COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT* PERMIT** ***[October 12, 2021]
TO WITHDRAW GROUNDWATER IN THE EASTERN VIRGINIA GROUNDWATER MANAGEMENT AREA

Permit Number: GW0007701

Effective Date: Xxxxxxx XX, 2021
Expiration Date: Xxxxxxx XX, 2036

Pursuant to the Ground Water Management Act of 1992 (Section 62.1-254 et seq. of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610-10), the State Water Control Board (Board) hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee New Kent County Department of Public Utilities

Facility Colonies Water System

Facility Address 901 & 911 Colonies Trail

Lanexa, VA 23089

The Permittee's authorized groundwater withdrawal shall not exceed:

13,300,000 gallons per year,
1,900,000 gallons per month,

The permitted withdrawal will be used to provide a municipal public 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

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This permit is based on the Permittee's application received on October 17, 2018, 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/bls)	Screen Intervals (ft/bls)	Aquifer	Latitude	Longitude	Datum
Well #1	163-00078	280	198-238	Piney Point	37° 23' 58.17"	76° 54' 5.84"	NAD27
Well #2	163-00079	250	198-238	Piney Point	37° 23' 55.93"	76° 54' 6.04"	NAD27
Well #2A	163-00248	Pending	Pending	Piney Point	37° 23' 55.974"	76° 54' 5.863"	NAD83

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

B. Public Water Supplies

1. Daily withdrawal limits set forth in this permit are consistent with the requirements and conditions of the Virginia Department of Health (VDH) Waterworks Operation Permit #4127115. 9VAC25-610-140 A 5

2. The Permittee shall submit copies of an updated Waterworks Operation Permit and the associated Engineering Description Sheets to the Department within 30 days of receipt from the Virginia Department of Health. 9VAC25-610-140 C

C. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140 A 6

2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

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Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)
Well #1	163-00078	174
Well #2	163-00079	174
Well #2A	163-00248	174*

*Pending verification from new geophysical data from the well site.

D. 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	163-00078	Water Use
Well 2	163-00079	Water Use

E. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received October 17, 2018 and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.

2. By the end of the first year of the permit cycle [*date*] the Permittee shall submit documentation to the Department that the leak detection and repair program defined in the WCMP has been initiated. This documentation shall include activities completed during the first year of the permit term. 9VAC25-610-100 B

3. As soon as completed but not later than the end of the second year of the permit cycle [*date*] the Permittee shall submit to the Department results of an audit of the total amount of groundwater used in the distribution system and operational processes. This documentation shall include any resulting changes to the leak detection and repair program in the WCMP. 9VAC25-610-100 B

4. A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [*date*] and ten [*date*] of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C

    a. Any new water saving equipment installed or water saving processes adopted;

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b. WCMP actions taken to reduce the volume of water needed to supply the system;

c. Planned short or long term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system or by customers and for reducing the loss of water;

d. Results of additional water audits completed;

e. Review of water use category (residential, commercial, industrial) per-connection use in municipal systems;

f. Evaluation of the leak detection and repair program;

g. Description of educational activities completed; and

h. Identification of any water reuse opportunities identified.

5. If revisions or additions to the plan are necessary, an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan

6. Records of activities conducted pursuant to the WCMP are to be submitted to DEQ upon request.

F. Mitigation Plan

The Mitigation Plan approved on April 28, 2021 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

G. 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

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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. Well Abandonment

Within 6 months after Well #2A (DEQ# 163-00248) begins serving the withdrawal system, the Permittee shall permanently abandon Well #2 (DEQ# 163-00079) in accordance with the Virginia Department of Health's Regulations and submit documentation to the Department of Environmental Quality within 30 days of abandonment. At least two weeks prior to the scheduled abandonment, the Permittee shall notify the Department of the scheduled abandonment date.

Part III
General Conditions

A. Duty to Comply

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

B. Duty to Cease or Confine Activity

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

C. Duty to Mitigate

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

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the 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

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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, readings, calculations and bench data used;

    f. the results of such analyses; and

    g. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et

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

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

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

3. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. 1VAC30-45-20

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Groundwater Withdrawal Regulations. 9VAC25-610-290 and 9VAC25-610-130 G

2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the 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. 9VAC25-610-96

7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96 C

8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140 C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall produce volume determinations within plus or minus 10% of actual flows. 9VAC25-610-140 A 7 b

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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 B 5

2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330 B 6

3. Minor modifications to this permit must also be made to:

   a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330 B 7

   b. Allow for change in ownership when the 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 two weeks prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the 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

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2. A complete suite of geophysical logs (16"/64" Normal, Single Point, Self-Potential, Lateral, and Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140 C

3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140 A 6

4. The Permittee shall install gravel packs and grout in a manner that prevents 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. The assigned DEQ Well number shall be included on all well documents. 9VAC25-610-140 C

6. In addition to the above requirements, if required by the permit, construction of a Water Level Monitoring State Observation Well (SOW) requires:

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

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C

    c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the installation of the transducer and final hook-up of the equipment. 9VAC25-610-140 C

7. In addition to the above requirements, if required by the permit, construction of a Chloride Monitoring SOW requires:

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

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents.

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At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C

c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct final hook-up of the equipment. 9VAC25-610-140 C

d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the final hook-up of the equipment. 9VAC25-610-140 C

L. Permit Reopening

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

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

2. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310 B 1

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

4. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140 C

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COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0007701
Application Date: October 17, 2018

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

New Kent County Department of Public Utilities
7051 Poindexter Road
New Kent, VA 23124
(804) 966-9625

Facility Name and Address

The Colonies Water System
901 & 911 Colonies Trail
Lanexa, Va 23089
(804) 966-9625

Contact Information:

C. Michael Lang, PG
Assistant Director DPU
cmlang@newkent-va.us
(804) 966-9625

Proposed Beneficial Use Type: Municipal Public Water Supply

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Processing Dates

Processing Action	Date Occurred/Received
Notification of Renewal:	March 30, 2018
Pre-Application Meeting:	May 17, 2018
Application Received by DEQ-OWS:	October 17, 2018
Permit Fee Deposited by Accounting:	August 28, 2018
Application Review Conducted:	October 2018, April 28, 2021
Notice of Deficiency Sent	None Sent
Request for Additional Information Sent:	None Sent
Local Government Ordinance Form Received by DEQ-OWS:	October 17, 2018
Application Complete:	April 28, 2021
Submit Request for Technical Evaluation:	May 11, 2021
Technical Evaluation Received by DEQ-OWS:	May 13, 2021
Draft Permit Package Sent:	October 13, 2021
Submit Draft Permit for Public Notice:	
Public Notice Published:	
End of 30-Day Public Comment Period:	
Response to Public comment:	
Public Meeting or Hearing:	

Application

Application Information

Description and History:

Purpose of Facility: The Colonies Water System supplies potable water to the 202 residential connections in the subdivision. The subdivision is located at the far south-eastern end of the county and is surrounded by the Chickahominy River on three sides and a railroad right-of-way to the north.

Background and Permitting History: The community began in the 1970's and is at 97% build out with six additional lots remaining. Groundwater Withdrawal Permit GW0007700 was issued with an effective date of August 1, 2009 and an annual withdrawal limit of 17,552,850 gal/yr. The system is supplied by two wells installed in 1975 and the same wells are included in the current permit. Following submittal of the application the applicant informed DEQ staff that the well and system are aging and plans were being made for system upgrades. The upgrades include replacement of Well #2 with a new well screened in the Piney Point aquifer and located in the same well lot, and replacement of the two storage tanks. The replacement of Well #1 is also planned but will follow the tank replacement.

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Location of Facility/Withdrawal:

Water Supply Planning Unit: New Kent

County: New Kent County

GWMA/Aquifer: Eastern Virginia / Piney Point

Conjunctive Use Source: The system does not rely on a surface water withdrawal for part of the withdrawal and is therefore, not a conjunctive use system

Withdrawal Use, Current Need, and Projected Demand Presented in the Application

Water Demand: Current Need and Projections: At the time of application the total use for 2017 was 11,450,000 gals, equating to an average of 155 gpd/conn. Expansion of the community beyond the existing 208 lots is not expected, especially given the boundary constraints of the river. The applicant does expect that homes will be built on the remaining six lots and connected to the water system, therefore the total number of connections to be supplied during the permit term is 208. In order to estimate the amount needed for the pending permit term, a daily average of 175 gpd/conn was determined to be appropriate for the system. 208 connections at 175 gpd/conn x 365 days/yr = 13,286,000 gal/yr. The 175 gpd/conn amount was stated to be chosen since this gpd amount is lower than that requested for the previous permit term (231 gpd/conn), and is comparable the level of water use similar developments within this groundwater management area.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal)	Volume in gal/day
Maximum Monthly:	1,880,000	62,667
Maximum Annual:	13,290,000	34,411

DEQ Evaluation

Historic Withdrawals: During the last permit term the system withdrawal ranged from a high of 14.28 Mgal in 2010 to a low of 10.67 Mgal in 2018. The reported withdrawal for the remaining years of the term has ranged from just under 11 Mgal/yr to just over 12 Mgal/yr with withdrawal for the last two years being just under 11.6 Mgal. This equates to a per connection use of 157 gal/d over the last two years, with a high of 194 gal/d per connection in 2010 (assuming the same number of connections (202) for 2010).

Monthly withdrawals do vary with higher withdrawals in the summer season. The July withdrawal is generally the highest during the year, ranging from 1.3 Mgal to close to 1.4 Mgal for the month. However, the reported withdrawal in July 2010 was higher at 1.88 Mgal. The lowest withdrawals occur during the winter months, with a range from the high-600,000 gal to the mid-700,000 gal.

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Analysis of Alternative Water Supplies: The application states that, due to the remote location near the border with James City County, and the relatively small water withdrawal needed to support the system, an alternate water supply source, such as interconnection to the larger county system, is not being considered for the Colonies. For most of the other county systems that will be gradually interconnected, a surface water/ground water conjunctive use supply is planned. The Colonies is located 7 to 8 miles from the other county systems and the closer neighbors along the river are all small, private systems. The closest neighbors in James City County are also small, groundwater based systems. The subdivision is located adjacent to the Chickahominy River but the infrastructure and treatment to switch to a surface water supply for this system alone is cost prohibitive.

Status of Other Permits/Approvals Required: Department staff are not aware of any land use or other approvals that are pending or required for this water system/project. Wastewater is treated with individual septic tanks and drainfields.

Public Water Supply: The Colonies is permitted under VDH Waterworks Operations Permit# 4127115 with an effective date of February 22, 2013 and a permitted design capacity of 144,400 gpd. The Engineering Description Sheet that goes with the permit is dated February 6, 2013 and states that the limiting factor for the design capacity is the storage capacity.

Water Supply Plan Review:
Groundwater withdrawal permitting regulations requires coordination with water supply plans throughout the groundwater permitting process. The main goals are to promote a more holistic approach to resource planning and to incorporating relevant information from water supply plans into the review of water withdrawal applications.

The Regional Water Supply Plan does not identify any water source alternatives not considered by the applicant or suited for the water system. The 2020 State Water Resources Plan does indicate that Piney Point critical cells are predicted to increase over time and groundwater availability in the area may decrease in future decades. This underscores the importance for New Kent County communities on the whole to continue to consider and work toward alternate water sources such as surface water.

Department Recommended Withdrawal Limits: The expectation that homes on the remaining 6 lots will be built and connected to the water system during the pending permit term is reasonable given the growth in the county and the small number of lots remaining. The requested annual amount was projected by using a 175 gal/d per connection amount. While the current per connection withdrawal level is lower, at around 157 gal/d, the highest withdrawal in 2010 equates to 196 gal/d per connection. The 175 gal/d amount is considered to be reasonable for predicting the withdrawal needed for the pending permit term given that the higher withdrawal level seems likely to have been addressed through the County's conservation measures. In addition, the requested per connection level is representative of similar systems and provides for variation in the amount needed as the demographics of the neighborhood fluctuates with the potential of younger families moving in. The requested amount represents about a 24% reduction from the previously permitted amount of 17.553 Mgal/yr.

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

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day

Maximum Monthly:	1,900,000	63,333
Maximum Annual:	13,300,000	36,438

Technical Evaluation: Aquaveo, LLC performed a technical evaluation of the application for the Department based on a 2007 on-site aquifer test and a 2-D analytical simulation. 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, 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. The complete Technical Evaluation is included for reference as Attachment 1 to the Factsheet.

Department staff concluded that the withdrawal requested by New Kent County Department of Public Utilities for the Colonies Water system satisfies the technical evaluation criteria for permit issuance.

Well Construction /Well History: Water is withdrawn from two wells, Well #1 and Well #2, both installed in 1975 in the Piney Point aquifer. Corrosion was recently found in Well #2 when the pump would not go back in the well. Well #2 will be replaced with a new well, Well #2A, which will also be installed in the Piney Point aquifer in the fall of 2021. Once Well #2A is installed and connected to the water system, Well #2 will be abandoned.

Active/Backup Production Wells

Owner Well Name/ DEQ Well Number	Well Construction Date	Well Driller	Pump Intake Depth (ft/bls)	Well Depth (ft/bls)	Screen Intervals (ft/bls)
Well #1 / 163-00078	10/06/1975	Sydnor Hydrodynamics, Inc.	168	280	198-238
Well #2 / 163-00079	10/02/1075	Sydnor Hydrodynamics, Inc	168	250	198-238

Pending Wells: Well #2A is to be located about 50 ft north of Well #2 and to replace Well #2 as one of two production wells for the system.

Owner Well Name/ DEQ Well Number	Well Construction Date	Well Depth	Well Driller	Screen Intervals (ft/bls)
Well #2A / 163-00248	Pending	240 Estimated	Pending	Pending

There are no Out of Service, Abandoned, or Monitoring/Observation Wells associated with the system.

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Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft/bls)
Well #1	163-00078	Piney Point	Production	174
Well #2	163-00079	Piney Point	Production	174
Well #2A	163-00248	Piney Point	Production	174*

- Pending confirmation during well construction.

Apportionment: The wells are run fairly evenly and a 50/50 apportionment was requested. Well #2 will be replaced by Well #2A so there will not be three pumping wells at the same time.

Pump Intake Settings: DEQ staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following wells. Information reviewed in this process included the completion report, driller's log, and geophysical log for Well #1, as well as the completion report and driller's log for Well #2, and the Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Aquifer	Well #1	Well #2
Yorktown-Eastover	Not Determined	
Piney Point top	174	174
Piney Point bottom	250	250
Aquia	Not Determined	

Both well pumps are correctly positioned in accordance with 9VAC25-610-140 A 6 at 168 ft/bls. The gravel packing in both wells extends above the top of the Piney Point aquifer to a depth of 50 ft/bls. This well construction indicates the gravel pack in both wells may extend up through the overlying Yorktown-Eastover aquifer, which is located between the Piney Point and the water table (Columbia) aquifers, potentially creating a connection between the two aquifers. The Yorktown-Eastover aquifer is incised over segments of the upper York-James Peninsula allowing areas of connection with direct recharge, which significantly lessens any concern of impact to the Yorktown-Eastover aquifer from this withdrawal. Well #2 will be replaced by Well #2A during the permit term and replacement of Well #1 due to the planned system upgrades is possible during the permit term as well. Gravel packing in any new wells will be placed in a manner to prevent the connection between aquifers. Given this low level of risk associated with the extended gravel packing in this situation, abandonment of the two production wells, due to the extended gravel packing, is not being required, but it is expected due to planned system upgrades.

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

Water Conservation and Management Plan:

DRAFT

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

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

Mitigation Plan: The predicted AOI resulting from the Technical Evaluation extends beyond the property boundaries in the Piney Point. Given this prediction, a Mitigation Plan to address potential claims from existing well owners within the predicted area of impact is incorporated by reference in the permit and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 3).

Well Tags: Replacement Well tags were provided in 2017 or 2018 and new well tags are not needed. The well tags are to remain affixed to the wells as shown in the application.

Part II
Special Conditions

With the exception of condition listed below, review of the applicant's application, well construction data, operations at the facility, and the Technical Evaluation of the application did not identify a need for water quality or water level monitoring or pump intake reset conditions in the permit. A new well to replace Well #2 is planned and must be constructed as outlined in Part III General Permit Conditions of the permit. Technical Evaluation of the application was based on aquifer testing conducted in 2008 at the facility and additional aquifer testing is not required at this time. Construction of observation wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

Well Abandonment: Within 6 months of replacement Well #2A being brought on-line, Well #2 will need to be permanently abandoned in accordance with well abandonment standards contained in VDH regulations.

Part III

General Conditions

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

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:

If the facility is not a public water supply then insert this statement: "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 New Kent County Administrator certified on August 22, 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.

- The draft permit reflects the required consultation with and full consideration of the written recommendations of VDH. (pending)

Staff recommends Groundwater Withdrawal Permit Number GW0007701 be issued as proposed.

Attachments

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

Approved: _____
Director, Office of Water Supply

Date: _____

DRAFT

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: May 11, 2021

Application /Permit Number: GW0007701

Owner / Applicant Name: New Kent County Department of Public Utilities

Facility / System Name: Colonies

Facility Type: Municipal Public Water Supply

Facility / System Location: New Kent County

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

This evaluation determines the:

(1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.

(2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource.

(3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested withdrawal amount:

Requested Withdrawal Amount	
Fifteen (15) Year Value	Not Applicable
Annual Value	13,300,000 (36,438 average gpd)
Monthly Value	1,900,000 (63,333 average gpd)

Requested Apportionment of Withdrawal:

DEQ Well #	Owner Well #	Aquifer	Percent of Withdrawal
163-00078	Well #1	Piney Point	50

163-00079	Well #2	Piney Point	50

Summary of Requested Withdrawal:
The Colonies Water System is a County-owned and operated system supplying the Colonies residential subdivision consisting of 208 lots located at the south-east end of New Kent County, near Lanexa. The requested amount is for re-issuance of the previous permit with a reduced withdrawal amount.

Production Well(s):

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well #1 DEQ Well Number: 163-00078 MPID: 372310076541501	Lat: 37° 23' 58.17" Lon: -76° 54' 5.84" (datum NAD 1927) Elevation 96.5 ft/msl	Completion Date: 10/06/75 Screens (ft/bls): 198-238 Total Depth (ft/bls): 280	168 ft/bls	Piney Point
Owner Well Name: Well #2 DEQ Well Number: 163-00079 MPID: 372310076541502	Lat: 37° 23' 55.93" Lon: -76° 54' 6.04" (datum NAD 1927) Elevation 93.5 ft/msl	Completion Date: 10/02/75 Screens (ft/bls): 198-238 Total Depth (ft/bls): 250	168 ft/bls	Piney Point

Pending Wells(s)

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well #2A DEQ Well Number: 163-00248 MPID: Pending	Exact Location Pending Lat: 37° 23 ' ??" Lon: -76° 54' ??" (datum NAD NAD27) Elevation 94 ft/msl	Completion Date: Pending Screens (ft/bls): 200-240 Total Depth (ft/bls): 240	Pending – about 50 ft north of Well #2	Piney Point

Out of Service/Abandoned Well(s):
There are no out of service or abandoned wells associated with the system. However, Well #2 is to be abandoned and replaced with Well #2A in the near future due to corrosion found in the well casing.

Observation Well(s): There are no observation wells associated with the system.

Geologic Setting:
The Colonies wells (applicant wells) are located in New Kent County. The applicant's production wells are screened in the Piney Point aquifer. USGS Professional Paper 1731[1], *The Virginia Coastal Plain*

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

Hydrogeologic Framework (VCPHF), is the most recent study discussing the aquifers and confining units of the Virginia Coastal Plain. The study utilized numerous boreholes throughout the Virginia Coastal Plain to interpolate the elevations of the different hydrogeologic units found in the Coastal Plain.

