in northern Accomack County. The production wells are screened in the Lower Yorktown-Eastover aquifer. The upper portion of the Yorktown-Eastover aquifer (described in the 2006 Virginia Coastal Plain Hydrologic Framework[1] (VCPHF) as a combination of the

[1] McFarland, E.R., and Bruce, T.S., 2006, The Virginia Coastal Plain Hydrogeologic Framework: U.S. Geological Survey Professional Paper 1731, 118 p., 25 pls.

Upper, Middle, and Lower Yorktown-Eastover aquifers) is composed primarily of estuarine to marine quartz sands of the Yorktown Formation of Pliocene age. The nearest USGS geologic cross section found in USGS Professional Paper 1731 is cross-section GS-GS' (see attached figure at the end of the report).

Virginia Eastern Shore Model data:
The following table lists the location of the applicant production wells within the Virginia Eastern Shore Model[2] (VAHydroGW-ES).

VAHydroGW-ES Model Grid				
Well	**Well Number**	**MPID**	**Row**	**Column**
Well #1	100-01502	375518075322801	48	52
Well #2	100-01503	375517075322802	48	52
Well #3	100-01504	375517075322803	48	52
Well #4	100-01505	375516075322804	48	52
Well #5	100-01506	375515075322905	48	52
Well #6	100-01507	375515075322906	48	52
Well #7	100-01508	375515075323007	48	52
Well #8	100-01509	375514075323008	48	52

Hydrologic Framework:
Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Eastern Shore near the applicant wells and identify major discrepancies between regional hydrogeology and site logs interpreted by the DEQ staff geologist.

The following average aquifer elevations were estimated from the VAHydroGW-ES at the model cell(s) containing the applicant production wells.

VAHydroGW-ES Average Hydrologic Unit Information		
Aquifer	**Elevation (feet msl)**	**Depth (feet bls)**
Surface	39	0
Columbia aquifer (bottom)	-31	70
Upper Yorktown-Eastover aquifer (top)	-92	131
Upper Yorktown-Eastover aquifer (bottom)	-138	177
Middle Yorktown-Eastover aquifer (top)	-177	216
Middle Yorktown-Eastover aquifer (bottom)	-201	240
Lower Yorktown-Eastover aquifer (top)	-233	272
Lower Yorktown-Eastover aquifer (bottom)	-332	371

Eastern Shore Hydrogeologic Framework Based Recommendations:
Due to a lack of geophysical borehole data, DEQ staff has reviewed available information and made the following preliminary determinations regarding the location of the aquifer tops for the following wells based upon a review of the GW-2 forms available and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731). Further evaluation of aquifer tops will be conducted during the upcoming permit term and as additional geophysical information becomes available.

[2] Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5066, 125 p.

Unit	Well #1-8 (ft-bls)
Top of the Upper Yorktown-Eastover	132
Top of the Middle Yorktown-Eastover	217
Top of the Lower Yorktown-Eastover	276

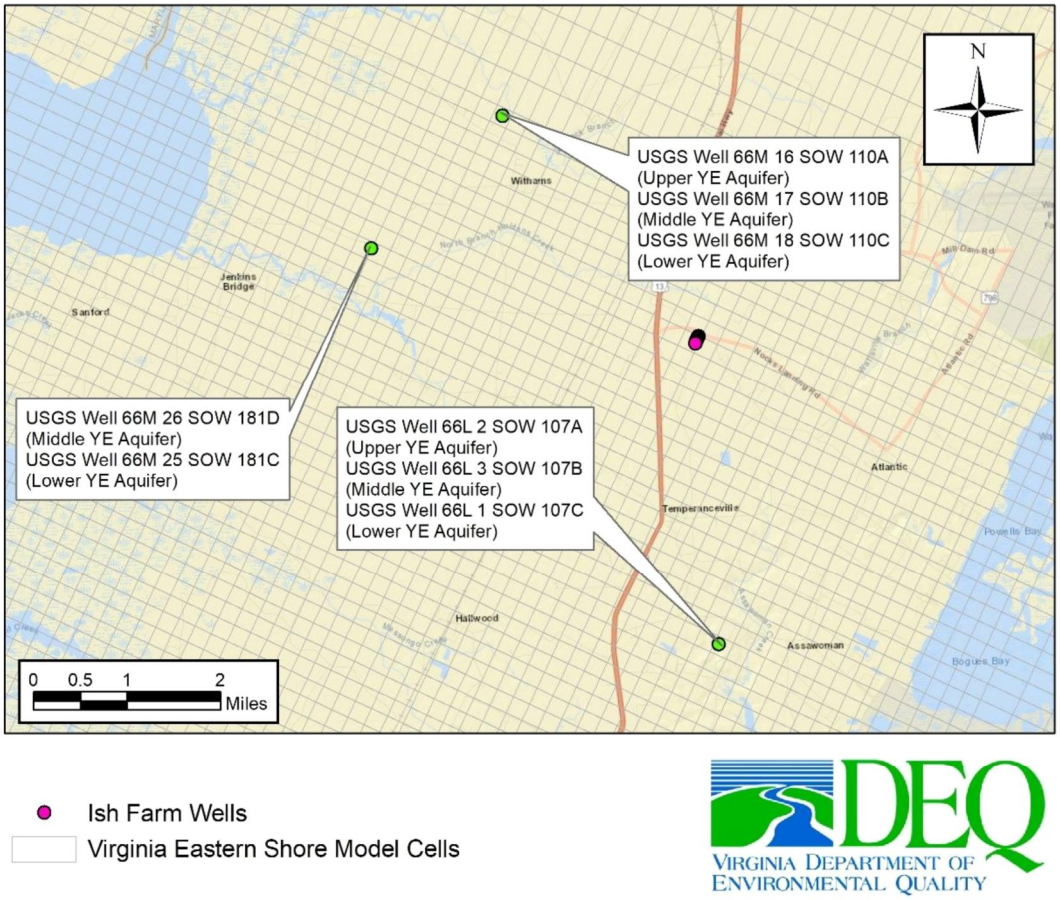
Water Level Comparison:
Below water levels retrieved from the USGS regional observation network wells are compared to the simulated water levels reported in the *Virginia Eastern Shore 2017-2018 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report (the 2017-2018 report) and simulation files.[3] This comparison is made in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends.

The 2017-2018 report provides two sets of simulated potentiometric water surface elevations. The VAHydroGW-ES model is divided into three parts. The first portion of the model simulates water levels within the Eastern Shore aquifers from 1900 through 2017 based upon historically reported pumping amounts (the "*Historic Use Simulation*"). This portion of the model has been calibrated to match water levels observed in USGS regional observation network wells situated throughout the peninsula. The water levels reported in the 2017-2018 report are based upon two separate simulations, each simulation running from 2018 through 2067. The simulated pumping amount in these two simulations are based upon, 1) the average 2013-2017 reported withdrawal amount of wells in the VAHydroGW-ES model (the "R*eported Use Simulation*") and, 2) the current (2018) maximum withdrawal amount allowed under their current permit for wells in the VAHydroGW-ES model (the "*Total Permitted Simulation*"). Both these simulations are an extension of the *Historic Use Simulation* and the water levels reported in the 2017-2018 report are the final water levels simulated at the end of the simulations (2067).