According to the study, the Piney Point aquifer contains marine, medium- to coarse grained, glauconitic, phosphatic, variably calcified, and fossiliferous quartz sands. The Piney Point aquifer extends across most of the Virginia Coastal Plain except for the southern half of the Fall Zone. Studies previous to the 2006 VCPHF study designated sediments of the Piney Point aquifer and several similar formations as the Chickahominy-Piney Point aquifer. The nearest east-west geologic cross section, ED-ED', from the USGS Professional Paper 1731 is shown in the figure at the end of this report.

Hydrologic Framework:
Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Coastal Plain near the applicant well and identify major discrepancies between regional hydrogeology and site logs interpreted by DEQ staff. The Virginia Coastal Plain Model[2] (VCPM) framework was constructed by extracting the hydrogeologic unit tops and thicknesses from the VCPHF. The original USGS VCPM was updated and adapted for use in the VA-DEQ well permitting process and is referred to as VAHydroGW-VCPM.

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

VAHydroGW-VCPM Model Grid				
Well	**Well Number**	**MPID**	**Row**	**Column**
Well #1	163-00078	372310076541501	70	35
Well #2	163-00079	372310076541502	70	35

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

VAHydroGW-VCPM Model Hydrogeologic Unit Information		
Aquifer	**Elevation (ft-msl)**	**Depth (ft-bls)**
Surface	3	0
Water Table aquifer (bottom)	-22	25
Yorktown-Eastover (top)	-22	25
Yorktown-Eastover (bottom)	-25	28
Piney Point (top)	-73	76
Piney Point (bottom)	-119	122
Aquia (top)	-175	178
Aquia (bottom)	-211	214
Potomac (top)	-224	227
Potomac (bottom)	-1011	1014

Note: ft-msl = feet mean sea level

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

Groundwater Characterization Program Recommendations:
DEQ staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following wells. Information reviewed in this process included the completion report, driller's log, and geophysical log for Well #1, as well as the completion report and driller's log for Well #2, and the Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well #1 (ft/bls)	Well #2 (ft/bls)
Yorktown-Eastover	Not Determined	
Piney Point top	174	174
Piney Point bottom	250	250
Aquia	Not determined	

Comparison of the Hydrogeologic Framework and Geologist Report:
The VCPMF identifies the top and thickness of the Piney Point aquifer at an elevation of 76 ft-bls and 46 feet thick at the cell containing the applicant wells. The top elevation and thickness of the Piney Point aquifer given by DEQ staff are 174 ft-bls and 76 feet, respectively. The top of the Piney Point aquifer identified by DEQ staff is about 100 feet lower than in the VCPMF. The thickness of the Piney Point aquifer identified by DEQ staff is 30 feet thicker than in the VCPMF.

Large discrepancies between DEQ staff estimations and the VCPMF are noted by the VADEQ and incorporated into VAHydroGW-VCPM model maintenance and updates.

Pump Intake Elevation:
Virginia regulations specify that well pump intakes must be placed at or above the top of the source aquifer. Based on a review of available site information by DEQ staff the pump intake elevations are in compliance with the limits specified by regulation[3].

Water Level Comparison:
The *Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and modeling files[4] provide two sets of simulated potentiometric water surface elevations. These water elevations are based upon, 1) the reported withdrawal amount of wells in the VAHydroGW-VCPM model ("the reported use simulation") and, 2) the total permitted withdrawal amount for wells in the VAHydroGW-VCPM model ("the total permitted simulation"). USGS regional observation network well water levels were compared to the water levels in the 2020 report in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends. In the tables below, simulated water levels from the year 2019, from the reported use simulation, were compared to USGS measured water levels for the same year. For comparison, the total permitted simulated water levels are also reported. The total permitted water levels are taken from the end of the 50 year total permitted simulation

[3] 9 VAC 25 610 140.A.5. "The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a ground water source or lower than the bottom of an unconfined aquifer that a well utilizes as a ground water source;
[4] Refer to "Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use" at http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterCharacterization/ReportsPublications.aspx

and represent simulated water levels, 50 years from present, if all GWMA wells were to pump at their total permitted amount.

The USGS regional observation network wells closest to the applicant wells are shown in Figure 1 and listed in the following tables. The depth of these wells corresponds with the Piney Point aquifer. The distances from the applicant wells to the USGS wells are also given in the tables. The VAHydroGW-VCPM row and column containing the USGS wells are also given. The water levels obtained from the regional observation network wells are shown in Figures 2 and 3. These figures also show the water levels from the reported use VAHydroGW-VCPM simulation for the cell containing each USGS well. The 2019 annual average water levels observed in the regional observation network wells are given in the following tables.

The water level graph for the first well in the Piney Point aquifer (56H 29 SOW 177E) shows a steady decline in water levels from the time of the earliest available records (1985) to about 2006. Water levels from 2006 to about 2010 show a steady increase. From 2010 to the present the water levels have remained relatively stable. Simulated reported use water levels from the VAHydroGW-VCPM are within a few feet of the USGS observed water levels and therefore are in general agreement.

The water level graph for the second well in the Piney Point aquifer (55H 27 SOW 233E) shows yearly fluctuations in water levels of 1-2 feet from the time of the earliest available records (2011) until around 2017. From 2017 to 2018 the water levels decreased a few feet. From 2018 to the present the water levels have been increasing steadily, with a particularly large increase in water level in the last year. The VAHydroGW-VCPM reported use simulated water levels are within 1-2 feet of the USGS observed water levels with the exception of 2017 to 2020 during which time the reported use simulated water levels were up to 5 feet higher than the USGS observed water levels. The water level graph for this second well in the Piney Point aquifer also indicates a general agreement with the USGS observed water levels.

Piney Point Aquifer		
Measurement	**Well 56H 29 SOW 177E**	**Well 55H 27 SOW 233E**
Distance from nearest applicant well (miles)	2.5	4.2
Elevation (ft-msl)	103	29
VAHydroGW-VCPM Row	69	68
VAHydroGW-VCPM Column	37	31
VAHydroGW-VCPM Cell Elevation	77	29
USGS Regional Well 2019 Average Water Level (ft-bls)	123.2	33.9
USGS Regional Well 2019 Average Water Level (ft-msl)	-20.2	-4.9
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-bls)	99.0	30.5
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-msl)	-22.0	-1.5
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	101	32.5
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	-24.0	-3.5

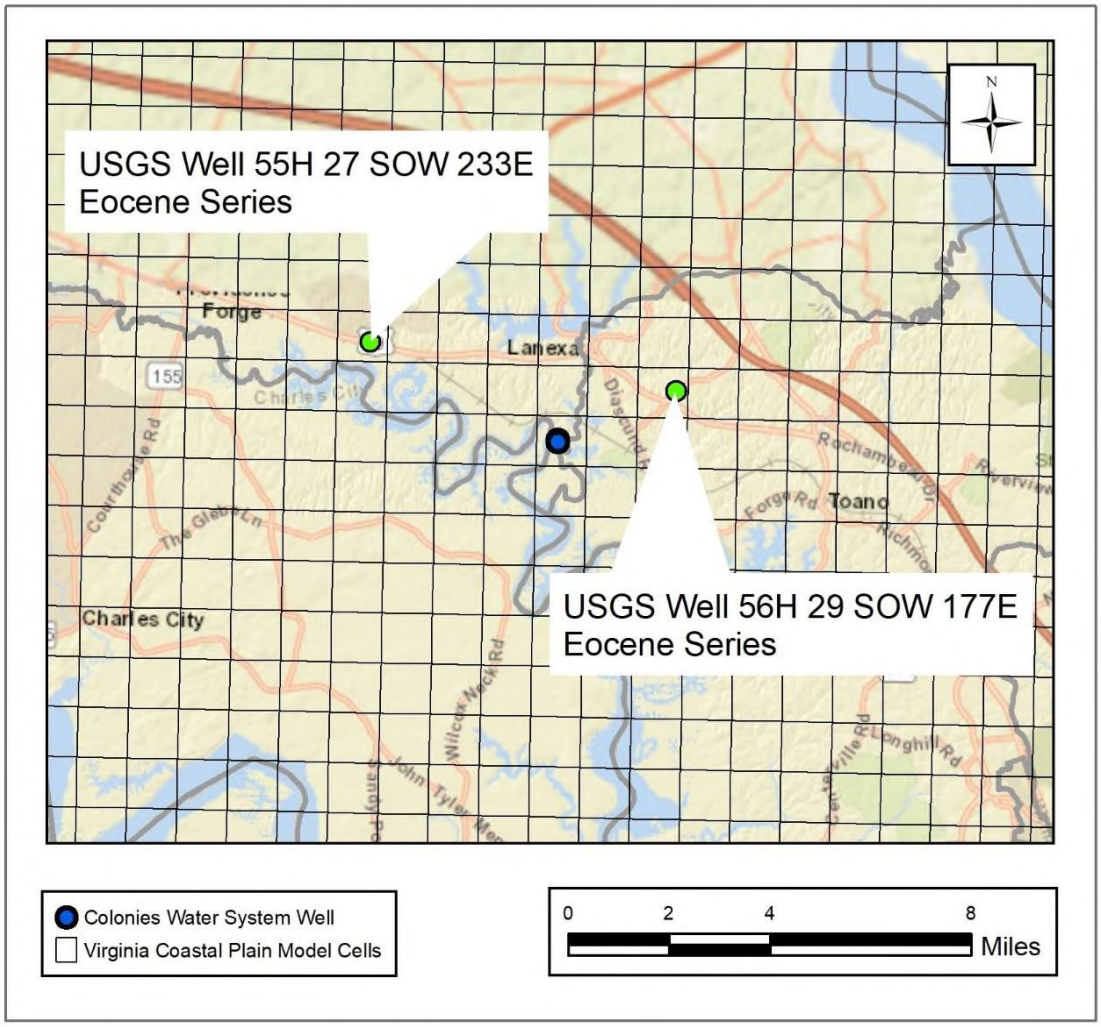


Figure 1. Nearest USGS regional observation network wells.

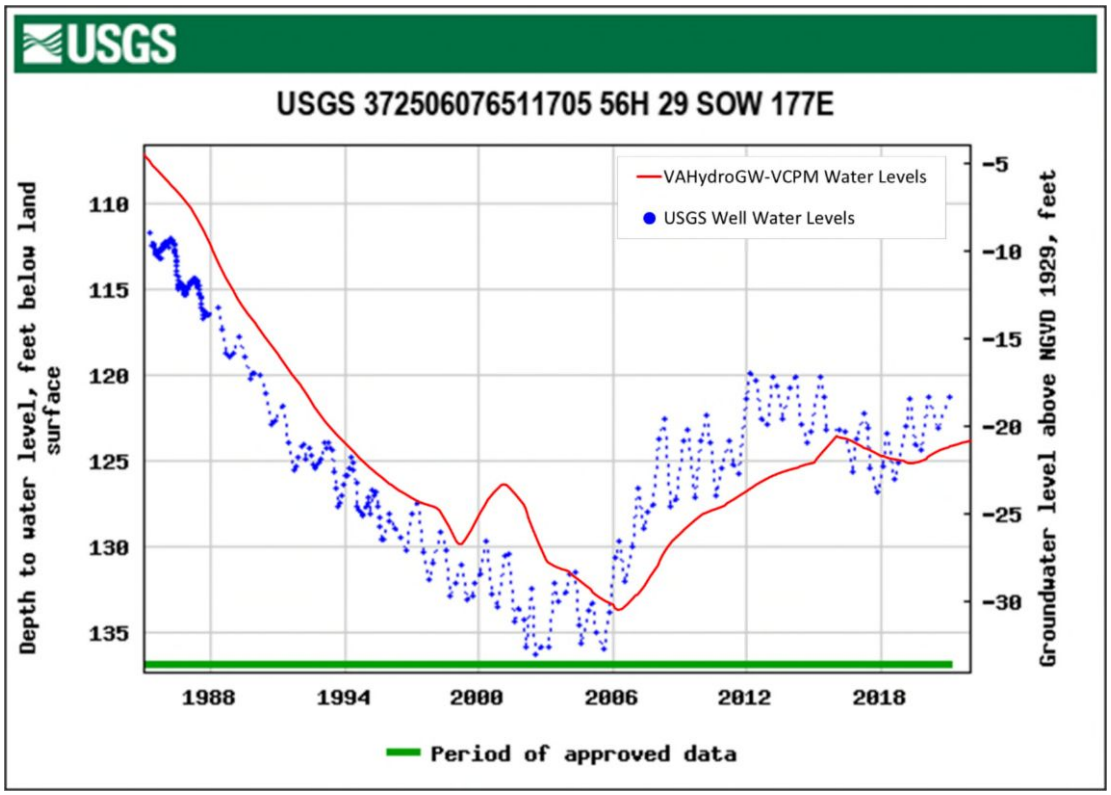


Figure 2. USGS Regional Observation Well 56H 29 SOW 177E, Piney Point aquifer water levels (Eocene Series) recorded from 1985 to present (well depth 235 ft bls, land surface 103 ft msl) and VAHydroGW-VCPM reported use water levels.

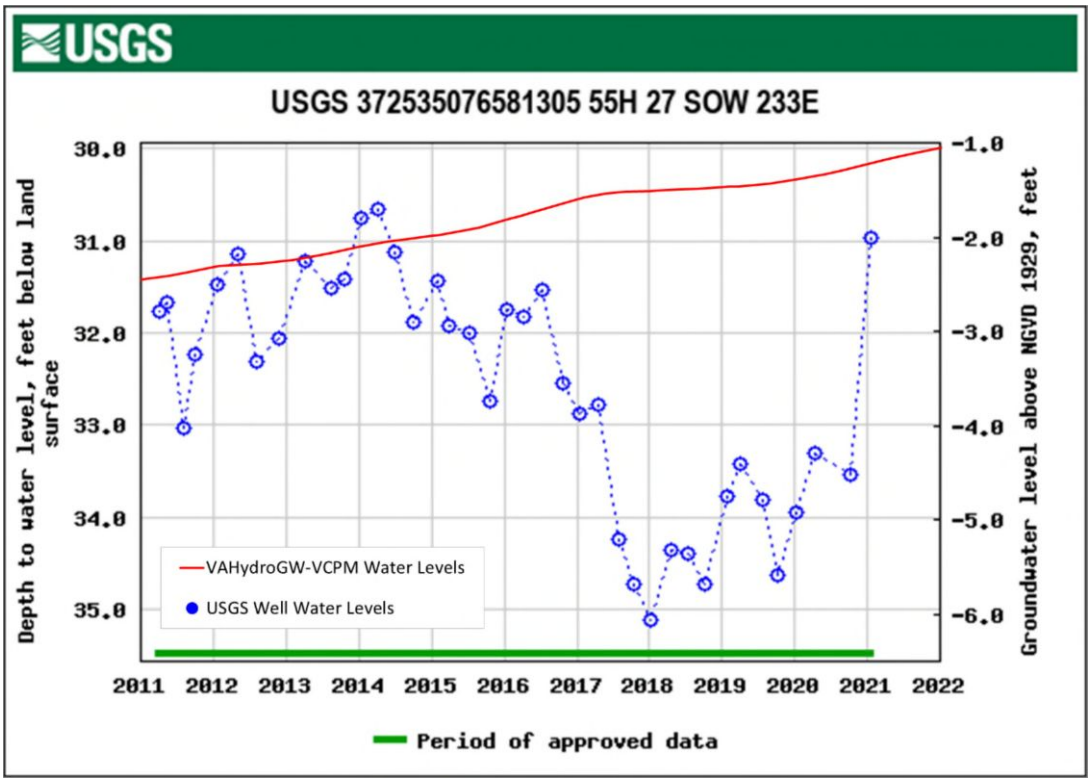


Figure 3. USGS Regional Observation Well 55H 27 SOW 233E, Piney Point aquifer water levels (Eocene Series) recorded from 2011 to present (land surface 29 ft msl) and VAHydroGW-VCPM reported use water levels.

Aquifer Test(s):
A 48-hour aquifer test was conducted by Sydnor Hydro, Inc on 3/8/2007 at the Colonies Subdivision in New Kent County. The data from the aquifer test was used for the previous permit term technical evaluation in 2008.

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

Hydrogeologic Unit	Horizontal Conductivity (ft/day)	Transmissivity (ft^2/day)	Storage Coefficient	Specific Storage (1/ft)
Surficial (Columbia) aquifer	2	50	-	0.000032
Yorktown-Eastover aquifer	22.4	67.1	0.00009	0.000032
Piney Point aquifer	23.1	1,062.6	0.00003	0.000032
Aquia aquifer	109	3,924	0.00116	0.000032
Potomac aquifer	14.9	11,758.9	0.00146	0.000002

Model Results

Evaluation of Withdrawal Impacts:
The magnitude of the proposed withdrawal does not allow for assessment of the area of impact using VAHydroGW-VCPM. The aquifer test conducted in 2007 for the facility was used for a 2-D analytical simulation for this technical evaluation. The drawdown in the Piney Point aquifer resulting from the proposed withdrawal was calculated using the Theis analytical solution which is used to predict drawdown in a confined aquifer assuming constant discharge from a fully penetrating well in a non-leaky aquifer.

The aquifer transmissivity and storage values used for the 2-D analytical simulation for this technical evaluation are listed below:

Model Input Parameters (source: 2007 Colonies Aquifer Test):
Piney Point Transmissivity = 6,769 ft^2/day
Piney Point Storage Coefficient = 9.1×10^{-7}

Withdrawal rate/Simulation Time = 50 years at 13,300,000 gallons per year (36,438 gallons per day).

Area of Impact:
The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal. The Theis analytical simulation was executed as described above and simulated a Piney Point AOI that extends approximately 0.6 miles from the applicant wells. A map showing the Piney Point AOI is included at the end of this report.

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

80 % Drawdown:
The 80% criterion was evaluated using the VAHydroGW-VCPM and the Theis analytical simulation. A base simulation was developed to predict the impacts from all existing permits (except the applicant well) operating at their maximum withdrawal. The base simulation used the 2020 Total Permitted pumping rates and 2019 simulated Reported Use water levels as starting conditions. The base simulation was executed for 50 years. A second simulation was conducted using the 2D analytical simulation to simulate drawdown resulting from the applicant well using the parameters and withdrawal rate listed above in the *Model Input Parameters* section of this report. For the baseline simulation, the VAHydroGW-VCPM cell containing applicant wells (row 70/column 35) was simulated to have a potentiometric surface of -18.3 ft-msl for the Piney Point aquifer. The 2D analytical simulation simulated a maximum drawdown of 1.7 feet for the Piney Point aquifer.

Subtracting the maximum drawdown simulated in the analytical simulation from the simulated water levels in the baseline VAHydroGW-VCPM simulation at the cell node resulted in a simulated water level of -20 ft-msl for the Piney Point aquifer. This approach for simulating the potentiometric surface elevation is the most conservative for the resource. The top elevation of the Piney Point aquifer at VAHydroGW-VCPM row 70/column 35 is -73 ft-msl.

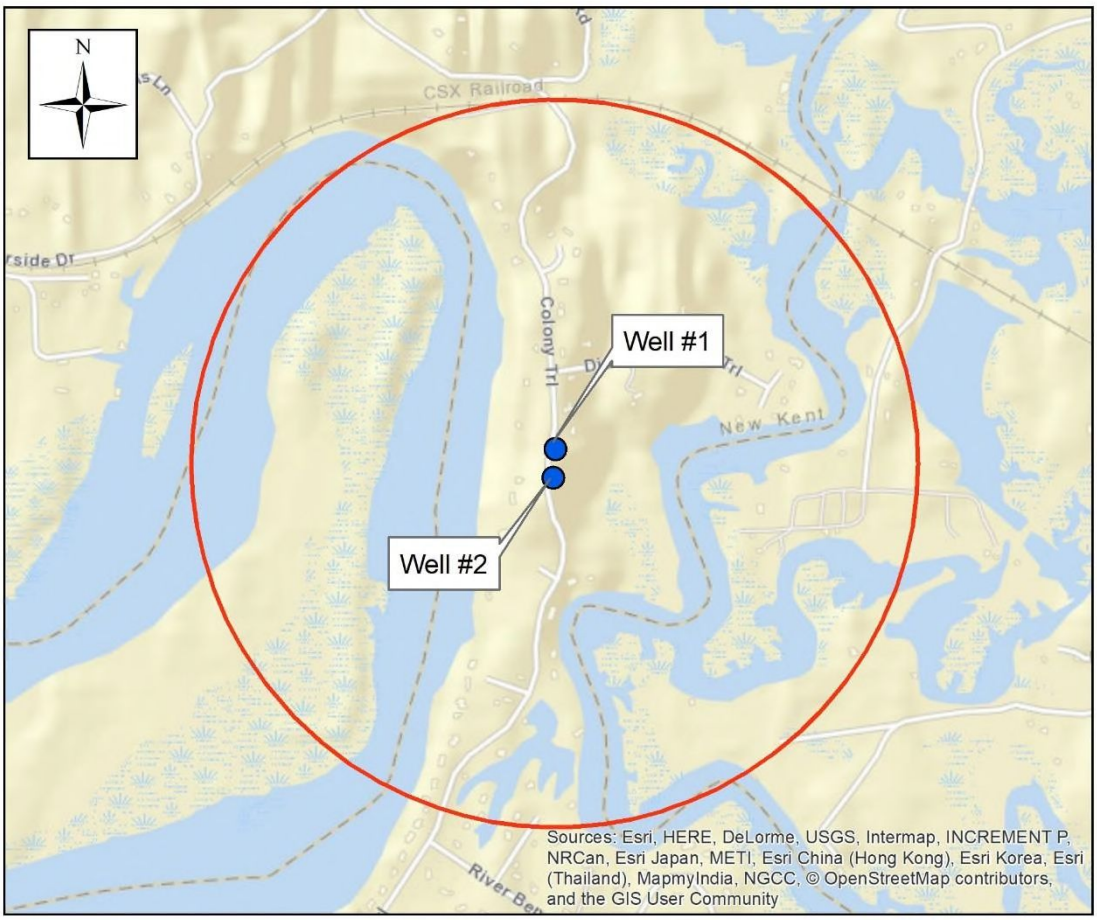
The 80% drawdown requirement allows the potentiometric surface (based on the critical surface elevation calculated from the VAHydroGW-VCPM data) to be reduced to -57.8 ft-msl in the Piney Point aquifer at the cell node nearest the applicant wells. Therefore, the water level in the source aquifer is not simulated to fall below the critical surface.

Additionally, the Piney Point aquifer AOI does not contain or intersect any VAHydroGW-VCPM cells simulated to have potentiometric water levels below the 80% drawdown requirement. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated to the Piney Point 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.

Conclusion:
The withdrawal requested by New Kent County Department of Public Utilities for the Colonies Water System satisfies the technical evaluation criteria for permit issuance. There are no existing permitted wells within the applicant's AOI.

Colonies Water System
Area of Impact - Piney Point Aquifer



Colonies Water System Wells

Piney Point AOI

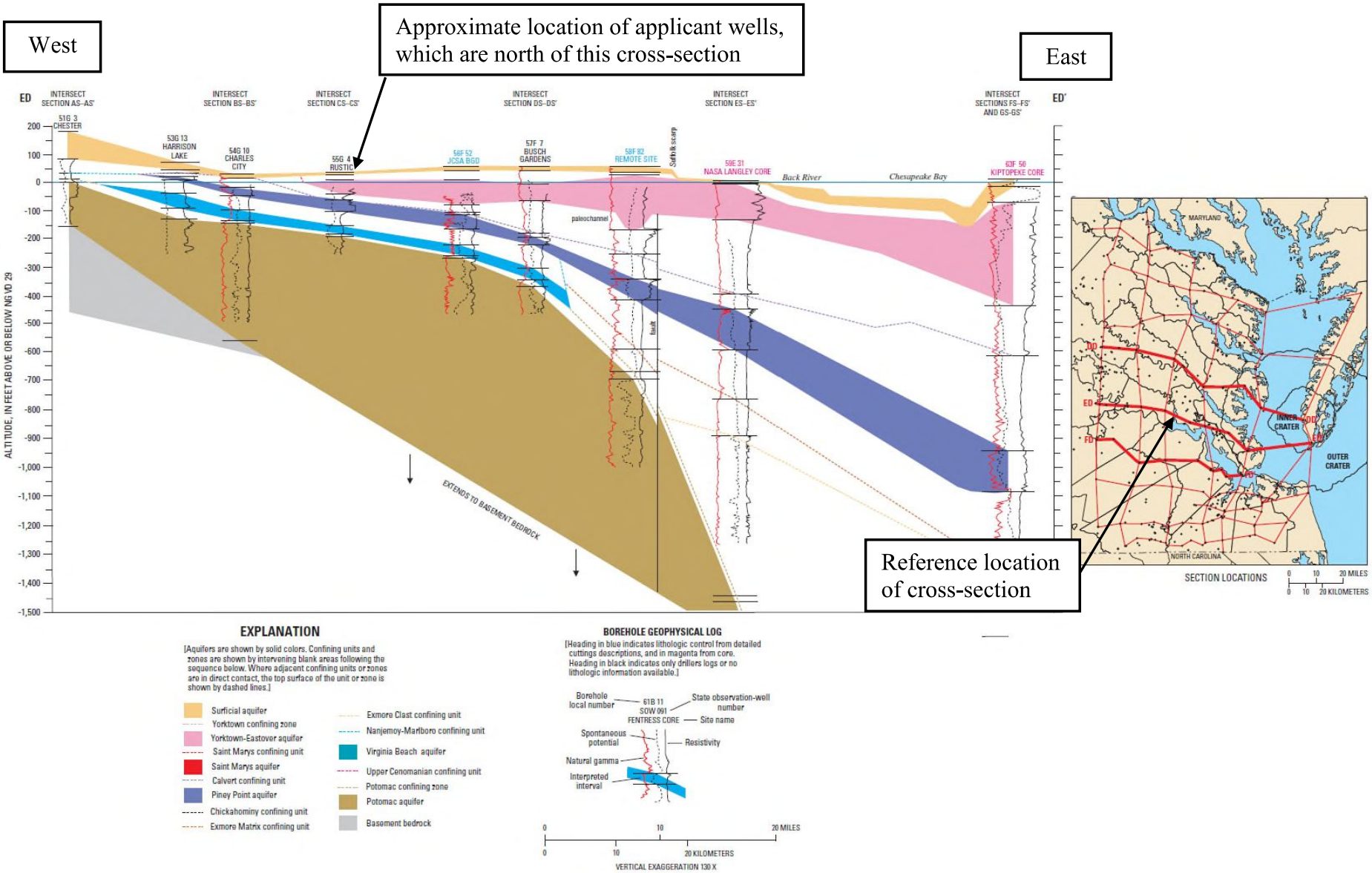
Piney Point Aquifer Critical Cells

0 0.125 0.25 0.5 Miles

Simulated drawdown at or exceeding one foot in the Piney Point aquifer resulting from a 2-dimensional Theis simulation of 50 years at 13,300,000 gallons per year from the Piney Point aquifer. Maximum radius of one-foot drawdown (Area of Impact) occurs 0.6 miles from the pumping center.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning
May 13, 2021

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY



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

Water Conservation and Management Plan

New Kent
COUNTY · VIRGINIA
A GREAT PLACE TO GROW

Effective Date
November 12, 2008

New Kent County
Department of Public Utilities

URS

Water Conservation and Management Plan
New Kent County, Virginia

Effective November 12, 2008

APPROVED

Prepared for:
New Kent County
Department of Public Utilities
New Kent, Virginia 23124

Prepared by:
URS Corporation
277 Bendix Road, Suite 500
Virginia Beach, Virginia 23452
A&E Purchase Order No. 27293
Internal Project No. 11657036

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APPROVED

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APPROVED

1.0 Introduction

1.1 Background

The Water Conservation and Management Plan presents an ongoing, long term program designed to elicit permanent reductions in water use through optimization of water system operation and public education to promote efficient water use without changing water customers' lifestyles. Water conservation includes measures and actions that reduce the demand for water, improve the efficiency of water use and reduce water losses and wastes. Conservation can reduce future water supply needs and may enable postponement of costly capital improvements to the water supply system.

The New Kent County Department of Public Utilities (Department) is committed to implementing a dynamic Water Conservation and Management Plan for users of the public water system. To fully understand the concept, it is necessary to first separate conservation measures into two segments:

- Program and activities aimed at reducing water usage by changing customer habits; and,
- System changes initiated by the water supplier which reduce water demand independent of customer use habits.

Both segments must be efficiently integrated in order to maximize the resulting benefits.

1.1.1 Water Management

Management of available raw and treated water supplies is an important part of any conservation program. Interconnections among and between localities create opportunities for the transfer of water supplies from locations that have excess water available to locations requiring additional water. As such, the entire region is interdependent and may be viewed, to an extent, as a single water supply system from a water source perspective.

The primary objective of water management is the efficient water withdrawal from each available water supply to obtain the highest reliable yield while maintaining water supply quality. This includes staging the utilization of various supplies based on system water demands or seasonal changes which affect the availability of a specific supply. For example, some surface water supplies are more effectively used during winter months when higher seasonal rainfall can recharge the supplies. In contrast, groundwater could be used during dry summer periods to supplement the surface water supplies, as groundwater yields are not typically seasonally dependent.

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In addition to maximizing raw water yields, water management is used as a tool to develop water supply criteria which define the water source depletion rate. The depletion rate is normally presented as feet of ground water level decline, which can be used to provide an early warning of possible future water shortages. New Kent County belongs to the York-James Drought Evaluation Region. Tiered water use restrictions go into effect when ground water levels and/or a combination of other factors, such as precipitation deficits and streamflows, reach certain threshold levels identified in the Virginia Drought Assessment and Response Plan (TAC, 2003), included as Appendix F.

1.1.2 Applicable Regulations

Pursuant to the Groundwater Act of 1973, the General Assembly determined that unrestricted usage of ground water was and will continue to contribute to pollution and shortage of ground water, thereby jeopardizing the public welfare, safety, and health. The Virginia Ground Water Management Act of 1992 mandates the regulation of large ground water withdrawals in certain portions of the Commonwealth to prevent adverse impacts on the ground water supply due to over-utilization. New Kent County is within the declared Eastern Virginia Groundwater Management Area (GWMA) (9VAC-25-600-20 et seq.). All of the County's water supply is currently obtained from ground water supplies.

The Virginia Administrative Code provides the Virginia Department of Environmental Quality (VDEQ) authority to require a water conservation and management plan as part of the reapplication process for ground water withdrawal permits in the Commonwealth (9VAC25-610-100).

The plan must include:

- Requirements for the use of water-saving plumbing and processes including, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided in the Uniform Statewide Building Code;
- A water loss reduction program;
- A water use education program;
- An evaluation of potential water reuse options; and
- Requirements for mandatory water use reductions during water shortage emergencies declared by the local governing body or director including, where appropriate, ordinances prohibiting the waste of water generally and requirements providing for mandatory water use restrictions, with penalties, during water shortage emergencies.

1.2 Water Conservation and Management Goals

A comprehensive water conservation program has many components that must be properly combined to ensure overall success of the program. The ultimate goal of any water conservation program is to realize long-term water demand reductions. It is the Department's commitment to thoughtfully and effectively reach that goal without significantly impacting the standard of living of our citizens.

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1.3 Plan Organization

This plan includes several sections that were developed to fulfill the plan goals and address plan requirements as specified in 9VAC25-610-100. The water conservation activities in Sections 2.0 through 6.0 are implemented at all times to ensure the most efficient use of the groundwater supply. Section 6.0 presents additional measures activated in times of drought.

- Section 1.0 This section of the plan, "Introduction," provides the background, plan goals and contents.
- Section 2.0 "Water Loss Reduction" describes the planned water conservation measures that the Department implements in order to reduce the amount of lost and otherwise wasted water from the public water supply system. Water-saving plumbing requirements are included in this section.
- Section 3.0 "System Demand Reduction" describes the planned water conservation measures that the Department implements in order to reduce system demand.
- Section 4.0 "Water Use Education" describes various activities implemented by the Department to provide water conservation education to the public and other water users.
- Section 5.0 "Recycling and Reuse Programs" describes the existing and planned water conservation efforts that the Department will implement.
- Section 6.0 "Drought Response and Contingency Plan" references the County's authority and outlines the requirements for water use restrictions during identified water shortages.
- Section 7.0 "Program Monitoring and Evaluation" identifies processes to monitor and evaluate the effectiveness and success of the water conservation and management plan.
- Section 8.0 "References" lists all supporting documents used in the preparation of this plan.
- Appendix A "Acronyms and Glossary" provides a list of acronyms and defines terms associated with water conservation and management.
- Appendix B "Existing Water Rates" presents water fees assessed by the County as of July 1, 2007.
- Appendix C "Project-Specific Water Conservation Plan Outline" presents an outline for use in developing project-specific water conservation plans.
- Appendix D "Water Conservation References" is a list of informative references related to water conservation.
- Appendix E "New Kent County Code Section 38-97" contains the referenced code section.

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- Appendix F “Virginia Drought Assessment and Response Plan” contains the referenced document.

- Appendix G “Conservation Measure Implementation Schedule” provides a timeline for identified conservation measures.

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2.0 Water Loss Reduction

The following sections outline conservation measures the Department undertakes to further reduce potable water lost from the system or otherwise wasted. See Appendix G for the implementation schedule associated with the following activities.

2.1 Water Conserving Plumbing Code

The New Kent County Code includes several sections that promote water conservation as provided below. Section 38-81 of the Code describes the penalties for violating any part of Article II – Water and Sewer Systems. Specifically, "any person violating the provisions…of this article shall be guilty of a class 2 misdemeanor."

2.1.1 Termination of Water Service

Section 38-86(a)(2) of the New Kent County Code allows the Department to terminate water service "for willful waste of water through improper or imperfect pipes, fixtures, or otherwise."

2.1.2 Low Flow Plumbing Fixture Requirements

Plumbing work in New Kent County must conform to the 1997 edition of the Virginia Uniform Statewide Building Code (VUSBC). The VUSBC references the 1995 edition of the International Plumbing Code (IPC) including the 1996 supplement for requirements for water conserving fixtures. The code applies to all new construction and major renovation of existing structures and is enforced by the County Building Inspector's Office.

Although the major benefit of low flow plumbing fixtures is a reduction in the unnecessary use of potable water, it also has the benefit of reducing the volume of wastewater requiring treatment.

2.1.3 Irrigation Systems Requirements

Section 98-871(a)(8) of the New Kent County Code requires that "irrigation of businesses and commercial properties shall require the use of low water volume and water-conserving systems. Any irrigation system, regardless of type shall be equipped with devices to measure natural rainfall and meter irrigation water usage and timing accordingly."

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2.2 Water System Pressure Optimization

Pressure optimization in an existing water distribution system can decrease water use independent of customer use patterns. Reducing pressure decreases the amount of water lost through leaking pipes, faucets and water heaters and also decreases the water used without changing customer usage habits. Reduced system pressures can result in decreased water use and lower operating costs due to reduced pumping requirements. However, the applicability of the measure is limited by state requirements regarding minimum system pressures, the need to provide adequate fire flow capability in a system, and the constraints of existing facilities such as elevated storage tanks.

Currently, County water system pressures are controlled to attain a minimum system pressure of 40 psi at the point of highest elevation in the system, with average system pressures ranging between 45 and 60 psi. An informal examination of options to further optimize system performance is ongoing.

Existing County ordinances require that all connections with a water pressure over 80 psi have individual Pressure Reducing Valves (PRVs). The Department will also provide mainline PRVs for areas experiencing static water pressures in excess of 100 psi when storage facilities are at or above high water levels. Using PRVs to reduce system pressure aids conservation in two ways. The first is by reducing losses from leaks or undetected faulty fixtures. Secondly, PRVs reduce the amount of water consumed during time-dependent activities such as showering or lawn irrigation.

The Department routinely examines water system operational data along with topographic data to identify areas of potential concern for high pressures. As areas with pressures exceeding the allowable values are identified, the Department will take positive steps to install PRVs as soon as possible.

2.3 Water System Audit

The Department is currently improving its methodology to quantify amounts of water distributed throughout the system in relation to customer consumption quantities. This measure serves as one of the first steps in developing best water management practices critical to any conservation program.

The Department will complete an audit of the total amount of groundwater used in the distribution system and operational processes within the first two years of the permit cycle. Individual water system audits shall be performed annually.

2.4 Unaccounted-For Water Loss Identification

Examples of unaccounted-for water include:

- Major line leaks;
- Water meter measurement inaccuracies;

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- Water theft;
- Construction use; and,
- Fire department uses such as hydrant flushing.

Water meter calibration, renovation, leak detection, and the repair and replacement of pipelines often reduce losses and lower the percent of unaccounted-for water (UAW).

Water meter calibration and customer meter "change-out" programs are a way to ensure that the percentage of unaccounted water is minimized and the customers are accurately charged for all water consumed.

Naturally, there are limits to the economic viability of reducing or limiting UAW losses. A rough engineering rule of thumb is that water systems that lose less than 15 percent of total production are in fairly good shape.

The Department works on a continual basis to identify and account for water losses in the system. The Department is currently instituting procedures to quantify and record non-metered uses, such as hydrant flushing, to better determine where water is being lost due to leaks.

2.5 Leak Detection and Repair

Accurately estimating the volume of water that is lost due to leaks (as opposed to that which is simply UAW loss) due to meter under-registration or unmetered uses, is a difficult task for all water utilities.

The location of leaks in the distribution system and the success of a repair depend on the following factors:

- Pipe age and material;
- System operating pressures;
- Soil type;
- Soil pH; and,
- Pipeline depth.

There are two established types of methods that can be used to detect leaks in distribution systems - conventional and electronic. Conventional methods include using a stethoscope to listen to hydrants, valve boxes, meters and the ground along the length of the main. These tests are usually performed late in the evening to minimize background noise. This method is best used in residential and rural areas where background noise is not significant and has an estimated cost of $170 to $200 per mile. The electronic method involved sending an electronic signal through water mains. Leaks are identified according to changes in frequency. This method can be used in areas where background noise is a problem. The approximate cost of this method is $500 per mile. New Kent County will use all reasonably available, industry accepted, current technologies for leak detection as appropriate.

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New Kent systems are fairly new. Leak detection locations shall be identified based on the results of UAW identification or when a customer's metered usage indicates a leak. A leak detection investigation will be performed when the UAW percentage from the annual water audit exceeds 10% or as indicated via abnormal customer usage. The Department will prioritize leak detection efforts based on available resources and the results of cost-benefit analyses. The leak detection effort shall continue until the entire system has been checked or the Department determines that sufficient leak identification and repair has been made. The Department will repair all identified leaks immediately.

2.6 Plumbing Retrofit Program

While plumbing codes ensure that water-saving devices are used in new construction, all structures built before implementation of the codes are likely to use conventional fixtures. This leaves a large portion of the population without water-conserving fixtures. Retrofitting involves the placement of low flow plumbing fixtures in these existing structures. Such fixtures include devices to reduce shower water usage and devices to limit toilet flush water volumes. Currently, retrofitting is being implemented by individual homeowners independent of any water utility-sponsored programs.

The Department will implement a comprehensive retrofit program to include residential water audits to identify indoor and outdoor water saving opportunities. This audit will include the distribution of free educational materials regarding water conservation. The feasibility of providing discounted installation of water-saving devices will be examined.

2.7 Meter Repair and Replacement

A water meter maintenance program is essential to ensure that an accurate measure of system integrity is upheld. Under-registration by meters results in unaccounted-for water and loss of revenue.

The Department is currently changing all meters over from touch to radio read. This process began in early 2007. The meters are guaranteed to perform to at least AWWA Repair Meter Accuracy Standards for 10 to 15 years depending on size.