The "VAHydroGW-ES 2067 Reported Use Water Level," reported in the tables below, is the simulated water level – 50 years from present – if all permitted pumping continued at the average 2013-2017 reported withdrawal amount for the next 50 years. And the "VAHydroGW-ES 2067 Total Permitted Water Level," reported in the tables below, is the simulated water level – 50 years from present – if all Eastern Shore permitted wells were to pump at the maximum permitted amount allowed under their current permit for the next 50 years. Finally, the "VAHydroGW-ES 2017 Historic Use Water Level," reported in the tables below, is the water level simulated for the year 2017 in the *Historic Use Simulation*.

The nearest USGS regional observation network wells to the applicant wells, completed in the Upper, Middle, or Lower Yorktown-Eastover aquifers, are listed in the following tables and shown in Figure 1. For the USGS regional observation network wells, average 2017 reported water levels are shown in the following tables. Simulated water levels for the Upper, Middle, and Lower Yorktown-Eastover aquifers, for the VAHydroGW-ES cells containing the USGS regional observation network wells are also shown in the following tables.

[3] See *Virginia Eastern Shore 2017-2018 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and simulation files on file with the VA DEQ.



Ish Farm Wells

Virginia Eastern Shore Model Cells

Figure 1. Nearest USGS regional observation network wells.

Comparing the VAHydroGW-ES 2017 Historic Use Water Level with the USGS Network Well 2017 Water Level provides a method for judging the accuracy of the VAHydroGW-ES. Figures 2 through 9 show graphs of the recorded water levels from the USGS observation wells listed in the following tables. These figures also show the simulated VAHydroGW-ES *Historic Use Simulation* water levels for the model cell containing each USGS well. Observing the simulated and observed water elevations together provide a second method for assessing the accuracy of the VAHydroGW-ES in the vicinity of the applicant wells.

The Upper Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Level is the same value as the USGS Network Well 2017 Water Level observed in Well 66L 2 SOW 107A; while the 2017 VAHydroGW-ES water level is a few feet higher than the level observed in Well 66M 16 SOW 110A. The water levels observed over the past approximately 40 years in both Upper Yorktown-Eastover USGS wells are shown in Figures 2 and 3. Both wells exhibit yearly fluctuations in water levels of approximately 2 to 4 feet. Water levels simulated by the VAHydroGW-ES do not fluctuate in the same manner because the pumping and recharge simulated in the model for any given year are averaged over the year and entered in the model as the average value for the year. Water levels for Well 66L 2 SOW 107A are in general agreement with the water level simulated by the VAHydroGW-ES. Water levels for Well 66M 16 SOW 110A are approximately 4 feet lower for the period of record than those simulated by the VAHydroGW-ES.

The Middle Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Levels are one-half to six feet lower than the USGS Network Well 2017 Water Levels observed in Well 66L 3 SOW 107B, Well 66M 17 SOW 110B, and Well 66M 26 SOW 181D. The water levels observed over the past 30 to 40 years in the Middle Yorktown-Eastover USGS wells are shown in Figures 4 through 6. Each well exhibits yearly

fluctuations in water levels of approximately 2 to 4 feet. Water levels for the USGS Middle Yorktown-Eastover wells are in general agreement with the water level simulated by the VAHydroGW-ES – especially for wells 66L 3 SOW 107B and 66M 17 SOW 110B. While still reasonably accurate, water levels for 66M 26 SOW 181D are lower than and have diverged slightly from those simulated by the VAHydroGW-ES over the past 15 years.

The Lower Yorktown-Eastover VAHydroGW-ES 2017 Reported Use Water Levels are one to five feet lower than the USGS Network Well 2017 Water Levels observed in Well 66L 1 SOW 107C, Well 66M 18 SOW 110C, and Well 66M 25 SOW 181C. The water levels observed over the past 30 to 40 years in the Lower Yorktown-Eastover USGS wells are shown in Figures 7 through 9. Each well exhibits yearly fluctuations in water levels of approximately 2 to 4 feet. Water levels for the USGS Lower Yorktown-Eastover wells are in general agreement with the water level simulated by the VAHydroGW-ES.

Differences between observed and simulated water levels will be noted and addressed during the next calibration of the VAHydroGW-ES.

Upper Yorktown-Eastover Measurements	**66L 2 SOW 107A**	**66M 16 SOW 110A**
Distance from applicant wells (miles)	3.3	3.2
VAHydroGW-ES Row	63	41
VAHydroGW-ES Column	61	37
VAHydroGW-ES Land Surface Elevation (ft-msl)	27	10
USGS Well Land Surface Elevation (ft-msl)	10	11
USGS Network Well 2017 Water Level (ft-msl)	0.9	1.1
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	0.9	4.5
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	0.2	4.5
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	-0.9	4.5

Middle Yorktown-Eastover Measurements	**66L 3 SOW 107B**	**66M 17 SOW 110B**	**66M 26 SOW 181D**
Distance from applicant wells (miles)	3.3	3.2	3.6
VAHydroGW-ES Row	63	41	51
VAHydroGW-ES Column	61	37	33
VAHydroGW-ES Land Surface Elevation (ft-msl)	27	10	6
Land Surface Elevation (ft-msl)	10	11	6
USGS Network Well 2017 Water Level (ft-msl)	0.5	0.3	5.0
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	0.0	-1.0	-1.1
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	-0.7	-2.1	-1.7
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	-31.4	-2.7	-2.1

Lower Yorktown-Eastover Measurements	66L 1 SOW 107C	66M 18 SOW 110C	66M 25 SOW 181C
Distance from applicant wells (miles)	3.3	3.2	3.6
VAHydroGW-ES Row	63	41	51
VAHydroGW-ES Column	61	37	33
VAHydroGW-ES Land Surface Elevation (ft-msl)	27	10	6
Land Surface Elevation (ft-msl)	10	11	6
USGS Network Well 2017 Water Level (ft-msl)	-0.9	-0.3	2.1
VAHydroGW-ES 2017 Reported Use Water Level (ft-msl)	0.0	-1.1	-1.1
VAHydroGW-ES 2067 Reported Use Water Level (ft-msl)	-0.8	-2.2	-1.7
VAHydroGW-ES 2067 Total Permitted Water Level (ft-msl)	-1.9	-2.8	-2.2