The Department believes that the need to replace a meter is better indicated by suspected inaccurate reported usage than by age. Currently, the Department identifies erroneous meters by comparing current to past usage. Each billing cycle, customer accounts are automatically flagged with an error code for high or low usage. Flagged accounts are then manually reviewed by the billing department. Each identified meter is then re-read and the customer service line checked for leaks. Resulting inaccurate meters are then calibrated, repaired, or replaced, as appropriate. This methodology applies to all system customers. Using this procedure ensures that all inaccurate meters are serviced regardless of age. The Department will perform phased replacement of meters that have been in service for fifteen (15) years.

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Also, according to the New Kent County Code, a water meter will be tested for accuracy upon request of the customer. Section 38-106 of the code addresses water meter accuracy as follows: "If the meter registers greater than five percent over the correct value, the County shall bear the cost of testing…and the meter shall be repaired or another meter may be substituted for the inaccurate meter."

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3.0 System Demand Reduction

The following sections outline conservation measures the Department undertakes to reduce water system demands. See Appendix G for the implementation schedule associated with the following activities.

New Kent County is committed to making technological, procedural, or programmatic improvements to the County's facilities and processes to decrease water consumption. Opportunities for system demand reduction, including the use of water-saving plumbing and processes for the water supply system, will be implemented as appropriate.

3.1 Water Conservation-Oriented Rate Structure

There are four basic types of rate structures:

- Decreasing block rates;
- Increasing block rates;
- Instituting summer surcharges (summer conservation rate); and,
- Uniform rates.

The declining or decreasing block rate structure does not provide an incentive for conservation because the unit price of water decreases as the quantity of water used increases. This structure is typically designed to charge customers who contribute to the peak period demand on a system, such as residential users for the additional stress they place on the water distribution system and the additional overhead expenses incurred by the utility from meter reading and billing procedures. Customers who do not contribute to peak period demand (i.e. industrial users) are charged less because they do not place excessive stress on the system during those peak time periods.

Increasing block rates are designed to encourage conservation of water. Under this structure, unit rates for water volume increase as the quantity of water used increases. Because of concerns for water conservation throughout the year and recognition that water use varies seasonally, separate winter and summers increasing block rates are often developed. Generally, summer rates increase at a much higher rate in each block than do winter rates.

The summer conservation rate (SCR) and the uniform rate structure are forms of peak-load pricing. Higher rates are charged during the summer or other high use periods when demand increases.

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The SCR assesses a relatively higher price for water used during the summer in excess of the winter average. The charge theoretically applies to non-essential, outside uses of water that generally occur during the summer months. "Normal" usage during the winter months is used to set a threshold usage level. Any water used in excess of the threshold level during the summer months is deemed non-essential and is billed at the SCR. In addition, the higher customer cost results in heightened awareness of the cost and limited supply of water and an increased receptiveness to water use reduction.

The uniform rate structure is designed to charge a constant price per unit of water. These rates are usually broken down by seasons. All water purchased during the season of greatest usage is priced higher than water purchases during periods of lower usage. High use periods generally occur during the summer, while winter usage is normally lower. Under the uniform rate a constant price per unit of water is changed, which changes seasonally, for all customer classes. The total cost of water is directly proportional to the amount of water used and the season of the year.

New Kent County currently uses an increasing block rate schedule for all customers whose quarterly water consumption is not more than 72,000 gallons (790 gpd). See Appendix B for a table of current domestic and irrigation water fees.

The County has the authority to amend the existing rate structure to cover all expenses pertaining to the waterworks system or supply (New Kent Code Section 38-81). Peak-load pricing options including an SCR or uniform rate structure will be established and implemented if deemed necessary by the Department.

3.2 Landscape Efficiency

Outdoor water usage affects maximum-day demand, which drives water supply volumes. Landscape watering using potable water is in direct competition with domestic uses. Reducing outdoor usage is an efficient conservation strategy. Efficiency-oriented landscaping principles are typically used to reduce outdoor water use.

The County promotes the development of water conserving principles into the planning, development, and management of new landscape projects. New Kent County Code 98-1063 currently requires the use of native, drought-resistant landscaping and promotes minimized turf areas for new development plans. This requirement is enforced by the zoning administrator as set forth in Section 98-7 of the Code. Section 98-1063 states that "no site or development plan…shall receive final approval [by the zoning administrator] unless a landscaping plan has been submitted and approved." The Department will cooperate with local nurseries to ensure the availability of water-conserving plants.

The Department promotes Xeriscaping™, an efficiency-oriented approach to landscaping that encompasses seven principles:

- Planning and design;
- Limited turf areas;

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- Efficient irrigation;
- Soil improvement;
- Mulching;
- Use of lower water demand plants; and,
- Appropriate maintenance.

The County currently requires a separate irrigation meter for new connections. Irrigation submetering will be used to improve irrigation management and to research irrigation pricing. The County currently requires water-sensing devices (rain sensors) for new irrigation systems for businesses and commercial properties. The Department is in the process of expanding the code to include residential subdivisions and other appropriate development.

3.3 Customer Usage Monitoring

Water billing is used as a means to disseminate conservation information to water users and to provide water use information with each bill distributed to a user. Each customer's water consumption for each billing cycle is included on the bill. Consumer water use is then compared with a predetermined water goal or reasonable usage rate.

Water goals are established by estimating indoor and outdoor water use through the year. The indoor usage generally remains constant year-round while the outdoor value increases during the late spring, summer, and early fall months. Goals are based on the particular characteristics of each customer.

This program is targeted for residential users because their total water use is easily identified and reasonable goals developed. It is more difficult to determine goals for commercial and industrial users because water use varies with the type of processes employed.

Consumers will benefit from a goal-billing program because they will become aware of their own water use patterns. As a result, they will have an opportunity to reduce their unnecessary water use. The water goals developed as a part of this program will be used to make changes to the County water rates as appropriate.

3.4 Submetering

Submetering is a conservation measure designed to target water users who are not directly billed for their water use. It involves the use of separate meters in multi-family dwellings or complexes to monitor actual water usage per unit.

Apartments, rental condominiums, and mobile home parks served by a master meter are potential dwelling units for submetering. In these dwellings, the management typically incorporates a set amount into the rent to cover water usage. Because residents do not receive a monthly description of their water use, they are often unaware of the true cost of water. Submetering

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provides an avenue for providing information on conservation to those residing in multi-family units, and makes them responsible for and aware of their own water demand.

The Department will implement submetering using several different methods. The utility, property manager, or a third-party will bear the responsibility of monitoring the meters on a case-by-case basis.

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4.0 Water Use Education

An annual comprehensive public awareness and education program is essential to an effective conservation program. Significant amounts of Department labor and budget can go into developing a good program. However, without public education on water conservation goals and measures, even a well-planned program could be met with opposition from customers.

Public acceptance is essential to a successful water conservation program. Listed below are several common misconceptions surrounding water management. Though this list was originally developed as part of a water sustainability tool for businesses (GEMI 2002), it is applicable to all customer categories. The public awareness and education campaign is designed to address concerns such as:

- "The price of water does not always justify conservation activities."

  Considering existing low water prices, it can be difficult to persuade customers that implementing water conservation measures provides them any benefit.

- "To have a healthy lawn I need to water every day for an hour."

  Excessive lawn watering is a common problem during summer months. A lawn that has been over-watered may appear to be lacking water, compounding the problem. Proper, restrictive lawn irrigation leads to deep, strong root systems and the most efficient use of irrigation water.

- "If I conserve now, my share will be reduced further in times of drought or reallocation."

  Consideration for previous conservation efforts is often times not given during drought or other reduction periods. Therefore, customers feel that maintaining high levels of water use is in their interest.

- "If water use is reduced, the Department will have to raise water rates to pay for system operations."

  Since utilities often set rates based on water usage, the high fixed costs of local water systems can lead to a disincentive for water conservation. However, it is

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often the case that a savings is realized due to reduced consumption regardless of a rate increase.

- "The public is not ready to accept the use of recycled water."

  Although the use of recycled water for irrigated golf courses and other such uses seem to be accepted by the public, education about other potential water recycling options is necessary.

The following sections outline water use education activities provided by the Department. See Appendix G for the implementation schedule associated with the following activities.

4.1 Public Awareness and Education Campaign

In addition to addressing issues like those presented above, the goal of a conservation awareness program is to help the customer understand their water sources and describe how water conservation activities can result in a lower bill with little inconvenience.

One focus area of the campaign is to educate the public on their water source and the conditions which led to the promulgation of the declared GWMA.

There are several tools currently used to relay information to the public. These include, but are not limited to:

- Billing inserts and pamphlets;
- Films, videos, and poster displays;
- Media;
- School programs;
- Community outreach;
- Monitoring of current customer usage;
- Cable television public access channels; and,
- Links from the County website to water conservation websites – including those listed in the following paragraph and in Appendix D.

The Virginia Department of Environmental Quality (VDEQ), U.S. Environmental Protection Agency (USEPA), and neighboring Hampton Roads Planning District Commission (HRPDC) each sponsor informative water conservation websites targeting residential customers and focusing on measures such as low flow plumbing fixtures and water efficient landscaping.

4.2 Citizen Self-Enforcement

Water use education efforts include instruction on self-enforcement. Instruction reemphasizes County water conservation regulations and promoted practices and provides directives to contact the Department in the event of an observed violation.

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4.3 Water Savings Opportunities for Water-Consuming Processes

Water users that employ water-consuming processes are in the position to identify additional water savings opportunities not applicable to the general public.

Target groups for additional water use education include:

- Homeowners' associations;
- Industrial and commercial establishments;
- Educational institutions;
- Nursery owners, landscape and irrigation contractors; and,
- Builders and developers.

The County will help target groups identify areas of potential water savings.

4.4 Water Conservation Opportunities for Builders & Developers

In addition to complying with conservation measures outlined in this Plan, developers and other users will be required to develop project-specific water conservation plans as part of the site plan submittal and approval process. A project-specific water conservation plan outline has been developed by the Department and is included as Appendix C. The outline describes types of conservation activities that developers will be required to implement. Examples of applicable conservation measures have also been provided. Individual measures listed in the outline are not requirements per se, and do not exclude alternative conservation measures the applicant may wish to propose to the Department.

The County has compiled a list of informative references to educate builders and developers on water conservation planning, conservation measures, and water savings opportunities. The reference list has been included as Appendix D and is also available at Department offices.

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5.0 Recycling and Reuse Programs

Water recycling and reuse are conservation measures designed to reduce the demand on conventionally treated water supplies by providing treated wastewater or partially treated water as an alternative supply source for non-potable uses. Although these terms are often used interchangeably, their definitions vary slightly. The main differences between water recycling and water reuse are the degree of treatment required and the end use of the treated water. Water recycling involves taking used water or wastewater, and treating it to such an extent that it can be used again for its original purposes. For the purposes of this plan, water reuse is defined as a deliberate strategy of directly reusing wastewater effluent, treated to the degree appropriate for the intended reuse, to satisfy non-potable demands.

The Regional Raw Water Study Group (RRWSG) evaluated treatment plant effluent reuse as a long-term alternative supply to meet future water demands of the York-James Peninsula. The VDEQ voiced opposition to the alternative and the consultants' report therefore concluded that "it is highly unlikely that the Commonwealth of Virginia would approve a Lower Peninsula wastewater reuse project for potable use." According to the report, wastewater reuse to meet non-potable demands such as industrial cooling, irrigation, and car washes is more viable.

Recycling and reuse programs will positively affect the Department by reducing demands on the potable water supplies. Water saved can be re-appropriated to uses that require potable quality water and decrease water supply development needs.

5.1 Applicable Regulations

VDEQ worked with stakeholders to develop the Water Reclamation and Reuse Regulation (9VAC25-740) that would allow the reuse of treated wastewater or reclaimed water from municipal and industrial wastewater treatment facilities. The proposed regulation establishes requirements for treating and monitoring reclaimed water for reuse as well as allowable reuse categories.

Reuse categories in the proposed regulation include:

- Urban;
- Irrigation;
- Landscape Impoundments;
- Construction; and,
- Industrial Uses.

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The proposed regulation does not currently include ground water recharge or aquifer storage and recovery (ASR). However, VDEQ may consider these uses in future amendments to the regulation.

Adoption of the final regulation is anticipated in the near future. The pending regulation is intended to increase the potential for nonpotable water reuse. The County will take advantage of all feasible reuse opportunities provided by the legislation once it has been adopted.

5.2 Water Recycling Code Requirements

Section 98-871(b)(3) of the New Kent County Code requires that new car washes "utilize a low-volume water recycling system which provides for an average of at least 80 percent recycled water per wash." The only existing car wash in the County recycles wash water.

5.3 Treatment Plant Effluent Reuse

The Department is committed to being proactive with treatment plant effluent reuse where feasible. Opportunities for reuse are somewhat limited due to the fact that the County is very rural; many areas are not on public sewer. The following sections outline identified reuse opportunities the Department is pursuing. See Appendix G for the implementation schedule associated with the following activities.

5.3.1 Brickshire Golf Course

The Department currently has a contractual obligation to provide treated wastewater to Brickshire Golf Course. This customer consumes one treatment plant's entire effluent during the irrigation season.

5.3.2 Colonial Downs Racetrack

The Department also has an obligation to provide Colonial Downs with reuse water once additional wastewater treatment plant effluent becomes available.

5.3.3 Other Identified Large Users

The Department plans to continue supplying both users with reuse water and is currently looking into expanding its water reuse to address the future needs of other large users such as Royal New Kent and the Farms of New Kent golf courses.

5.4 Proposed Reuse Water Line

The Department is in the preliminary stages of design of a reuse line from the proposed wastewater treatment plant (WWTP) at Parham Landing to the Chickahominy WWTP site.

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Piping reuse water to minimal users would be cost prohibitive. However, the Department will make logical and equitable extensions to the reuse lines in the vicinity of the planned route.

5.5 Future Reuse Planning

The Department is committed to expanding its reuse to include all feasible reuse opportunities. To aid with future reuse planning efforts, the Department will require project-specific water conservation plans to address potential reuse opportunities. Refer to Section 4.4 and Appendix C. Provided information will be considered along with other factors when locating additional reuse water lines. The Department is not obligated to provide reuse water to applicants based on the information provided in the project-specific water conservation plan.

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6.0 Drought Response and Contingency Plan

Use restrictions are conservation measures that are employed to produce short-term water demand reductions during water supply emergencies. They are instituted to create immediate reductions in water usage and carry either a long-term or short-term cost to customers. When restrictions are removed, habits formed tend to linger for a time and to some extent can have a lasting impact on water use.

Use restrictions must be clearly differentiated from normal conservation programs. While use restrictions are considered a form of conservation because they result in demand reductions, they are addressed separately from normal conservation because they are only implemented during periods when the water supply is threatened. As a result, the savings associated with the implementation of use restrictions should not be incorporated into the planning of future water supplies. Rather, such restrictions are reserved as contingency measures for emergency situations (e.g., drought) and are more severe than those used to determine the long-term water supply deficit.

6.1 Applicable Regulations

During the summer of 2002, many portions of the Commonwealth experienced significant drought impacts due to a prolonged precipitation deficit. In response to economic and societal impacts of the drought, Governor Warner issued Executive Order #39, the Virginia Water Supply Initiative. The Order required the Commonwealth's Drought Coordinator to develop a formal drought assessment and response plan. The resulting document, included as Appendix F, provides mandatory restrictions that all water users within a drought declaration area, including private well and other self-supplied users, must follow (TAC, 2003).

6.2 Water Emergency Ordinances

Section 38-97 of the New Kent County Code provides the County with the authority "to restrict the uses of water in any reasonable manner for the protection of the county and its water supply…in case of emergency" and has been included as Appendix E.

The ordinance will be expanded to provide for the following:

- Declaration of a water emergency, each stage, and authority to impose water use restrictions.
- Enforcement authority with penalties for above-normal water consumption as defined in each stage of the ordinance.

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- Stiffer penalties for noncompliance with conservation directives after due public notice. Similar restrictions, penalties, and incentives will be imposed upon all County industrial and commercial users.
- These regulations will only apply to New Kent County public water system customers.

6.3 Parameters for Drought Declaration & Emergency Use Restrictions

Stage I: Drought Declaration & Implementation of Tier I Procedures

A drought declaration may be issued when:

- A precipitation deficit corresponding to the Watch stage as described in the Virginia Drought Assessment and Response Plan (TAC, 2003) is identified. This data is provided by the Virginia State Climatology Office and is available from the VDEQ Drought Website.

A drought declaration will be issued when:

- A water emergency is declared by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act; or,
- By mutual agreement between the New Kent County Board of Supervisors and Department of Public Utilities.

The declaration is described in Section 6.4, Drought Declaration. Tier 1 procedures will then be initiated as outlined in Section 6.5, Emergency Use Restriction Procedures.

Stage II: Implementation of Tier II Emergency Use Restriction Procedures

Emergency use restriction procedures may start when:

- A precipitation deficit corresponding to the Warning stage as described in the Virginia Drought Assessment and Response Plan (TAC, 2003) is identified.

Emergency use restrictions will start when:

- A water emergency is declared by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act; or,
- By mutual agreement between the New Kent County Board of Supervisors and Department of Public Utilities.

The declaration is described in Section 6.4, Drought Declaration. Tier 2 procedures will then be initiated as outlined in Section 6.5, Emergency Use Restriction Procedures.

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Stage III: Implementation of Tier III Emergency Use Restriction Procedures

Emergency use restriction procedures may start when:

- A precipitation deficit corresponding to the Emergency stage as described in the Virginia Drought Assessment and Response Plan (TAC, 2003) is identified.

Emergency use restriction procedures will start when:

- A water emergency is declared by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act; or,
- By mutual agreement between the New Kent County Board of Supervisors and Department of Public Utilities.

The declaration is described in Section 6.4, Drought Declaration. Tier 3 procedures will then be initiated as outlined in Section 6.5, Emergency Use Restriction Procedures.

Stage IV: Implementation of Tier IV Emergency Use Restriction Procedures

Emergency use restriction procedures may start when:

- A precipitation deficit corresponding to the Emergency stage as described in the Virginia Drought Assessment and Response Plan (TAC, 2003) has persisted for more than thirty (30) days.

Emergency use restriction procedures will start when:

- A water emergency is declared by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act; or,
- By mutual agreement between the New Kent County Board of Supervisors and Department of Public Utilities.

The declaration is described in Section 6.4, Drought Declaration. Tier 4 procedures will then be initiated as outlined in Section 6.5, Emergency Use Restriction Procedures.

6.4 Drought Declaration

Once the parameters for drought determination are met, as listed in Section 6.3, the County will issue an emergency declaration that will initiate conservation measures as defined in the following section. The declaration will be issued to the public, and to commercial and industrial customers through local newspapers and cable television public access channels and any other means of communication deemed appropriate. The declaration will state specific conservation efforts to be taken.

6.5 Emergency Use Restriction Procedures

Use restrictions will be implemented using the following tiered approach in accordance with the parameters described in Section 6.3.

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Tier 1 – Voluntary Use Restrictions

Once a drought declaration is issued, the following emergency actions for Tier 1 will be put into effect:

- Voluntary water conservation measures will be encouraged. Voluntary use restrictions are employed as a first stage in reducing water demands during a water shortage. These constraints are designed to limit water use for nonessential uses, such as outdoor water uses (e.g., car washing, and lawn watering).
- A public awareness and information process will be implemented to distribute additional water conservation information and other special notices to the public water system customers. Industrial and commercial users will be asked to initiate internal conservation plans.
- The County may delay landscape installation for new construction with a bond when drought declaration is evoked. This is in addition to voluntary water conservation measures.

Tier 2 – Mandatory Use Restrictions

When implementation of Tier 1 actions does not reduce demands efficiently or when a parameter described in Section 6.3 for Stage II is reached, Tier 2 mandatory restrictions are put into effect. The following emergency actions will occur:

- The watering of shrubbery, trees, lawns, grass, plants, or any other vegetation is not permitted, except indoor plantings, greenhouses, or nursery stocks, or from a bucket or other containing not exceeding three (3) gallons in capacity and except watering by commercial nurseries of plants freshly planted and once a week for five weeks following planting or until the drought emergency declaration is revoked.
- Washing of automobiles, trucks, trailers, boats, airplanes, or other types of mobile equipment is not permitted except in facilities operating with a water recycling system approved by the Department, or except from a bucket or other container not exceeding three (3) gallons in capacity. Provided, however, that any facility operating with an approved water recycling system shall prominently display in public view a notice stating that such system is in operation. In lieu of the provision hereof, the County Board may curtail the hours of operation of commercial enterprises offering such services or washing their own equipment.
- Washing of streets, driveways, parking lots, service station aprons, office buildings, the exterior of homes or apartments, or other outdoor surfaces by commercial washing/cleaning services is not permitted except from a bucket or other container not exceeding three (3) gallons in capacity.
- The operation of any ornamental fountain or other structure making similar use of water is not permitted.
- The filling of swimming and/or wading pools, or the refilling of swimming and/or wading pools that were drained after the effective date of the declaration is not permitted.
- The use of water from fire hydrants for any other purpose than fire suppression or other emergency is not permitted except as authorized by the Department.
- Serving of water in restaurants, except upon request of customers, will not be permitted.

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Tier 3 – Water Rationing

If Tier 2 restrictions fail to bring about necessary water savings, or when a parameter described in Section 6.3 for Stage III is reached, Tier 3 restrictions will be put into effect. The following emergency actions will occur:

- The Department shall allocate water to customers based on a reduction of either the average consumption of their last 12 months billing or water consumption data available from similar activities of equal intensity.
    - Residential, Industrial, commercial, and school water use shall be reduced by 25% of normal consumption.
    - The amount of water allocated shall not be less than fifty (50) gallons per person per day per household.
- Increased water rates of 300% will be charged for water use in excess of the conservation goal.
- Installation of new water service connections will be suspended.
- Application for appropriate state or federal drought emergency grants will be submitted.

Tier 4 – Additional Restrictions

The Board of Supervisors or Department designee may implement additional restrictions determined prudent to reduce water demand.

No new water service connections will be sold, and permits for the installation of new wells will not be issued, except for replacement of failed private domestic wells where public water service is not available.

6.6 Revocation of Drought Declaration

When the precipitation deficit has fallen below the trigger levels for each increased stage of drought severity and has remained below that level for fifteen (15) consecutive days, or by mutual agreement between the New Kent County Board of Supervisors and Department of Public Utilities; but not before the declaration of water emergency is lifted by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act, the drought management requirements for that stage may be lifted. All customers will be notified in accordance with Section 6.4. It should be emphasized that voluntary conservation efforts shall be promoted to avert other emergency situations.

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7.0 Program Monitoring and Evaluation

The water conservation and management plan is a dynamic document. Changes to the program are expected to keep it effective and economical. Observations concerning the water supply situation, growth projections, customer participation and satisfaction, and achieved water savings will be made.

The plan will be reviewed periodically to take advantage of new devices and measures to save water. As a condition of the Ground Water Withdrawal Permit, all plan modifications must be approved by VDEQ before incorporation.
According to the AWWA (AWWA 2006), several types of program follow-up typically need to be performed:

- The Department must keep good records of conservation plan impacts. Water use data before, during, and after implementation of a measure is required to evaluate water savings.
- Actual program costs should be compared to planned costs. This involves the development of an accounting system that allows costs to implement plan elements, including but not limited to labor, contracts, materials, and rebates, to be tracked separately. Costs are to be reported annually.
- Customer acceptance levels for plan measures should be monitored. Customer surveys (by mail or telephone) are a useful and fairly inexpensive way to monitor the progress of public information and education programs or to gauge customer acceptance of other conservation methods. If customer feedback is negative, it is indicative of needed changes to plan measures or approaches. If the feedback is positive, it reinforces that the plan is succeeding.

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8.0 References

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Aquaculture Enhancement Areas Technical Advisory Committee. *Water Reclamation and Reuse Regulation (9VAC2-740).* Prepared for VDEQ. March 2008.

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Virginia Administrative Code (VAC). *Declaration of ground water management areas* (9VAC25-600-20 et seq.), effective December 6, 1989. And *Water conservation and management plans* (9VAC25-610-100), effective September 22, 1993. And *Drought response and contingency plans* (9VAC25-780-120), effective November 2, 2005.

Virginia Department of Environmental Quality (VDEQ) Drought Website. http://www.deq.virginia.gov/waterresources/drought.php

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APPENDIX A

Acronyms and Glossary

Acronyms

AWWA	American Water Works Association
BMP	Best management practice
gpcd	Gallons per capita per day
gpf	Gallons per flush
gpm	Gallons per minute
HRPDC	Hampton Roads Planning District Commission
IPC	International Plumbing Code
Mgd	Million gallons per day
PRV	Pressure reducing valve
RRWSG	Regional Raw Water Study Group
SCR	Summer conservation rate
UAW	Unaccounted-for water
USEPA	United States Environmental Protection Agency
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality
VUSBC	Virginia Uniform Statewide Building Code

Glossary

audit (end-use). A systematic accounting of water uses by end users (residential, commercial, or industrial), often used to identify potential areas for water reduction, conservation, or efficiency improvement.

audit (system). A systematic accounting of water throughout the production, transmission, and distribution facilities of the system.

available supply. The maximum amount of reliable water supply, including surface water, ground water, and purchases under secure contracts.

average-day demand. A water system's average daily use based on total annual water production (total annual gallons or cubic feet divided by 365); multiple years can be used to account for yearly variations.

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beneficial use. A use of water resources that benefits people or nature. State law may define beneficial use.

best management practice. A measure or activity that is beneficial, empirically proven, cost-effective, and widely accepted in the professional community.

block. A quantity of water for which a price per unit of water (or billing rate) is established.

capital facilities. Physical facilities used in the production, transmission, and distribution of water.

community water system. According to the SDWA, a drinking water conveyance system serving at least 15 service connections used by year-round residents of the area served by the system of regularly serving at least 25 year-round residents.

conservation (water). Any beneficial reduction in water losses, waste, or use.

conservation pricing. Water rate structures that help achieve beneficial reductions in water usage. See **nonpromotional** rates.

consumptive use. Use that permanently withdraws water from its source.

customer class. A group of customers (residential, commercial, industrial, wholesale, and so on) defined by similar costs of service or patterns of water usage.

decreasing-block (or declining-block) rate. A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) decreases with the amount water usage.

demand management. Measures, practices, or incentives deployed by water utilities to permanently reduce the level or change the pattern of demand for a utility service.

discount rate. A percentage that is used to adjust a forecast of expenditures to account for the time value of money or opportunity costs; it can be based on the utility's cost of capital.

distribution facilities. Pipes, treatment, storage and other facilities used to distribute drinking water to end users.

drought. A sustained period of inadequate or subnormal precipitation that can lead to water supply shortages, as well as increased water usage.

end use. Fixtures, appliances, and activities that use water.

end user. Residential, commercial, industrial, governmental, or institutional water consumer.

fixed charge. The portion of a water bill that does not vary with water usage.

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fixed costs. Costs associated with water service that do not vary with the amount of water produces or sold.

graywater. Treated wastewater use for nonpotable purposes such as irrigation.

increasing-block (or inclining-block) rate. A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) increases with the amount water usage.

irrigation scheduling. An automated method for optimizing outdoor water use by matching the watering schedule to plant needs.

large-volume user. A water customer, usually industrial or wholesale, whose usage is substantial relative to other users; large-volume users may present unique peaking or other demand characteristics.

leak detection. Methods for identifying water leakage in pipes and fittings.

life span. The expected useful life of a supply-side or demand-side project, measure, or practice. (The life span may not be identical to useful life for tax purposes.)

losses (water). Metered source water less revenue-producing water and authorized unmetered water uses.

low water-use landscaping. Use of plant materials that are appropriate to an area's climate and growing conditions (usually native and adaptive plants). See **Xeriscape™.**

master metering. A large meter at a point of distribution to multiple uses or users that could be further submetered. Includes metered wholesale sales.

maximum-day demand. Total production for the water system on its highest day of production during a year.

meter. An instrument for measuring and recording water volume.

nonaccount water. Metered source water less metered water sales.

nonconsumptive use. Water withdrawn and returned to the source.

nonpromotional rates. Rates that do not encourage additional consumption by water users.

nonresidential customer. A commercial or industrial utility customer.

peak demand. The highest point of total water usage experienced by a system, measured on an hourly and on a daily basis.

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per-capita use. Total use divided by the total population served.

per-capita residential use. Residential use divided by the total population served.

rationing. Mandatory water-use restrictions sometimes used under drought or other emergency conditions.

raw water. Untreated water.

retrofit. Replacement of parts in an existing plumbing fixture or water-using appliance in order to improve its operational efficiency.

reuse (water). Beneficial use of treated wastewater.

Safe Drinking Water Act (SDWA). Federal drinking water quality legislation administered by the U.S. Environmental Protection Agency (EPA) through state primacy agencies; amended in 1996.

safe yield. The maximum reliable amount that can be withdrawn from a source without compromising quality or quantity, as defined by hydrological studies; can be based on acceptable withdrawals during a critical supply period or drought with a specific probability of occurrence.

seasonal rate. A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) varies by season of use; higher rates usually are charged in the season of **peak demand.**

source meter. A meter used to record water withdrawn from a surface water or groundwater source, or purchased from a wholesale supplier.

supply management. Measures deployed by the utility that improve the efficiency of production, transmission, and distribution facilities.

submetering. Metering for units comprising a larger service connection, such as apartments in a multifamily building.

surcharge. A special charge on a water bill used to send customers a specific pricing signal and recover costs associated with a particular activity.

system (water). A series of interconnected conveyance facilities owned and operated by a drinking water supplier; some utilities operate multiple water systems.

transfers (water). Exchange of water among willing buyers and sellers.

transmission facilities. Pipes used to transport raw or treated water to distribution facilities.

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treated water. Water treated to meet drinking water standards.

unaccounted–for water. The amount of **nonaccount water** less known or estimated losses and leaks.

uniform rate. A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) does not vary with the amount of water usage.

universal metering. Metering of all water-service connections.

unmetered water. Water delivered but not measured for accounting and billing purposes.

user class. See customer class.

variable charge. The portion of a water bill that varies with water usage; also known as a commodity charge.

variable cost. Costs associated with water service that vary with the amount of water produced or sold.

water right. A property right or legal claim to withdraw a specified amount of water in a specified time frame for a beneficial use.

watershed. A regional land area, defined by topography, soil and drainage characteristics, within which raw waters collect and replenish supplies.

Xeriscape ™. Landscaping that involves seven principles: proper planning and design; soil analysis and improvement; practical turf areas; appropriate plant selection; efficient irrigation; mulching; and appropriate maintenance.

Independent research projects have defined three microclimatic zones in a xeriscape.

- The first zone is a very low water zone and provides the greatest savings when compared to traditional landscaping. In the zone, irrigation is needed only to establish new plantings. Once establishment has occurred, the plants require very little additional water.
- The second zone is the low water zone. Plants growing within this microclimate require somewhat more water than what it available from the natural rainfall. The additional water needed does not necessarily have to come from irrigation. The low water zone can be located in areas that naturally receive more water, such as runoff areas or gutter discharge zones.
- The third zone is a moderate water zone. This zone uses the most water in the xeriscape. However, it uses less than is required for a traditional landscape. In an efficient xeriscape, this zone should be the smallest of the three.

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APPENDIX B
Existing Water Rates

Water and Irrigation Rates (Effective July 1, 2007)

Meter size	Minimum Usage Charge	Charge Per 1,000 Gallons Over Minimum Usage			
	0 - 9,000 gal total water consumption*	9,001 - 18,000 gal total water consumption	18,001 - 27,000 gal total water consumption	27,001 - 72,000 gal total water consumption	72,001 + gal total water consumption
5/8"	$41.58	$4.16	$4.54	$4.75	$4.16
3/4"	$41.58	$4.16	$4.54	$4.75	$4.16
1"	$78.00	$4.16	$4.54	$4.75	$4.16
1 1/2"	$164.00	$4.16	$4.54	$4.75	$4.16
2"	$246.00	$4.16	$4.54	$4.75	$4.16
3"	$430.00	$4.16	$4.54	$4.75	$4.16
4"	$688.00	$4.16	$4.54	$4.75	$4.16
6"	$1,375.00	$4.16	$4.54	$4.75	$4.16
8" to 10"	$2,475.00	$4.16	$4.54	$4.75	$4.16

Number of billings per year 4

Irrigation Meter Installation Charges

Construction and Installation $750.00

Installation only $300.00

*Total water consumption is the sum of the domestic water reading and the irrigation meter reading (if applicable).

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APPENDIX C

Project-Specific Water Conservation Plan Outline

In addition to complying with the conservation measures presented in the County's Water Conservation and Management Plan, applicants submitting site plans that include provision of potable water must prepare a site-specific Water Conservation Plan to include all Code-required conservation activities and other direct and indirect measures resulting in significant water savings. In making such determination, the Department will consider the type of use, the potential water use efficiency that could be obtained using best available technologies, and the efficiency of other similar water uses.

The applicant's Water Conservation Plan shall follow the following chapter format:

1) Project Description
2) New Kent County Required Conservation Activities
3) Direct Water Saving Measures
4) Indirect Water Saving Measures
5) Opportunities for Potential Nonpotable Reuse
6) Summary of Water Savings and Projected Water Demands

The following sections provide descriptions of the types of information to be included in the aforementioned chapters of the applicant's Water Conservation Plan.

- **Chapter 1. Project Description**
  This section shall provide a description of the project to include the following New Kent County Code site plan submittal requirements: Sec. 98-862(b)(1) through (6), (12), and (13).

  The applicant must also describe all anticipated water-consuming practices related to the project.

- **Chapter 2. New Kent County Required Conservation Activities**
  This section shall include all applicable conservation activities required by the New Kent County Code of Ordinances. This section should also include a description of the applicants' plan to meet requirements.

  Code-required activities at the time this outline was developed include:
  - Low Flow Plumbing Fixture Requirements as required by VUSBC, 1997 Ed.;

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- Business & Commercial Irrigation Systems Requirements [Sec. 98-871(a)(8)]; and,
- Car Wash Recycling Requirements [Sec. 98-871(b)(3)]

- **Chapter 3. Direct Water Saving Measures**
  This section shall include the direct water saving measures the applicant has committed to implement for the proposed project. Conservation activities required by the County Code, with the exception of low flow plumbing fixture requirements, may be used to meet the requirements of this chapter. This section must also include a description of the applicant's plan to meet the selected measures.

  The following are measures which qualify to meet conservation plan requirements for direct water savings measures. Individual measures listed herein are not requirements per se, and do not exclude alternative conservation measures the applicant may wish to propose to the Department. The applicant may:
  - Use water-conserving plumbing fixtures more stringent than required by VUSBC such as ultra-low flow fixtures, motor sensor faucet controls, hot water recirculating pumps, and dual-flush toilets
  - Reuse on-site reclaimed water or stormwater in the place of higher quality water sources.
  - Line irrigation ponds, where ponds are provided.
  - Install an irrigation system in accordance with County Code 98-871(a)(8).
  - Limit the amount of acreage to be irrigated.
  - Substantially reduce once-through cooling procedures.
  - Replace water cooling with air cooling procedures.
  - Install automatic shutoff valves.
  - Develop and propose other measures to reduce the amount of allocated water.

  Note: Leak detection and repair do not qualify to meet the conservation plan requirements because these measures are considered essential to prevent water from being wasted.

- **Chapter 4. Indirect Water Saving Measures**
  This section shall include the indirect water saving measures the applicant has committed to implement for the proposed project. This section must also include a description of the applicants' plan to meet the selected measures.

  The following are measures which qualify to meet conservation plan requirements for indirect water savings measures. Individual measures listed herein are not requirements per se, and do not exclude alternative conservation measures the applicant may wish to propose to the Department. The applicant may:
  - Install a network of soil moisture monitoring and rain sensor devices to determine actual irrigation needs.
  - Install an on-site weather station to assist the Department in drought condition monitoring.

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- Evaluate and reassess overseeing practices.
- Serve as a Xeriscape™ demonstration site.
- Develop a written company policy that establishes a commitment to water conservation efforts. This measure is available to the user of the project site.
- Develop and propose other strategies to reduce water consumption.

- **Chapter 5. Opportunities for Potential Nonpotable Reuse**
  The applicant shall describe any opportunities for reuse of treatment plant effluent for nonpotable uses relevant to the project. The proposed Water Reclamation and Reuse Regulation (9VAC25-740) provides the framework for allowable reuse opportunities.

  The County is committed to being proactive with treatment plant effluent reuse where feasible. The Department plans to continue supplying existing users and expand its water reuse to address the future needs of its customers.

  Providing opportunities for reuse relevant to the project helps the Department plan future reuse provision. Future rebate or cost-share opportunities and lower utility costs are potential benefits of identified reuse opportunities. The Department will consider this data among other factors to determine the need for future reuse lines. There is no obligation to provide applicants with reuse water based on the information provided in this chapter.

- **Chapter 6. Summary of Water Savings and Projected Water Demands**
  This section shall provide a summary of the Plan. The anticipated water savings resulting from required and direct water savings measures shall be discussed. The applicant shall provide the Department with the projected water demand for the project, including the effects of water conservation activities.

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APPENDIX D

Water Conservation References

While this reference list includes many helpful references on water conservation planning and activities, it is not meant to be all-inclusive.

American Water Works Association (AWWA). *Water Conservation Programs – A Planning Manual*. First Edition, Denver, CO: American Water Works Association, 2006.

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Rural Community Assistance Program. http://www.rcap.org

Tualatin Valley Water District. Commercial/Industrial Conservation Tips. http://www.tvwd.org/conservation/

U.S. Environmental Protection Agency (USEPA). http://www.epa.gov/owm/genwave.htm

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APPENDIX E

New Kent County Code Section 38-97

Sec. 38-97. Liability of county.
The county shall not be liable for any damages resulting from the bursting of any main, service pipe or cock, from the shutting off of water for repairs, extensions or connections or from the accidental failure of the water supply from any cause whatsoever. In cases of emergency, the county shall have the right to restrict the uses of water in any reasonable manner for the protection of the county and its water supply. The county will not be responsible for any damage caused by defective plumbing or open outlets when water is ordered turned on by the owner or agent of the owner. All applicants for and consumers of water service shall be required to accept and shall be deemed to have consented to such conditions of pressure and service as are provided by the county's distribution system at the locations serviced and to hold the county harmless from any damages arising out of low pressure or high pressure conditions, interruptions of service or quality of water.
(Code 1999, § 8-56)

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APPENDIX F

Virginia Drought Assessment and Response Plan

Submitted by the Drought Response Technical
Advisory Committee

March 28, 2003

APPROVED

Virginia Drought Assessment and Response Plan

Submitted by the Drought Response Technical Advisory Committee

March 28, 2003

Introduction

During the summer of 2002 Virginia experienced significant drought impacts due to precipitation deficits that dated to 1999 in most areas of the Commonwealth. While this drought did not reach the level of severity of the drought of record (1930-1932), increases in water demands when compared to the 1930's resulted in significant impacts to all sectors of Virginia's economy and society.

The intensity of these drought impacts peaked in late August 2002. Wildfire indices were at levels previously unrecorded in Virginia, the vast majority of Virginia agricultural counties had applied for Federal drought disaster designation, streamflows reached period of record lows, and thousands of individual private wells failed. During the third week of August several public water supply systems across the Commonwealth were on the brink of failure. Several large municipal systems, such as Charlottesville and Portsmouth, had less than sixty days of water supply capacity remaining in reservoirs. Several smaller rural systems that rely primarily on withdrawals from free-flowing streams, such as the towns of Farmville and Orange, had at most a few days of water supply available and were forced to severely curtail usage.

On August 30, 2002 Governor Warner took the unprecedented action of declaring a drought emergency in the majority of the Commonwealth by issuance of Executive Order #33. This executive order required the elimination of some non-essential water uses in large areas of the Commonwealth. In addition, this executive order named the Deputy Secretary of Natural Resources as the Commonwealth Drought Coordinator and charged him with the implementation of the water use restrictions. While these emergency actions were necessary in light of the drought impacts within the Commonwealth, they resulted in significant confusion and consternation among water users who were impacted.