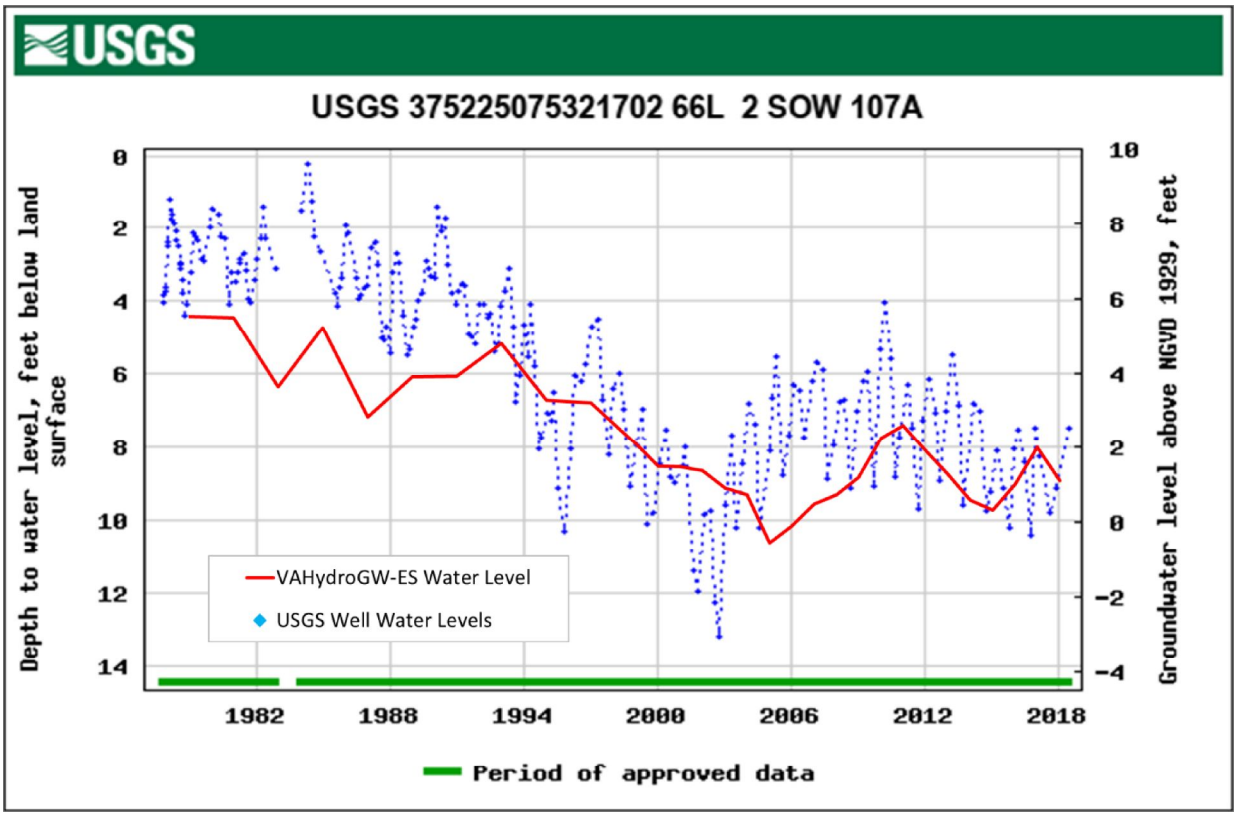


Figure 2. USGS Regional Observation Well 66L 2 SOW 107A, Upper Yorktown-Eastover aquifer water levels recorded from 1977 to present (well depth 140 ft bls, land surface 10 ft msl).

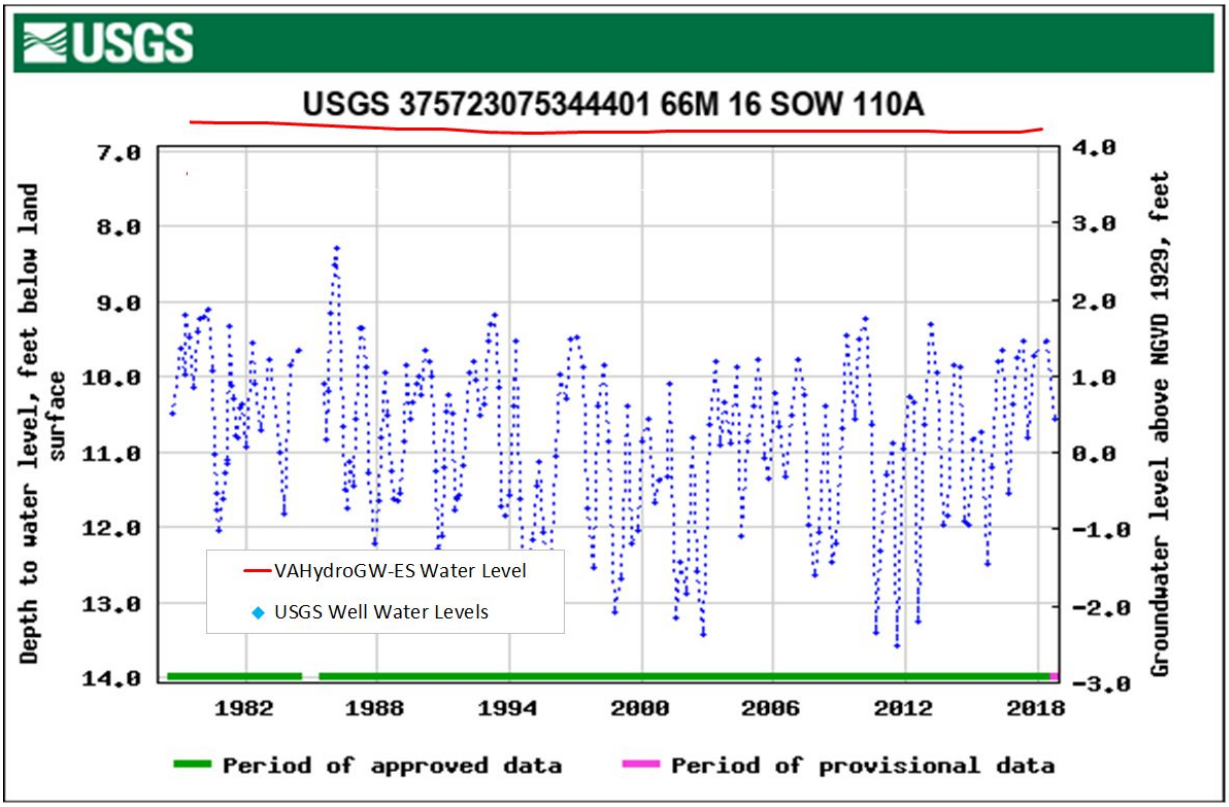


Figure 3. USGS Regional Observation Well 66M 16 SOW 110A, Upper Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 130 ft bls, land surface 11 ft msl).

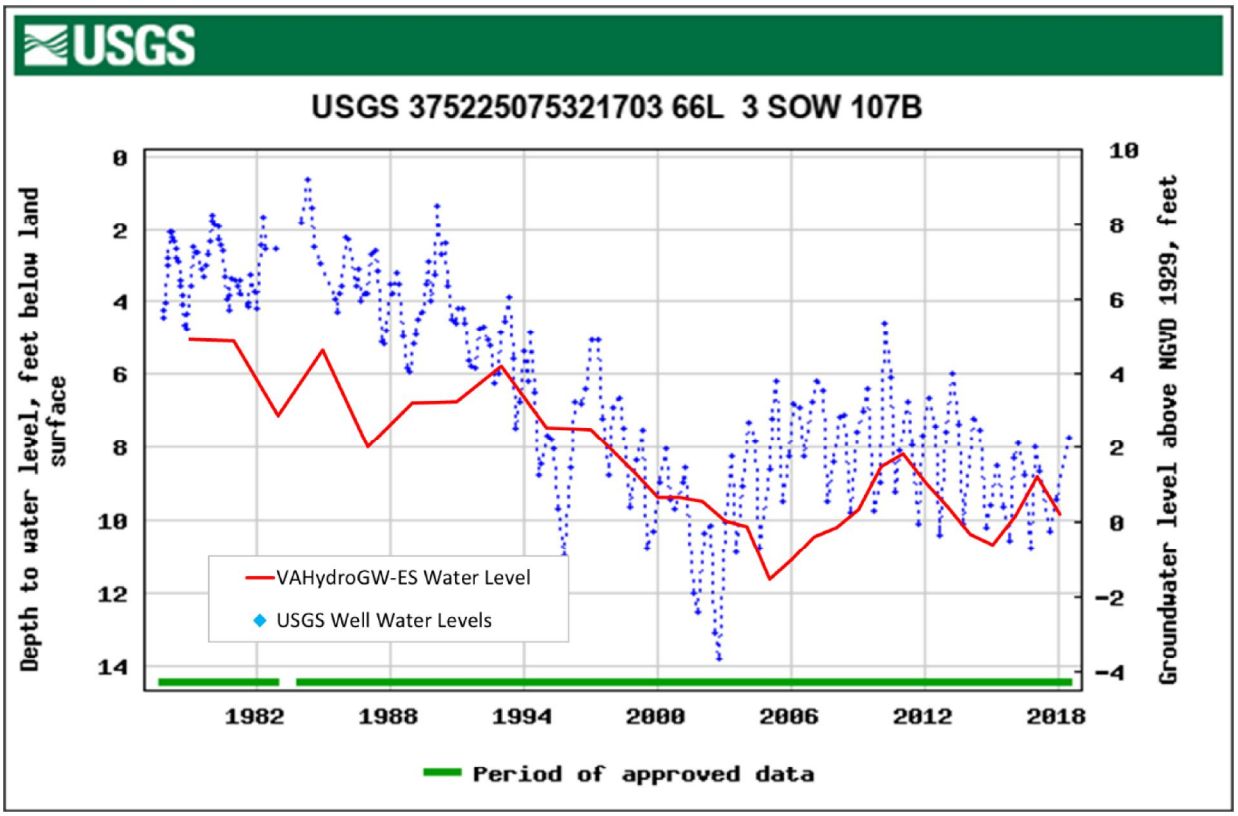


Figure 4. USGS Regional Observation Well 66L 3 SOW 107B, Middle Yorktown-Eastover aquifer water levels recorded from 1977 to present (well depth 206 ft bls, land surface 10 ft msl).

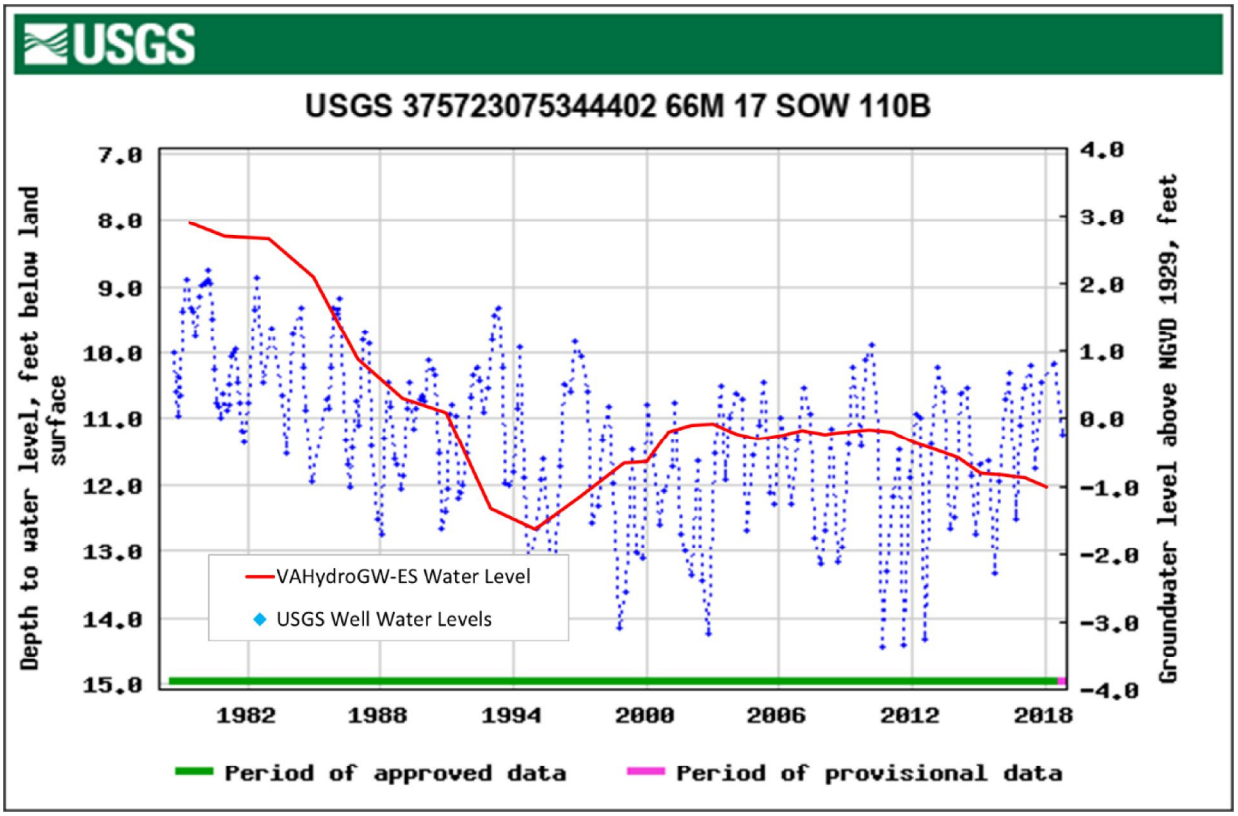


Figure 5. USGS Regional Observation Well 66M 17 SOW 110B, Middle Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 178 ft bls, land surface 11 ft msl).

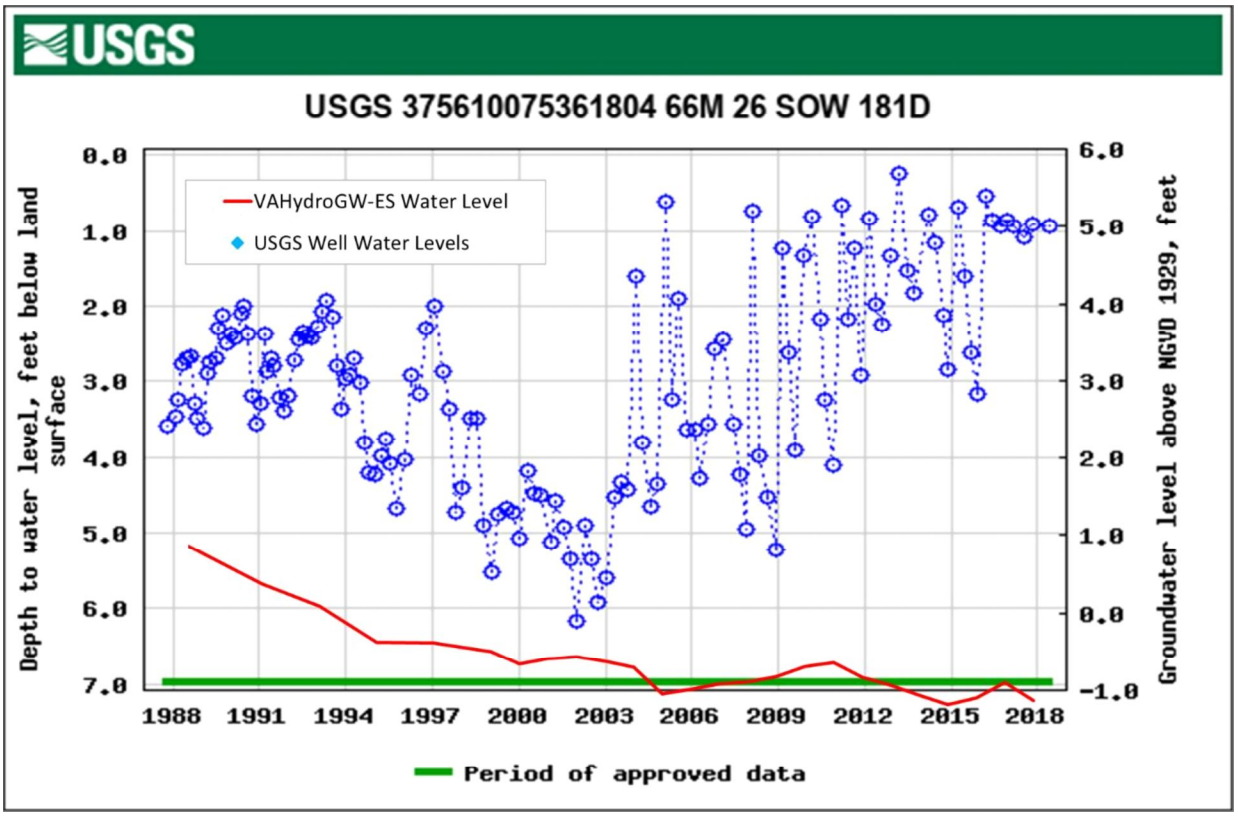


Figure 6. USGS Regional Observation Well 66M 26 SOW 181D, Middle Yorktown-Eastover aquifer water levels recorded from 1987 to present (well depth 230 ft bls, land surface 6 ft msl).

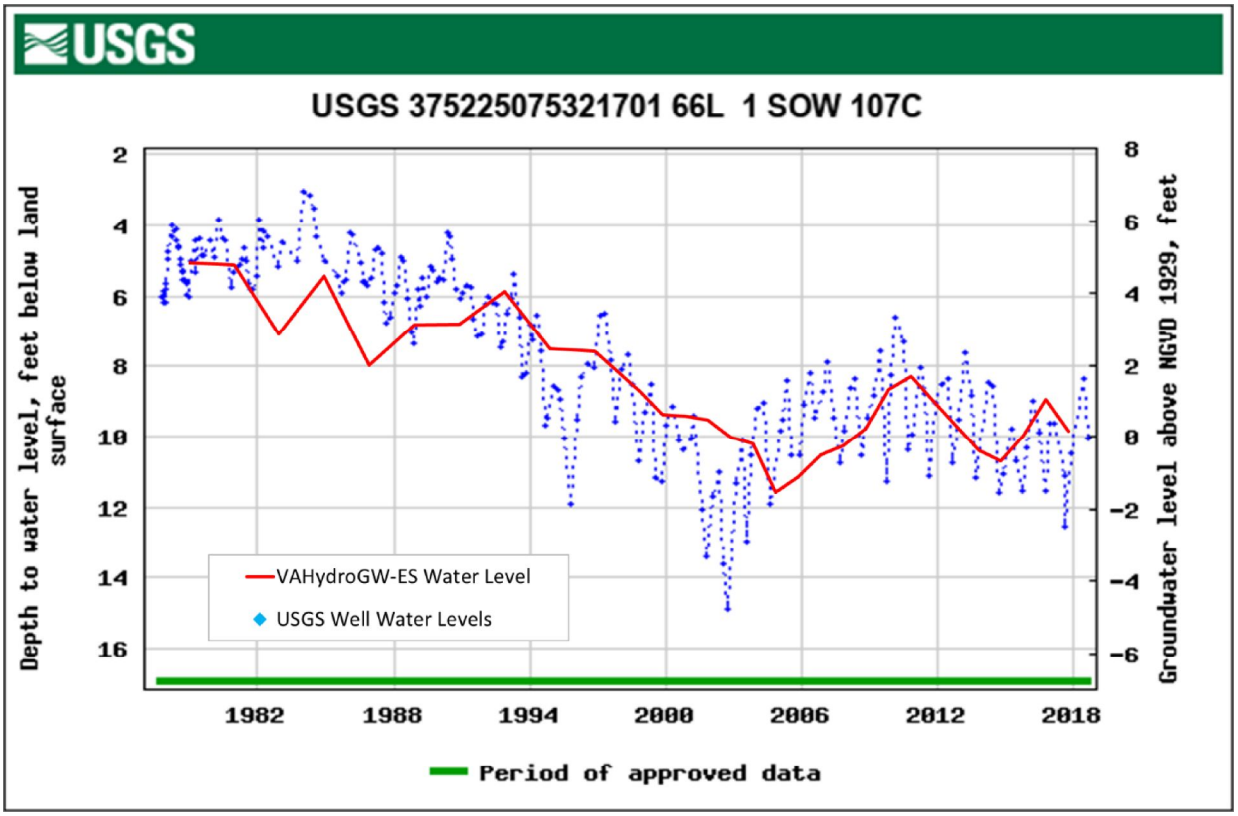


Figure 7. USGS Regional Observation Well 66L 1 SOW 107C, Lower Yorktown-Eastover aquifer water levels recorded from 1977 to present (well depth 305 ft bls, land surface 10 ft msl).

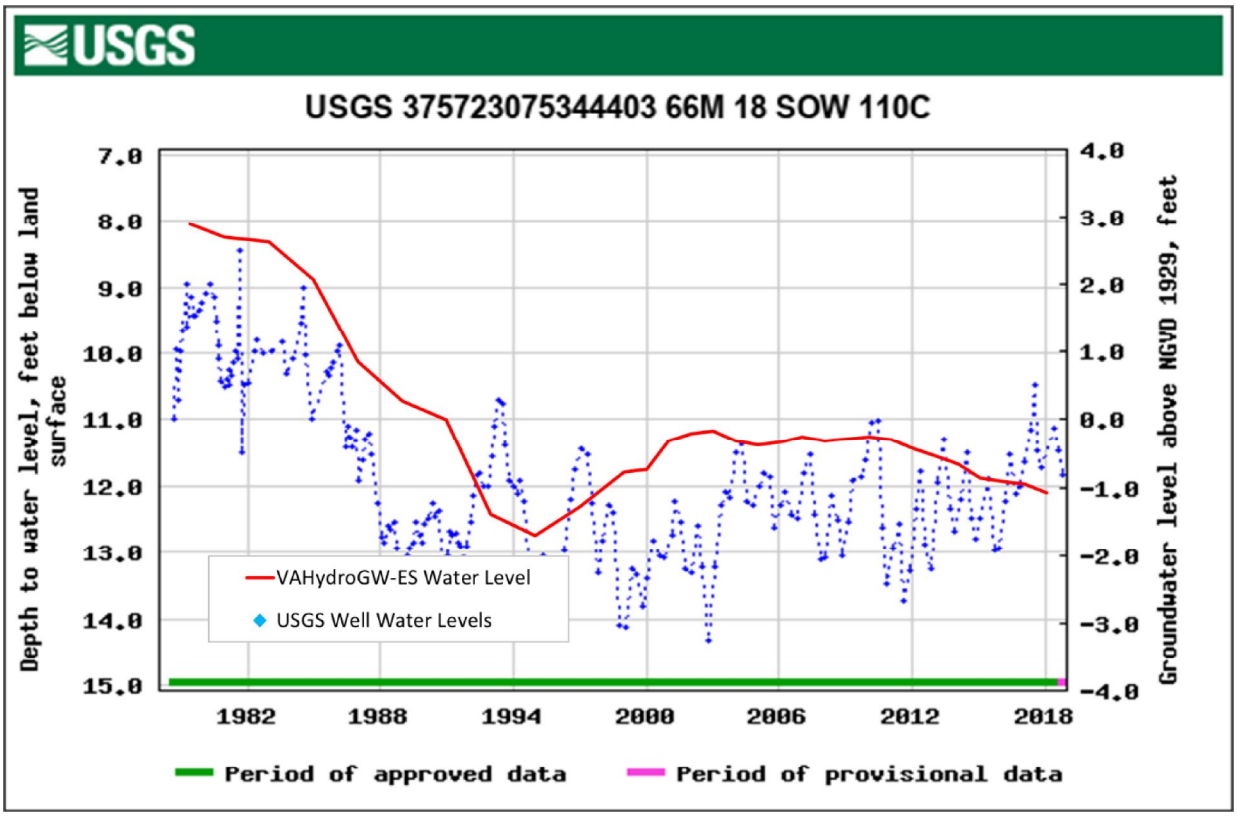


Figure 8. USGS Regional Observation Well 66M 18 SOW 110C, Lower Yorktown-Eastover aquifer water levels recorded from 1978 to present (well depth 240 ft bls, land surface 11 ft msl).

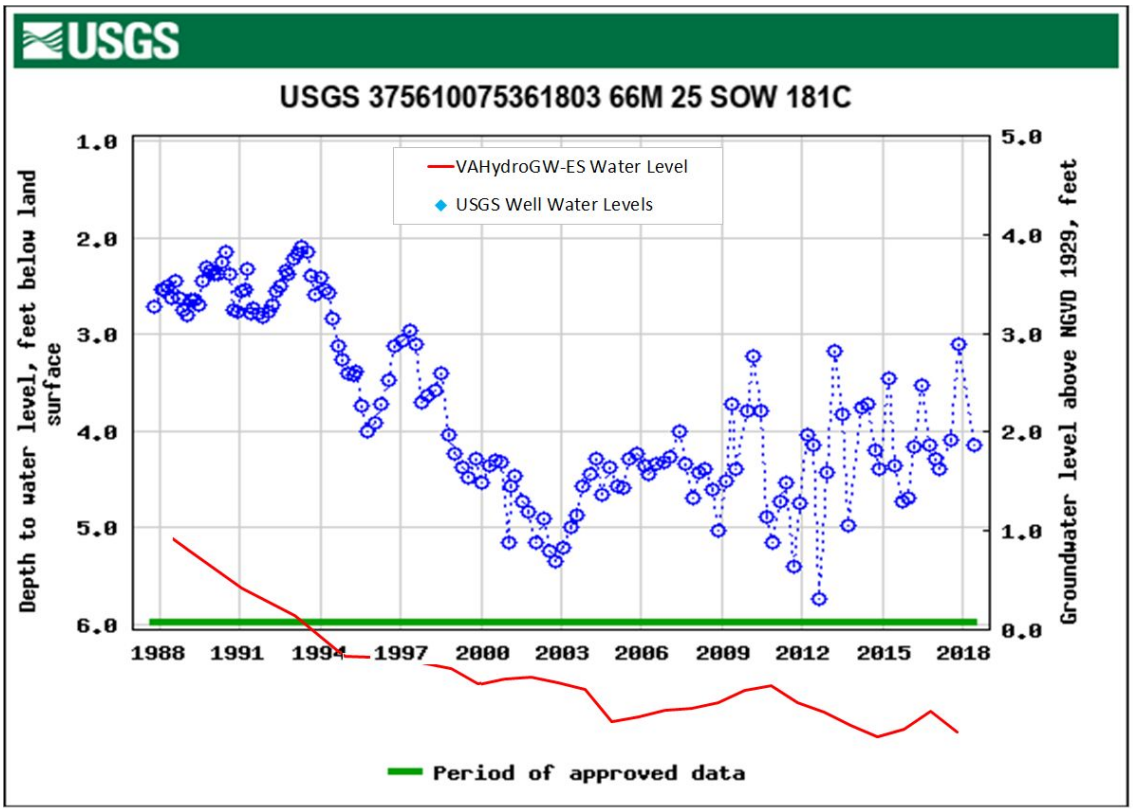


Figure 9. USGS Regional Observation Well 66M 25 SOW 181C, Lower Yorktown-Eastover aquifer water levels recorded from 1987 to present (well depth 340 ft bls, land surface 6 ft msl).

Aquifer Test(s):
An aquifer test has not been conducted for this system and the VAHydroGW-ES model was used to evaluate the application. The following table provides the average hydrogeologic properties assigned to the VAHydroGW-ES cell(s) containing the applicant wells.

Virginia Eastern Shore Model Hydrogeologic Properties: Row 48/Column 52							
Aquifer	**Top Elevation (feet msl)**	**Top Elevation (feet bls)**	**Aquifer Thickness (feet)**	**Horizontal Conductivity (feet/day)**	**Vertical Conductivity (feet/day)**	**Specific Storage (1/feet)**	**Specific Yield**
Columbia	39	0	70	76	0.5	0.00001	0.15
Upper Yorktown-Eastover	-92	131	46	5	3.4	0.000004	N/A
Middle Yorktown-Eastover	-177	216	24	5	5.2	0.000004	N/A
Lower Yorktown-Eastover	-233	272	99	6	4.6	0.000004	N/A

Model Results

Evaluation of Withdrawal Impacts:
The VAHydroGW-ES model was used to simulate the effects resulting from the proposed withdrawal due to the multi-aquifer impacts. The stabilized effects resulting from the proposed withdrawal were simulated at the annual permitted withdrawal rate of 11,500,000 gallons per year (31,506 average gpd). The stabilized effects were simulated by replacing the reported use amounts in the 2017 VAHydroGW-ES Reported Use Simulation with the current maximum annual withdrawal limit allowed under the terms of their permit for all Ground Water Management Area (GWMA) permit holders. That same simulation

was executed twice, once with the proposed withdrawal removed (the *baseline simulation*), and once with the proposed withdrawal added (the *proposed withdrawal simulation*). The stabilized effects of the proposed withdrawal were considered by simulating both simulations for 50 years and observing the difference in water potentiometric levels at the end of the simulations.

Area of Impact:
The area of impact (AOI) for an aquifer is the area where the additional drawdown due to the proposed withdrawal exceeds one foot. The results of the VAHydroGW-ES simulations, outlined in the preceding section, predict areas of impact in the Middle and Lower Yorktown-Eastover aquifers. The AOI areas extend a maximum distance of approximately 1.0 and 1.1 miles from the production center for the Middle and Lower Yorktown-Eastover aquifers. AOI maps for all affected aquifers are attached to this report.

80 % Drawdown:
The 80% drawdown criterion was evaluated for all impacted, confined aquifers in the Virginia Eastern Shore using the VAHydroGW-ES *proposed withdrawal simulation*. The elevations of the top of the Upper, Middle, and Lower Yorktown-Eastover aquifers at the VAHydroGW-ES cell (row 48, column 52) simulating the greatest drawdown are -92, -177, and -233 feet msl, respectively. Based on the results of the *proposed withdrawal simulation* the predicted potentiometric water levels at the same VAHydroGW-ES cell are 15.9, -3.5, and -41.4 feet msl for the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. The 80% drawdown criterion allows the potentiometric water level (based on the critical surface elevation calculated from the VAHydroGW-ES data) to be reduced to -69.1, -138.5, and -183.6 feet msl in the Upper, Middle, and Lower Yorktown-Eastover aquifers, respectively. Therefore, the water levels in the VAHydroGW-ES cell containing the applicant wells for each confined aquifer are not simulated to fall below the critical surface. Additionally, no new VAHydroGW-ES cells are simulated to have water levels fall below the critical surface. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated 100% to the Lower Yorktown-Eastover aquifer. 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.

Water Quality:
The EPA has established the National Secondary Drinking Water Regulations (NSDWRs) which are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic (such as taste, odor, or color) effects in drinking water. The EPA recommends the secondary standards to water systems – states may choose to adopt them as enforceable standards. The EPA NSDWRs specify the limit on chloride as 250 mg/L.

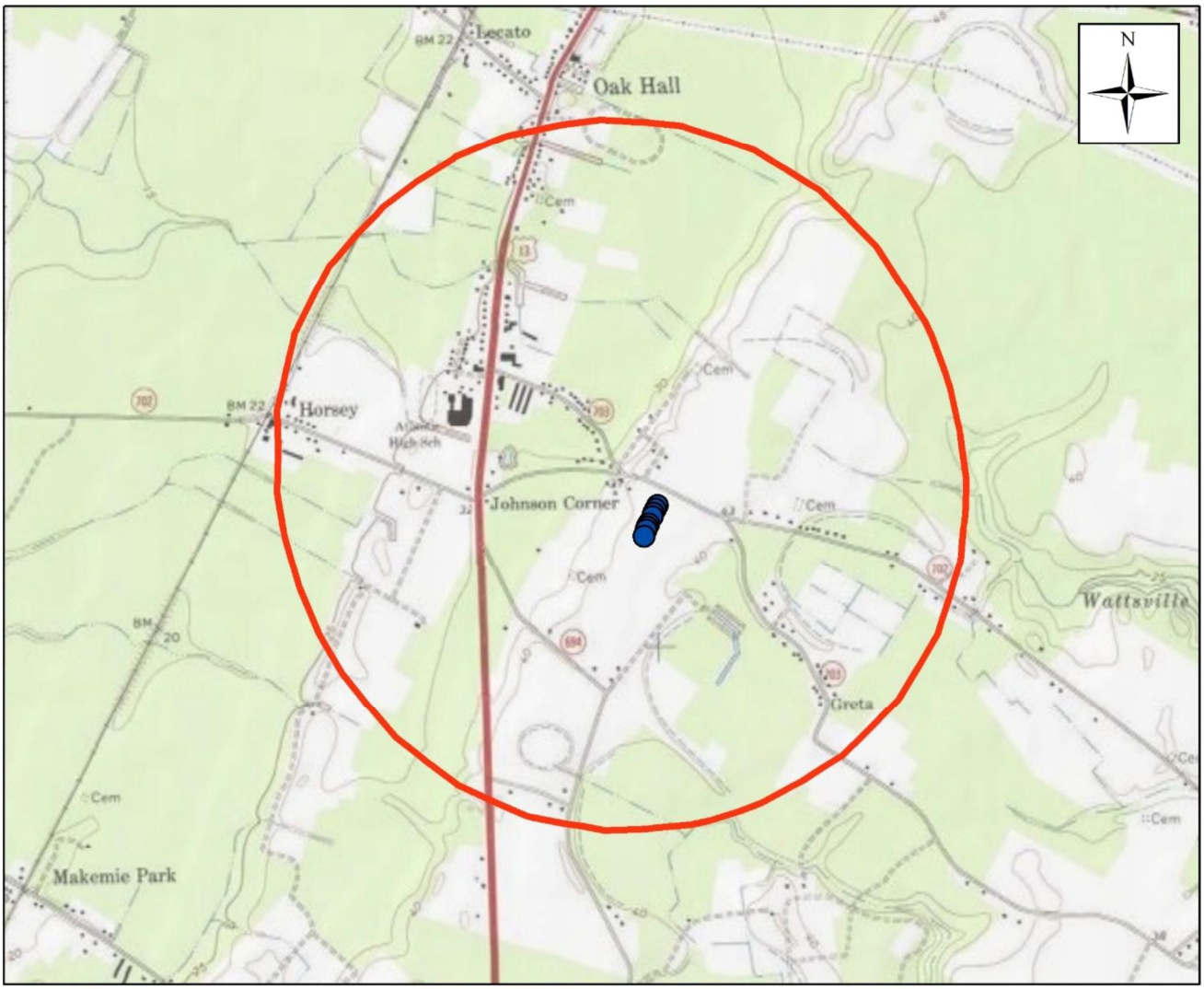
The VAHydroGW-ES was created "to help the Commonwealth and local water managers better plan water use and estimate future changes in water and salinity levels in response to changes in water use."[4] Use of the model to predict future chloride concentrations results in a "general useful understanding of system behavior, but water-resource managers must be careful in trusting the accuracy of predictions at individual wells from a regional model."[5] Further, chloride concentrations at individual wells, predicted using the regional model, should not be relied upon to predict actual concentrations at those locations.

[4] Sanford, W.E., Pope, J.P., and Nelms, D.L., 2009, Simulation of groundwater-level and salinity changes in the Eastern Shore, Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5066, 125 p.
[5] Sanford, W.E. and Pope, J.P., 2009, Current challenges using models to forecast seawater intrusion: lessons from the Eastern Shore of Virginia, USA. Hydrogeology Journal (2009), Volume: 18, Issue: 1, p: 73-93

The potential for adverse changes to water quality due to the requested withdrawal was evaluated using transient, density-dependent, SEAWAT simulations using the VAHydroGW-ES. Two simulations were executed – one simulation without the proposed withdrawal included and a second with the proposed withdrawal included. Both simulations were executed for 50 years. And both used the 2017 total permitted stresses, concentrations, and heads as starting conditions. In an effort to simulate the long-term effects on water quality due to the proposed withdrawal, the amount of 11,500,000 gallons per year (31,506 average gpd) was used for the duration of the second simulation. The two simulations were compared to evaluate the potential for adverse changes to water quality. The results indicated that no model cells simulate an increase in chloride concentration greater than 20 mg/L due to the proposed withdrawal. Therefore, the VAHydroGW-ES model results do not indicate the potential for reduced water quality as a result of the proposed withdrawal.

Conclusion:
The withdrawal requested by Ish Farms, LLC for the Ish Farm withdrawal satisfies the technical evaluation criteria for permit issuance. The AOIs for the Middle and Lower Yorktown-Eastover aquifers are shown in the following maps. There are no existing permitted wells located within the applicant's AOI.