On December 13, 2002 Governor Warner issued Executive Order #39, the Virginia Water Supply Initiative. This executive order requires the Commonwealth's Drought Coordinator to develop a formal drought assessment and response plan. In January 2003, the Deputy Secretary of Natural Resources invited a broad coalition of stakeholders to participate in a Drought Response Technical Advisory Committee chaired by the Virginia Department of Environmental Quality. This technical advisory committee was supported by the existing Virginia Drought Monitoring Task Force. Groups and agencies invited to participate or represented on the Drought Monitoring Task Force are listed below.

Mid-Atlantic Car Wash Association
National Spa and Pool Institute
Virginia Rural Water Association
Virginia Agribusiness Council
Virginia Green Industry Council
Virginia Golf Course Superintendent's Association
Virginia Association of Counties
Virginia Section of the American Water Works Association
Virginia Municipal League
Virginia Sports Turf Manager's Association
Virginia Hospitality and Travel Association
Virginia Water Well Association

Virginia Manufacturer's Association
Virginia Farm Bureau
Southern Environmental Law Center
Roanoke River Landowner's Association
Virginia Irrigation Association
City of Portsmouth
Henrico County
Town of Orange
U.S. Navy
U.S. Army Corp of Engineers
Virginia Department of Environmental Quality
Virginia Department of Emergency Management
Virginia Department of Health
Virginia Cooperative Extension Service
Virginia Department of Game and Inland Fisheries
Virginia Department of Agriculture and Consumer Services
Virginia State Climatology Office
Virginia Department of Forestry
U.S. Geological Survey
U.S. Department of Agriculture, Farm Services Agency
National Oceanic and Atmospheric Administration, National Weather Service

The Drought Response Technical Advisory Group met three times in February and March and developed the following drought assessment and response plan for the consideration of the Commonwealth Drought Coordinator. There are several key concepts that must be kept in mind as this proposal is reviewed.

The development of droughts and the development of associated impacts is very complex. The coverage of monitoring points for most drought indicators (precipitation deficits, streamflows, ground water levels, and reservoir storage) is sparse. These two facts work together to preclude the development of a truly automated, objective drought monitoring system. This proposal includes a monitoring framework that relies heavily on the professional judgment of the Virginia Drought Monitoring Task Force in the determination of drought stages in the Commonwealth.

Due to the complexity of drought impacts on differing segments of society, the responses that are proposed at each drought stage are actions that should be considered. The Commonwealth Drought Coordinator will need to evaluate reported drought conditions and the impacts associated with those conditions and decide what actions are necessary. As an example, there will likely be circumstances in the future when actions currently proposed at the drought warning stage should be initiated somewhat earlier.

From a water supply standpoint, the impacts on a particular water supply may be as dependent on the reliability of that supply as it is on the severity of drought conditions at any point in time. As an example, water supply systems that rely on small order free-flowing streams and do not have storage may experience large impacts from relatively small drought events. This variability in reliability exists in all categories of water supplies; public waterworks, large self-supplied industrial and commercial supplies, and individual residential water supplies. Nothing that is proposed in this plan should be

viewed as limiting local government or public waterworks from taking more stringent action at any time to respond to local conditions.

Drought Monitoring

The responsibility for monitoring drought conditions in the Commonwealth rests with the Virginia Drought Monitoring Task Force (DMTF), an interagency group of technical representatives from state and federal agencies responsible for monitoring natural resource conditions and the effects of drought on various segments of society. During periods of normal moisture conditions, the Virginia Department of Environmental Quality will monitor the NOAA U.S. Drought Monitor, and will produce information from this report specific to Virginia on a monthly basis. The Virginia drought map will be produced concurrent with the release of NOAA monthly and seasonal outlooks, which usually are released on the Thursday closest to the middle of the month. The DMTF will be activated with the first occurrence of *moderate drought* conditions (D1) in the Commonwealth or the occurrence of smaller scale moisture deficits that may fall beneath the level of resolution of the U.S. Drought Monitor. The DMTF will monitor the advance of drought conditions in the Commonwealth using the drought indicators listed on page 4 as other indicators such as the Standardized Precipitation Index, Palmer Drought Severity Index, Crop Moisture Index, Keetch-Byrum Drought Index, and NOAA monthly and seasonal precipitation outlooks. In addition, the DMTF will monitor the effect of advancing drought conditions on various sectors of society including agriculture, forestry, and recreation. The DMTF will produce a monthly report of current drought conditions and their effects, and will generally remain active until the NOAA U.S. Drought Monitor indicates that all drought impacts in the Commonwealth have subsided to an *unusually dry* level (D0). The DMTF may remain active after all drought impacts have subsided to an *unusually dry* level when small areas beneath the resolution of the U.S. Drought Monitor continue to experience drought impacts. The primary purpose of the drought monitoring system described below is to provide a framework for the DMTF to operate within when preparing recommendations for the declaration of various drought stages. Due to the complex nature of drought development, professional expertise must be applied to the wide range of drought monitoring data in order to develop defensible recommendations.

Drought Evaluation Regions

For the purpose of implementation of this drought response plan the Commonwealth has been divided into thirteen drought evaluation regions. The regions were established based on a consideration of river basins, climatic divisions, physiographic provinces, major geomorphologic features, and service areas of major water supplies. Regional boundaries were chosen to correspond with local government boundaries to simplify the implementation of this plan. While the regional boundaries are somewhat arbitrary, they generally correspond to regions of the Commonwealth that possess similar climatic, ground water, streamflow and water supply conditions. Drought evaluation regions for the Commonwealth are listed below and displayed in Appendix A. Towns and independent cities are only listed when they are on the boundary of a drought evaluation region. Drought evaluation regions included all towns and independent cities located within the region.

Big Sandy Drought Evaluation Region: Lee, Wise, Buchanan, Dickenson, Scott, Russell, Tazewell, Washington and Smyth Counties.

New River Drought Evaluation Region: Grayson, Wythe, Bland, Carroll, Floyd, Pulaski, Giles, and Montgomery Counties.

Roanoke River Drought Evaluation Region: Patrick, Franklin, Roanoke, Henry, Bedford, Pittsylvania, Campbell, Halifax, Charlotte, and Mecklenburg Counties.

Upper James Drought Evaluation Region: Craig, Alleghany, Bath, Highland, Botetourt, and Rockbridge Counties.

Middle James Drought Evaluation Region: Amherst, Lynchburg, Nelson, Albemarle, Appomattox, Buckingham, Fluvanna, Prince Edward, Cumberland, Goochland, Amelia, Powhatan, Chesterfield, Petersburg, Hopewell, Colonial Heights, Henrico, and Hanover Counties.

Shenandoah Drought Evaluation Region: Augusta, Rockingham, Shenandoah, Frederick, Page, Warren, and Clarke Counties.

Northern Virginia Drought Evaluation Region: Fauquier, Loudoun, Prince William, Arlington, and Fairfax Counties.

Northern Piedmont Drought Evaluation Region: Greene, Madison, Rappahannock, Orange, Culpeper, Louisa, Spotsylvania, and Stafford Counties.

Chowan Drought Evaluation Region: Lunenburg, Nottoway, Brunswick, Dinwiddie, Greensville, Sussex, Prince George, Southampton and Surry Counties.

Northern Coastal Plain Drought Evaluation Region: Caroline, King George, King William, King and Queen, Essex, Richmond, Westmoreland, Gloucester, Mathews, Middlesex, Lancaster, and Northumberland Counties.

York-James Drought Evaluation Region: Hampton, Newport News, James City, York, Charles City, and New Kent Counties.

Southeast Virginia Drought Evaluation Region: Suffolk, Isle of Wight, Chesapeake, Virginia Beach, Portsmouth, and Norfolk.

Eastern Shore Drought Evaluation Region: Northampton and Accomack Counties.

Drought Indicators

In order to monitor potential drought conditions in a uniform manner across the Commonwealth, Virginia will use four indicators to evaluate drought severity. The indicators are based on the amount of precipitation and the effect of the precipitation (or lack of precipitation) on the hydrologic system. These indicators include:

- Precipitation Deficits
- Streamflows
- Ground water levels
- Reservoir storage

Indicators will be evaluated by comparing current conditions to long term average conditions. This evaluation will be used to determine if current conditions are within a range of conditions commonly experienced or if significant drought conditions exist.

Precipitation Deficits

Precipitation deficits will be monitored by comparing current precipitation amounts with historical precipitation values as a percent of normal long-term average values. Comparisons will be made for each drought evaluation region using data compiled by the Office of the State Climatologist. Normal long-term average precipitation is defined as the mean precipitation for a thirty-year period of record for the area and time period being evaluated.

Precipitation amounts will be evaluated based on the water year (beginning October 1). Water years are a natural dividing point for water supply drought, as precipitation that falls in the first six months of a water year is analogous to putting money in the bank. Precipitation that occurs during this six month period has the potential to recharge ground water, which will sustain stream flows and support withdrawals from wells during the following six month period when moisture deficits naturally develop as evaporation and plant transpiration generally exceed precipitation. If a precipitation deficit outside of the normal range exists at the end of a water year, the precipitation records will carry forward until a normal condition is reached (i.e. if a precipitation deficit exists on October 1, precipitation records for the previous twelve months will be evaluated until the twelve month deficit is eliminated).

Because the significance of a precipitation deficit changes as the water year progresses, drought response stages will trigger at different percentages of normal depending upon the date of evaluation.

Months Analyzed	**Normal (% of Normal Precipitation)**	**Watch (% of Normal Precipitation)**	**Warning (% of Normal Precipitation)**	**Emergency (% of Normal Precipitation)**
October-December	>75.0	<75.0	<65.0	<55.0
October-January	>80.0	<80.0	<70.0	<60.0
October-February	>80.0	<80.0	<70.0	<60.0
October-March	>80.0	<80.0	<70.0	<60.0
October-April	>81.5	<81.5	<71.5	<61.5
October-May	>82.5	<82.5	<72.5	<62.5
October-June	>83.5	<83.5	<73.5	<63.5
October-July	>85.0	<85.0	<75.0	<65.0
October-August	>85.0	<85.0	<75.0	<65.0
October – September (and previous 12 months)	>85.0	<85.0	<75.0	<65.0

Streamflow

Streamflow gages representing drought evaluation regions will be used to monitor streamflow responses to drought conditions. Representative daily flow values will be compared with historic flow statistics for the period of record. Representative daily streamflows above the 25th percentile for return flow frequency will be defined as normal conditions. Representative daily streamflows between the 10th and 25th percentile for return flow frequencies will be defined as drought watch conditions. Representative daily streamflows between the 5th and 10th percentile for return flow frequencies will be defined as drought warning conditions. Representative daily streamflows below the 5th percentile for return flow frequencies will be defined as drought emergency conditions. (A streamflow that represents the 25th percentile of return flow frequencies indicates that, for the period of record, 75% of streamflows have exceeded the current flow.) Gages were selected on the basis of the availability of real-time data, period of record, and relative location within the drought evaluation region. Typically, gages were selected that monitor moderately large drainage areas on streams without significant regulation. In drought evaluation areas where no appropriate stream gages exist, this indicator will not be utilized. Gages selected to monitor drought severity in each evaluation region are listed below and displayed in Appendix B.

Big Sandy Drought Evaluation Region: Clinch River at Cleveland, USGS Station 03524000

New River Drought Evaluation Region: Reed Creek at Graham Forge, USGS Station 03167000

Roanoke River Drought Evaluation Region: Goose Creek near Huddleston, USGS Station 02059500

Upper James Drought Evaluation Region: Cowpasture River near Clifton Forge, USGS Station 02016000

Middle James Drought Evaluation Region: Appomattox River at Farmville, USGS Station 02039500

Shenandoah Drought Evaluation Region: North Fork Shenandoah near Strasburg, USGS Station 01634000

Northern Virginia Drought Evaluation Region: Accotink Creek near Annandale, USGS Station 01654000

Northern Piedmont Drought Evaluation Region: Rapidan River near Culpeper, USGS Station 01667500

Chowan Drought Evaluation Region: Meherrin River near Lawrenceville, USGS Station 02051500

Northern Coastal Plain Drought Evaluation Region: Mattaponi River near Beulahville, USGS Station 01674500

York-James Drought Evaluation Region: Chickahominy River near Providence Forge, USGS Station 02042500

Southeast Virginia Drought Evaluation Region: No stream gages available to monitor.

Eastern Shore Drought Evaluation Region: No stream gages available to monitor.

Ground Water Levels

Water table ground water monitoring wells representing drought evaluation regions will be used to monitor shallow ground water responses to drought conditions. In areas west of Route 95 it was assumed that wells completed in shallow fractured rock formations are indicative of water table conditions. Measured ground water levels will be compared with historic level statistics for the period of record. Measured ground water levels above the 25th percentile for all historic levels will be defined as normal conditions. Measured ground water levels between the10th and 25th percentiles for all historic levels will be defined as drought watch conditions. Measured ground water levels between the 5th and 10th percentile for all historic levels will be defined as drought warning conditions. Measured ground water levels below the 5th percentile for all historic levels will be defined as drought emergency conditions. Monitoring wells were selected on the basis of period of record and relative location within the drought evaluation region. Monitoring wells selected to monitor drought severity in each evaluation region are listed below and displayed in Appendix C. In drought evaluation regions where no appropriate monitoring wells exist, the ground water indicator will not be used.

Big Sandy Drought Evaluation Region: No water table monitoring wells available to monitor.

New River Drought Evaluation Region: Christiansburg Observation Well, USGS Local Number 27F 2 SOW 019

Roanoke River Drought Evaluation Region: Roanoke-Nelson Observation Well, USGS Local Number 31G 1 SOW 008

Upper James Drought Evaluation Region: Glasgow Observation Well, USGS local Number 35K 1 SOW 063

Middle James Drought Evaluation Region: Buckingham Observation Well, USGS Local Number 41H 3; Virginia Maples Observation Well, USGS Local Number 53K 19 SOW 080

Shenandoah Drought Evaluation Region: McGaheysville Observation Well, USGS Local Number 41Q 1; Blandy Farm Observation Well, USGS Local Number 46W 175
:

Northern Virginia Drought Evaluation Region: Harper's Ferry Observation Well, USGS Local Number 49Y 1 SOW 022; Arlington Cemetery Observation Well, USGS Local Number 54V 3

Northern Piedmont Drought Evaluation Region: Gordonsville Observation Well, USGS Local Number 45P 1 SOW 030

Chowan Drought Evaluation Region: Slade Farm Observation Well, USGS Local Number 57E 13 SOW 094C

Northern Coastal Plain Drought Evaluation Region: George Washington Birthplace Observation Well, USGS Local Number 55P 9

York-James Drought Evaluation Region: Toano Observation Well, USGS Local Number 56H 31 SOW 135B

Southeast Virginia Drought Evaluation Region: Brinkley Observation Well, USGS Local Number 58B 13; Pungo Observation Well, USGS Local Number 62B 1 SOW 098A

Eastern Shore Drought Evaluation Region: P. C. Kellam Observation Well, USGS Local Number 63H 6 SOW 103A; Withams Observation Well, USGS Local Number 66M 19 SOW 110S

Reservoir Storage

Storage in major reservoirs will be used as a fourth drought indicator. Major reservoirs in Virginia support a wide variety of uses that include water supply storage, electric power generation, and flow augmentation to protect water quality. Water supply reservoirs will be evaluated based on the estimated days of available usable storage. Storage of greater than 120 days will represent normal conditions, storage of 90 to 120 days will represent watch conditions, storage of 60 to 90 days will represent warning conditions, and storage of less than 60 days will represent emergency conditions. Useable storage will be calculated as that storage above the level where advanced water treatment will be required.

Several large multi-purpose reservoirs will be evaluated as drought indicators. The criteria for consideration of drought stages are listed below for these reservoirs. Pool elevations of these reservoirs will be compared to benchmark elevations in relation to mean sea level (msl) or U.S. Army Corp of Engineers operating guide curves as indicated in the following table.

	NORMAL	DROUGHT WATCH	DROUGHT WARNING	DROUGHT EMERGENCY
Smith Mountain Lake	>793 feet msl	793 to 791.5 feet msl	791.5 to 790 feet msl	< 790 feet msl
Lake Moomaw	>1565 feet msl	1565 to 1562.5 feet msl	1562.5 to 1560 feet msl	< 1560 feet msl
Lake Anna	> 248 feet msl	248 to 246 feet msl	246 to 244 feet msl	< 244 feet msl
Kerr Reservoir	< 3 feet below the guide curve	3 to 6 feet below the guide curve	> 6 feet below the guide curve	< 288 feet msl

Reservoirs that will be used to monitor drought conditions are listed below. In drought evaluation regions where no appropriate reservoirs exist, this indicator will not be used.

Big Sandy Drought Evaluation Region: Big Cherry Water Supply Reservoir

New River Drought Evaluation Region: No reservoirs will be monitored.

Roanoke River Drought Evaluation Region: Smith Mountain Lake, Kerr Reservoir

Upper James Drought Evaluation Region: Lake Moomaw

Middle James Drought Evaluation Region: Lake Moomaw, Charlottesville Water Supply Reservoir System

Shenandoah Drought Evaluation Region: Switzer Water Supply Reservoir

Northern Virginia Drought Evaluation Region: Occoquan Water Supply Reservoir, Lake Manassas Water Supply Reservoir

Northern Piedmont Drought Evaluation Region: Lake Anna, Spotsylvania Water Supply Reservoir System

Chowan Drought Evaluation Region: Emporia Water Supply Reservoir

Northern Coastal Plain Drought Evaluation Region: Gloucester Water Supply Reservoir

York-James Drought Evaluation Region: Newport News Water Supply Reservoir System

Southeastern Virginia Drought Evaluation Region: Kerr Reservoir, Portsmouth Water Supply Reservoir System

Eastern Shore Drought Evaluation Region: No reservoirs will be monitored.

Other Indicators

The DMTF will evaluate all other available drought information during deliberations related to the development of drought stage recommendations. Other drought indicators that will be considered include the Standardized Precipitation Index, Palmer Drought Severity Index, Crop Moisture Index, and NOAA monthly and seasonal precipitation outlooks.

When streamflows or ground water levels at the selected monitoring sites previously listed indicate drought conditions, the DMTF will monitor other stream gages and ground water monitoring wells that are available.

The DMTF will evaluate the Cumulative Severity Index developed by the Virginia Department of Forestry (VDOF) and the Keech-Byrum Drought Index to determine the potential impact of drought on forests and the potential for wildfire starts. In addition, the DMTF will consider the number of wildfire starts and the number of acres of forest burned as supplied by the VDOF as indicators of drought impacts on forestry.
The DMTF will evaluate information compiled by the Virginia Agricultural Statistics Service to assess the impacts of drought on agricultural interests in the state. The DMTF will also rely on the input of local agricultural extension agents through the Virginia Cooperative Extension Service to document actual drought impacts through the Commonwealth. In addition, the DMTF will evaluate the number of requests for federal

drought disaster designation as reported by the Virginia Department of Agriculture and Consumer Services.

The DMTF will consider operating conditions at public waterworks in the determination of drought recommendations. The Virginia Department of Health (VDH) monitors the conditions of many public waterworks in the Commonwealth on a monthly basis. At a minimum, individual public waterworks typically contact the VDH when they experience water supply problems that are due to drought. VDH will continue to provide support to these waterworks and will continue monthly reporting of water supply problems. These monthly reports will be used as an additional indicator of drought severity in the Commonwealth. In addition, the DMTF will consider the number of private well replacement permits issued by the VDH as an indication of drought impacts to persons served by this type of system.