Ish Farm
Area of Impact - Middle Yorktown-Eastover Aquifer



Ish Farm Wells

Middle Yorktown-Eastover Aquifer Area of Impact

0 1,000 2,000 4,000 Feet

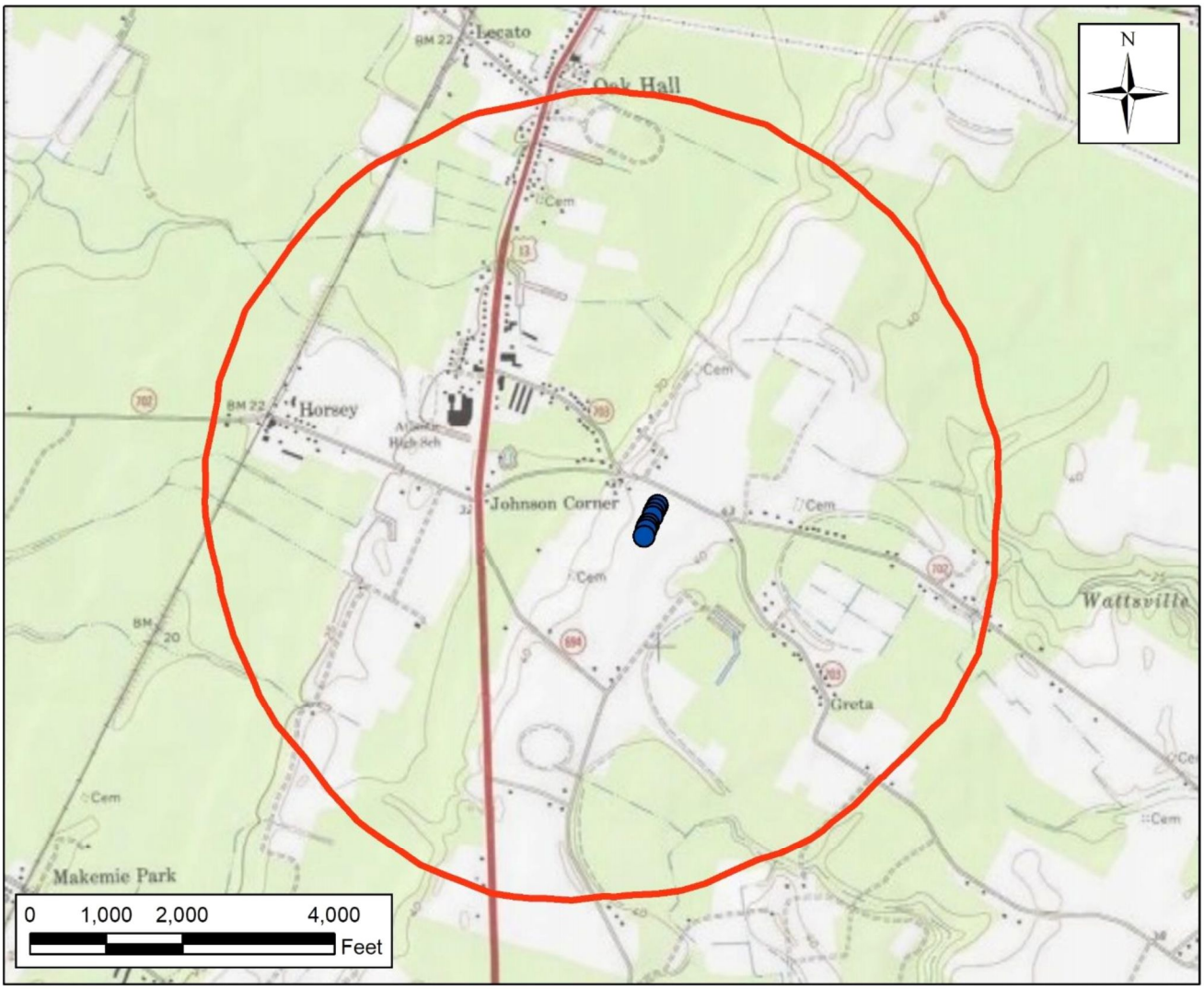
Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 11,500,000 gallon per year (31,506 average gpd), 50 year, Lower Yorktown-Eastover withdrawal using the VAHydroGW-ES.

Maximum radius of one foot drawdown (Area of Impact) extends approximately 1.0 miles from the pumping center.

Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply December 14, 2018

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Ish Farm
Area of Impact - Lower Yorktown-Eastover Aquifer



Ish Farm Wells

Lower Yorktown-Eastover Aquifer Area of Impact

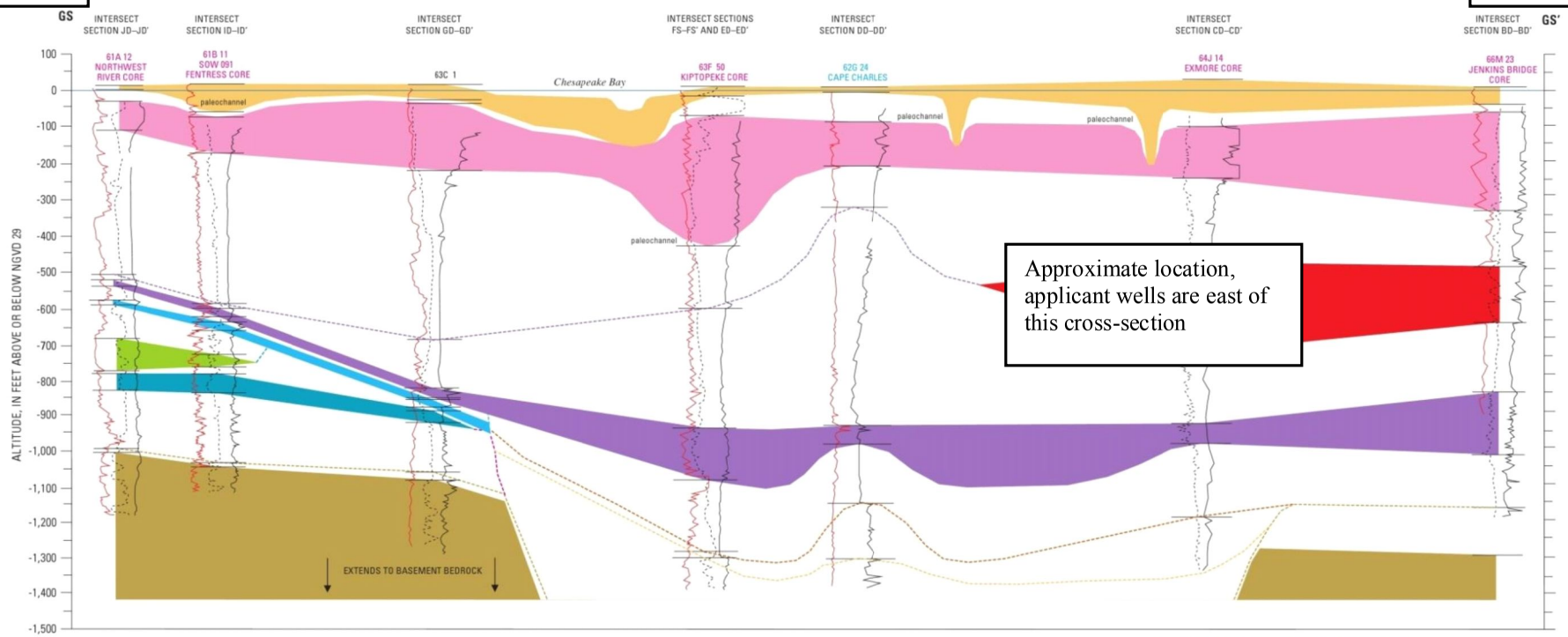
Simulated drawdown at or exceeding one foot in the Lower Yorktown-Eastover aquifer resulting from a 11,500,000 gallon per year (31,506 average gpd), 50 year, Lower Yorktown-Eastover withdrawal using the VAHydroGW-ES.
Maximum radius of one foot drawdown (Area of Influence) extends approximately 1.1 miles from the pumping center.

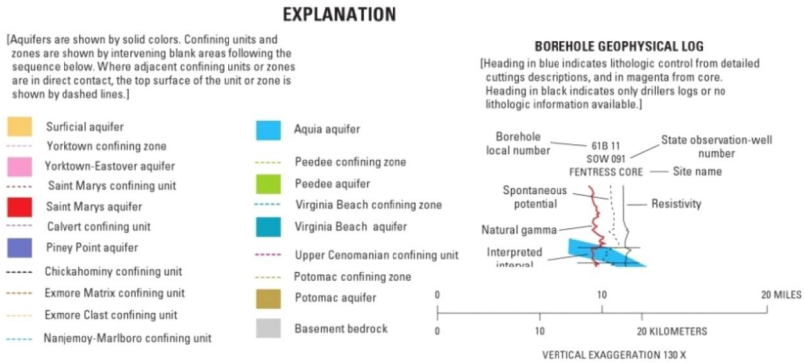
Technical evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply
December 14, 2018

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

SOUTH

NORTH





Reference location of cross-section above

Coastal Plain (2006) Cross-Sections GS-GS' from USGS Professional Paper 1731.