Declaration of Drought Stages

The DMTF will use the four drought indicators; precipitation deficits, streamflows, ground water levels, and reservoir levels; as the initial indicators to be considered when making a recommendation concerning the declaration of a particular drought stage. When two indicators exceed the threshold for stage determination, the DMTF will evaluate all other drought information and provide a recommendation to the Virginia Drought Coordinator. This recommendation may be to declare a specific drought stage or the recommendation may include an explanation of why the particular drought stage should not be declared at that time. Conversely, the DMTF may recommend the declaration of a particular drought stage prior to the exceedance of threshold levels for two of the four indicators. Recommendations for declaration of specific drought stages will generally be based on the drought evaluation regions previously described. It is likely that conditions may exist where the DMTF may recommend the declaration of a specific drought stage for a portion of a drought evaluation region. Recommendations for declaration of a portion of a drought evaluation region may be based on differing climatic conditions within the area or differences in the ability of specific waterworks to reliably provide water during drought conditions.

As an example, when two of the four drought indicators indicate drought warning conditions, the DMTF will evaluate all other drought information available and, if the majority of information warrants declaration, recommend the declaration of a drought warning in the drought evaluation region where these conditions exist. In all cases, the final decision regarding the declaration of a particular drought stage will be at the discretion of the Virginia Drought Coordinator. Any local government may declare local drought emergencies, adopt emergency ordinances to address those local emergencies and implement those ordinances prior to the declaration of a Drought Emergency by the Governor of Virginia.

The DMTF will use the following general descriptions of four drought stages when making recommendations to the Virginia Drought Coordinator concerning drought declarations in the Commonwealth. These descriptions should not be viewed as absolute requirements for drought designation, but as a mechanism to be used by the DMTF to reach consensus on the appropriate drought recommendations.

Normal Conditions

No more than one indicator outside of the normal range:

- Precipitation exceeds the percent of normal precipitation for the time period in precipitation table
- Streamflows are above the 25th percentile
- Ground water levels are above the 25th percentile for all historic levels
- Water Supply Reservoirs exceed 120 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Watch

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 10th and 25th percentile
- Ground water levels fall between the 10th and 25th percentile for all historic levels
- Water Supply Reservoirs contain between 90 and 120 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Warning

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 5th and 10th percentile
- Measured ground water levels fall between the 5th and 10th percentile for all historic levels
- Reservoirs contain between 60 and 90 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Emergency

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows are at or below the 5th percentile
- Measured ground water levels fall are at or below the 5th percentile for all historic levels
- Reservoirs contain 60 days or less of useable storage or appropriate criteria for non-water supply reservoirs

Responses to Drought in Virginia

The impacts of drought on society are broad reaching and complex. In addition, the nature of a particular drought event is dependent on the time of year, the long-term duration of precipitation deficits, the immediate impacts of short-term precipitation deficits within a period of general precipitation deficits, and many other interrelated factors. In short, every significant drought has a particular signature and the impacts of no two droughts will be identical. Due to the complex nature of droughts, responses to individual drought events must be tailored to the impacts that are being propagated. The specific response activities that are delineated below for the three drought stages should

be viewed as activities that will generally be initiated and not as required activities that are “written in stone”.

Drought watch responses are generally responses that are intended to increase awareness, in the public and private sector, to climatic conditions that are likely to precede the occurrence of a significant drought event. During this drought stage the primary activities that are suggested are to prepare for the onset of a drought event. It is unlikely that significant water use reductions will occur at this stage although it is possible that the increased public awareness of water conservation activities may reduce water use up to 5%.

Drought warning responses are generally responses that are required when the onset of a significant drought event is imminent. Water conservation and contingency plans that have been prepared during a drought watch stage would begin to be implemented. From the perspective of the Commonwealth, water conservation activities at this stage would generally be voluntary. Voluntary water conservation activities generally result in reductions in water use of 5-10%.

Drought emergency responses are generally responses that are required during the height of a significant drought event. During these times, it is likely that some water supplies will not supply the amount of water needed by all users and non-essential uses of water should be eliminated. Mandatory water conservation requirements contained in water conservation and contingency plans should be initiated at this stage. Mandatory water conservation activities generally result in water use reductions of 10-15%.

While actions on the State level are important for the purpose of alerting localities and citizens of the advance of drought impacts, actions by local governments, individual water suppliers, and individual citizens are much more important and effective in actually addressing the impacts of drought. Water sources used by public waterworks and self-supplied water users vary considerably across the Commonwealth. Water conservation requirements for water users whose only source of water supply is a free-flowing stream with no significant storage will likely be different than requirements for a water user who relies entirely on a reservoir system for water supply. The development of a drought water conservation and contingency plan that takes into account the nature of a particular water source and the nature of the end use of water withdrawn is necessary to assure that proper water conservation activities are instituted at the proper times. In general, water supplies that rely on sources with significant storage (reservoir and ground water based systems) will realize greater benefits of water conservation activities initiated early in a drought cycle when compared to supplies that rely solely on free-flowing streams. It is likely that individual private well users, especially those who rely on shallow water table wells, will receive the largest benefit from their early individual initiation of water conservation activities.

The following responses will generally be made upon declaration of individual drought stages.

Drought Watch

- The Virginia Drought Coordinator will declare a statewide or regional Drought Watch and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought watch area of drought watch status.

- The Virginia Drought Coordinator will report the drought watch declaration to the Governor's Cabinet and request the assistance of all state agencies in the implementation of the drought response plan.
- The VDH will inform all public waterworks within the drought watch area of drought watch status.
- The Virginia Cooperative Extension Service will cooperate with all state agencies owning or controlling impoundments and/or river access to identify sources that may be used by livestock producers for emergency livestock watering during declared drought emergencies. VCE will inform livestock producers of these opportunities and will provide contact information necessary to access these sources.
- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator who will update the Governor's Cabinet.
- The DMTF will make monthly reports of drought conditions available to media outlets within the drought watch area.
- The Virginia Drought Coordinator will encourage all public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day to develop or review existing drought water conservation and contingency plans.
- All DMTF agencies will include water conservation information on their websites and will distribute water conservation information as broadly as possible.
- All executive branch agencies and institutions will review existing drought water conservation and contingency plans or develop new plans with the goal of reducing water usage by 15% during declared drought emergencies.
- VDH will continue monitoring problems incurred by public waterworks on a monthly basis.
- VDH will encourage all public waterworks to aggressively pursue leak detection and repair programs.
- Local governments and public waterworks may impose water use restrictions consistent with local water supply conditions at any time.

Drought Warning

- The Virginia Drought Coordinator will declare a statewide or regional Drought Warning and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought warning area of drought warning status.
- The Virginia Drought Coordinator will advise the Governor and his Cabinet regarding the necessity of authorizing the Departments of State Police, Transportation and Motor Vehicles to grant temporary overweight/overwidth/registration/license exemptions to carriers transporting essential emergency relief supplies into and through the Commonwealth in order to support disaster response and recovery.
- The VDH will inform all public waterworks within the drought warning area of drought warning status.
- The Virginia Department of Agriculture and Consumer Services will cooperate with the Virginia Association of Counties, the Virginia Municipal League, Virginia Cooperative Extension, the Virginia Farm Bureau Federation and the Virginia Agribusiness Council in notifying agricultural communities, agriculture

interest groups and local governments within the drought warning area of the potential for federal agricultural drought disaster designation. VDACS will also work with VACO, VML, VCE, VFBF and VAC in communicating the appropriate procedure for local governments to use in applying to the Governor for federal disaster designation.

- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator. Significant changes in drought conditions will be reported biweekly.
- The Virginia Drought Coordinator will update the Governor's Cabinet concerning drought conditions on a biweekly basis.
- The Governor's Press Office will encourage media outlets within the drought warning area to publicize updates of drought conditions by developing biweekly press releases.
- All local governments will be encouraged to review existing local ordinances requiring mandatory non-essential water use restrictions or adopt such ordinances consistent with the mandatory non-essential water use restrictions listed below.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day will initiate voluntary water conservation requirements contained in drought water conservation and contingency plans.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day that have not developed drought water conservation and contingency plans will be encouraged to voluntarily reduce or eliminate non-essential uses of water including the elimination of non-essential flushing of water lines.
- All persons who utilize any source of water for outdoor irrigation will assure that the minimum amount of water is utilized in the most efficient manner practical.
- All self-supplied users who withdraw less than 10,000 gallons per day, including private well users, will be encouraged to voluntarily reduce or eliminate non-essential uses of water.
- All executive branch agencies and institutions will initiate the reduction or elimination of non-essential uses of water with the goal of reducing total water usage by 5-10%.
- VDH will continue monitoring problems incurred by public waterworks on a monthly basis.
- Local governments and public waterworks may impose water use restrictions consistent with local water supply conditions at any time.

Drought Emergency

- The Governor will declare a statewide or regional Drought Emergency by executive order and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought emergency area of drought emergency status.
- The VDH will inform all public waterworks within the drought emergency area of drought emergency status.
- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator. Significant changes in drought conditions will be reported weekly.

- The Virginia Drought Coordinator will update the Governor's Cabinet concerning drought conditions on a weekly basis.
- The Governor's Press Office will encourage media outlets within the drought emergency area to publicize updates of drought conditions by developing weekly press releases.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day will initiate mandatory water conservation requirements contained in drought water conservation and contingency plans that include the mandatory non-essential water use restrictions listed on page 16.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day that have not developed drought water conservation and contingency plans initiate the mandatory non-essential water use restrictions listed below including the elimination of non-essential flushing of water lines.
- All self-supplied users, who withdraw less than 10,000 gallons per day, including private well users, will initiate the mandatory non-essential water use restrictions listed below.
- All executive branch agencies and institutions will implement drought water conservation and contingency plans with the goal of reducing water usage by 15% that include the mandatory non-essential water use restrictions listed on page 16.
- Local governments and public waterworks may impose water use restrictions more stringent than the mandatory non-essential water use restrictions listed below consistent with local water supply conditions at any time.
- For the duration of the declared drought emergency the Director of the Department of Environmental Quality shall be authorized to allocate ground water and surface water resources and to restrict any withdrawals based upon the adequacy of the resource to meet the necessary beneficial uses as set forth in §62.1-44.36 of the Code of Virginia. Such allocations may apply to any withdrawer and shall over-ride any existing authorizations to use or withdraw surface water or ground water.
- For the duration of the declared drought emergency the State Forester shall be authorized to declare open burning bans in wild fire susceptible areas of the Commonwealth.
- For the duration of the declared drought emergency the Departments of State Police, Transportation and Motor Vehicles shall be authorized to grant temporary overweight/overwidth/registration/license exemptions to carriers transporting essential emergency relief supplies into and through the Commonwealth in order to support the disaster response and recovery.
- Volume I, Virginia Emergency Operations Plan (COVEOP) Basic Plan, July 1997 as amended shall be implemented by agencies of the state and local government along with other appropriate state agency plans.
- The Virginia Emergency Operations Center (VEOC) and State Emergency Response Team (SERT) will be activated to coordinate state operations in support of affected localities and the Commonwealth, to include issuing mission assignments to agencies designated in the COVEOP and others that may be identified by the State Coordinator of Emergency Management, in consultation with the Secretary of Public Safety, which are needed to provide for the preservation of life, protection of property and implementation of recovery activities.

- Local governments of the Commonwealth will be authorized to adopt local ordinances to enforce the mandatory non-essential water use restrictions listed below and to establish, collect, and retain fines for violations of these restrictions. Nothing contained in this drought response plan should be construed to limit the powers of local government to adopt and enforce local emergency ordinances as necessary to protect the public welfare, safety and health.

Mandatory Non-essential Water Use Restrictions

The following non-essential water uses will be prohibited during periods of declared drought emergencies. Please note the exceptions that follow each prohibited use. These prohibitions and exceptions will apply to uses from all sources of water and will only be effective when the Governor of Virginia declares a Drought Emergency through the issuance of an executive order. Water use restrictions shall not apply to the agricultural production of food or fiber, the maintenance of livestock including poultry, nor the commercial production of plant materials so long as best management practices are applied to assure the minimum amount of water is utilized.

Unrestricted irrigation of lawns is prohibited.

- Newly sodded and seeded areas may be irrigated to establish cover on bare ground at the minimum rate necessary for no more than a period of 60 days. . Irrigation rates may not exceed one inch of applied water in any 7 day period.
- Gardens, bedding plants, trees, shrubs and other landscape materials may be watered with hand held containers, hand held hoses equipped with an automatic shutoff device, sprinklers or other automated watering devices at the minimum rate necessary but in no case more frequently than twice per week. Irrigation should not occur during the heat of the day.
- All allowed lawn irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Irrigation systems may be tested after installation, routine maintenance or repair for no more than ten minutes per zone.

Unrestricted irrigation of golf courses is prohibited.

- Tees and greens may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary.
- Localized dry areas may be irrigated with a hand held container or hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Greens may be cooled by syringing or by the application of water with a hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Fairways may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary not to exceed one inch of applied water in any ten-day period.
- Fairways, tees and greens may be irrigated during necessary overseeding or resodding operations in September and October at the minimum rate necessary. Irrigation rates during this restoration period may not exceed one inch of applied water in any seven-day period.

- Newly constructed fairways, tees and greens and areas that are re-established by sprigging or sodding may be irrigated at the minimum rate necessary not to exceed one inch of applied water in any seven-day period for a total period that does not exceed 60 days.
- Fairways, tees and greens may be irrigated without regard to the restrictions listed above so long as:
  - The only water sources utilized are water features whose primary purpose is stormwater management,
  - Any water features utilized do not impound permanent streams,
  - During declared Drought Emergencies these water features receive no recharge from other water sources such as ground water wells, surface water intakes, or sources of public water supply, and,
  - All irrigation occurs between 9:00 p.m. and 10:00 a.m.
- All allowed golf course irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Rough areas may not be irrigated.

Unrestricted irrigation of athletic fields is prohibited.

- Athletic fields may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at a rate not to exceed one inch per application or more than a total of one inch in multiple applications during any ten-day period. All irrigation water must fall on playing surfaces with no outlying areas receiving irrigation water directly from irrigation heads.
- Localized dry areas that show signs of drought stress and wilt (curled leaves, foot-printing, purpling) may be syringed by the application of water for a cumulative time not to exceed fifteen minutes during any twenty four hour period. Syringing may be accomplished with an automated irrigation system or with a hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Athletic fields may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. during necessary overseeding, sprigging or resodding operations at the minimum rate necessary for a period that does not exceed 60 days. Irrigation rates during this restoration period may not exceed one inch of applied water in any seven-day period. Syringing is permitted during signs of drought stress and wilt (curled leaves, foot-printing, purpling).
- All allowed athletic field irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Irrigation is prohibited on athletic fields that are not scheduled for use within the next 120-day period.
- Water may be used for the daily maintenance of pitching mounds, home plate areas and base areas with the use of hand held containers or hand held hoses equipped with an automatic shutoff device at the minimum rate necessary.
- Skinned infield areas may utilize water to control dust and improve playing surface conditions utilizing hand held containers or hand held hoses equipped with an automatic shutoff device at the minimum rate necessary no earlier than two hours prior to official game time.

Washing paved surfaces such as streets, roads, sidewalks, driveways, garages, parking areas, tennis courts, and patios is prohibited.

- Driveways and roadways may be pre-washed in preparation for recoating and sealing.
- Tennis courts composed of clay or similar materials may be wetted by means of a hand-held hose equipped with an automatic shutoff device at the minimum rate necessary for maintenance. Automatic wetting systems may be used between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary.
- Public eating and drinking areas may be washed using the minimum amount of water required to assure sanitation and public health.
- Water may be used at the minimum rate necessary to maintain effective dust control during the construction of highways and roads.

Use of water for washing or cleaning of mobile equipment including automobiles, trucks, trailers and boats is prohibited.

- Mobile equipment may be washed using hand held containers or hand held hoses equipped with automatic shutoff devices provided that no mobile equipment is washed more than once per calendar month and the minimum amount of water is utilized.
- Construction, emergency or public transportation vehicles may be washed as necessary to preserve the proper functioning and safe operation of the vehicle.
- Mobile equipment may be washed at car washes that utilize reclaimed water as part of the wash process or reduce water consumption by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Automobile dealers may wash cars that are in inventory no more than once per week utilizing hand held containers and hoses equipped with automatic shutoff devices, automated equipment that utilizes reclaimed water as part of the wash process, or automated equipment where water consumption is reduced by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Automobile rental agencies may wash cars no more than once per week utilizing hand held containers and hoses equipped with automatic shutoff devices, automated equipment that utilizes reclaimed water as part of the wash process, or automated equipment where water consumption is reduced by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Marine engines may be flushed with water for a period that does not exceed 5 minutes after each use.

Use of water for the operation of ornamental fountains, artificial waterfalls, misting machines, and reflecting pools is prohibited.

- Fountains and other means of aeration necessary to support aquatic life are permitted.

Use of water to fill and top off outdoor swimming pools is prohibited.

- Newly built or repaired pools may be filled to protect their structural integrity.
- Outdoor pools operated by commercial ventures, community associations, recreation associations, and similar institutions open to the public may be refilled as long as:
    - Levels are maintained at mid-skimmer depth or lower,
    - Any visible leaks are immediately repaired,
    - Backwashing occurs only when necessary to assure proper filter operation,

    - Deck areas are washed no more than once per calendar month (except where chemical spills or other health hazards occur),
    - All water features (other than slides) that increase losses due to evaporation are eliminated, and
    - Slides are turned off when the pool is not in operation.
- Swimming pools operated by health care facilities used in relation to patient care and rehabilitation may be filled or topped off.
- Indoor pools may be filled or topped off.
- Residential swimming pools may be filled only to protect structural integrity, public welfare, safety and health and may not be filled to allow the continued operation of such pools.

Water may be served in restaurants, clubs, or eating-places only at the request of customers.

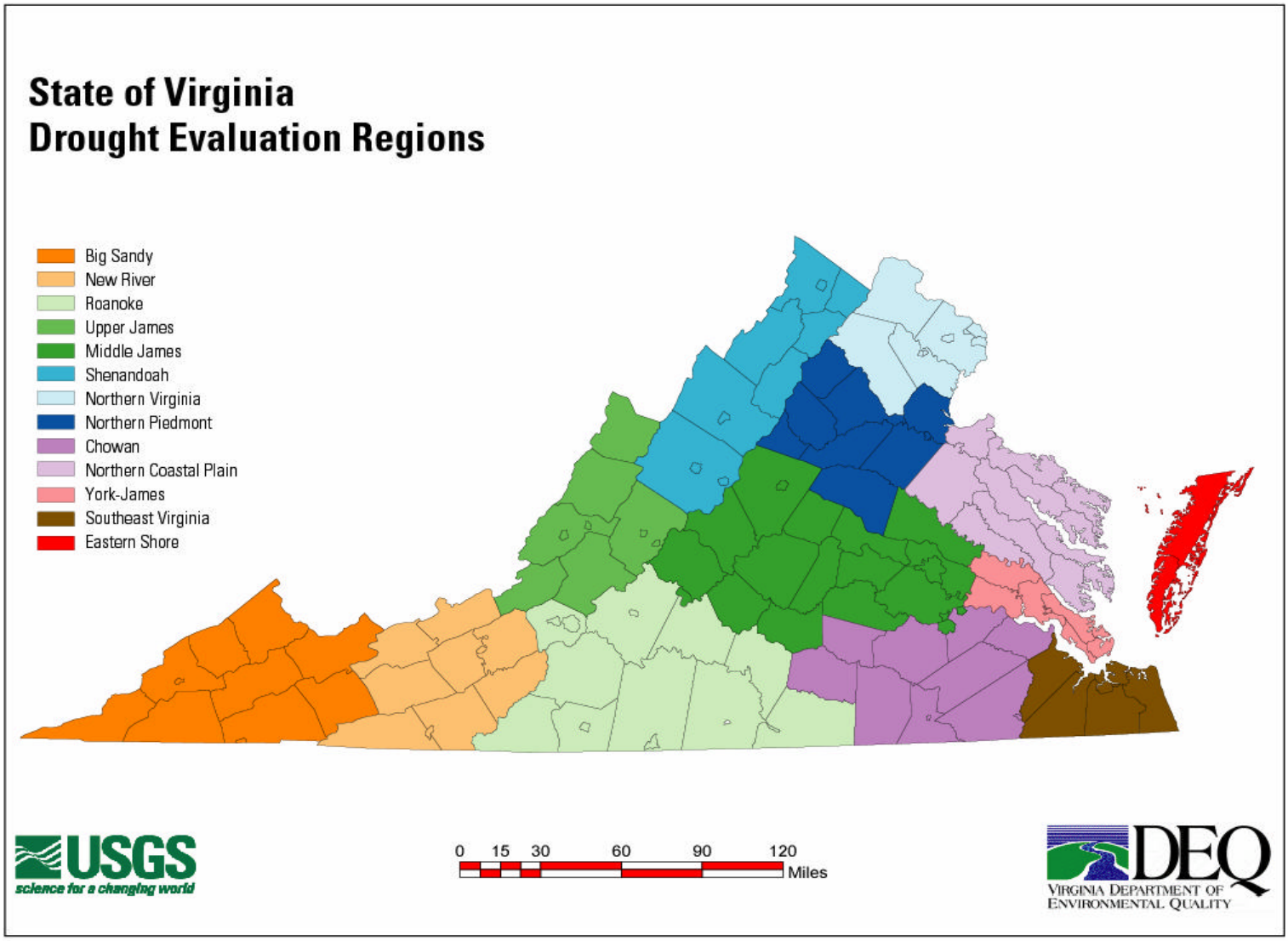
All residential, business and industrial water users; whether supplied by public water supplies, self-supplied sources, or private water wells; who do not normally utilize water for any of the listed prohibited uses are requested to voluntarily reduce water consumption by at least 10%. This reduction may be the result of elimination of other non-essential water uses, application of water conservation practices, or reduction in essential water uses.

Water Rationing

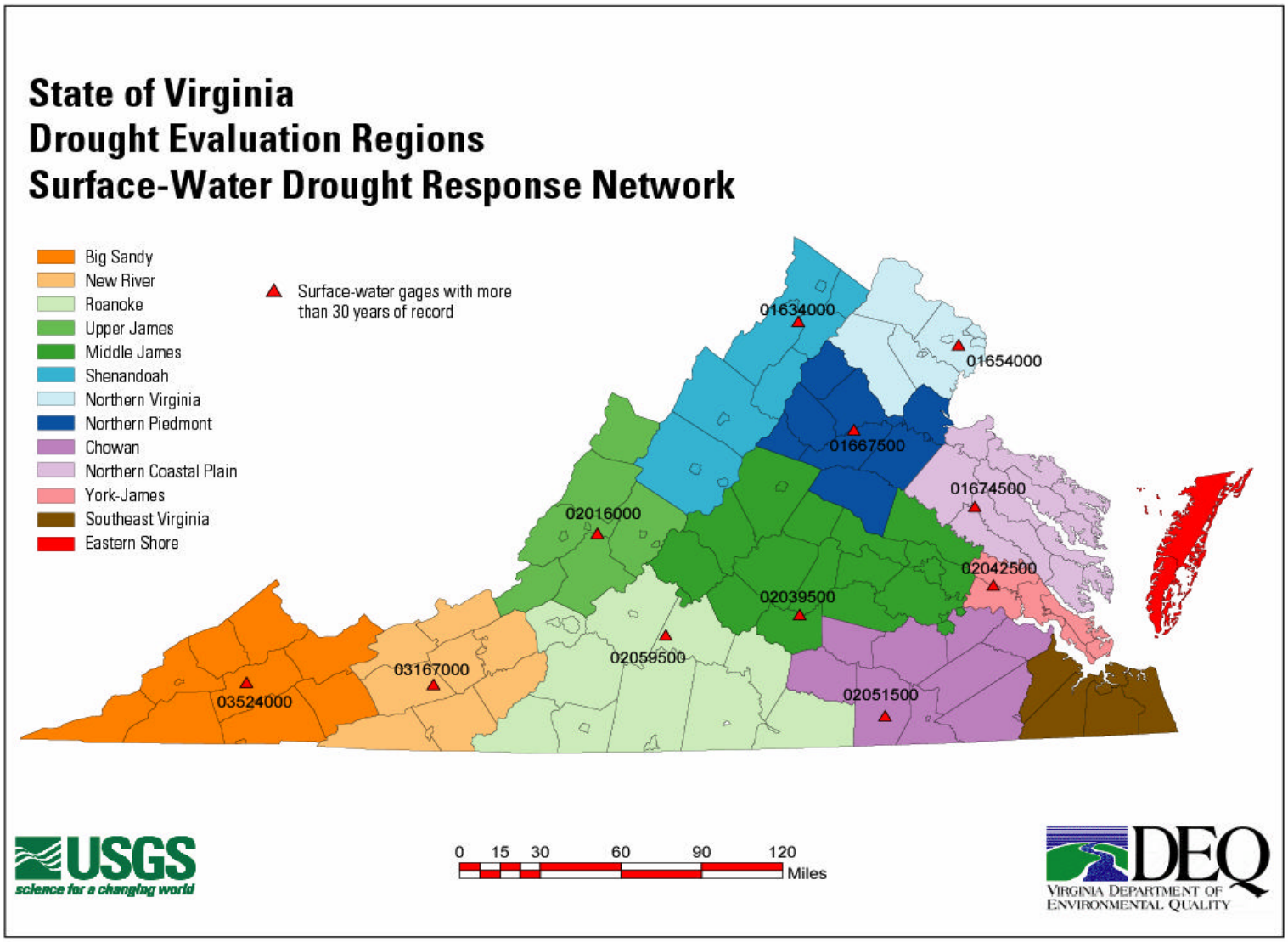
In some cases, the mandatory non-essential water use restrictions may not be sufficient to protect the supplies of an individual public waterworks. When an individual waterworks' sources are so depleted as to threaten public health and safety, it may become necessary to ration water within that system in order to assure that water is available to support essential uses. Rationing water is a more severe measure than merely banning nonessential uses of water. Under rationing, each customer is allotted a given amount of water, based on a method of allotment developed by the waterworks or local government. Generally it will be based on a percentage of previous usage or on a specific daily quantity per household. Rationing is more likely to have some effect on welfare than mandatory non-essential use restrictions, because industrial and commercial water uses may be curtailed or eliminated to assure an adequate supply is available for human consumptive uses.

The decision to ration water will typically be made by the local government or waterworks operator. The Virginia Drought Coordinator will work closely with any entity where water rationing is required to assure that all available State resources are effectively used to support these highly stressed water supply systems. The Virginia Department of Emergency Management (VDEM) is the first point of contact for waterworks or local governments who decide to ration water. VDEM will coordinate the Commonwealth's response and assistance to such entities.

Appendix A


State of Virginia
Drought Evaluation Regions
Big Sandy
New River
Roanoke
Upper James
Middle James
Shenandoah
Northern Virginia
Northern Piedmont
Chowan
Northern Coastal Plain
York-James
Southeast Virginia
Eastern Shore
USGS
science for a changing world
0 15 30 60 90 120
Miles
DEQ
Virginia Department of Environmental Quality

Appendix B


State of Virginia
Drought Evaluation Regions
Surface-Water Drought Response Network
Big Sandy
New River
Roanoke
Upper James
Middle James
Shenandoah
Northern Virginia
Northern Piedmont
Chowan
Northern Coastal Plain
York-James
Southeast Virginia
Eastern Shore
Surface-water gages with more than 30 years of record
01634000
01654000
01667500
01674500
02016000
02042500
02039500
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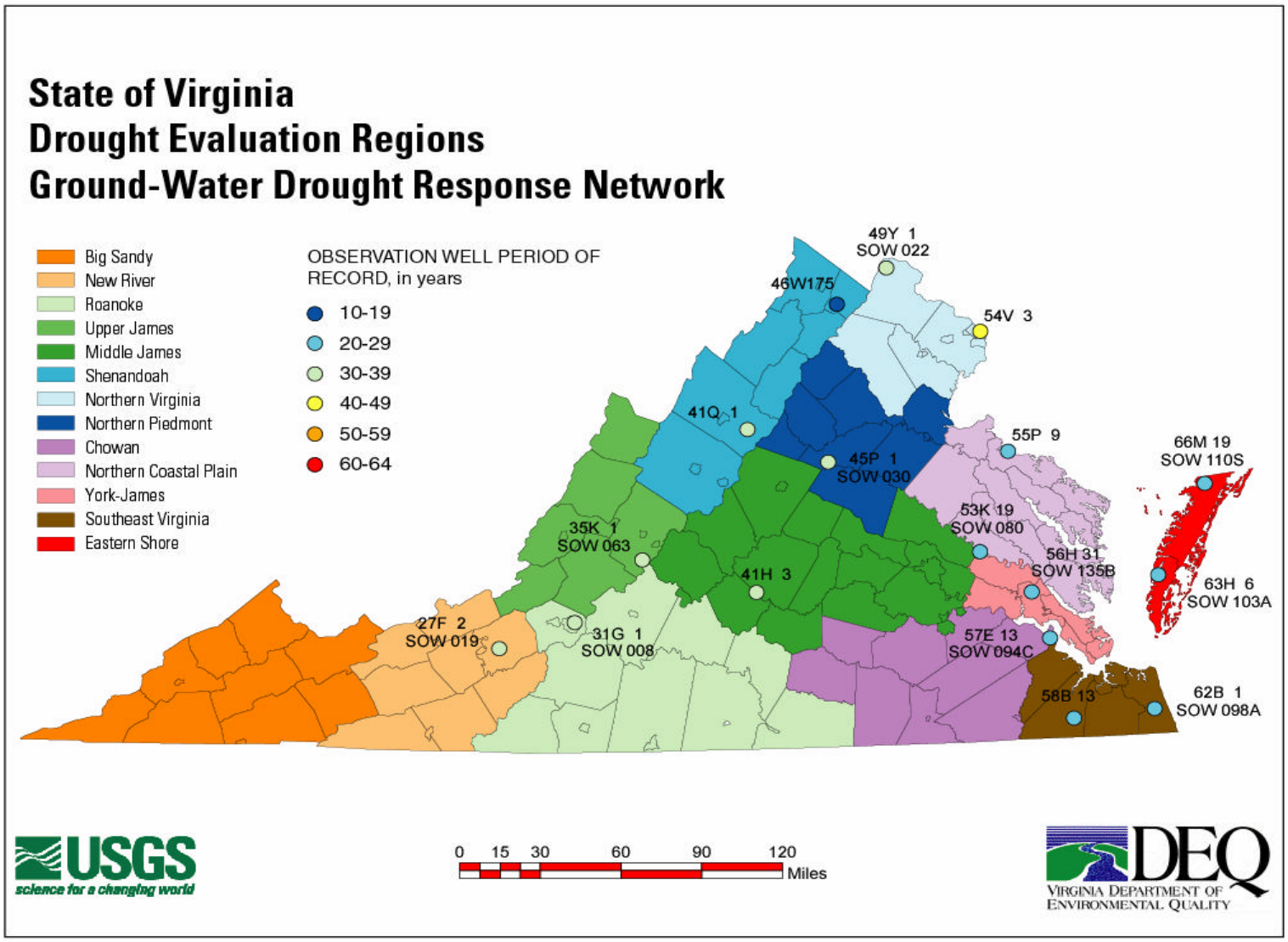
USGS
science for a changing world
0 15 30 60 90 120
Miles
DEQ
Virginia Department of Environmental Quality

Appendix C


State of Virginia
Drought Evaluation Regions
Ground-Water Drought Response Network
Big Sandy
New River
Roanoke
Upper James
Middle James
Shenandoah
Northern Virginia
Northern Piedmont
Chowan
Northern Coastal Plain
York-James
Southeast Virginia
Eastern Shore
OBSERVATION WELL PERIOD OF RECORD, in years
10-19
20-29
30-39
40-49
50-59
60-64
49Y 1 SOW 022
46W175
54V 3
41Q 1
55P 9
45P 1 SOW 030
66M 19 SOW 110S
53K 19 SOW 080
35K 1 SOW 063
56H 31 SOW 135B
41H 3
63H 6 SOW 103A
27F 2 SOW 019
31G 1 SOW 008
57E 13 SOW 094C
58B 13
62B 1 SOW 098A
USGS
science for a changing world
0 15 30 60 90 120 Miles
DEQ
Virginia Department of Environmental Quality

APPENDIX G
Conservation Measure Implementation Schedule

Conservation Measure or Activity	Implementation Status / Date	Contingencies
Water Loss Reduction		
Water Conserving Plumbing Code	On-going	None
Termination of Water Service	On-going	None
Willful Waste of Water Code Amendment	Planned / 2010	Board Approval
Low Flow Plumbing Fixture Requirements	On-going	None
Irrigation Systems Requirements	On-going	None
Water System Pressure Optimization	On-going	None
Water System Audit	Yrs 0 – 2 of permit cycle	None
Unaccounted-For Water Loss Identification	On-going	None
Leak Detection and Repair	On-going	None
Plumbing Retrofit Program	Planned / 2012	Extent based on Resource Availability
Meter Repair and Replacement	Immediately	None
System Demand Reduction		
Water Conservation-Oriented Rate Structure Amendment	Planned / 2010	Board Approval
Landscape Efficiency	On-going	None
Water-sensing Irrigation System Code Amendment	Planned / 2010	Board Approval
Customer Usage Monitoring	On-going	None
Submetering	As needed for new construction	Site Plan Approval
Water Use Education		
Public Awareness and Education Campaign	On-going	None
Citizen Self-Enforcement	Immediately	None
Water-Savings Opportunities for Water-Consuming Processes	Planned / Case-by-case basis	None
Water Conservation Opportunities for Builders & Developers	Immediately	Site Plan Approval
Adoption of Project-Specific Water Conservation Plan Requirement	Planned / 2010	Board Approval
Recycling and Reuse Programs		
Water Reuse Code Requirements	On-going	None
Treatment Plant Effluent Reuse	On-going	None
Proposed Reuse Water Line	Planned / 2011	Plan Approval & Construction
Future Reuse Planning	Immediately	Adoption of Project-Specific Plans
Drought Response and Contingency Plan		
Water Emergency Ordinance Expansion	Planned / 2010	Board Approval
Program Monitoring and Evaluation	Immediately	VDEQ & Board Approval

APPROVED

MITIGATION PLAN

DEQ GROUNDWATER WITHDRAWAL PERMIT NO. GW0007701

OWNER NAME: **New Kent County**

FACILITY NAME: **The Colonies Water System**

LOCATION: **901 & 911 Colony Trail**
Lanexa, VA 23089

INTRODUCTION

On October 15, 2018, New Kent County 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 to provide potable water for The Colonies Water System.

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 The Colonies Water System well field. Predicted drawdown of water levels due to the withdrawal(s) from the Chickahominy-Piney Point aquifer(s) are shown in the attached maps(s).

Modeled impacts, as shown on the attached maps, extend beyond the boundary of The Colonies Water System facility. Due to these findings, New Kent County 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 New Kent County/The Colonies Water System has not caused the adverse impact. New Kent County 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	C. Michael Lang, PG
Title	Assistant Director
Permittee Name	New Kent County
Address	PO Box 150
City, State Zip Code	New Kent, VA 23124

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 New Kent County to locate the well on the claimant's property; (c) the reasons the claimant believes that the The Colonies Water System withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

New Kent County will review any claim within **five (5) business days**. If New Kent County determines that no rebuttal will be made and accepts the claim as valid, New Kent County will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, New Kent County 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, New Kent County will notify the claimant (a) that New Kent County 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 New Kent County, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and New Kent County.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to New Kent County. Within **five (5) business days** of receipt of such notification, New Kent County will notify the claimant and claimant's representative of the identity of New Kent County 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. New Kent County 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 New Kent County 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, New Kent County 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, New Kent County may seek reimbursement from the claimant for the claimant's committee representative and one half of the 3rd representative on the committee.

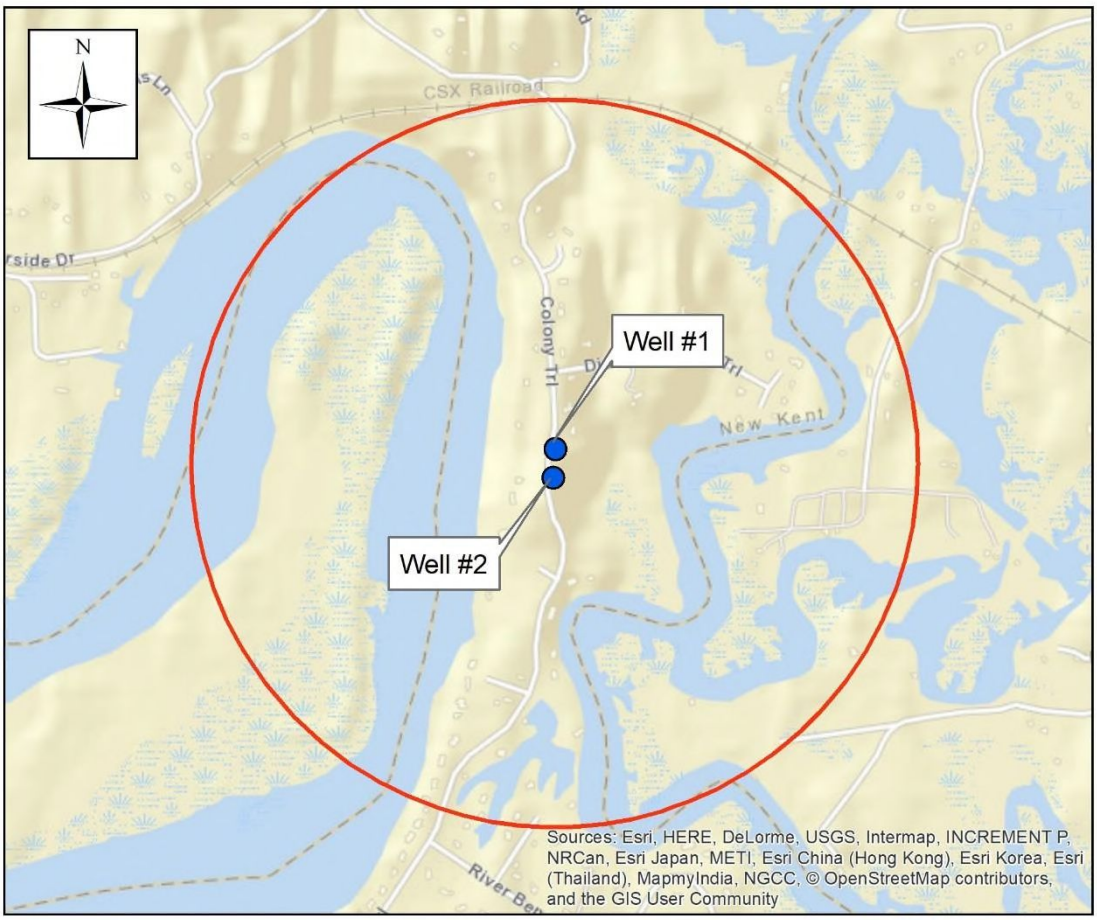
If a claimant within the indicated area of impact indicates that they are out of water, New Kent County will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. New Kent County reserves the right to recover the cost of such emergency supply if the claim is denied by New Kent County or found to be fraudulent or frivolous. If New Kent County denies a claim and the claimant elects to proceed with the three (3) member committee, New Kent County 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, New Kent County 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 the New Kent County/The Colonies Water System Plan other than those owned and operated by New Kent County has contributed to the claimed adverse impact, New Kent County's 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.

Colonies Water System
Area of Impact - Piney Point Aquifer



Colonies Water System Wells

Piney Point AOI

Piney Point Aquifer Critical Cells

0 0.125 0.25 0.5 Miles

Simulated drawdown at or exceeding one foot in the Piney Point aquifer resulting from a 2-dimensional Theis simulation of 50 years at 13,300,000 gallons per year from the Piney Point aquifer. Maximum radius of one-foot drawdown (Area of Impact) occurs 0.6 miles from the pumping center.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning
May 13, 2021

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY