Middle Peninsula: WATER REUSE STUDY

2014

As water regulations tighten and it becomes increasingly important for water resource managers to meet water supply demands for the health of future generations and our natural systems, water reuse is a primary component of comprehensive water resource management in the Middle Peninsula.

This project, Task 52 was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

NOAA

MIDDLE PENINSULA PLANNING DISTRICT COMMISSION

Virginia Coastal Zone MANAGEMENT PROGRAM

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Report Abbreviations

AR – Aquifer Recharge

ASR – Aquifer Storage and Recovery

BOS – Board of Supervisors

CDPH – California Department of Public Health

CZM - Virginia Coastal Zone Management

DCR – Department of Conservation and Recreation

DEQ – Department of Environmental Quality

GWMA - Eastern Groundwater Management Area

EPA – Environmental Protection Agency

HRSD – Hampton Roads Sanitation District

IPR – Indirect Potable Reuse

MBR - membrane bioreactor

MPPDC – Middle Peninsula Planning District Commission

mgd – million gallons per day

RWQCB – Regional Water Quality Control Boards

SWRCB – State Water Resource Control Board

TMDL - Total Maximum Daily Loads

UIC – Underground Injection Control

UV – Ultraviolet

VAC – Virginia Administrative Code

VDH – Virginia Department of Health

VPA – Virginia Pollution Abatement

VPDES – Virginia Pollutant Discharge Elimination

VSMP – Virginia Stormwater Management Program

WSP - Water Supply Plan

WWTF – Wastewater Treatment Facility

Executive Summary

For years water regulations within the Commonwealth of Virginia have tightened in order to protect water quality and manage water supply. In 2011, a line item in the appropriations act and a letter from Delegate Harvey Morgan requested the Virginia Department of Environmental Quality (DEQ) and the Virginia Department of Health (VDH) to examine opportunities to expand water reuse and reclamation. As a result, a substantial amount of work has been completed by the Commonwealth to encourage the expansion of water reuse in order to supplement water supplies and reduce nutrient loads into surface waters.

Additionally, upon recent amendments to the Virginia Stormwater Management Act, the Virginia Stormwater Management Program (VSMP) (9VAC25-870) and the expansion of the Eastern Groundwater Management Area (GWMA) (9VAC25-600), localities are expected to meet additional water quality standards and safeguard water supplies. However each present potential fiscal impacts to local governments and their constituents. Thus commoditizing water resources through water reuse could benefit Middle Peninsula localities through revenue generation, but may also supplement dwindling water supplies and help sustain businesses and economic growth for the future.

To begin to understand water reclamation, the MPPDC was funded through the Virginia Coastal Zone Management Program (CZM) to research and organize general information about water reclamation, associated regulations, and Virginia case-studies. MPPDC staff also organized a Water Ruse Steering Committee, consisting of representatives from member localities and the Hampton Road Sanitation District (HRSD), for educational purposes and for policy discussions.

Based on new research and multiple meetings, this project resulted in a list of recommendations for Middle Peninsula localities to consider as they move forward on water reuse and supply issues: (1) absent a state directive to conserve, concerned localities could implement voluntary measures as outlined in the Regional Water Supply Plan; (2) Develop a model/plan for an exchange program or trading program for groundwater; (3) Explore the idea of developing a funding opportunities for public infrastructure improvements specific to water

reclamation; (4) Identify issues that Virginia Department of Health has with water reclamation and assuming risk, in light of the dwindling water supply; (5) research surface water management areas, surface water rights, and how these rights can be relinquished; and (6) develop cost estimates of water reuse, aquifer recharge, and other technologies for potential funding opportunities.

While such recommendations are not silver bullets to resolving the water resource issues at hand they actions that support supplementing future resources for the Virginia Coastal Plain and the Middle Peninsula.

Introduction

As water regulations tighten and water resource management becomes increasingly important to meet water quality standards and water supply demands for future generations and to maintain the health of environmental ecosystems, water reclamation becomes a viable option, among other techniques, to assist in the comprehensive management of water resources within the Middle Peninsula.

Based on amendments to the Virginia Stormwater Management Act and the Virginia Stormwater Management Program (VSMP) (9VAC25-870) regulations in 2011, localities were required to develop and implement a local VSMP. During 2013, the Middle Planning District Commission (MPPDC) was funded through the Virginia Department of Conservation and Recreation (DCR) to partner with Middle Peninsula localities to develop their local VSMP. In part, a staffing and budget plan estimated the costs of implementing and administrating a VSMP for all Middle Peninsula localities to be approximately $579,000 to $752,000 over the next five years. Such estimates surpassed estimates of the revenue that would be generated from VSMP permit fees for land disturbing activities. In parallel and concurrent efforts with stormwater regulation amendments, the Commonwealth of Virginia expanded the Eastern Groundwater Management Area (GWMA) (9VAC25-600). New regulations added ten localities to the GWMA as well as additional requirements for new or expanding groundwater users. Of

the ten localities added, five were Middle Peninsula localities, making all 9 Middle Peninsula localities part of the GWMA impacted by the new groundwater withdraw regulations.

These regulation changes to meet water quality standards and to improve water supply, present potential fiscal impacts to local governments and their constituents. Thus commoditizing water resources through water reuse may benefit Middle Peninsula localities through revenue generation, but may also supplement dwindling water supplies and help sustain businesses and economic growth for the future.

To begin to understand water reclamation, the MPPDC was funded through the Virginia Coastal Zone Management Program (CZM) to research and organize general information about water reclamation, associated regulations, and Virginia case-studies. MPPDC staff also created a Water Reuse Steering Committee to initiate regional discussions regarding opportunities for water reuse within the Middle Peninsula, relevant State regulatory and local policy concerns/issues, and provide recommendations to move forward with implementing water reuse within the Middle Peninsula.

Product #1: Research and Assessment of Water Reuse and Reclamation

A. Water Reuse & Reclamation- What is it?

According to Virginia Administrative Code (9 VAC 25-740), reclaimed water is "water resulting from the treatment of domestic, municipal, or industrial wastewater that is suitable for a water reuse that would not otherwise occur." This definition excludes gray water[1], harvested rainwater[2], and stormwater[3]. While the federal government does not regulate reclaimed water, the U.S. Environmental Protection Agency (EPA) does provide guidelines. Thus

[1] 9VAC25-740-10. "Gray water" means untreated wastewater from bathtubs, showers, lavatory fixtures, wash basins, washing machines and laundry tubs. It does not include wastewater from toilets, urinals, kitchen sinks, dishwashers, or laundry water from solid diapers.

[2] 9VAC25-740-10. "Harvested rainwater" means rainwater that has been collected off a rooftop through a system that concentrates the rooftop flow and conveys this to a storage device, container, or vessel with the intention of using this water before discharge to waterways via sanitary sewer systems, septic tank or other onsite treatment and disposal systems, or a land based discharge.

[3] 9VAC25-740-10. "Stormwater" means precipitation that is discharged across the land surface or through conveyance to one or more waterways and that may include stormwater runoff, snow melt runoff and surface runoff and drainage.

it is up individual states to establish their own regulations and policies that follow U.S. EPA guidelines or that are more stringent than the guidelines. In 2008, the Commonwealth of Virginia promulgated regulations for water reclamation and reuse to promote and encourage the reclamation of wastewater "in a manner that is protective of the environmental and public health, and as an alternative to discharging treated effluent to state water."

To give a basic snapshot of how the water reclamation process occurs, we begin at a municipal wastewater treatment plant where wastewater is collected and subjected to a series of treatments (Figure 1). First, wastewater will follow through bar screens and grit chambers to remove large pieces of debris and heavy inorganic particles. Next, primary treatment of the water occurs in sedimentation tanks where larger organic solids are able to

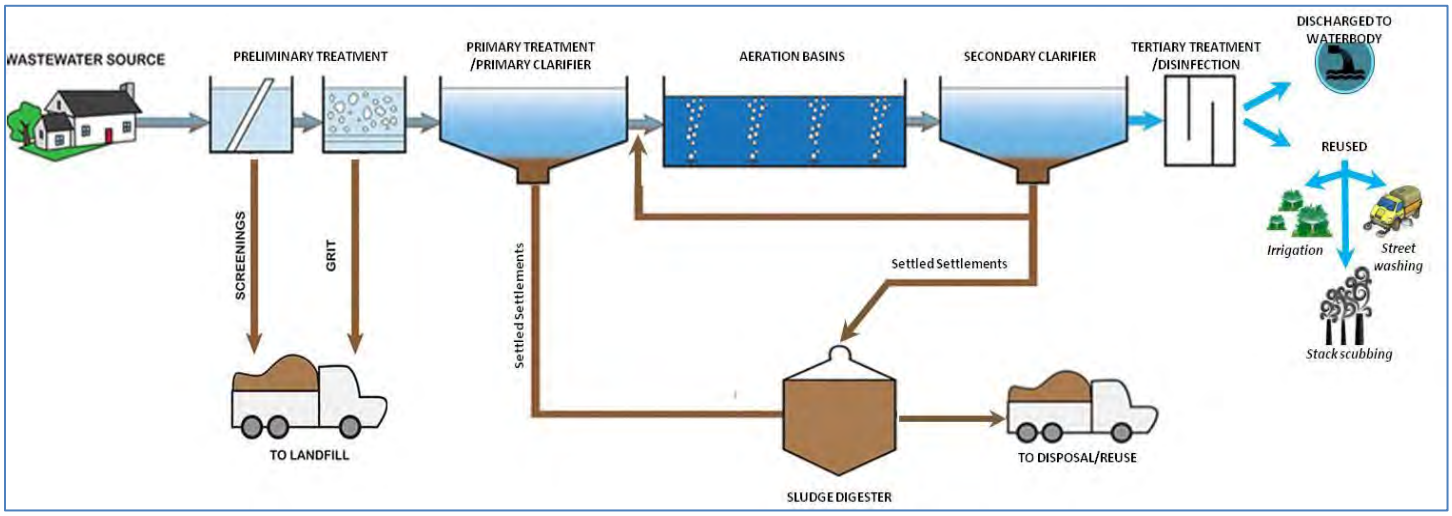


Figure 1: The general process of water reclamation at a municipal wastewater treatment facility. Please note that not all systems are designed exactly alike.

settle to the bottom and separate from the water. Then, water flows through secondary treatment at which point it enters aeration tanks with microorganisms that will feed on pollutants. Finally, there is tertiary treatment and disinfection which make the water compliant with effluent standards for discharge into an adjacent body of water and/or treated to meet water reclamation standards.

Water treated to reclamation standards can only be reused for a direct beneficial use, an indirect potable reuse, an indirect nonpotable reuse, or a controlled use as define in Virginia Administrative Code (9VAC25-740-10):

Direct Beneficial Use: the use of reclaimed water in a manner protective of the environment and public health that involves transport of the reclaimed water from the point of reclamation treatment and production to the point of use without an intervening discharge to waters of the state.

Indirect Potable Reuse (IPR): the discharge of reclaimed water to a receiving surface water for the purpose of intentionally augmenting a water supply source, with subsequent withdrawal after mixing with the ambient surface water and transport to the withdrawal location, followed by treatment and distribution for drinking water and other potable water purposes.

Indirect Nonpotable Reuse - the discharge of reclaimed water to a receiving surface water for the purpose of intentionally augmenting a water source, followed by withdrawal from the water source with or without mixing and transport to the withdrawal location, for reuse or distribution for reuse other than indirect potable reuse.

Controlled Use- a use of reclaimed water authorized in accordance with this chapter.

Reclaimed water is treated to one of two standards – Level 1 or Level 2 – depending on the use. Reclaimed water meeting Level 1 standards is treated and disinfected to a higher standard and suitable for ***reuses with potential for public contact.*** Level 2 treated water is not as highly treated and disinfected as Level 1 reclaimed water but is suitable for ***reuses where there is little or no potential for public contact***. *Please refer to Appendix A for a table of treatment standards for reclaimed water.* Table 1 provides examples of reuses of reclaimed water meeting Level 1 and Level 2 treatment standards.

Table 1: Reuses of Reclaimed water (DEQ, 2012).	
Level 1 Reclaimed Water	**Level 2 Reclaimed Water**
• All types of landscape irrigation in public access areas (i.e. golf courses, cemeteries, public parks, school yards and athletic fields) • Non-residential toilet flushing • Fire fighting or protection and fire suppression in non-residential buildings • Outdoor domestic or residential reuse (i.e. lawn watering and non-commercial car washing) • Commercial car washes • Commercial air condition systems • Irrigation for any food crops not commercially processed, including crops eaten raw • Landscape impoundments with potential for public access or contact • Commercial laundries	• Irrigation for any food crops commercially processed • Irrigation for non-food crops and turf, including fodder, fiber, and seek crops; pasture for livestock; sod farms; ornamental nurseries; and silviculture • Landscape impoundments with no potential for public access or contact • Soil compaction • Dust control • Washing aggregate • Making concrete • Livestock watering • Aquaculture • Stack scrubbing • Street washing • Boiler feed • Ship ballast • Once-through cooling • Recirculating cooling towers

As one can notice from the table above reclaimed water cannot be sent directly to a drinking water distribution system for human consumption. However, reclaimed water may be used for drinking water only when it is discharged to and combined with surface water, such as a lake or stream that is used for a drinking water supply. After mixing, the combined reclaimed and surface water may be withdrawn, treated to meet drinking water standards and then distributed. This is referred to as indirect potable reuse.

B. Permitting Reclamation Projects

Reclamation systems associated with a wastewater treatment facility (WWTF) that has or will have a surface water discharge is covered under the Virginia Pollutant Discharge

Elimination System (VPDES) permit to the WWTF. A reclamation system associated with a WWTF that does not or will not have a surface water discharge is covered under the Virginia Pollution Abatement (VPA) permit issued to the WWTF. Satellite reclamation systems and reclaimed water distribution systems that are independently owned or managed generally require a VPA permit. Permittees work with DEQ staff on permit conditions based on project specifies.

C. Water Reclamation in the Middle Peninsula and Beyond

To-date there are no active reclamation plants in the Middle Peninsula region. However Hampton Roads Sanitation District (HRSD) is currently pursuing a project with Nestle Purina Tidy Cat Litter Company in King William County that will utilize the total amount of 30,000 gallons of treated wastewater per day from the King William Wastewater Treatment Plant for the production of Tidy Cat Litter. HRSD will construct a 2.5 mile water reuse pipe from the King William Wastewater Treatment Plant to the property line of the Nestle Purina at which point Nestle will construct the necessary infrastructure to reach the pipe from the plant. This project will result in a zero discharge from the wastewater treatment plant.

In conjunction with this pending project in the region, Middle Peninsula localities have taken action in support of groundwater as well as water reuse with the passing of resolutions. First, in September and November of 2013, the Middlesex County Board of Supervisors (BOS) as well as the MPPDC passed resolutions *requesting that the Virginia Department of Environmental Quality take proactive measures to restore artesian head pressure and reduce high chloride concentrations in the Potomac aquifer.* Then on May 6, 2014, the Middlesex County BOS passed a resolution *urging our Governor, our Secretary of Natural Resources, the Director of Virginia Department of Environmental Quality, our Senator and our Delegate to save our potable water supply by sensible reuse of Water for agricultural and industrial purposes, while lowering the total load of nutrients reaching the Chesapeake Bay.* These resolutions have been forwarded to the respective parties and agencies mentioned in the resolutions, yet the responses have been minimal. Please refer to Appendix B for copies of the resolutions.

Outside of the Middle Peninsula there are a handful of localities within the Commonwealth implementing water reclamation that can ultimately be used as examples for future projects in the Middle Peninsula region. New Kent County, located directly west of the Middle Peninsula region, has been providing reclaimed water for the last three years. It all started with New Kent County's Director of Public Utilities, Mr. Larry Dame, expressing interest in this technology and bringing his idea to the Board of Supervisors (BOS). The BOS authorized the design of a reclamation facility in 2008 and upon completion of the design, funding became available through the American Recovery and Reinvestment Act of 2009. Upon receipt of funding, New Kent County upgraded their Parham Landing Wastewater Treatment Plant to accommodate water reclamation. The reclamation plant was designed and constructed to reclaim 2 million gallons per day (mgd) and was in full operation by January 2011. This became the first reclamation in the Commonwealth to send out water to customers. Table 2 below provides plant performance numbers for 2012 – 2013. Since its beginning the New Kent County Reclamation plant has had service contracts with three businesses to purchase and receive reclaimed water, including Brickshire Golf Course, Royal New Kent Golf Course, and Colonial Downs Race Track. The golf courses use the reclaimed water for irrigation and the race track uses the water for irrigation as well as dust control. While utilizing reclaimed water is a

Table 2: New Kent County Reclamation Plant Performance

	2012	**2013**
Total flow received at the plant	92.3 million gallons	91.5 million gallons
Total flow sent to Reclaimed	43.6 million gallons	28.8 million gallons
Revenue received from Reclaimed Water Sales	$32,700	$21,685
Nutrient Exchange Revenue	$26,155	$30,014
Percent discharged to river of the total wastewater received at the plant	52.7%	68.5%
Months that Reclaimed water was sent to customers	May through October	May through October
Discharges to the Pamunkey River	No discharges for six months of the year	No discharges in May and August. The other months saw limited discharge.

voluntary option for businesses, Colonial Downs Race Track was practically pushed to utilize the reclaimed water due to the County's water supply circumstances. Since groundwater is the sole source of potable water in New Kent County, Colonial Downs attempted to renew their permit for groundwater in 2007. However DEQ deemed irrigation for the racetrack a "non-beneficial" use, and denied the permit for additional irrigation/dust control allocation. Revenue generated from this reclamation plant has come from the three businesses purchasing reclaimed water at a rate of $2.38 per 1000 gallons as well as from the selling of nutrient credits to sources facing more expensive nutrient control options at market value. *Please see Appendix D Attachment 1 for more information about the New Kent County Reclamation Plant.*

Other reclamation projects occurring in the Commonwealth include:

- The Broad Run Water Reclamation Facility in Ashburn, Virginia is permitted to produce 11 million gallons day of reclaimed water. The facility uses preliminary screening/grit removal, primary clarification, fine screening (2 mm), flow equalization, a membrane bioreactor (MBR), activated carbon and UV disinfection to produce Level 1 reclaimed water for turf and landscape irrigation; toilet flushing; fire fighting and protection; and evaporative cooling.

- The City of Bedford has eliminated discharges into the Little Otter River from the Bedford City WWTP. Through a new water reclamation and reuse system the City of Bedford saves approximately 500,000 gallons of potable drinking water each month, adding up to an additional 6 million gallons per year of potable drinking water a month. Bedford currently sells reclaimed water to local businesses, including a food packaging facility for cooling.

- The Noman Cole, Jr. Pollution Control Plant in Fairfax County is permitted for the production of 1.2 billion gallons of water a year. The majority of the water is being sent to Covanta Fairfax Resource Recovery Plant to process household trash into energy as the plant uses up to 1.3 mgd for cooling towers. The remaining reclaimed water is sent to the Laurel Hill Golf Course and the Lower Potomac Park for irrigation.

Beyond the Commonwealth, Florida and California lead the nation with water reclamation programs/projects. In Florida, approximately 719 mgd of reclaimed water was reused for beneficial purposes in 2013. This represents an average per capita reuse of 37 gallons per day per person. Reusing this amount of reclaimed water has been estimated to have avoided the use of over 139 billion gallons of potable quality water and ultimately preserving

groundwater supplies. The total reuse capacity of Florida's domestic wastewater treatment facilities has gone from 362 mgd in 1986 to 1,691 mgd in 2013 which is equal to a 367% increase. Reclaimed water from public access reuse systems was used to irrigate 343,782 residences, 536 golf courses, 948 parks, and 358 schools. Irrigation of these areas accessible to the public represented about 54% of the 719 mgd of reclaimed water reused.

In California, statutes governing water use and the protection of water quality are contained in the California Water Code, which includes varying degrees of permitting authority by nine Regional Water Quality Control Boards (RWQCB), the State Water Resources Control Board (SWRCB), and the California Department of Public Health (CDPH). Each RWQCB is given authority to regulate specific reclaimed water discharges through the establishment of Water Quality Control Plans (Basin Plans), which include water quality objectives to protect beneficial uses of surface waters and groundwater within the region. The SWRCB is authorized to adopt statewide policies for water quality control, which are then implemented by each RWQCB. Due to low seasonal rainfall, large population centers, and strong agricultural demands, reclaimed water has been utilized within the state of California for almost a century to meet irrigation and other nonpotable water needs. A 2009 Municipal Wastewater Recycling Survey released by the SWRCB identified 600 mgd of reclaimed water being used in California - 37% used for agricultural irrigation, 24% for landscape and golf course irrigation, and 19% for groundwater recharge and injection into seawater intrusion barriers (SWRCB, 2011). Other uses included natural system restoration (ie. wetlands and wildlife habitat), recreational impoundments, and geothermal energy production.

D. Benefits of Water Reclamation & Reuse

When environmentally and economically justified, water reclamation can maximize existing water supplies. This can provide for future economic growth, sustainable stewardship of precious water resources, and an alternative to water customers. More specifically reclaimed water can offer multiple benefits:

- ***Supplement and conserve drinking water and groundwater supplies.*** Reclaimed water can and has reduced stresses on high quality surface and groundwater supplies. As

population slowly increases in the Middle Peninsula, reclaimed water may assist in prolonging the water supply for citizens over a longer period of time. Additionally existing permit holders will need sustainable supplies to continue business as normal. For instance, the RockTenn Papermill in the Town of West Point is permitted to withdraw 23 mgd. Without water this mill is at risk of closing and having a drastic impact on the local economy. DEQ continues to access water resources and consider permit applications. If permit applications propose non-essential uses of water (ie. irrigation, dust control, etc.), it is highly likely that permits will be denied and that there will be an increased need for reclaimed water.

- ***Reduce nutrient loads.*** When a reclamation system is implemented, effluent from wastewater treatment plants is reduced or no water is discharged into adjacent water bodies. For Middle Peninsula localities and other localities affected by Chesapeake Bay Total Maximum Daily Loads (TMDL), water reclamation and reuse could help localities meet local and Bay nutrient loads. Additionally, as a wastewater treatment plant reduces their overall nutrient load into adjacent water bodies, this positions them within the Chesapeake Bay Nutrient Credit Exchange Program to sell their nutrient credits and generate revenue.

- ***Supplemental nutrients for crops.*** While reclaimed water may reduce discharges of nutrient loads to adjacent water bodies, reclaimed water may be a great source of nutrients for crops through irrigation. Reclaimed water can be inserted into business fertilization plans.

- ***Save money.*** Typically, reclaimed water is cheaper than drinking water because it requires little to no additional treatment over that of the high-quality wastewater currently discharged. For instance, in New Kent County the price of 1000 gallons for reclaimed water is $2.38 and in Fairfax County the price for 1000 gallons for reclaimed water is $1.81. When compared to drinking water, costs of reclaimed water are 50% or more less. For instance, residential drinking water in New Kent County is $7.48 per 1000 gallons for the first 0-6,000 gallons used, which is approximately three times the price of reclaimed water. Needless to say this as the potential to reduce industry costs for large consumers.

- ***Offset the need for new water sources and treatment plants.*** Reclaimed water can delay both the need to find new drinking water resources and future expansions of water and wastewater treatment plants. This in turn, minimizes long-term capital invest in new infrastructure needs.

E. Challenges of Water Reclamation

According to a recent publication from Mission H_20, a stakeholder group focused on water supply issues in Virginia, there are multiple challenges to water reclamation specific to the Eastern Groundwater Management Area, which includes all Middle Peninsula localities.

First, regulatory omissions within the VAC create many obstacles to implementation of this technology. For instance, existing regulations require reuse systems to distribute reuse water under contract with the end user. For a municipal utility, this allows the end user to negotiate the cost of the reclaimed water, rather than at a rate established by the locality that could help cover connection fees, capital recovery fees or capacity. Thus such rate structures are generally financially unsustainable for localities. Additionally the Commonwealth of Virginia currently has few regulatory or financial incentives to explore reclaimed water as an alternative water source. Some may argue that having two levels of treatment does not seem necessary, the majority of reclamation plants could treat to Level 1 standards or higher so that it could be reused for all water regulated reuses.

Second, the funding of capital costs for reuse water infrastructure as well as the operation and maintenance of a facility is a major obstacle. With the need for pipelines, pumping/booster stations, storage tanks, additional treatment units (e.g. filtration, chlorination and Ultraviolet treatment) and easements to route infrastructure the costs quickly add up to the millions.

Third, public perception of reclaimed water may hinder use of the resource. With an idea that reuse water is dirty or sewage, ample public outreach could help debunk the stigmas surrounding this resource.

Finally, supplying the proper quality and quantity demand of reclaimed water is a limitation of the current technology. As end users of reclaimed water require various levels of water quality and as providers of reclaimed water need to meet effluent standards for discharge as well as the needs of the end users, the technology limitations do not allow for quick – “on the fly” – adjustments to meet all water quality needs. In addition maintaining an adequate supply for all reuses, especially during peak months may be difficult to attain.

For more detailed information and for the full report from Mission H20 please see Appendix D Attachment 4.

F. Current Water Usage and Supply in the Middle Peninsula?

In 2003, the Virginia General Assembly amended the Virginia Administrative Code (9VAC 25-780) to require the development of a comprehensive statewide water supply planning process that would: (1) ensure adequate and safe drinking water is available to all citizens of the Commonwealth, (2) encourage, promote, and protect all other beneficial uses of the Commonwealth's water resources, and (3) encourage, promote, and develop incentives for alternative water resources. Additionally, the General Assembly required that local or regional water supply plans be prepared and submitted to the DEQ in accordance with the criteria and guidelines developed by the Virginia Water Control Board. Therefore to keep Middle Peninsula localities compliant, MPPDC staff worked with member localities, excluding Gloucester County (who partnered with the Hampton Roads Planning District Commission), to develop a regional water supply plan (WSP).

The WSP reviewed the regional water supplies, regional water demands, and projections of future use and needs. It found that projected total water demand through the planning period (2007 – 2040) within the planning region could exceed existing water supplies identified in the WSP. Available water supplies were projected as a range between 34 mgd and 59 mgd of combined surface and groundwater. The projected total demand would exceed 100% of the low end of the range and an additional 1.5 mgd of new supply would be required to make up the difference. The projected total demand/supply balance (Table 3), however, disguises the shortfall that would be experienced by two of the community systems. Rapid growth in King William County and the Town of West Point is expected to result in demand exceeding existing system capacity during the planning period. King William County could exceed capacity before 2020 at current rates of increase, while the Town of West Point could exceed capacity between 2020 and 2030.

Table 3: Summary Table – Balance of water needs (in mgd) throughout planning period (2007-2040).

Water Source	2007	2010	2020	2030	2040
Community System	1.530	1.576	2.877	4.345	5.750
Large industrial self-supplier (Rock-Tenn)	23.033	23.033	23.033	23.033	23.033
Other large industrial self suppliers	0.195	0.195	0.195	0.195	0.195
Large agricultural self-suppliers (surface water)	2.056	2.056	2.056	2.056	2.056
Large agricultural self-suppliers (groundwater)	0.023	0.023	0.023	0.023	0.023
Small self-suppliers outside community systems (Residents)	3.14	3.20	3.46	3.74	4.06
Small self-suppliers outside community systems	0.32	0.33	0.36	0.39	0.42
TOTAL	**30.297**	**30.413**	**32.004**	**33.782**	**35.537**
Available water = (32-57 mgd from aquifers + 2 mgd existing surface water)	34-59	34-59	34-59	34-59	34-59
Balance:					
Water demand as a % of total available water (lower limit = 39 mgd)	51% - 89%	52% - 90%	54% - 94%	57% - 99%	60% - 105%

In conjunction with this regional WSP, findings in recent research reports and models depict new data and reflect a critical water shortage. First according to a USGS study, focused on groundwater availably of the Northern Atlantic Coastal Plain, there have been significant groundwater level declines across this region. Specifically, in some areas, such as southeastern Virginia, these declines are greater than 200 ft resulting in water-level altitudes of more than 100 ft below the mean sea-level elevation of 1929. Figure 2 depicts the water-level changes from predevelopment to 1980 in the Middle Potomac aquifer for the North America Coastal Plain. Based on the map, water level declines of 10ft to greater than 100 ft has already impacted portions of the Middle Peninsula (ie. Gloucester, King William, and King & Queen Counties as well as the Town of West Point).

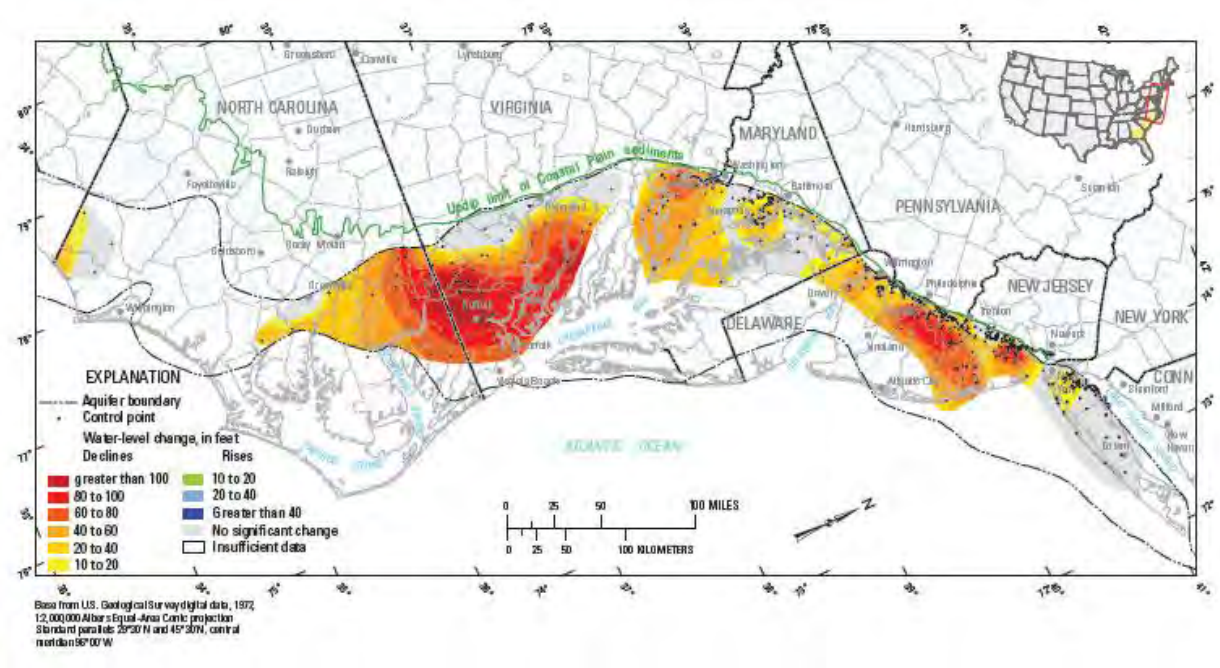


Figure 2: Water-level changes from predevelopment to 1980 in the Middle Potomac Aquifer for the North Atlantic Coastal Plain (DePaul and others, 2008).

In addition, recent simulations completed by DEQ show depleting resources throughout coastal zone aquifers. Among the simulations two in particular took a glimpse at resources from 2013 – 2062 in the Potomac Aquifer as well as the Piney Point Aquifer. Both aquifers supply Middle Peninsula localities with groundwater, and are expected to decline with time. In the Piney Point simulation (Figure 3), groundwater levels are expected to drop between 0-140 ft in the Middle Peninsula. The simulation also depicts areas within King William, King & Queen and Essex Counties as well as the Town of West Point that will dewater and/or reach an 80% criterion violation. In the Potomac Aquifer simulation (Figure 4), groundwater levels are expected to drop between 0 ft and >160ft in the Middle Peninsula.

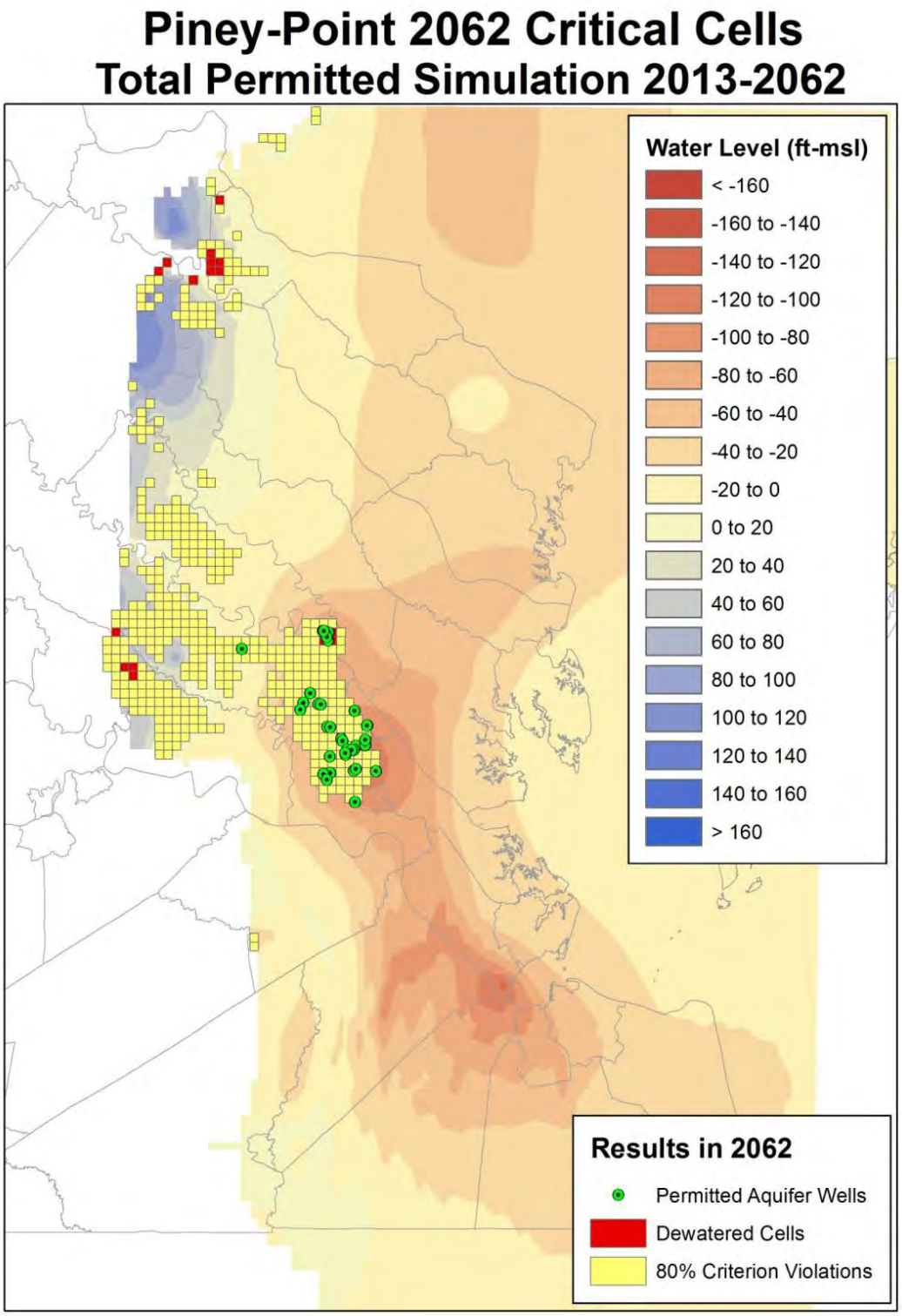


Figure 3: Piney-Point Aquifer simulation of groundwater levels from 2013-2062

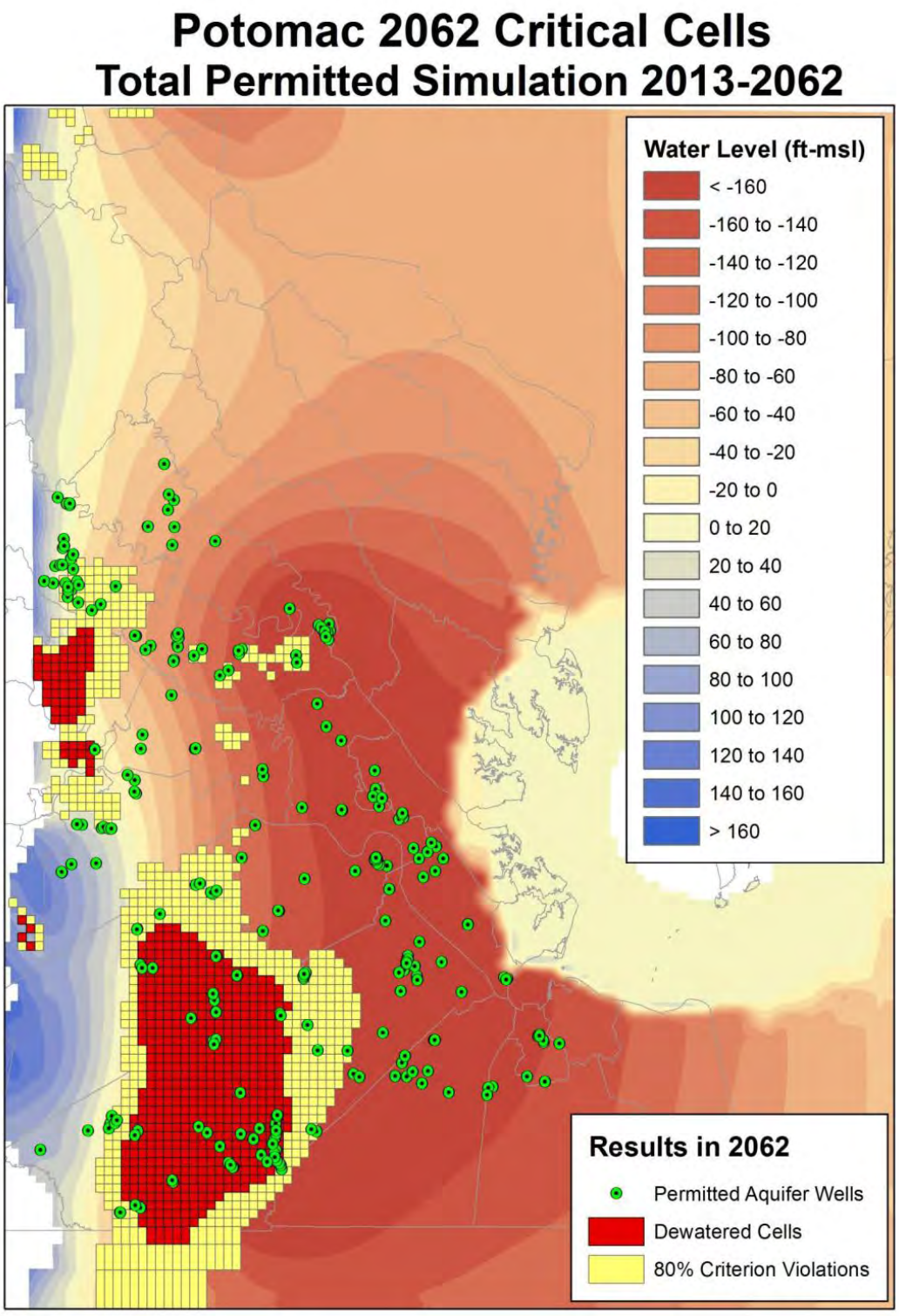


Figure 4: Potomac Aquifer simulation of groundwater levels from 2013-2062.

With obvious pending water resource decline in the short-term, Middle Peninsula localities must consider all available water resource options – from water conservation measures to water reuse to aquifer recharge – to sustain a viable economy and way of life in the region.

While water reuse presents itself as a viable option to reduce the pressure on water supply there are other options to consider in supplementing water supply and demand within the region including: (1) aquifer recharge (AR) and aquifer storage and recovery wells (ASR), (2) desalination, (3) stormwater/rainwater harvesting and (4) water conservation.

Regulated by the U.S. EPA's Underground Injection Control (UIC) Program, aquifer recharge and aquifer storage and recovery wells can supplement water supplies. While an aquifer recharge well is used only to increase the water supply in an aquifer, ASR wells are used to store water in the ground and to recover stored water either using the same well or by pairing injection wells with recovery wells located on the same well field. AR wells may be utilized to deter salt water intrusion into freshwater aquifers and to control land subsidence (Figure 5). For instance in southern California, seawater intrusion causes contamination of the groundwater with salt. This generally occurs as groundwater levels approach sea level as a result of groundwater withdraws by humans. As groundwater withdraws increase and groundwater levels decrease this reduces the overall freshwater pressure, which allows saltwater to move into the groundwater source. Therefore in some coastal of areas of California seawater intrusion barriers are created with the use of groundwater injection well. As potable water is injected into the aquifer groundwater levels increase and blocks the intrusion of

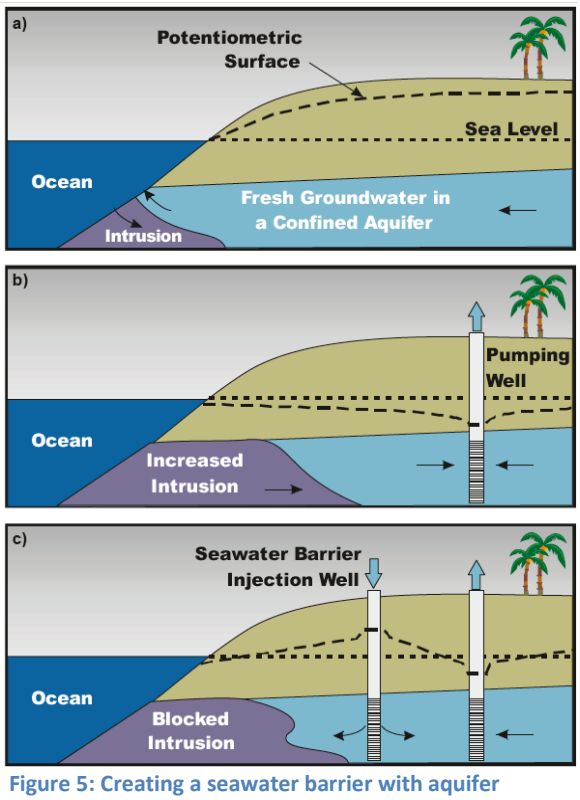


Figure 5: Creating a seawater barrier with aquifer recharge.

additional seawater. Ultimately a wall is created along the line of inject wells to overcome the pressure of the seawater. ASR wells have been used to store and recover water for drinking supplies, irrigation, and ecosystem restoration projects. Water injected into AR and ASR wells is typically treated to meet primary and secondary water standards. AR and ASR wells may be drilled to various depths depending on the depth of the receiving aquifer which is confined, semi-confined or unconfined. Currently in the Commonwealth there are no AR or ASR wells. However at the July 22, 2014 meeting of the Hampton Roads Sanitation District Commission, a new Capital Improvement Project was approved to evaluate the feasibility of using highly treated wastewater for aquifer replenishment. This project could provide multiple benefits, such as attracting economic development by relaxing groundwater withdrawal restrictions, repairing the aquifer and potentially protecting it from saltwater intrusion, allowing the aquifer to be cost-effectively used as a water distribution source as opposed to building reclaimed water distribution pipelines, slow land subsidence which is amplified by sea-level rise and act as a catalyst to using EPA's integrated water planning approach.

Desalination is the art of removing salt and minerals from salt or brackish waters. To make the water potable, membrane filtration, which includes reverse osmosis (RO) and electrodialysis (ED), and ion exchange, is used to remove the salt and minerals for the water. Currently within the Commonwealth there are five desalination plants that utilize brackish water.

Rainwater is the collection, conveyance, and storage of precipitation from roof surfaces. It may be part of an overall stormwater management program but harvested rainwater is not intended for releases into a waterway. VDH recommends that harvested rainwater be restricted to non-potable activities (ie. irrigation, making cement, etc.).

Finally, water conservation may reduce one's use of the water resource which will help alleviate pressure on the resource. If constituents and businesses reduced non-essential water uses, including using water to wash down streets sidewalks, driveways, automobiles, or to water shrubbery, or fill/refill swimming pools there could be addition water resources available to keep business open and for drinking water.

Product #2: Water Reuse Steering Committee

To gain an understanding of local perspectives and to have local guidance through this project, MPPDC staff created a Water Reuse Steering Committee. MPPDC staff solicited committee appointments from all Middle Peninsula localities (ie. Essex, Gloucester, King & Queen, King William, Mathews, and Middlesex Counties and the Towns of West Point, Tappahannock, and Urbanna) but only received responses from those localities below. The Committee consisted of the following participants:

Mr. Jim Pyne, Chief of Small Communities	Hampton Roads Sanitation District
Mr. Peter Mansfield, BOS Member	Middlesex County
Mr. Brenton Payne, Utilities Department	Gloucester County
Mr. Edwin Smith, BOS Member	Essex County
Mr. Walter Feurer, Director of Utilities	Town of West Point
Mr. Jack White, BOS Member	Mathews County

Throughout this project, the Water Reuse Steering Committee met on three separate occasions. At the first meeting MPPDC staff invited Ms. Valarie Rourke, Virginia Department of Environmental Quality Agency Coordinator of Water Reclamation and Reuse and Land Treatment, to give a presentation to the Committee. She reviewed the Commonwealth's Water Reclamation and Reuse Regulations (9VAC 25-740) and the required components of implementing a water reclamation project (Appendix C). At the second meeting MPPDC staff invited Mr. Larry Dame, New Kent County Director of Public Utilities, to provide an overview the County's Water Reclamation System implemented in 2011 (Appendix D). Upon discussions at this meeting Committee members expressed interest in hosting a third meeting with the State Agencies as well as local industries to review the water supply issues of the region. Therefore MPPDC staff organized a third meeting and invited representatives from Virginia Department of Environmental Quality, RockTenn paper mill, as well as Delegate Keith Hodges representing Virginia's 98th District (Appendix E). At this meeting multiple recommendations were generated to move forward in improving water supply and encouraging reuse. For more specific information and discussion details from Steering Committee meetings, please refer to Appendix C, D, and E for meeting agendas, handouts, and minutes.

Conclusions & Recommendations:

As a result of this project, Middle Peninsula localities, DEQ, HRSD, private firms and Delegate Hodges engaged in conversations that brought the issue of water reuse and water supply to light. Such conversations have moved Delegate Keith Hodges to work with the Joint Legislative Audit and Review Commission to figure out best path to address water issues at hand. Delegate Hodges is also hopeful that many of the groundwater concerns can be added to a list of recommendations generated as part a final report from the Joint Sub-Committee to Study Recurrent Flooding.

In conjunction with the action taken by Delegate Hodges, this project has resulted in a list of recommendations for Middle Peninsula localities to consider in moving forward with water reuse and supply:

RECOMMENDATIONS:

(1) Implement water conservation measures identified in the Regional Water Supply Plan.
Absent of state directives, as well as based on current water supply models from DEQ and recent research papers from the U.S. Geological Survey (USGS) that suggest current rates of groundwater withdraws are unsustainable for the long-term, sea-level is rising, land is subsiding, saltwater is entering aquifers and that water levels are declining, Middle Peninsula localities could consider implementing measures presented in the Drought Response and Contingency Plan in the 2011 Regional Water Supply Plan for the Middle Peninsula of Virginia. Such measures could entail voluntary reductions, mandatory reductions, or cessation of non-essential water use for affected public and privately –owned systems. This would ultimately help conserve water and reduce the overall stress on regional water supplies.

(2) Seek funding and develop a model and/or plan for an exchange program or trading program for groundwater.
The Commonwealth of Virginia currently has a nutrient credit exchange program which is a voluntary market based on nutrient credit trading as a means of achieving compliance more cost effectively and more expeditiously to meet the nitrogen and phosphorus waste load allocations. In a similar light, having an exchange program or trading program for groundwater could more efficiently utilizing water supplies. However, before a program like this is implemented, localities should seek funds to design, plan, or create a model for this

program. With an understanding of how this program may work, this could be presented to the General Assembly and/or the Virginia Department of Environmental Quality to be considered for additional funding and implementation statewide.

(3) Explore the idea of developing funding opportunities for public infrastructure improvements as it relates to reclamation technologies.

The Virginia Clean Water Revolving Loan Fund is a self-perpetuating loan fund which provides low interest financing options to Virginia cities, towns and wastewater authorities for the upgrade, expansion, extension, replacement, repair, rehabilitation, and/or additions to public wastewater collection and treatment facilities. Additionally the Water Quality Improvement Fund is available to assist local governments and individuals in reducing point source nutrient loads to the Chesapeake Bay with technical and financial assistance made available through grants. While both may assist in funding a water reclamation project, the Commonwealth currently does not have a pot of money specific to reclamation projects that may financially encourage localities to implement this technology. Middle Peninsula localities should work with funding entities to move this idea forward.

(4) Identify issues that Virginia Department of Health has with water reclamation and assuming risk, in light of the dwindling water supply.

During the latest amendments to the Water Reuse and Reclamation regulations in 2011-2013 the Virginia Department of Health did not want to assume any health risks associated with reclaimed water. Thus as such sentiments are reflected in the limited use of reclaimed water within the regulations, localities (or MPPDC staff) could develop a project scope focused on understanding VDH's perspectives and issues surrounding this topic in order to advance the use of reclaimed water in the Commonwealth of Virginia.

(5) Research surface water management areas, the rights to surface water, and how these rights can be relinquished.

As water becomes a more critical resource, all sources of water will need to be considered including state surface waters. New Kent County is in the process of looking for future water supplies and currently find themselves in negotiations with Hampton Roads. New Kent County was initially under the impression that they had access to withdraw water from the adjacent water bodies to supplement water supplies; however it was brought to their attention that Hampton Roads had the rights to the surface water surrounding New Kent County. Therefore both localities are discussing the rights to surface waters and how Hampton Roads could potentially relinquish surface water rights to New Kent for a short period of time, but there is still a lot of uncertainty surrounding this. Therefore Middle

Peninsula localities should research who has the legal rights to the surface water within their jurisdiction. Also what is the mechanism or process that allows a locality to relinquish the rights to surface water temporarily or long-term?

(6) Develop cost estimates of water reuse, aquifer recharge, and other technologies.
With cost estimates for water reuse projects, aquifer recharge, and other relevant technologies, localities position themselves for potential funding. As water resources are critical to sustain businesses and citizen's way of life, being proactive about addressing water issues can only benefit Middle Peninsula communities. Additionally, if localities are not interested in researching or calculating cost estimates for such technologies, localities should strongly consider supporting efforts by neighboring localities and/or private businesses.

In conclusion, with the creation of more water regulations to improve water quality and to ensure adequate water supplies for demands, as well as more data generating a more ominous picture of water supply in the region, there is an immediate need for localities to act. Whether that action is to implement water technologies (ie. reclamation, desalination, or rainwater harvesting); push the Commonwealth to amend water reclamation regulations to broaden the spectrum of reuses; or support an application to the U.S. EPA UIC program for aquifer recharge, actions need to occur that support future resources for the Virginia Coastal Plain and the Middle Peninsula.

APPENDIX A:

Treatment Standards for Reclaimed Water

9VAC25-740-70. Treatment and standards for reclaimed water.

Table 70-A Treatment and Standards for Reclaimed Water	
1. Level 1	
a. Treatment	Secondary treatment with filtration and higher-level disinfection.
b. Bacterial Standards	(1) Fecal coliform[1]: monthly geometric mean[2] less than or equal to 14 colonies/100ml; corrective action threshold at greater than 49 colonies/100 ml; or
	(2) E. coli[1]: monthly geometric mean[2] less than or equal to 11 colonies/100 ml; corrective action threshold at greater than 35 colonies/100 ml; or
	(3) Enterococci[1]: monthly geometric mean[2] less than or equal to 11 colonies/100 ml; corrective action threshold at greater than 24 colonies/100 ml.
c. Total Residual Chlorine (TRC)[3]	Corrective action threshold at less than 1.0 mg/l[4] after a minimum contact time of 30 minutes at average flow or 20 minutes at peak flow.
d. pH	6.0 – 9.0 standard units
e. Five-day Biochemical Oxygen Demand (BOD_5)	(1) BOD_5: monthly average less than or equal to 10 mg/l; or (2) Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)[5]: monthly average less than or equal to 8 mg/l.
f. Turbidity[6]	Daily average of discrete measurements recorded over a 24-hour period less than or equal to 2.0 nephelometric turbidity units (NTU); corrective action threshold at greater than 5.0 NTU.
2. Level 2	
a. Treatment	Secondary treatment and standard disinfection.
b. Bacterial Standards	(1) Fecal coliform[1]: monthly geometric mean[2] less than or equal to 200 colonies/100ml; corrective action threshold at greater than 800 colonies/100 ml; or
	(2) E. coli[1]: monthly geometric mean[2] less than or equal to 126 colonies/100 ml; corrective action threshold at greater than 235 colonies/100 ml; or
	(3) Enterococci[1]: monthly geometric mean[2] less than or equal to 35 colonies/100 ml; corrective action threshold at greater than 104 colonies/100 ml.
c. Total Residual Chlorine (TRC)[3]	Corrective action threshold at less than 1.0 mg/l[4] after a minimum contact time of 30 minutes at average flow or 20 minutes at peak flow.
d. pH	6.0 – 9.0 standard units
e. Five-day Biochemical Oxygen Demand (BOD_5)	(1) BOD_5: monthly average less than or equal to 30 mg/l; maximum weekly average 45 mg/l; or (2) Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)[5]: monthly average less than or equal to 25 mg/l; maximum weekly average 40 mg/l.
f. Total Suspended Solids (TSS)	Monthly average less than or equal to 30 mg/l; maximum weekly average 45 mg/l.

[1]After disinfection.
[2]For the purpose of calculating the geometric mean, bacterial analytical results below the detection level of the analytical method used shall be reported as values equal to the detection level.
[3]Applies only if chlorine is used for disinfection.
[4]TRC less than 1.0 mg/l may be authorized by the board if demonstrated to provide comparable disinfection through a chlorine reduction program in accordance with the Sewage Collection and Treatment Regulations (9VAC25-790).
[5]Applies only if $CBOD_5$ is used in lieu of BOD_5.
[6]Where ultraviolet radiation will be used for disinfection of Level 1 reclaimed water, other turbidity standards may apply in accordance with 9VAC25-740-110 A 2 a.

APPENDIX B:

Resolutions in Support of Groundwater and Reuse

MIDDLE PENINSULA PLANNING DISTRICT COMMISSION

Saluda Professional Center, 125 Bowden Street, P.O. Box 286, Saluda, VA 23149-0286
Phone: (804) 758-2311 FAX: (804) 758-3221
Email: pdcinfo@mppdc.com Webpage: www.mppdc.org

RESOLUTION

Requesting that the Virginia Department of Environmental Quality Take Proactive Measures to Restore Artesian Head Pressure and Reduce High Chloride Concentrations in the Potomac Aquifer

Whereas, the most productive aquifers of the Virginia Coastal Plain are in the Potomac Formation; and

Whereas, the Potomac Aquifer is the largest source of fresh water in the Virginia Coastal Plain; and

Whereas, groundwater level field measurements for State Observation Well 216 in Westmoreland County, Virginia for the period of August 25, 1967 to December 31, 2011 show a continual long-term water-level decline and loss of artesian pressure; and

Whereas, pumping of water from the Potomac aquifers and from shallower aquifers has lowered ground-water levels substantially and changed the direction of ground-water flow over much of the region; and

Whereas, water levels are falling at a rate of approximately 2 feet per year in the Middle Potomac aquifer and simulated water density near the saltwater transition zone of the Virginia Coastal plain has illustrated an inland movement of saltwater, further degrading water quality within the Chesapeake Bay impact crater and across a large portion of the Middle Peninsula; and

Whereas, chloride intrusion has been noted in USGS reports and studies, and by the scientific community, the Department of Environment Quality and local residents of the Middle Peninsula; and

Whereas, land subsidence rates on the order of 0.05-0.06 in/yr (1.2-1.4 mm/yr) attributed to the postglacial forebulge collapse within the Chesapeake Bay region are further exacerbated by large industrial and domestic use groundwater withdrawals from the Potomac aquifer series occurring in the areas of Franklin, Suffolk and West Point, VA; and

Whereas, recent analysis of tide gauge data by the Virginia Institute of Marine Science reports RSL rise rates ranging from 0.11-0.23 in/yr (2.9-5.8 mm/yr; period: 1976-2007; 10 stations) within the Chesapeake Bay region, with a number of the values representing the highest rates reported along the U.S. Atlantic coast complicating groundwater management by the Virginia Department of Environmental Quality; and

Whereas, the failure to reduce overdraws of the Potomac Aquifer may jeopardize the health, welfare and future development of all counties currently drawing from said aquifer including those of the Middle Peninsula:

Now therefore be it resolved, that the Middle Peninsula Planning District Commission, created to promote the orderly and efficient development of the physical, social, and economic elements of the Planning District, requests the Commonwealth of Virginia, acting through its duly authorized agency, the Virginia Department of Environmental Quality and/or other state agencies, to take all appropriate action including but not limited to a review of regulations pertaining to groundwater withdrawals, increased education for the public, and utilization of water reuse planning, especially for areas with highest rates of groundwater removal, to reduce high chloride concentrations and loss of artesian head pressure in the Potomac Aquifer for the benefit of all those living in the region.

Sue Cary
Chair

Nov. 20, 2013
Date

County of Middlesex

BOARD OF SUPERVISORS

AT A REGULAR MEETING OF THE MIDDLESEX COUNTY BOARD OF SUPERVISORS, HELD ON TUESDAY, SEPTEMBER 3, 2013, AT 3:00 P.M. IN THE BOARD ROOM IN THE HISTORIC COURTHOUSE, SALUDA, VIRGINIA: ON A MOTION DULY MADE BY MRS. HURD AND SECONDED BY MR. MILLER, THE FOLLOWING RESOLUTION WAS ADOPTED BY THE FOLLOWING VOTE:

CARLTON S. REVERE	aye
WAYNE H. JESSIE, SR.	aye
ELIZABETH B. HURD	aye
PETER W. MANSFIELD	aye
JOHN D. MILLER, JR.	aye

A RESOLUTION REQUESTING THAT THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY TAKE PROACTIVE MEASURES TO RESTORE ARTESIAN HEAD PRESSURE AND REDUCE HIGH CHLORIDE CONCENTRATIONS IN THE POTOMAC ACQUIFER.

WHEREAS, Middlesex County is included in a 3000 square mile area which overlays the Potomac Aquifer and is adjacent to a fracture line of said aquifer known as the Chesapeake Bay Crater; and

WHEREAS, the United States Geological Survey Map 1873 published in 2006 has shown that more than forty percent of the test wells in said area have chloride concentrations (salt) above 250 milligrams per liter (mg/l); and

WHEREAS the United States Environmental Protection Agency has set a maximum chloride concentration (salt) of 250 mg/l for potable (drinking water); and

WHEREAS, the Virginia Department of Environmental Quality (DEQ) has published information that states "The groundwater in four counties (including Middlesex County, Virginia) have evidence of high chloride (salt) concentration"; and

WHEREAS, DEQ is charged by the General Assembly to manage the safety of Virginia's water supplies for the protection of the citizens of Virginia from pollution in said water supplies; and

P.O. Box 428, Saluda, Virginia 23149-0428 · Phone: (804) 758-4330 Fax: (804) 758-0061

WHEREAS, DEQ offered information before the State Water Commission, an advisory committee of the Virginia General Assembly showing:

1. Groundwater levels in the area are declining or are expected to decline excessively; and
2. The wells of two or more groundwater users within the area are interfering or may reasonably be expected to interfere substantially with one another; and
3. The available groundwater supply has been or may be overdrawn; and
4. The groundwater in the area has been or may become polluted; and

WHEREAS, Middlesex County has experienced substantial well interference from two or more groundwater users; a declining groundwater level and an increase in salinity in wells drawing from the Potomac Aquifer, synonymous of a groundwater supply that is overdrawn; and

WHEREAS, a responsible representative of DEQ has stated that the declining groundwater levels are caused by overdraws of the available groundwater supply contained by the Potomac Aquifer; and

WHEREAS, DEQ is charged by the General Assembly to manage the fair distribution and priority of said water supplies for potable use by issuing appropriate permits for water withdrawals; and

WHEREAS, at the current rate of water withdrawal from the Potomac Aquifer responsible representatives of the Virginia Department of Environmental Quality have stated before both the State Water Control Board and the State Water Commission that the water supply might fail completely in 20 to 50 years; and

WHEREAS, the Board of Supervisors of Middlesex County and others have offered for consideration, solutions to substantially reduce or eliminate this condition of overdraws of the Potomac Aquifer by proactive measures to be effected by the Commonwealth of Virginia; and

WHEREAS, the Board of Supervisors of Middlesex County understands that the Commonwealth, through its elected representatives, as a whole must decide the most cost effective course to preserve a source of potable water for the greater citizens of the coastal plain of Virginia; and

WHEREAS, let it be known that the failure to stop overdraws of the Potomac Aquifer may jeopardize the health, welfare and future development of all counties currently drawing from said Aquifer; and

WHEREAS, be it known that counties designated as areas of increasing chloride contamination by DEQ are suffering said effects at this time and will continue to suffer at an ever increasing rate.

NOW THEREFORE, BE IT RESOLVED, that the Middlesex County Board of Supervisors charged with the duty to protect the health, safety and welfare of the Citizens of Middlesex County requests that the Commonwealth of Virginia acting through its duly authorized agency, the Virginia Department of Environmental Quality and/or other appropriate agencies, take all appropriate actions to reduce the high chloride concentration and loss of artesian head pressure in the Potomac Aquifer;

BY FIRST equalizing the estimated natural replenishment of the Potomac Aquifer to the estimated total draw by lowering the total draw by providing and/or mandating the use of practical alternative water sources such as reclaimed water or surface water for industrial and agricultural purposes:

AND, initiate such programs as required to restore a condition whereby natural replenishment significantly exceeds the estimated total withdraw of water from the aquifer by providing and/or mandating the use of a practical alternative water source such as reclaimed water or surface water for industrial and agricultural purposes;

AND, by review of regulations, education and the like to promote reclaiming water on a local level for industrial and irrigation uses to offset future demands on the Potomac Aquifer for water for human consumption.

A Copy Teste:

Matt Walker
Clerk

Matthew L. Walker
County Administrator

Marcia Jones
Assistant Administrator

County of Middlesex
OFFICE OF THE COUNTY ADMINISTRATOR

RESOLUTION

Urging our Governor, our Secretary of Natural Resources, the Director of Virginia Department of Environmental Quality (DEQ), our Senator and our Delegate to save our potable water supply by sensible reuse of water for agricultural and industrial purposes, while lowering the total load of nutrients reaching the Chesapeake Bay

WHEREAS, DEQ has determined that the Potomac Aquifer that provides the potable water for ninety percent of the citizens of the Virginia Coastal Plain is losing artesian head pressure at an unsustainable rate, and

WHEREAS, as the artesian level drops, salt water from the Chesapeake Bay back flows into the aquifer contaminating wells in Middlesex County and surrounding counties to the extent that the salt in many of these wells now exceeds the Environmental Protection Agency's (EPA) limit, and

WHEREAS, Middlesex County needs at this time to provide an alternative potable water source and infrastructure for the health and safety of our citizens in certain areas of our County, and

WHEREAS, DEQ now estimates that the entire Potomac Aquifer will be depleted by 2050 unless the demand is reduced by 40 million gallons per day, and

WHEREAS, infrastructure and operating costs of providing an alternative potable water source will cost each homeowner in the contaminated area of Middlesex County an additional eight hundred dollars each year, and by extension complete failure of the Potomac Aquifer would cost the Commonwealth nearly four hundred million dollars each year in today's money, and

WHEREAS, one possible solution is available for a one time cost of about 250 million dollars, by which the Commonwealth could replace 40 million gallons per day demand on the Potomac Aquifer with treated wastewater (reuse) piped to two

industrial locations, and concurrently reduce the nutrient load in the Chesapeake Bay by nearly a million pounds a year, and

WHEREAS, returning the withdrawals from the Potomac Aquifer to 70 to 80 million gallons per day as suggested by DEQ's Director of Water Resources will stabilize the aquifer, it will not provide for future economic development in Virginia's Coastal Plain, and

WHEREAS, one proven solution to provide for growth in areas of limited water resources is the productive reuse of waste water, and

WHEREAS, this solution also eliminates pollutants such as nutrients from entering the Chesapeake Bay, and

WHEREAS, current waste water reuse regulations limit the economic viability of productive reuse of waste water, therefore

BE IT RESOLVED that our General Assembly immediately consider all appropriate measures to save the Potomac Aquifer and assure a sensible, economically viable reuse of our water resources for both agricultural and industrial purposes, thereby ensuring a stable supply of potable water for the protection of the health and welfare of the citizens of our Commonwealth, and

BE IT RESOLVED FURTHER that the Middlesex Board of Supervisors shall transmit copies of this resolution to the Honorable Terence R. McAuliffe, Governor of the Commonwealth of Virginia and the members of the Virginia General Assembly and others so noted above that they may be apprised of the sense of the Middlesex County Board of Supervisors in this matter.

Robert L. LeBoeuf	nay
Elizabeth B. Hurd	aye
Pete W. Mansfield	aye
John D. Miller, Jr.	nay
Wayne H. Jessie, Sr.	aye

CERTIFICATION

I, Betty S. Muncy, Deputy Clerk of the Board of Supervisors of the County of Middlesex, Virginia, certify that the foregoing is a true and correct copy of a resolution passed at a lawfully organized meeting of the Board of Supervisors of Middlesex County held at Saluda, Virginia, at 3:00 p.m. on May 6, 2014

Betty S. Muncy

APPENDIX C:

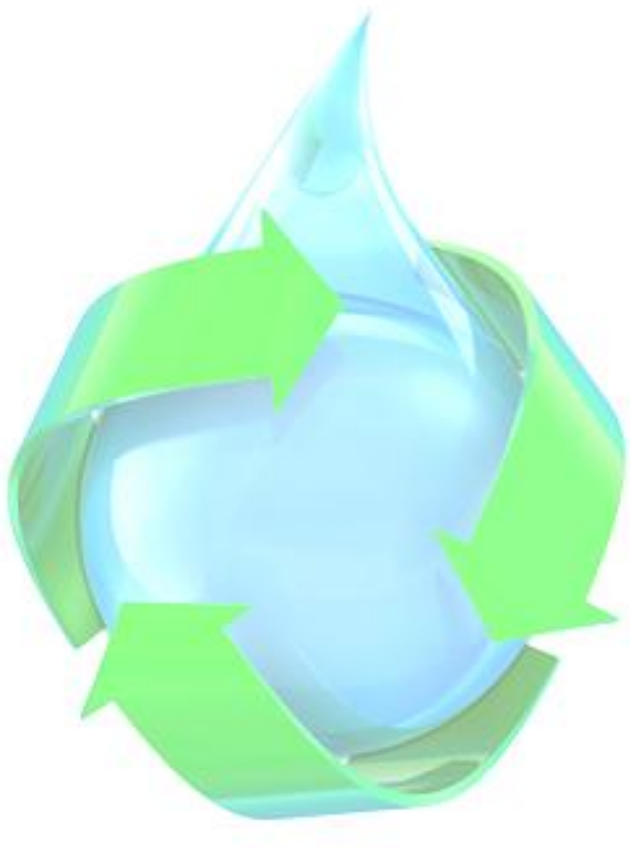
Water Reuse Steering Committee - Meeting 1

Water Reuse Steering Committee

Meeting #1
March 11, 2014

AGENDA

1. Introductions
2. Water Reuse and Regulation – Valarie Rourke, Virginia Department of Environmental Quality
3. Discussion: What would you like to get out this project?
4. Schedule next meeting
5. Adjourn



Jackie Rickards, Project Manager
Phone: (804) 758-2311
Email: jrickards@mppdc.com

Water Reuse Steering Committee
Meeting #1

MINUTES

1. **Introductions**

The Middle Peninsula Planning District Commission (MPPDC) hosted the first meeting of the Water Reuse Steering Committee on March 11, 2014 at 10 a.m. in the Saluda, VA Boardroom. Committee members in attendance included Mr. Bud Smith, Essex County Board of Supervisors (BOS); Mr. Jim Pyne, Hampton Roads Sanitation District; Mr. Pete Mansfield, Middlesex County BOS; Mr. Brent Payne, Gloucester County Public Utilities; and Mr. Walt Feurer, Town of West Point Director of Public Works. Others in attendance included Ms. Valerie Rourke, Agency Coordinator of Water Reclamation and Reuse and Land Treatment of Virginia Department of Environmental Quality (DEQ) and Ms. Jackie Rickards, MPPDC staff.

2. **Water Reclamation and Reuse Regulations Presentation**

Ms. Valerie Rourke (DEQ) gave a presentation to the Committee regarding the Water Reclamation and Reuse Regulations (9VAC25-740) in the Commonwealth. First, Ms. Rourke defined the following terms that were used throughout the presentation:

- *Reclaimed water:* water resulting from the treatment of domestic, municipal, or industrial wastewater that is suitable for a water reuse that would not otherwise occur.
- *Water reuse:* the use of reclaimed water for a direct beneficial use, an indirect potable reuse, an indirect non-potable reuse, or a controlled use.
- *Reclamation System:* a treatment works that treats domestic, municipal, or industrial wastewater or sewage to produce reclaimed water for a water reuse that would not otherwise occur.
- *Satellite Reclamation System:* a conjunctive system that operates within or parallel to a sewage collection system to treat a portion of the available wastewater flow in the collection system and to produce reclaimed water for reuse. Satellite reclamation systems do not have a discharge to surface waters, but may return their treated wastewater and residuals to the sewage collection system.
- *Reclaimed water distribution system:* a network of pipes, pumping facilities, storage facilities, and appurtenances designed to convey and distribute reclaimed water from one or more reclamation systems to end uses.

Ms. Rourke explained the type of uses for reclaimed water and the level of treatment needed for each. For municipal wastewater, water may be treated to Level 1 or Level 2 treatment standards. Reclaimed water meeting Level 1 standards is treated and disinfected to a higher standard and suitable for reuses with potential for public contact. Examples of Level 1 reclaimed water reuses include all types of landscape irrigation in public access areas (i.e., golf courses, cemeteries, public parks, school yards and athletic fields); non-residential toilet flushing; fire fighting or protection and fire suppression in non-residential buildings; outdoor domestic or residential reuse (i.e., lawn watering and non-commercial car washing); commercial car washes; commercial air conditioning systems; irrigation for any food crops not commercially processed, including crops eaten raw; landscape impoundments with potential for public access or contact; and commercial laundries. Reclaimed water meeting Level 2 standards is not as highly treated and disinfected as Level 1 reclaimed water but is suitable for reuses where there is little or no potential for public contact including irrigation for any food crops commercially processed; irrigation for non-food crops and turf, including fodder, fiber and seed crops; pasture for foraging livestock, sod farms, ornamental nurseries, and silviculture; landscape impoundments with no potential for public access or contact; soil compaction; dust control; washing aggregate; making concrete; livestock watering; aquaculture; stack scrubbing; street washing; boiler feed; ship ballast; and cooling towers.

Ms. Rourke also mentioned that the Commonwealth of Virginia offers two grant/loan opportunities for water reclamation projects. First, the Virginia Clean Water Revolving Loan Fund (VCWRLF) is available for publicly-owned projects that involve the treatment and reuse of municipal wastewater or sewage. Second, the Water Quality Improvement Fund (WQIF) will reimburse the cost for design and installation of nutrient removal technology, including water reclamation and reuse, at publicly-owned treatment works that meets the nutrient reduction goal in an approved tributary strategy plan or applicable regulatory requirement, and is incurred prior to the execution of a grant agreement. Privately-owned or industrial facilities are not eligible to receive loans or cost share from VCWRL or WQIF. *Please see Attachment 1 for the entire presentation.*

Following the presentation, Ms. Rourke entertained questions and comments from the Committee. Mr. Pyne and Mr. Mansfield questioned the need for two levels of treatment. They thought that there should be one standard, since the majority of reclamation plants would treat to the highest level so that the reclaimed water could be used for the spectrum of level 1 and level 2 reuses. Other comments revolved around the intent of land treatment

(i.e. irrigation). The Committee questioned the reason for seasonal irrigation only and that reclaimed water can only be used as a supplement to other irrigation sources. There was skepticism amongst the Committee about the regulations and how they do not encourage the implementation of this technique.

3. **Discussion: what would you like to get out this project?**
   Following the discussion, Ms. Rickards asked the Committee if there specific outcomes that they would like to see from this project. The Committee suggested developing recommendations for large scale development and how water reuse can be utilized. They also mentioned that educational outreach to local government staff, Board of Supervisors/Town Councils, and developers is important in order educate them about water reuse and potential reclamation options to consider. At this point in the meeting Mr. Mansfield handed out a few research papers he had authored. Please see Attachment 2 for his papers.

4. **Schedule next meeting**
   The next meeting will take place in May 2014. A specific date and time will be scheduled later in the month.

5. **Adjourn**

Attachment 1:
Water Reuse and Regulation Presentation

Water Reclamation and Reuse Regulation (9VAC25-740)

Presentation for the Middle Peninsula Planning District Commission, Water Reuse Steering Committee

March 11, 2014

1

What is:

- reclaimed water
- water reuse
- reclamation system
- satellite reclamation system
- reclaimed water distribution system

2

Who regulates water reuse in Virginia?

DEQ – regulates the reclamation of domestic, municipal (sewage) and industrial wastewater and subsequent reuse; effective 7/1/13 – has authority to develop regulations for storm water reclamation and reuse

VDH – regulates onsite recycle of sewage for toilet flushing and other reuses on "experimental" basis; provides guidelines on the reuse of gray water and use of harvested rainwater

DHCD – will regulate installation and operation of non-potable water systems for gray water and harvested rainwater, and distribution of reclaimed water inside buildings

3

Water reclamation and reuse is voluntary in Virginia

- Market-based rather than mandated approach to implementation
- If you choose to do it, you will, in most cases, be required to comply with the Water Reclamation and Reuse Regulation

4

Water Reclamation and Reuse Regulation

Part I - Definitions and General Program Requirements

Part II - Reclaimed Water Standards, Monitoring Requirements and Reuses

Part III - Application and Technical Requirements

5

Standards for Reclaimed Water

- For the reclamation of municipal wastewater
  - Level 1 – suitable for reuse with potential for public contact
  - Level 2 – suitable for reuses with no or minimal potential for public contact
- For the reclamation of industrial wastewater – developed on a case-by-case basis

6

Parameter	Treatment and Standards for Reclaimed Water	
	Level 1	Level 2
Description of minimum treatment	Secondary treatment with filtration and higher level disinfection	Secondary treatment with standard disinfection
Fecal coliform or	Monthly geometric mean ≤ 14 colonies/100 ml; CAT > 49 colonies/100 ml	Monthly geometric mean ≤ 200 colonies/100 ml; CAT > 800 colonies/100 ml
E. coli or	Monthly geometric mean ≤ 11 colonies/100 ml; CAT > 35 colonies/100 ml	Monthly geometric mean ≤ 126 colonies/100 ml; CAT > 235 colonies/100 ml
Enterococci	Monthly geometric mean ≤ 11 colonies/100 ml; CAT > 24 colonies/100 ml	Monthly geometric mean ≤ 35 colonies/100 ml; CAT > 104 colonies/100 ml
Total Residual Chlorine	CAT < 1 mg/l after a minimum contact time of 30 minutes at average flow or 20 minutes at peak flow	CAT < 1 mg/l after a minimum contact time of 30 minutes at average flow or 20 minutes at peak flow
pH	6.0-9.0 standard units	6.0-9.0 standard units
BOD_5 or	Monthly average ≤ 10 mg/l	Monthly average ≤ 30 mg/l; maximum weekly average 45 mg/l
$CBOD_5$	Monthly average ≤ 8 mg/l	Monthly average ≤ 25 mg/l; maximum weekly average 40 mg/l
Turbidity	Daily average of discrete measurements recorded over a 24-hour period ≤ 2 NTU; CAT > 5 NTU	
Total Suspended Solids (TSS)		Monthly average ≤ 30 mg/l; maximum weekly average 45 mg/l

7

Reuse Categories and Minimum Standard Requirements

1. Urban - Unrestricted Access (Level 1)
2. Irrigation - Unrestricted Access (Level 1)
3. Irrigation - Restricted Access (Level 2)
4. Landscape Impoundments (Level 1 or 2)
5. Construction (Level 2)
6. Industrial (Level 1 or 2)

8

Reuse Category	Reuse	Minimum Standard Requirements[a]
1. Urban – Unrestricted Access	All types of landscape irrigation in public access areas (i.e., golf courses, cemeteries, public parks, school yards and athletic fields) Toilet flushing – non-residential Fire fighting or protection and fire suppression in non-residential buildings Outdoor domestic or residential reuse (i.e., lawn watering and non-commercial car washing) Commercial car washes Commercial air conditioning systems	Level 1
2. Irrigation – Unrestricted Access	Irrigation for any food crops not commercially processed, including crops eaten raw	Level 1
3. Irrigation – Restricted Access[b]	Irrigation for any food crops commercially processed	Level 2
	Irrigation for non-food crops and turf, including fodder, fiber and seed crops; pasture for foraging livestock; sod farms; ornamental nurseries; and silviculture	

a. For reclaimed industrial wastewater, minimum standards required shall be determined on a case-by-case basis relative to the proposed reuse or reuses.
b. For irrigation with reclaimed water treated to Level 2, the following shall be prohibited unless Level 1 disinfection is provided:
   1. Grazing by milking animals on the irrigation reuse site for 15 days after irrigation with reclaimed water ceases, and
   2. Harvesting, retail sale or allowing access by the general public to ornamental nursery stock or sod farms for 14 days after irrigation with reclaimed water ceases.

9

Reuse Category	Reuse	Minimum Standard Requirements[a]
4. Landscape Impoundments	Potential for public access or contact	Level 1
	No Potential for public access or contact	Level 2
5. Construction[c]	Soil compaction Dust control Washing aggregate Making concrete	Level 2
6. Industrial[c]	Commercial laundries	Level 1
	Livestock watering[d] Aquaculture[e] Stack scrubbing Street washing Boiler feed Ship ballast Once-through cooling Recirculating cooling towers	Level 2

c. Worker contact with reclaimed water treated to Level 2 shall be minimized. Level 1 disinfection shall be provided when worker contact with reclaimed water is likely.
d. Level 1 disinfection shall be provided when the reclaimed water is consumed by milking livestock.
e. Level 1 disinfection shall be provided for aquaculture production of fish to be consumed raw, such as for sushi.

10

Landscape Impoundments with Potential for Public Access/Contact

11

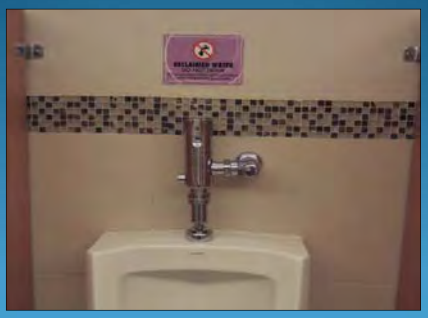
Commercial Air Conditioning Systems

12

Industrial Cooling Water

13

Toilet/Urinal Flushing



14

Landscape Irrigation in Public Access Areas

15

Irrigation Reuse

- Must be supplemental irrigation – no exceptions
- May require a nutrient management plan or nutrient load tracking and reporting
  - Nutrient content of reclaimed water
  - Size of the irrigated area(s)
- Setback requirements:
  - For Level 1 and Level 2
  - May be reduced or eliminated for sites irrigated with Level 2

16

Irrigation Reuse vs. Land Treatment

- Both use water derived from wastewater
- Irrigation reuse per 9VAC25-740
  - With only reclaimed water
  - Primarily intended to meet water demands of irrigated vegetation, secondarily conserves potable water & may provide some nutrients
  - Site is not intended to provide additional treatment, no groundwater monitoring required
- Land Treatment (Irrigation) per 9VAC25-790
  - With wastewater having minimum of secondary treatment
  - Primarily a method of treatment & disposal intended to meet nutrient demands of irrigated vegetation
  - Site typically provides additional wastewater treatment, groundwater monitoring required

17

Permitting for Water Reclamation and Reuse

- Implemented through VPDES and VPA Permit Programs
- Most end users will not be permitted by DEQ, but will be required to enter into service agreement/contract with reclaimed water agent
- Permits are required for existing unpermitted or new proposed facilities that are/will produce or distribute reclaimed water
- Grandfathering provision for existing permitted facilities producing, distributing or using reclaimed water on 10/1/08 – no permit application required until expansion or modification

18

Application for a Permit

- General information – for reclamation systems and reclaimed water distribution systems
- Reclaimed Water Management (RWM) Plan – developed by reclaimed water agent
  - Description and map of service area
  - Inventory of reclaimed and reject water storage
  - Water balance – reclaimed water generated, stored, reused and discharged
  - Example service agreements or contracts
  - Education and notification program (Level 1)
  - Cross-connection & backflow prevention program
  - Procedures to maintain reclaimed water quality in distribution
  - Nutrient management requirements for irrigation reuse
  - Site plans for bulk irrigation reuse sites
  - Auxiliary or back up plans for certain conjunctive systems

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Other Important Requirements of the Regulation

- Reclaimed water monitoring
- Design criteria for reclamation systems, satellite reclamation systems and distribution systems
- Construction
- Operator and system reliability
- Operation and maintenance
- Management of pollutants from significant industrial users
- Access control and advisory signs
- Generator and distributor reporting

20

Changes to the Regulation Effective 1/29/14

Variances

Allows deviations or variances from design, construction, operation and maintenance requirements of the regulation

Emergency authorizations for the production, distribution or reuse of reclaimed water

Temporary authorization that DEQ may issue where due to drought, there is insufficient water supply that may result in a substantial threat to public safety.

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Primary Factor to a Viable Water R/R Project

End users:

- More than one
- Need the water long term
- Need the water consistently

22

Groundwater Recharge with Reclaimed Water

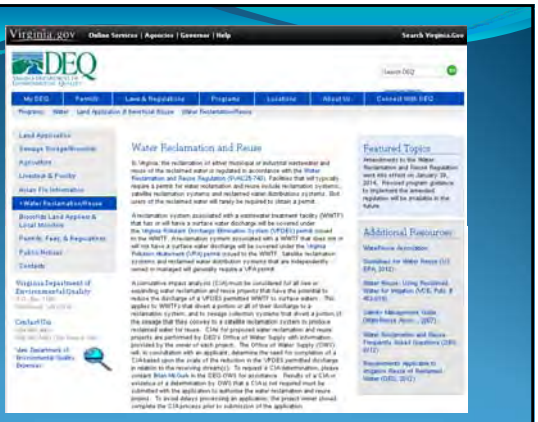
- If performed through injection wells, may be permitted by EPA's Underground Injection Control (UIC) Program
- If issued UIC permit, excluded from requirements of Water Reclamation and Reuse Regulation
- VPA Permit issued by DEQ is not required provided DEQ approves EPA's decision to issue UIC permit
- VDH would be consulted on potential impacts to potable water supply wells and human health

23

DEQ Support for Water R/R

- DEQ online water r/r program page
- Program implementation guidance
- Dedication of staff resources to the r/r program through the VPDES & VPA permit programs
- Funding

24



http://www.deq.virginia.gov/Programs/Water/LandApplicationBeneficialReuse/WaterReclamationReuse.aspx

25

DEQ Funding for Water R/R Projects

- Funding is only available to projects that:
  - Are publicly owned
  - Involve treatment & reuse of municipal wastewater or sewage
- Virginia Clean Water Revolving Loan Fund (VCWRLF)
- Water Quality Improvement Fund (WQIF)

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DEQ's Water Reclamation and Reuse Program

Contact Information:

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(804) 698-4158

Valerie.Rourke@deq.virginia.gov

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Questions?

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Attachment 2:
Mr. Mansfield's Research

THE THREAT TO THE POTOMAC AQUIFER

Water is a necessity. Clean, drinkable water is a necessity for people. A sustainable supply of water is a necessity for industry and agriculture. In Virginia the necessary supply is seriously threatened and, in the coastal plain, the threat is frighteningly imminent.

The Potomac Aquifer is being depleted at an unsustainable rate, as indicated by Figures 1-3 of the attachments provided by the Department of Environmental Quality (DEQ.) As the aquifer's level drops it allows intrusion of contaminants from the Chesapeake Bay, mainly salt (chloride), spreading westward primarily from the Chesapeake Bay impact crater. Fig. 1 is a 2006 US Geological Survey map with a bold red line indicating the extent of chloride concentrations exceeding 250 mg/l (EPA's limit for drinking water.) Based on rate of change in test wells this line is continuing to move westward.

About 40% of current draw from the Potomac Aquifer is used for potable water; a like amount is used for the production of paper products, and the remaining 20% used for other industrial and irrigation purposes.

The West Point paper mill alone draws more water than all other users in the Middle Peninsula and Northern Neck combined and, when combined with the Franklin paper mill, creates a cone of water depression shown in Fig. 2 that extends from North Carolina to Maryland.

The Environmental Protection Agency has imposed on the Commonwealth a requirement to eliminate 10.57 million pounds of nitrogen, and phosphorus compounds (aka nutrients) that enter the Chesapeake Bay each year.

At the present time the only proposed means of achieving this result is the upgrading of our existing wastewater treatment plants -- at an estimated cost ranging between $200 and $300 per pound.

A proposal to consider a means of addressing both the depletion of the aquifer and the EPA nutrient requirement was presented recently to both the State Water Control Board and the State Water Commission. It is based on the concept of recycling wastewater, also known as reuse water. The recycling of wastewater is not new; it has been used for the last sixty years in other states, and is a large component (20 to 90 percent) of the water in

the Occoquan Reservoir that provides drinking water for Washington, and surrounding Virginia counties.

In considering the single example of the West Point paper mill it is estimated that by supplying 23 million gallons per day of treated (reuse) water to the mill from two treatment plants (the Yorktown and Williamsburg plants) the withdrawal from the aquifer could be reduced by 20% (see Fig. 3), and the northern center of the depression cone shown in Fig. 2 eventually eliminated. Concurrently it would also result in the removal of an estimated 500,000 pounds (5% of the total nutrients required by EPA) for a cost of about $120 million, a cost that the Commonwealth is spending for nutrient removal alone.

Overdraw of the aquifer won't just go away - and the solution won't be cheaper if postponed. Using the example of the West Point mill, each year the project is delayed, the citizens of Virginia will lose benefits worth an estimated $100 million (just about the cost of developing the pipeline and infrastructure to provide reuse water by virtue of:

- ~ a loss of $50 million dollars worth of potable water (.6 cents/gal)
- ~ 500,000 more pounds of nutrients will enter the Chesapeake Bay
- ~ a further loss of aquifer storage capacity through land subsidence
- ~ a loss of wells due to salt water intrusion and/or artesian pressure
- ~ personal health problems due to high salt levels in more wells
- ~ a loss of future growth and economic opportunities for the region

Consideration should be given to proceeding with the provision of reuse water from the Yorktown and Williamsburg treatment plants as a pilot project. At the same time consideration should be given to charging DEQ to conduct a study of other major withdrawals from the aquifer and where applicable, provide a cost comparison of providing reuse water versus the cost of upgrading waste treatment plants to meet the EPA requirement.

In sum, pursuing the West Point pilot project alone would: (1) reduce the withdrawal from the Potomac Aquifer by 20% with a return on the infrastructure investment of nearly 100%, (2) provide a sustainable source of quality water for the West Point mill, and (3) reduce the nutrients entering the Chesapeake Bay by 500,000 pounds per year.

It is worth pursuing without delay.

FIG 1 CHLORIDE (SALT) CONCENTRATIONS

Dark red line shows chloride concentrations above EPA's limit for drinking water @ 250 mg/l

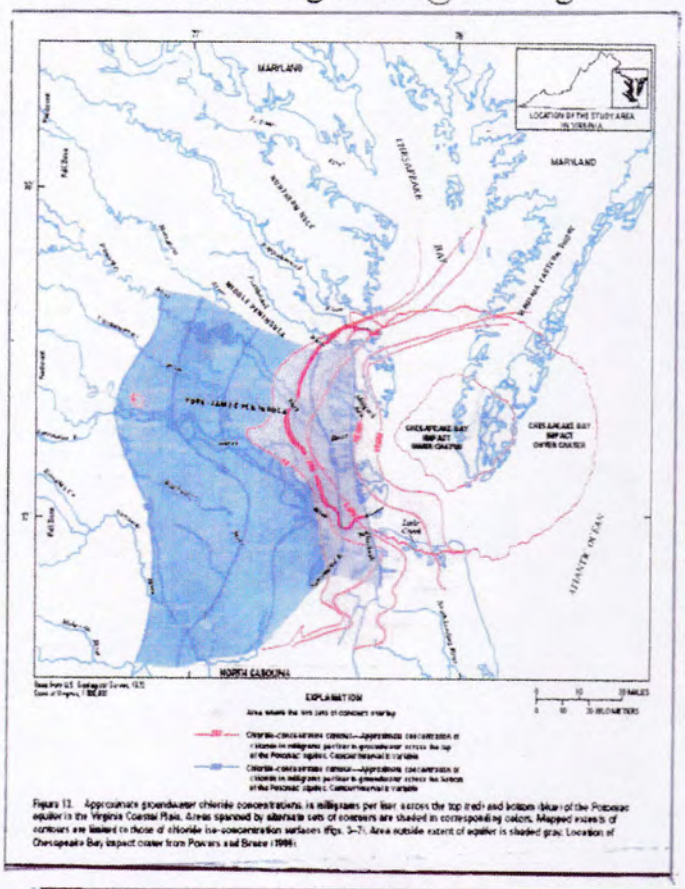


FIG 2 CONES OF DEPRESSION

Intersecting cones of depression caused by withdrawals from the Potomac Aquifer at the West Point and Franklin paper-mills

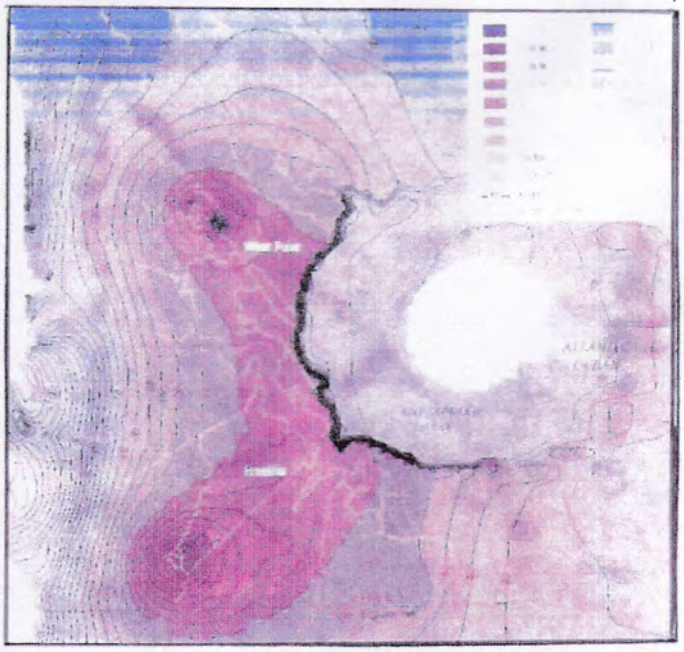
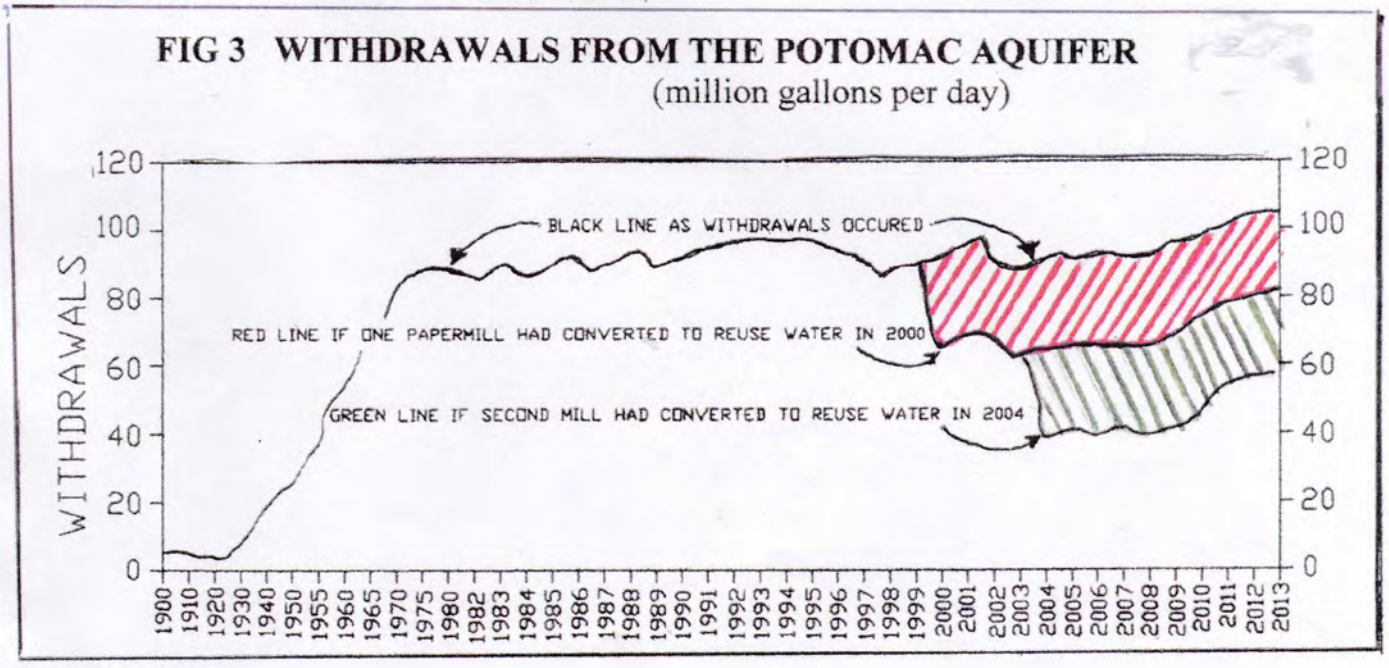


FIG 3 WITHDRAWALS FROM THE POTOMAC AQUIFER

(million gallons per day)



DEPARTMENT OF ENVIRONMENTAL QUALITY'S
ROLE IN NUTRIENTCONTROL FOR THE CHESAPEAKE BAY

Percent TN entering the James from "Point Source" discharges 49%
EPA's 2010 "Allowable Maximum Load" .. .. 11.50 MPY
Actual TN entering the James from "Point Source" Discharges 15.88 MPY
Current unused permitted plant capacity ..... 2.50 MPY

These numbers indicate that if you add "non-significant sources" (+5%) and excess capacity (2.5 MPY) Virginia could conceivably exceed EPA's TMDL in the James River by 50%. Half of the pollutants in the James River are caused by the outfall from wastetreatment plants.

In 2009, Middlesex County considered building a new plant that would require reuse or "land application" of the effluent. However, the capital investment was too great (three times that of a surface water discharge).

The following are the reasons (the italics are mine):

1. DEQ only allows spraying reuse water in quantities that equal the calculated nutrient uptake of the vegetation it is intended to irrigate. Specifically, Virginia Code 9VAC25-740-100.C.2 states that all irrigation with reclaimed water must be only "supplemental irrigation" which in combination with rainfall, meets but does not exceed the water necessary to maximize growth of the irrigated vegetation. *[This is excessive governmental intrusion into water use for agricultural purposes. Obviously agricultural users that are on location know better than governmental agencies the amount of water to properly irrigate their land.]*

2. Reuse water can only be sprayed during the eight months growing season and storage capacity must be furnished for effluent generated during the other four months. Specifically Virginia Code 9VAC25-740-10 permits the distribution at the above supplemental rates "only during the active growing season for the designated vegetation." *[To adhere to this regulation the donor waste treatment plant must provide storage capacity equal to about one third of the plant's yearly capacity; this more than triples the capital investment of the treatment plant. The idea that overwatering may cause an over dose of nutrients is not supported by fact. Spraying reuse water removes 25% of the nitrogen. And nature provides leaves and other*

sources of nutrients that fall to the ground and continue to decay during the fallow season, creating nutrients for the following growing season.]

In rural areas we do have viable waste treatment options. For example, a 60,000 gpd package wastetreatment plants with drip irrigation, and taps for spray irrigation would have these advantages:

1. Wastewater would be treated to 10mg/l nutrients and biological toxins removed; replacing existing septic systems for 250 homes that run about 125mg/l nutrients with no biological treatment and in many cases enter into grounds adjacent to our Bay waters.
2. With taps for distribution of water for irrigation of local farmland our agriculture community would benefit with nutrient rich irrigation water.
3. And, an average of about 30,000 gpd of demand would be removed from our stressed potable water supply.

But it will not happen unless DEQ can remove some of their more restrictive requirements, some of which appear to this writer to be just plain ridicules. As an example in a pilot reuse program that provides water to the race track and several golf courses, the reuse line passed through a community with no water for fire suppression. DEQ refused to allow the community to tie into the reuse line for their fire hydrants.

I lived in a Florida county that returns reuse water to the community for irrigation. Instead of dumping 12 million gallons of nutrient rich water into the Gulf, they are now selling every drop to local agriculture and home owners with revenue to the county of about $5,000,000/year.

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APPENDIX D:

Water Reuse Steering Committee - Meeting 2

Water Reuse Steering Committee

Meeting #2
May 22, 2014

AGENDA

1. Welcome/Introductions
2. *New Kent County Reclaimed Water Facilities* - Larry Dame, Director of Public Utilities
3. Nestle' Purina Pet Care Co. Update – Jim Pyne
4. Mission H20
5. Schedule next meeting
6. Adjourn

Jackie Rickards, Project Manager
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Email: jrickards@mppdc.com

Water Reuse Steering Committee

Meeting #2

MINUTES

1. **Introductions**

   The Middle Peninsula Planning District Commission (MPPDC) hosted the second meeting of the Water Reuse Steering Committee on May 22, 2014 at 10 a.m. in the Saluda, VA Boardroom. Committee members in attendance included Mr. Bud Smith, Essex County Board of Supervisors (BOS); Mr. Pete Mansfield, Middlesex County BOS; Mr. Brent Payne, Gloucester County Public Utilities; and Mr. Walt Feurer, Town of West Point Director of Public Works. Others in attendance included Mr. Larry Dame, Director of Public Utilities in New Kent County, and Ms. Jackie Rickards, MPPDC staff.

2. **New Kent County Reclaimed Water Facilities –**

   Mr. Larry Dame presented information about the New Kent County Reclamation Plant and his experience in operating the system. With support from the New Kent County Board of Supervisors to complete an engineering study for reclaimed water in 2009, the County was properly positioned to apply for financial assistance through the American Recovery and Reinvestment Act of 2009. As the County was funded the reclamation plant's capital costs were covered. In 2011 New Kent County became the first jurisdiction with the Commonwealth to supply reclaimed water. New Kent County currently has service contracts with three businesses in New Kent County to receive reclaimed water, including Brickshire Golf Course, Royal New Kent Golf Course, and Colonial Downs Race Track. Mr. Dame also spoke to the Committee regarding regulatory issues and the difficulty of implementing water reclamation. *Please see the Attachment 1 presentation for more details.*

   The presentation sparked discussion about Hampton Roads Sanitation District's (HRSD) and their mission focused on wastewater and not water reuse. The Committee thought that is may be the reason why more has not been done in this area. The Committee also discussed how reclaimed water could ultimately reduce nutrient loads going into the bay.

3. **Nestle' Purina Pet Care Co. Update –**

   Ms. Rickards pointed to HRSD's winter 2013 Sustainability Advocacy Group newsletter that included a review of a HRSD project at the King William Wastewater Treatment Plant to

provide Nestle' Purina Pet Care Co. with reclaimed water. According to the newsletter, *HRSD is studying the feasibility of delivering this water to the neighboring Nestle' Purina Pet Care Company. If this water reuse project is a success, the entire volume of HRSD's King William Wastewater Treatment Plant effluent will be utilized for the production of "Tidy Cats" litter*. In addition, Ms. Rickards introduced another local effort in Middlesex County, with the Board of Supervisors passing a resolution *Urging our Governor, our Secretary of natural Resources, the Director of Virginia Department of Environmental Quality (DEQ), our Senator and our Delegate to save our potable water supply by sensible reuse of water for agricultural and industrial purposes, while lowering the total loads of nutrients reaching the Chesapeake Bay*. Please s*ee Attachment 2 for the newsletter and Attachment 3 for a copy of the resolution.*

4. **Mission H20 –**

   Ms. Rickards explained that through her research and discussions with Hampton Roads Planning District Commission, she found Mission H_20, a professional stakeholder group focused on water supply in Virginia. In recent efforts this stakeholder group has drafted a white paper titled, *Water Reuse as a Solution in the Eastern Virginia Groundwater Management Area*, which provides an overview of water reuse and the challenges to utilizing this technology (ie. regulatory, public perceptions, and financial). *Please see Attachment 3 for the report*.

5. **Schedule next meeting -**

   The Committee expressed interest in hosting a meeting with Delegate Hodges and regional state representatives to provide an overview view of the water supply issues in the coastal plain and to encourage water reuse.

   The next meeting will take place in July 2014. A specific date and time will be scheduled later in the month.

6. **Adjourn**

Attachment 1:
New Kent County Reclaimed Water Facilities Presentation

NEW KENT COUNTY RECLAIMED WATER FACILITIES

General Information

- Parham Landing Wastewater Treatment Plant began full operation in January of 2011 from where Reclaimed Water is generated.
- Plant is Design Rated for 2 Million Gallons per Day (MGD).
- State of the Art Facility that is computer operated which runs 24 hours a day while only being staffed 10 hours per day.
- Plant design specifically incorporated Reclaimed Water Operation.
- Sent out the first Reclaimed Water in May of 2011.

Overall View of Computer Screen for Plant Operations

Plant Parameters and Results for 2012

Parameter	Limit (Mon. Avg.)	Actual (Avg.)
CBOD	10 mg/l	0 mg/l
TSS	10 mg/l	1.7 mg/l
Total Phosphorus	0.7 mg/l	0.15 mg/l
Total Nitrogen	6.0 mg/l	3.3 mg/l
pH	6.0 to 9.0	8.2
Dissolved Oxygen	5.0 mg/l (min)	11.2 mg/l
Turbidity	2.0 ntu	0.8 ntu
Enterococci	35	2.8
E. Coli	11	1.0

ntu = nephelometric turbidity units

January to December 2012 Plant Performance

- Total flow received at the plant = 92.3 million gallons.
- Total flow sent to Reclaimed = 43.6 million gallons.
  - Reclaimed water was sent from May through October.
  - Thus, six months of the year, no discharge to the Pamunkey River and thus, the Chesapeake Bay.
  - Revenue received from Reclaimed Water Sales = $32,700.
  - Nutrient Exchange Revenue = $26,155.
- Discharged to the river was 52.7% of total wastewater received at the Plant.

Parham Landing WW T P Loading for 2012

Total Maximum Daily Loading (TMDL) is the reality for cleaning up the Chesapeake Bay. New Kent County's Parham Plant has limits on nitrogen and phosphorus and are reported at the end of the year.

Total Nitrogen allowed	=	36,457 lbs.
Actual Nitrogen discharged	=	1,138 lbs.
Total Phosphorus allowed	=	2,436 lbs
Actual Phosphorus discharged	=	50 lbs

Why the Plant Did so Well

- Excellent Design with a proven process in the Sequential Batch Reactors (SBR) with Filters.
- Staff is excellent!
  - Four main operators have been with the County over 6 years with two operators added to the plant upon completion.
  - Each is extremely dedicated to the optimum performance of the plant.
  - Each Operator is committed to Reclaimed Water and the optimum performance

Reclaimed Facilities

- Three Major Components
  - Transmission including pumps, chlorination and a 16 inch Force Main
  - Distribution, including a 300,000 gallons ground storage tank, pumps, chlorination and monitoring equipment.
  - Irrigation ponds (privately owned)

Transmission Facilities Pumps

Transmission Facilities
Ultra-Violet Disinfection

Transmission Facilities
Chlorination

Transmission Facilities
16” Force Main

Distribution
300,000 gallons Storage Tank

Distribution
Control Building

Distribution
Controls

Distribution
More Controls

Distribution
Metering

Distribution
Chlorination-again

Distribution
Chlorinate Contact Time

Distribution
Reject Facilities

Distribution
Buried Valve Box

Irrigation Ponds
Brickshire Golf Course

Irrigation Ponds
Royal New Kent Golf Course

Irrigation Ponds
Colonial Downs Race Track

Reclaimed Water How it Began

- Began the process with an idea in July of 2008
  - Why?
  - To provide irrigation water for three businesses in the county.
  - To preserve groundwater while the County was negotiating 3 new groundwater permits and 3 reissuing of existing groundwater permits.
- Board of Supervisors authorized the Design of the Facilities in September of 2008.
- Hired Malcolm Pirnie to begin work in October of 2008.

Regulatory Issues

- Reclaimed Water Regulations were just passed in 2008.
- New Kent County was the first WWTP to use them.
- Permit writers seemed unsure of how to interpret certain regulations, thus they errored on the side of caution.
- Permit was finally written with two pages of Standards and Monitoring and eleven pages of **special conditions**.
- Required Service agreements which were essentially contracts.
  - It took nearly 18 months to negotiate the two contracts for this project.

Reclaimed Water Regulatory Issues

- Again, New Kent County was the first to work on Reclaimed Water under new regulations. This required the county to overcome some major hurdles.
- Issues with the new regulations
  - Necessitated a Reclaimed Water Management Plan
    - Turf Management
    - Irrigation limitations
    - Need to monitor rainfall and manage end user's irrigation amounts.
      - Can we legally?
      - Is it good policy?

Reclaimed Water Regulatory Issues (cont.)

- Issues with Regulations (cont.)
  - Irrigation storage pond design issues.
    - Must meet the 25 year/24 hour storm. Didn't think RNK pond would pass this limitation.
    - Must be lined. Questions on Clay vs. Artificial liner.
    - Heavily signed (which golf courses do not like)
  - Signage issues
    - Around pond which must be able to be read at 50 ft and bilingual.
    - At the club house for both golf courses and race track.
    - At the first and 10th tee boxes.
  - Point of Compliance! Big issue almost sunk the project.
  - The list goes on

Reclaimed Water Regulatory Issues (cont.)

- Continued with design, bidding and beginning construction while still working out details.
- A big gamble.
  - Didn't have any contract signed when we went out to bid on the facilities.
  - Didn't have the permit issues resolved.
  - Couldn't agree with end users on the price.
- In the end it worked out because everyone wanted it to work, including DEQ.

Results of New Kent County's Success

- New Kent County completed the project and is has operated it successfully for two years.
- DEQ worked on new regulations realizing the hurdles the 2008 regulations places on end users.
- New Regulations went into affect in 2013.
  - I served on the RAP committee working on the new regulations.
  - Addresses many concerns as other projects were working their way through the regulatory process.
  - There are currently 9 Reclaimed Water providers in the State
- Best result is less pollution for the Chesapeake Bay!

Potential Future Problems

- DEQ has other concerns which may impact future projects.
  - Nitrogen buildup and runoff from potential reclaimed water users.
  - Over irrigation which could result in non point discharging of pollutants to the Chesapeake Bay.
  - Not everyone will play by the rules, thus causing problems.

What the New Regulations Didn't Address

- Contracts. This could be a big issue as it was with New Kent. Language did change, but not enough in my opinion.
- Didn't address irrigation for residential neighborhoods.
  - This is potentially the biggest user in the future
  - The regulations make it difficult for Reclaimed Water Providers to implement reclaimed due to for violations.
  - Such as the following potential residential reclaimed user violations.

Irrigation over spray Causing Runoff

Irrigation Saturation allowing Runoff to Enter a Storm Sewer

Questions?

Attachment 2:
HRSD's Sustainability Advocacy Group Newsletter

Sustainability Advocacy Group

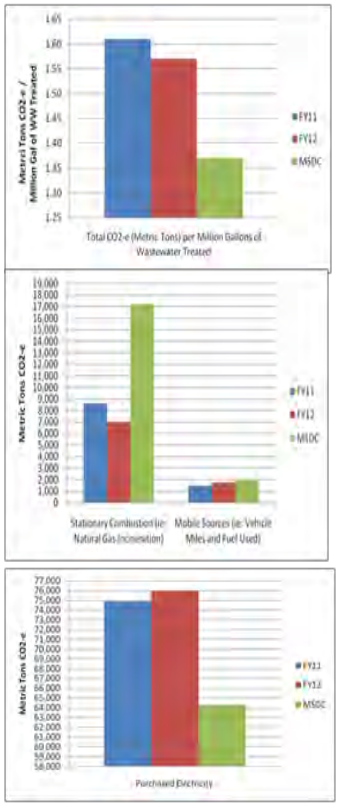
Cleaning wastewater every day for a better Bay.

Winter 2013

Issue 3

What is the Carbon Footprint for HRSD?

The Sustainability Advocacy Group calculates HRSD's Carbon Footprint each fiscal year (FY). The total Green House Gas Emissions for HRSD in fiscal year 2012 was 84,742 metric tons of CO2-e or 1.57 metric tons of CO2-e per million gallons of wastewater treated. As indicated in the graph to the right, this was a slight improvement from 2011.



HRSD operates 9 major wastewater treatment plants and 4 smaller plants, which collectively treated an average of 147.6 million gallons of wastewater each day in fiscal year 2012. The Metropolitan Sewer District of greater Cincinnati (MSDC) is similar in size to HRSD and is used for a comparison in each graph. The MSDC operates 7 major wastewater treatment plants and 3 package treatment plants, which collectively treat approximately 167 million gallons per day. MSD's CO2e may be lower because they have fewer plants to operate and cover a smaller land area.

The improvement from FY 11 appears to be attributed to the reduction of natural gas consumed. The incinerators located at 5 of the HRSD Treatment Plants are primarily responsible for natural gas consumption at HRSD. The total Direct Emissions from Stationary Combustion Sources (Natural Gas) was 7,012 metric tons of CO2-e.

Many HRSD vehicles are now used for employee commuting and carpooling efforts. This is most likely responsible for the increase in miles and fuel consumed in FY 12. The total Emissions from Mobile Sources was 1,761 metric tons of CO2-e.

"To waste, to destroy our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified and developed."
~Theodore Roosevelt

If you wish to view the entire 2012 Carbon Footprint Report, please click HERE .

King William Treatment Plant– ZERO Discharge

The HRSD King William Wastewater Treatment Plant treats approximately 30,000 gallons of wastewater each day. HRSD was preparing to design a new outfall to the Pamunkey River for this treatment plant when the concept of water reclamation was discussed as a viable alternative. King William's effluent is highly treated and can be reused for other beneficial purposes. HRSD is studying the feasibility of delivering this water to the neighboring Nestle' Purina Pet Care Co. If this water reuse project is a success, the entire volume of HRSD's King William Wastewater Treatment Plant effluent will be utilized for the production of "Tidy Cats" litter. This reclamation project would have many environmental benefits such as the reduction of groundwater currently withdrawn by Nestle' Purina and the elimination of the King William Wastewater Treatment Plant's discharge to the local water-way. A cost analysis and feasibility study for this project is currently underway.

Photo of the Pamunkey River, taken for the Walk Across Virginia Blog

Highlighting HRSD's Central Environmental Lab (CEL)

HRSD's Central Environmental Lab (CEL) made the changes shown below to reduce their impact on the environment.

CEL's Sustainability, Waste Minimization and Conservation Efforts	
The following have been implemented	
Action	**Result**
Purchased only the amount of chemicals needed for lab usage; established a longer chemical shelf life policy based on QC data	30-50% reduction in expired chemicals for disposal, savings in expenditure for chemical usage
Changed preserved sample volume requirement based on amount needed for analysis	Reduced amount of acid waste by ~6,500 liters per year
Utilized accelerated method of extracting organic samples using 66% less solvent; implemented re-cycling solvents used throughout the lab	Reduced amount of toxic solvent waste by about 500 liters per year which amounts to approximately $35,000/year in savings
Utilized micro distillation technology for cyanide analysis requiring less sample volume and chemical usage	Reduced amount of toxic acid waste by about ~75 liters/year
Downsized metals analysis requiring smaller sample volume and less acid for sample digestion	Reduced toxic acid waste by ~150 liters/years
Using copper instead of mercury as catalyst for Total Kjeldahl Nitrogen sample digestion	Eliminated ~5,500 grams / year of toxic mercuric waste
Switched from using mercury thermometers to alcohol filled thermometers	Eliminated mercury waste resulting from broken mercury thermometers
Recycling all plastics bottles, tubes and glass used for analytical processes	Reduced non-biodegradable landfill waste
Under consideration for future implementation	
Recycling of reject water from the CEL's Reverse Osmosis Water Purification System, which is approximately 3,000 gallons per day	Save 3,000 gallons per day of city water

Composting at Home

According to the US EPA, household food scraps and yard waste account for 20-30 percent of landfill waste. Making compost at home keeps these materials out of the landfill and helps preserve valuable space needed for other materials that cannot be recycled. By combining the proper amount of "green" waste (nitrogen source) and "brown" waste (carbon source) into your compost pile or bin, you can save money and improve the soil in your yard. The green to brown ratio should be roughly 3 parts brown to 1 part green.

You can compost at home using a bin or by building a pile. A compost pile that is working well will produce temperatures from 104 – 160 degrees Fahrenheit. It can take anywhere from 3-12 months for the compost to be ready depending on a number of variables. The compost is finished when it has a dark rich color and an earthy smell. Adding it to your soil will improve the soil's structure, enabling the soil to hold water and nutrients better. So not only will you be helping your yard, you can help Save the Bay by reducing runoff!

Learn more about composting at:

Composting 101 or GoGreenHampton-Roads

Environmental Impact: We continuously reduce human impact on the environment.

We focus on:

Outperforming regulatory requirements * Basing decisions on reducing our "net environmental impact" * Fostering a culture of conservation and recycling * Increasing energy efficiency through use of alternative energy sources and innovative technologies

Suggestions for the next issue or ideas for the SAG Team?

Email: SAGTeam@hrsd.com

Members: Erwin Bonatz, Rhonda Bowen, Jessie Deluna, Christel Dyer, Santino Granato, Melissa Josey-White, Laura Kirkwood, Tom Morris, Kevin Parker, Jim Pyne, Dominique Solano, & John Swann.

Attachment 3:
Mission H_20 Report

Mission H2O Groundwater Subgroup
Water Reuse as a Solution in the Eastern Virginia Groundwater Management Area

Executive Summary

The Virginia Department of Environmental Quality is reviewing groundwater management options for the Eastern Virginia Groundwater Management Area. One of the options under consideration is greater use of water reclamation and reuse as a means of replacing or reducing groundwater withdrawals. Mission H_2O has developed this paper as an initial review of the benefits and opportunities for water reuse in the Eastern Virginia Groundwater Management Area. It specifically examines the idea of a "reuse pipeline" from wastewater treatment facilities owned and operated by the Hampton Roads Sanitation District ("HRSD") and maps HRSD treatment plants and existing groundwater withdrawals to visualize the proximity of the potential reuse water sources to customers. The paper also proposes regulatory changes that could help promote water reuse.

The potential exists to expand water reclamation and reuse within the Eastern Virginia Groundwater Management Area, and the timing is right to do so. However, the incentives under the current economic and regulatory systems do not support water reclamation and reuse. For this reason, the Commonwealth must take the lead, either through statutory and regulatory changes, development and implementation of the State Water Resources Plan, or development of incentives. The initial step that is needed is a feasibility study to assess where and how the reuse projects with the greatest benefit to the Eastern Virginia Groundwater Management Area could be located and developed.

Mission H_2O is committed to helping the Commonwealth develop such a study, and stands ready to assist in removing the hurdles and moving forward with promotion of water reuse in the Eastern Virginia Groundwater Management Area.

Water Reuse as a Solution in the Eastern Virginia Groundwater Management Area

I. Introduction

The reuse of highly treated wastewater effluent could provide a sustainable water supply source to replace reductions in groundwater withdrawals. Water reuse is particularly suited to the Eastern Virginia Groundwater Management Area, where wastewater is often discharged to surface waters that are not used as water sources (unlike other areas of the state, where wastewater discharges are a significant source of instream flow). Reuse of wastewater effluent may also reduce the nutrient loads reaching the Chesapeake Bay.

This paper outlines the benefits and opportunities for water reuse in the Eastern Virginia Groundwater Management Area. It specifically examines the idea of a "reuse pipeline" from wastewater treatment facilities owned and operated by the Hampton Roads Sanitation District ("HRSD") and maps HRSD treatment plants and existing groundwater withdrawals to visualize the proximity of the potential reuse water sources to customers. The paper also proposes regulatory changes that could help promote water reuse.

II. Changing Incentives for Water Reuse

While water reuse is currently being performed in Virginia on a small, local scale, there is very little motivation to incorporate the practice on a broader scale in the Eastern Virginia Groundwater Management Area. Existing treatment works are already permitted to discharge their effluent directly to receiving waters, and water reuse represents additional costs and regulatory hurdles to an already costly and highly regulated process. More recent data regarding the impacts of groundwater withdrawals in the Eastern Virginia Groundwater Management Area coupled with the need to reduce nutrient loadings to the Chesapeake Bay is causing more water users to consider reuse. Water reuse allows high-quality groundwater to be reserved for the most beneficial use (potable use), while allowing wastewater treatment works the opportunity to increase their influent volume without increasing the nutrient load discharged.

Modern wastewater treatment technologies produce a higher quality effluent than was generated just a few decades ago. Surface water withdrawal and/or reservoir projects are facing increasing environmental scrutiny, and waterworks owners are facing increased regulations with regards to drinking water quality. The costs associated with treatment and infrastructure to provide potable water for non-potable uses continues to drive up the costs to water consumers. For these reasons, water reclamation and reuse represents unrealized potential for the water and wastewater industry. Looking forward, Virginia's ability to maintain its water supply and disposal avenues represents a limitation on future development and economic growth.

As a result of these factors, there are greater incentives to pursue water reuse in the Eastern Virginia Groundwater Management Area.

III. Opportunities For Water Reuse in the Eastern Virginia Groundwater Management Area

Eastern Virginia's population density, climate, and economy are favorable for beneficial application of reuse water. From a water supply management perspective, the area has an ample supply of treated effluent for disposal, a diverse economy dependent on a significant water demand for potable as well as non-potable uses, and is under the increasing regulatory constraints of being situated within the Eastern Virginia Groundwater Management Area and the Chesapeake Bay watershed. In recognition of the value of water resources, many industries already reuse water within their internal production processes. The question is how to expand the scale so that meaningful reductions in groundwater use are achieved. Examples of existing reuse activities in the Eastern Virginia Groundwater Management Area include:

- A typical paper mill reuses water 15 times before discharging it
- Several localities in the Eastern Virginia Groundwater Management area have engaged in wastewater reuse for golf course/racetrack irrigation
- An industrial facility in the Eastern Virginia Groundwater Management Area utilizes treated wastewater from a nearby wastewater treatment plant in portions of its air emissions control equipment

A. Reuse Pipeline from HRSD to Paper Mills

Within the Hampton Roads area there are opportunities for water reuse programs between wastewater treatment facilities and local industry. HRSD operates 13 wastewater treatment facilities within the Eastern Virginia Groundwater Management Area with an aggregate effluent discharge exceeding 150 million gallons per day (MGD) in 2013. There are also several industries within the Hampton Roads area that produce treated effluent and non-contact cooling water which have the potential for water reuse. These industries are permitted for their water withdrawals and discharges which individually may range between 2.5 MGD to 20 MGD.

Several times over the past 10 years the suggestion has been made that HRSD run a reuse pipeline to one or both of the paper mills located within the Eastern Virginia Groundwater Management Area. As new information becomes available about the potential need to reduce groundwater withdrawals, this concept becomes more viable. What is lacking is a feasibility study to fully address the technical, environmental and financial aspects of the concept. For a project of this magnitude to succeed, it cannot be

dependent on only one or two users. Rather, a feasibility study must address where and how other users could participate to sustain the project in the long-term. Finally, the pipeline must be viewed as a project for the aquifer, not "for the paper mills." It would have long term benefits for all water users in the Eastern Virginia Groundwater Management Area, and thus should have a broader base of support and financial participation than just certain industrial users.

Attached to this paper is a map reflecting HRSD's wastewater treatment facilities and significant water withdrawers. The map is a useful guide for lining up where reuse partnerships may be formed. Reuse projects have already been established on the peninsula between New Kent County and the Colonial Downs racetrack and, until recently, HRSD and the Yorktown Refinery (facility is no longer operating). The largest groundwater user, the West Point Mill, is located more than 35 miles from any large HRSD treatment plans. The map shows that several golf courses and industrial facilities are located within 10 miles of HRSD's Williamsburg Treatment Plant. Almost all of the groundwater permits are located along Interstate 64 which could serve as a reuse corridor. The map of Southside Hampton Roads shows less density of groundwater users. Golf courses in Virginia Beach are relatively spread out. The industrial users in Norfolk, Portsmouth and Chesapeake are 5-15 miles from HRSD's Virginia Initiative Treatment Plan and several water crossings would be required to create a reuse system to connect them. The map of Western Hampton Roads shows a cluster of large groundwater users around Franklin including the International Paper Mill and Hercules, Inc. These facilities are located more than 30 miles from HRSD's Nansmond Treatment Plant. These maps illustrate both the potential for reuse partnerships and the significant distances between groundwater users and treatment plants.

B. Other Immediate Reuse Opportunities

Ample opportunities exist in Eastern Virginia for water reuse to be beneficially and economically applied in the following sectors:

- recreation/tourism – turf & landscape irrigation, commercial toilet flushing & cooling
- agriculture & aquaculture – crop irrigation, fish farms
- manufacturing – process & cooling water
- power generation & co-generation – steam & cooling water
- suburban development – landscape irrigation, construction site dust control, commercial cooling & toilet flushing, car washes
- water supply augmentation – recharging aquifers & replenishing reservoirs

Besides the potential reuse between HRSD and industrial facilities there may be opportunities to reuse water within the service districts of medium to large municipal

wastewater treatment facilities to support tourism, development and industrial needs. In areas or periods where reuse water supply may exceed demand, groundwater recharge may be employed to replenish aquifers within the Groundwater Management Area. In turn, this should mitigate some of DEQ's concerns associated with excessive groundwater pumping, such as saltwater intrusion, land subsidence and loss of aquifer storage. Surface water reservoirs may be replenished utilizing reuse water, particularly during periods of drought, and this practice may mitigate some water use restrictions during these periods. Indirect potable reuse has been successfully practiced in Virginia (e.g., the Occoquan Reservoir) and in other states.

C. Potential Future Reuse Opportunities

Although not discussed in detail in this paper, another reuse opportunity to be considered for the Eastern Virginia Groundwater Management Area is groundwater recharge. Highly treated effluent may be returned to the subsurface for disposal or temporary storage. This is accomplished through shallow infiltration basins (similar to a drainfield), or through direct injection into deep wells. Reuse water can be used to bolster potable aquifers when there are no suitable sites for surface water reservoirs due to space limitations or environmental considerations. Advantages of groundwater recharge include significantly lower design, permitting and construction costs than surface water reservoirs, less land use impact, no evaporative water loss, and none of the maintenance or liabilities associated with operating a reservoir and dam.

Additionally, stormwater management is a growing issue, and stormwater harvesting could be an additional option for the Eastern Virginia Groundwater Management Area, where runoff often flows into the ocean or other surface waters that are not used as a water supply source.

IV. Obstacles to Water Reuse in the Eastern Virginia Groundwater Management Area

The most easily addressed obstacle to water reuse in the Eastern Virginia Groundwater Management Area is a lack of readily available information about the feasibility of reuse opportunities. Reuse has been discussed in the abstract, without any real understanding of the technical and economic requirements needed to implement a project. The water supply planning process offers the ability to compare water supply to water demand, and develop concrete data about alternative sources. Funding feasibility studies for such options would be the best way to advance water reuse in the Eastern Virginia Groundwater Management Area. Such feasibility studies would need to address the following potential hurdles:

A. Regulatory

i. Reuse Regulations

Many of the obstacles with water reuse within the Commonwealth of Virginia are regulatory driven. Currently Virginia Department of Environmental Quality (VADEQ) regulations outline minimum reuse water quality standards for various applications (9VAC25-740-90). However, end user requirements only address wastewater reuse for turf irrigation and industrial use (i.e., cooling water), which narrows the available outlets for reuse water (9VAC25-740-140). In order to maximize reuse, VADEQ would need to incorporate broader regulations that address other outlets.

The existing reclaimed water regulations allow DEQ to require reuse systems to distribute reuse water under contract with the end user. For a municipal utility, this allows the cost to be negotiated by the user, rather than at a rate set by the controlling board. Connection fees, capital recovery fees or capacity fees are typically not charged. Therefore, reuse systems are operated as a part of the wastewater treatment system, and the cost of any capital water reuse projects are reflected in sewerage rates, rather than in the reuse water rates. As such, the application of reuse water is not viewed as financially self-sustaining.

ii. Groundwater Withdrawal Regulations

Currently there are few regulatory or financial incentives to water users to explore reuse water as a water source. Regulatory changes may be necessary to provide incentives for water users to look beyond groundwater for water supply.

Neither Virginia's Groundwater Withdrawal nor Water Reclamation and Reuse regulations address aquifer recharge with reclaimed water or other sources. Lacking appropriate regulations from the Commonwealth of Virginia, aquifer recharge is currently regulated by the EPA through the Underground Injection Control (UIC) program. EPA regulations provide that "no owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons."

Virginia could submit an application to EPA to obtain primary enforcement responsibility or primacy for the UIC program. Some primacy states allow additional types of water to be used in ASR, including treated effluent, untreated surface and groundwater, reclaimed water subject to state recycled water criteria, or "any" injectate. However, state-specific ASR regulations do not supersede the prohibition of movement of fluid into underground sources of drinking water.

(http://water.epa.gov/typs/groundwater/uic/aquiferrecharge.cfm).

State regulations addressing aquifer recharge could result in discharges utilizing the practice.

B. Financial

Funding the capital costs of reuse water infrastructure may be the largest obstacle to widespread water reuse within the Eastern Virginia Groundwater Management Area. Typically this would include pipelines, pumping/booster stations, storage tanks and additional treatment units (e.g. filtration, chlorination and UV treatment). Easements for infrastructure routing would also be needed. Retrofitting existing development areas and resolving conflicts with existing utilities will add additional costs.

Operating costs of reuse systems also represent an obstacle to water reuse in Eastern Virginia. Operating costs are similar to those associated with water distribution systems. Typical costs include energy for pumping, equipment maintenance, calibration and repair, chemicals for disinfection, extensive water quality testing, operator's salaries and benefits, etc. As with traditional utilities, regional service authorities could offer economies of scale which would not be realized with the current, small scale generator/user agreements. For water reuse to become accepted by the water and sewer industry, the provider needs the ability to set rates that reflect the true capital and operating costs of the utility.

In Hampton Roads, localities operate and finance the drinking water systems and HRSD operates the wastewater treatment system. If discharges from HRSD's treatment plants were used to supplement the public water system demands, the localities could lose revenue associated with the reduced drinking water sales. As discussed in the regional report, "Water and Wastewater Utilities, Designing the Rate Structure of the Future," most utility costs are fixed and do not decrease when water demands decrease. Therefore, development of a reuse system for irrigation and other non-potable uses within public water systems should involve drinking water utilities so they can anticipate and account for the potential loss in revenue.

C. Public Perception & Acceptance

Any reuse project must consider public perception. Where potable supplies may be augmented or replenished (directly or indirectly), absolute assurance that adverse health effects will not occur must be provided. As such, the Virginia Department of Health (VDH) also needs to become involved in revising existing regulations to allow use of reuse water for various applications outside of irrigation and industrial use. Although

introduction and promulgation of such regulatory requirements would be feasible, the acceptance by the public and regulatory communities, and the removal of the stigma associated with reuse water would be necessary. Such stigmas typically surround the use of "sewage" water for applications which are commonly associated with "clean" water.

An important component of public outreach is information about available supply, impacts from additional groundwater use, and the environmental benefits of reuse.

D. Technical Issues

i. Quality of Supply

Certain end uses require different levels of quality. Determining the quality needed can impact the cost of treatment and the viability of a reuse project. The provider and user must agree on which entity pays for additional treatment and liability associated with it. Ultimately, however, the provider must treat to the (typically) more restrictive standard of their surface water discharge, as most treatment facilities cannot make such adjustments "on the fly."

ii. Quantity of Supply

Once implemented, maintaining adequate supply for the various applications may become an obstacle to moving water reuse forward. As with current water supplies, peak demand will occur during the summer months. While a short interruption in supply for an irrigation customer may not be problematic, it could be catastrophic for a manufacturing or industrial process. The need for on-site storage tanks or ponds and/or backup supply may be required, should for any reason, reuse water not be available in the desired quantities. A secondary connection to the potable water supply, or backup supply well (with appropriate separation and backflow prevention), may be needed in certain instances.

V. Conclusions

Reuse water is a greatly underutilized and undervalued resource in the Eastern Virginia Groundwater Management Area. Significant effort and expense is currently being expended to mitigate the effects of wastewater effluent discharges, as well as provide for adequate potable and non-potable water supply demand. The costs of these efforts must be passed along to end users in the municipal utilities and manufactured goods markets, or be absorbed by the providers. By integrating water reuse as part of the solution to some of Virginia's vexing water quality and quantity issues, a great opportunity exists for the Commonwealth to create water sustainability and self-reliance in Eastern Virginia, while remaining competitive in the global and local economies. When viewed in this

light, a high economic and social value must be placed on potable, non-potable and re-useable water supplies.

The potential exists to implement water reuse projects within the Eastern Virginia Groundwater Management Area on a larger scale, and the timing is right to do so. New information provides greater understanding of the stress the system is under at current groundwater withdrawal levels. DEQ is evaluating different management approaches, including potential across-the-board reductions. Even if such reductions are not imposed, the ability of new users to obtain groundwater withdrawal permits is unlikely.

Individual utility providers are currently not incentivized to promote regional water reuse. For wastewater providers, reuse represents an additional layer of operation and regulation which is not financially self-sustaining. For water providers, reuse represents a low-cost competitor. For these reasons, the Commonwealth must take the lead in the reuse regulation and funding arenas to get these programs off the ground.

The immediate need is a feasibility study to assess where and how the reuse projects with the greatest benefit to the Eastern Virginia Groundwater Management Area could be located and developed. The Commonwealth can and should take the lead in this effort.

Mission H_2O is committed to helping the Commonwealth in developing such a study, stands ready to assist in removing the hurdles and moving forward with promotion of water reuse in the Eastern Virginia Groundwater Management Area.

HRSD Treatment Plant Discharge Rates & Active Groundwater Withdrawal Permits in Southside Hampton Roads

Permitted Withdrawal *

- 0.01 - 1.28 MGD
- 1.29 - 2.88 MGD
- 2.89 - 6.67 MGD
- 6.68 - 20.61 MGD

System Use

- Community Water System
- Industrial
- Other (Agriculture/Commercial/Irrigation)

- Systems with Unrestricted Withdrawals (US Navy)
- Certificate of Groundwater Rights

*Permitted withdrawal given as million gallons/day (MGD)

HRSD Treatment Plants *

- Less than 0.42 MGD
- 0.43 - 13.19 MGD
- 13.20 - 18.03 MGD
- 18.04 - 29.49 MGD

*Flow given as million gallons/day (MGD) annual average (2012)

Source: Virginia 2013 DEQ Groundwater Permit Database; HRSD
Map created by HRPDC Staff, March 2014

0 2 4 Miles

BOAT HARBOR TREATMENT PLANT
14.76 MGD

ARMY BASE TREATMENT PLANT
11.71 MGD

NANSEMOND TREATMENT PLANT
16.72 MGD

VIRGINIA INITIATIVE TREATMENT PLANT
29.49 MGD

CHESAPEAKE-ELIZABETH TREATMENT PLANT
18.03 MGD

ATLANTIC TREATMENT PLANT
26.05 MGD

Sewells Point Golf Course
Unrestricted

Albert G. Horton, Jr. Memorial Veterans Cemetery
0.02 MGD

City of Norfolk Utilities
Four Suffolk Wells
16 MGD

Western Tidewater Water Authority
8.34 MGD

Cogentrix Portsmouth
2.6 MGD

BASF - Portsmouth Plant
0.42 MGD

JH Miles and Co., Inc.
0.22 MGD

Elizabeth Manor Golf and Country Club
0.06 MGD

Campostella Ready Mix Plant
0.04 MGD

Capital Concrete Inc
Stapleton Street Plant
0.04 MGD

Indian River Water Company
0.12 MGD

Alsco, Servitex Division
0.05 MGD

Bayville Golf Club
0.04 MGD

Broad Bay Country Club
0.07 MGD

Princess Anne Country Club
0.07 MGD

Cavalier Golf and Yacht Club
0.06 MGD

Kempsville Greens Golf Course
0.03 MGD

Oceana Ready-Mix Concrete Plant
0.02 MGD

Oceana Golf Club
Unrestricted

Bow Creek Golf Course
0.01 MGD

Shared Hospital Services
0.12 MGD

Cintas of Portsmouth
0.06 MGD

Perry Minnow Farm Incorporated
0.11 MGD

Ciba Corporation
0.09 MGD

City of Portsmouth Wells #1 and #2
and Lake Kilby

Princess Anne Athletic Complex
0.09 MGD

Virginia Beach National Golf Course
0.13 MGD

Bayshore Concrete Products/Chesapeake
0.02 MGD

Holland Water System
0.05 MGD

Village of Whaleyville
0.1 MGD

Greenbrier Farms Nursery
0.24 MGD

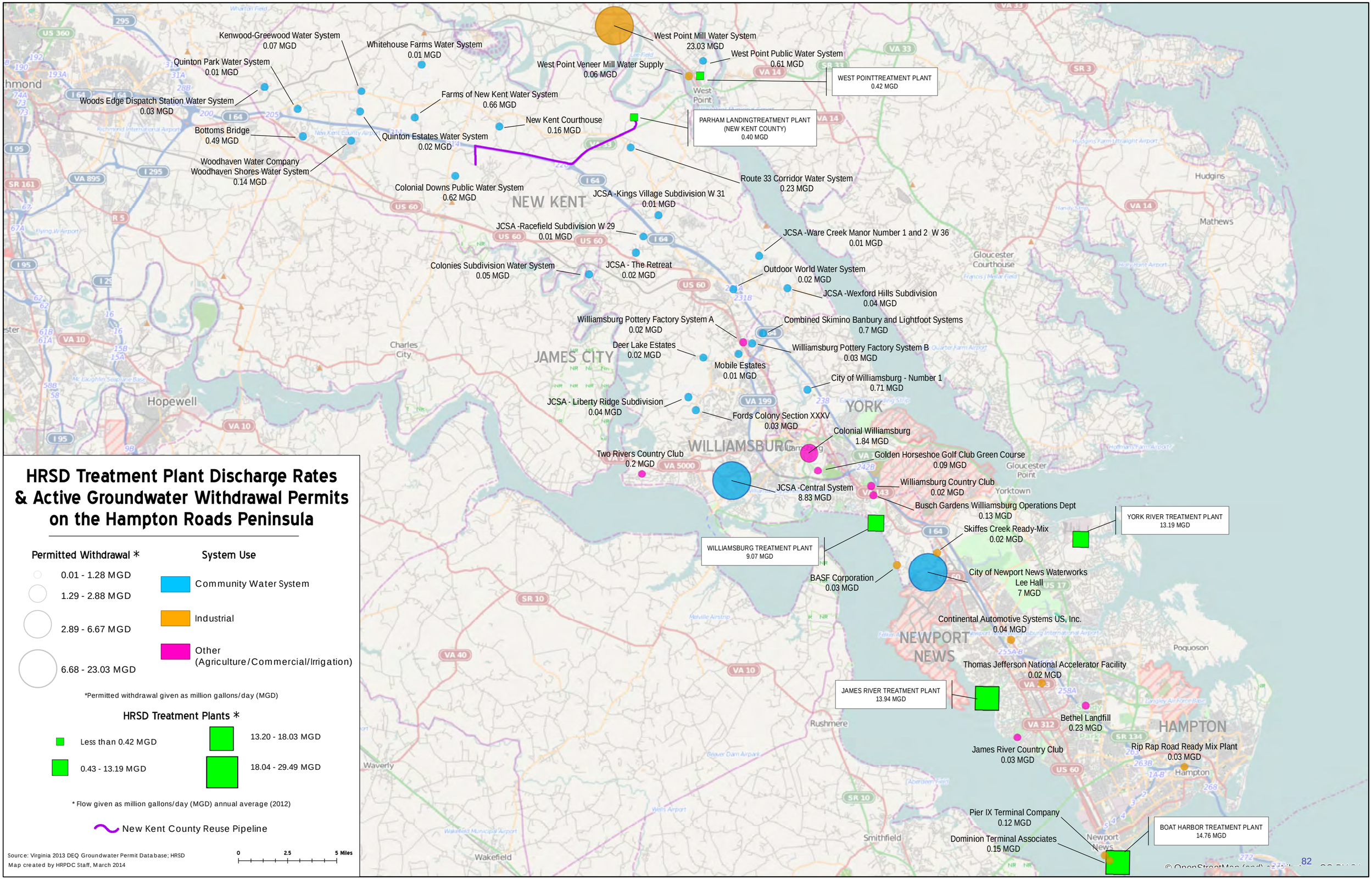
Norfolk City of Nursery
0.06 MGD

VDOC - Saint Brides / Indian Creek
Correctional Center
0.33 MGD

Northwest River/Western Branch Systems
11 MGD

Naval Security Activity Northwest
Unrestricted

Hampton
Newport News
NORFOLK
PORTSMOUTH
Portsmouth
Suffolk
SUFFOLK
CHESAPEAKE
VIRGINIA BEACH
Virginia Beach
Smithfield
Franklin



HRSD Treatment Plant Discharge Rates & Active Groundwater Withdrawal Permits on the Hampton Roads Peninsula

Permitted Withdrawal *

- 0.01 - 1.28 MGD
- 1.29 - 2.88 MGD
- 2.89 - 6.67 MGD
- 6.68 - 23.03 MGD

System Use

- Community Water System
- Industrial
- Other (Agriculture/Commercial/Irrigation)

*Permitted withdrawal given as million gallons/day (MGD)

HRSD Treatment Plants *

- Less than 0.42 MGD
- 0.43 - 13.19 MGD
- 13.20 - 18.03 MGD
- 18.04 - 29.49 MGD

* Flow given as million gallons/day (MGD) annual average (2012)

New Kent County Reuse Pipeline

Source: Virginia 2013 DEQ Groundwater Permit Database; HRSD
Map created by HRPDC Staff, March 2014

0 2.5 5 Miles

HRSD Treatment Plant Discharge Rates & Active Groundwater Withdrawal Permits in Western Hampton Roads

Permitted Withdrawal *

- 0.01 - 1.28 MGD
- 1.29 - 2.88 MGD
- 2.89 - 6.67 MGD
- 6.68 - 20.61 MGD

System Use

- Community Water System
- Industrial
- Other (Agriculture/Commercial/Irrigation)

- Systems with Unrestricted Withdrawals (US Navy)
- Certificate of Groundwater Rights

*Permitted withdrawal given as million gallons/day (MGD)

HRSD Treatment Plants *

- Less than 0.42 MGD
- 0.43 - 13.19 MGD
- 13.20 - 18.03 MGD
- 18.04 - 29.49 MGD

* Flow given as million gallons/day (MGD) annual average (2012)

Source: Virginia 2013 DEQ Groundwater Permit Database; HRSD
Map created by HRPDC Staff, March 2014

0 2.5 5 Miles

Town of Claremont Water System 0.05 MGD
CW Reeson Boxwood Nursery 0.01 MGD
Smithfield Carroll's Farms - 16 & 17 0.06 MGD
Smithfield Carroll's Farms - 9,10 & 21 0.1 MGD
Town of Surry Water System 0.06 MGD
Surry County of Public Schools 0.01 MGD
Town of Dendron Community Water System 0.02 MGD
Smithfield Carroll's Farms 1 thru 5 0.15 MGD
Smithfield Carroll's Farms 6-8 0.08 MGD
Town of Ivor 0.05 MGD
White Tail Park 0.02 MGD
Surry Nuclear Power Plant Water System 0.42 MGD
Lawnes Point Water Supply System 0.04 MGD
Rushmere Water System 0.02 MGD
Days Point 0.02 MGD
RCS Smithfield Incorporated 0.01 MGD
Smithfield Packing Company, Inc. 2.6 MGD
Rescue Water Works 0.01 MGD
Town of Smithfield 1.28 MGD
Smithfield Heights Sandy Mount Manor 0.04 MGD
Clydes Dale Mobile Home Park 0.04 MGD
Albert G. Horton, Jr. Memorial Veterans Cemetery 0.02 MGD
Town of Windsor Public Water System 0.54 MGD
Sedley Water Company 0.04 MGD
Perry Minnow Farm Incorporated 0.11 MGD
City of Norfolk Utilities Four Suffolk Wells 16 MGD
Ciba Corporation 0.09 MGD
Western Tidewater Water Authority 8.34 MGD
Shared Hospital Services 0.12 MGD
Cintas of Portsmouth 0.06 MGD
Elizabeth Manor Golf and Country Club 0.06 MGD
Campostella Ready Mix Plant 0.04 MGD
Capital Concrete Inc Stapleton Street Plant 0.04 MGD
BASF - Portsmouth Plant 0.42 MGD
Cogentrix Portsmouth 2.6 MGD
JH Miles and Co., Inc 0.22 MGD
City of Portsmouth Wells #1 and #2 and Lake Kilby
Bayshore Concrete Products/Chesapeake 0.02 MGD
Naval Security Activity Northwest Unrestricted
VDOC -Southampton Correctional Complex 0.33 MGD
Town of Capron 0.03 MGD
Valley Proteins Inc. Emporia Plant 0.03 MGD
Drewryville 0.02 MGD
Town of Courtland 0.16 MGD
Scottswood Subdivision Water System 0.04 MGD
Edgehill 0.02 MGD
Agri Business Industrial Park 0.08 MGD
Carrsville Water System 0.02 MGD
Holland Water System 0.05 MGD
Hercules Incorporated 6.67 MGD
City of Franklin Water System 2.88 MGD
International Paper Franklin Mill 20.61 MGD
Turner Tract Well System 0.08 MGD
Southampton Mobile Home Park 0.09 MGD
Town of Newsoms 0.06
Narricot Industries, LLC 0.14 MGD
Branchville Boykins 0.15
Village of Whaleyville 0.1 MGD
WILLIAMSBURG TREATMENT PLANT 9.07 MGD
YORK RIVER TREATMENT PLANT 13.19 MGD
JAMES RIVER TREATMENT PLANT 13.94 MGD
BOAT HARBOR TREATMENT PLANT 14.76 MGD
ARMY BASE TREATMENT PLANT 11.71 MGD
VIRGINIA INITIATIVE TREATMENT PLANT 29.49 MGD
NANSEMOND TREATMENT PLANT 16.72 MGD
SURRY
SOUTHAMPTON
ISLE OF WIGHT
FRANKLIN
SUFFOLK
CHESAPEAKE
PORTSMOUTH
NORFOLK
Yorktown
Poquoson
Hampton
Newport News
Smithfield
Suffolk
Franklin
Emporia
Waverly
Wakefield
Windsor
Rushmere

APPENDIX E:

Water Reuse Steering Committee – Meeting 3 –

Regional Stakeholders Meeting

Water Reuse & Water Supply Meeting

Middle Peninsula Planning District Commission
August 26, 2014
10 A.M.

AGENDA

1. Welcome/Introductions
2. VAPA Award to Delegate Hodges – Emily Gibson & Eldon James
3. WATER reuse & supply: *Reasons to Discuss* – Jackie Rickards
4. Coastal Plain Groundwater Status - Scott Kudlas, Virginia Department of Environmental Quality
5. Group Discussion – Steps needed to move forward
6. Adjourn

Jackie Rickards, Regional Projects Planner II
Phone: (215) 264-6451
Email: jrickards@mppdc.com

Water Reuse & Water Supply Meeting

Middle Peninsula Planning District Commission
August 26, 2014

MINUTES

1. Welcome/ Introductions

The Middle Peninsula Planning District Commission (MPPDC) staff and the Water Reuse Steering Committee hosted a Water Reuse and Water Supply Meeting on August 26, 2014 at 10 a.m. in the Saluda, VA Boardroom. Committee members in attendance included Mr. Bud Smith, Essex County Board of Supervisors (BOS); Mr. Pete Mansfield, Middlesex County BOS; Mr. Jim Pyne, Hampton Roads Sanitation District (HRSD); and Mr. Walt Feurer, Town of West Point Director of Public Works. Others in attendance included Mr. Larry Dame, Director of Public Utilities in New Kent County; Ms. Whitney Katchmark, Hampton Roads Planning District Commission (HRPDC); Ms. Emily Gibson, Gloucester County Planning and Zoning Department; Ms. Carol Hamner, RockTenn; Mr. Mike Hazlewood, Legislative Aid; Delegate Keith Hodges representing Virginia's 98th District; Mr. Eldon James, Eldon James & Associates; Mr. Scott Kudlas, Virginia Department of Environmental Quality (DEQ); Mr. Curt Thomas, DEQ; Mr. Matthew Dabrowski, RockTenn; Ms. Elizabeth Andrews, DEQ; and Ms. Jackie Rickards, MPPDC staff.

2. VAPA Award to Delegate Hodges

Ms. Emily Gibson and Mr. Eldon James with the Virginia Chapter of the American Planning Association (VAPA) presented Delegate Keith Hodges with the 2014 Legislator of the Year award. This award recognizes Delegate Hodges' efforts during the 2014 General Assembly session regarding stormwater legislation which provides non-MS4 localities an option of administering their own stormwater program or deferring to the state for administration. Senator Emmet Hanger was also recognized for this award.

3. WATER reuse & supply: *Reasons to Discuss*

Ms. Rickards presented reasons why this meeting was convened, an overview of the Water Reuse Project funded through the Coastal Zone Management Program, as well as the progress made to date. In recent years Virginia has worked to tighten water quality and supply regulations. In 2003, with Water Supply Planning regulations, to Water Reuse and Groundwater Management in 2010, to Virginia Stormwater Management Program (VSMP) regulations, local governments and constituents have adapted to meet these mandates. In the most recent efforts MPPDC staff assisted Middle Peninsula localities in the development

of a local and regional VSMP and calculated the cost of VSMP for the region. To administer a VSMP as a region the cost was found to be approximately $579,000 to $752,000 over a five year period. With such high costs, localities would need to consider additional revenue sources to supplement such program costs. Therefore to supplement program costs, MPPDC staff thought that water reuse could be a viable option for the region. With this thought the Water Reuse Project was initiated.

Ms. Rickards explained that the project had two objectives:

(1.) Research and Assess Water Reuse – Research and organize general information about water reuse, the associated regulations and Virginia case-studies.

(2.) Water Reuse Stakeholder Committee – Develop a Water Reuse Stakeholders Committee consisting of representatives from Middle Peninsula localities and Hampton Roads Sanitation District to discuss: (1) opportunities for water reuse in the region; (2) relevant state regulatory and local policy concerns/issues and (3) potential solutions and policy needs to implement water reuse within the Middle Peninsula.

Ms. Rickards also explained that to-date there have been two committee meetings. During these meetings the topic of water supply was mentioned multiple times and an expressed need for a larger discussion that encompassed water reuse and supply. Thus this meeting was convened to hear from regional and State stakeholders regarding the current status water supply and the needs to implement water reuse. *See Attachment 1 for the full presentation.*

4. Coastal Plain Groundwater Status

Mr. Scott Kudlas, Director of Water with the Virginia Department of Environmental Quality provided a presentation on the status of groundwater in the coastal plain. He explained that there are multiple research sources that support declining groundwater levels in the Virginia Coastal Plain, including USGS monitoring wells and DEQ computer simulations. Mr. Kudlas also reviewed short-term and long-term efforts taken by DEQ to research and address this issue. He reviewed data from the current DEQ models that also identify subsiding lands, salt intrusion, and that the primary aquifers within the coastal plain are not being pumped sustainably for the long-term. *See Attachment 2 for the full presentation.*

5. Group Discussion – Steps needed to move forward

Following the presentation from Mr. Kudlas, the group began to speak of their own personal experience, needs and thoughts regarding groundwater. From RockTenn's perspective they are worried about having enough water in the future to continue business. Ms. Carol Hamner suggested the development of a credit or exchange program for groundwater to could assist in the management of groundwater. In response Mr. Kudlas mentioned that in order for the Commonwealth to allocate appropriate funds for a credit or exchange program there would need to be some prerequisite work that provides a framework for the program and how it you would improve the aquifer. Mr. Larry Dame explained that while New Kent County has a water reclamation system he is concerned about access to future water supply. He has looked into gaining access to surface water adjacent to the county, but found that localities such as Hanover and Hampton Roads have the rights to these surface waters. Hanover would require $40 million from New Kent County to access their water, while Hampton Roads is aware of the issue but is not willing to relinquish water right at this moment. Therefore, this creates obstacles in having a future water supply for the County. Another topic that was brought to light entailed questions about the Virginia Department of Health. It was stated that many of the regulations were generated as a result of VDH not wanting to assume any risk associated with reclaimed water. Thus future discussions with VDH will need to occur in order to expand the use of reclaimed water.

There was also discussion about aquifer recharge and injecting reclaimed water into the cones of depression at the Town of West Point as well as in Franklin where paper mills are located. With injections at both of these locations there is a potential to replenish a percentage of the aquifer while also helping to block salt water intrusion into the aquifer from happening. However with limited knowledge of the potential impacts (i.e. hydrologic, geologic, biologic, etc) of aquifer injection, this may not be a viable option in the short-term. *Please see Attachment 3 for more information.*

In summary the group generated a list of recommendations to move forward with to focus on water reuse and supply:

1. Local governments may need to implement water conservation measures as identified in the Regional Water Supply Plan;
2. Seek funding to develop a model/ plan for an exchange program/trading program for groundwater;
3. Explore the idea of developing funding opportunities for public infrastructure improvements;

4. Identify issues that Virginia Department of Health has with water reclamation and assuming risk, in light of the dwindling water supply;
5. Research the current public policy and regulations regarding surface water rights and how these rights may be relinquished; and
6. Develop cost estimates of water reuse, aquifer recharge, and other technologies to present to General Assembly so that funds could be allocated.

6. Adjourn

Ms. Rickards explained that due to project funds ending on September 30, 2014, further discussions and actions on meeting outcomes will be dependent on future funding. She thanked the participants for attending the meeting.

Attachment 1:
WATER reuse & supply: Reasons to Discuss Presentation

WATER reuse & supply

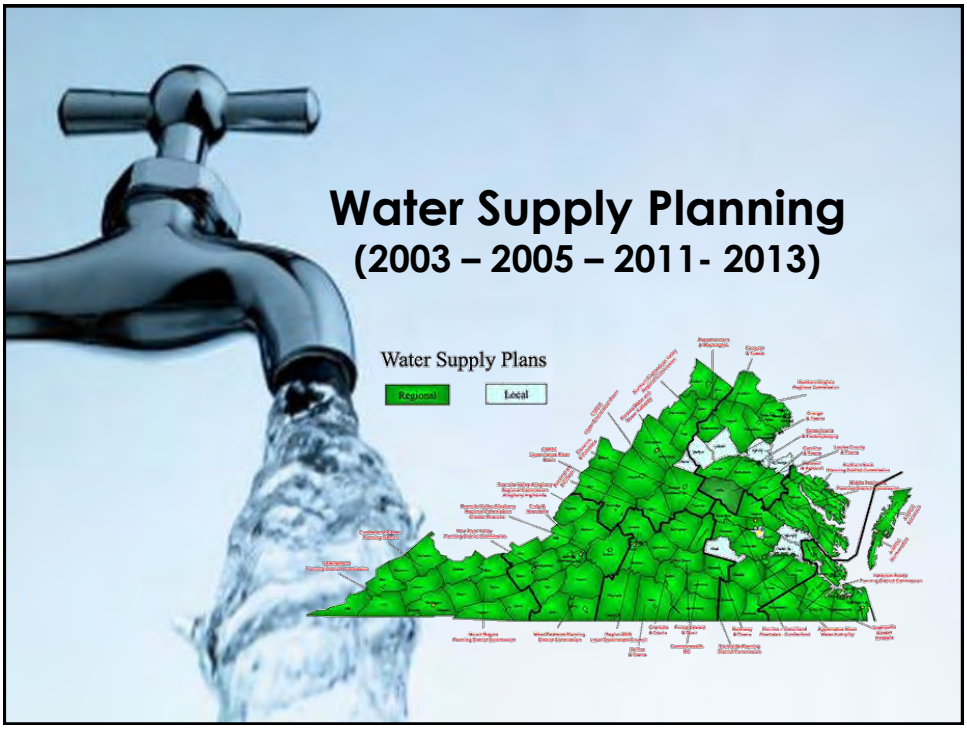
Reasons to Discuss

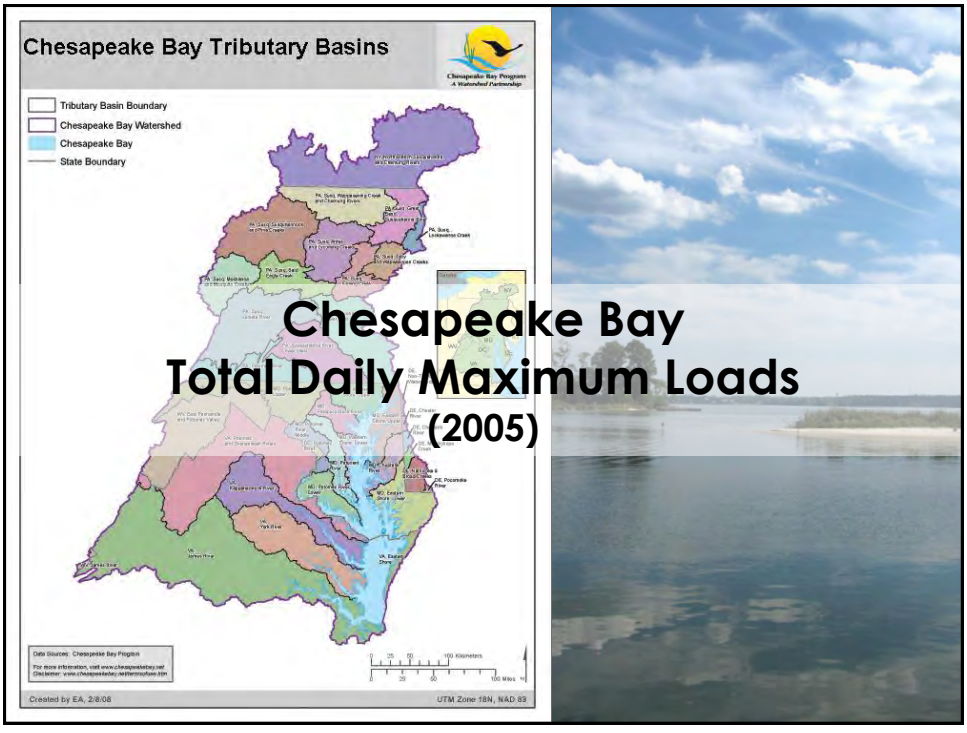
Jackie Rickards
Middle Peninsula Planning District Commission
August 26, 2014

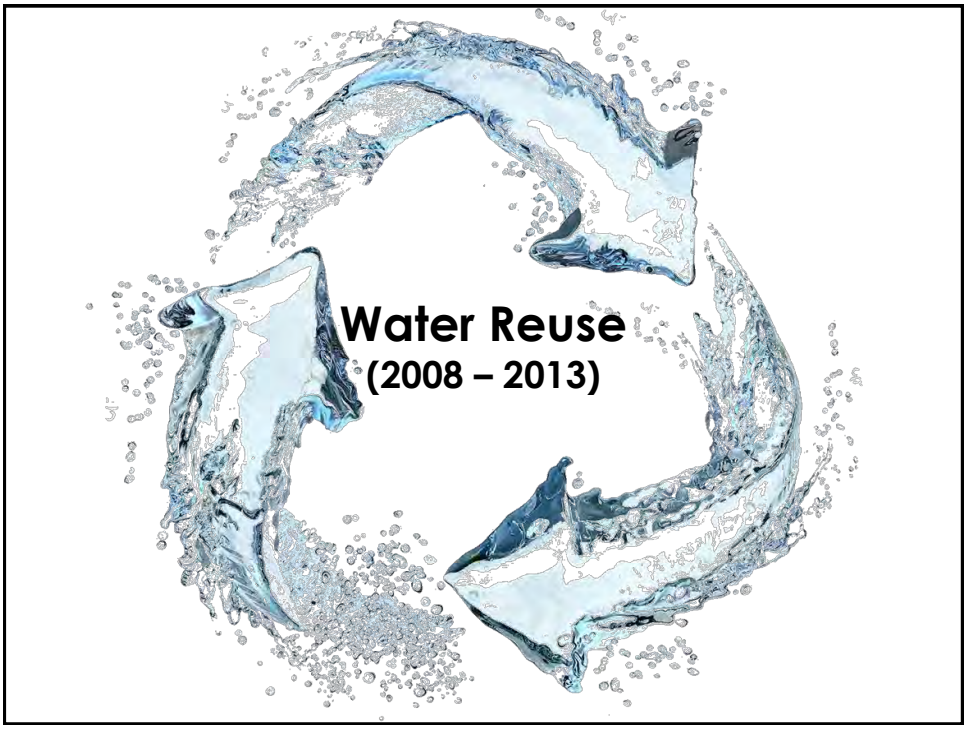
Virginia Coastal Zone MANAGEMENT PROGRAM

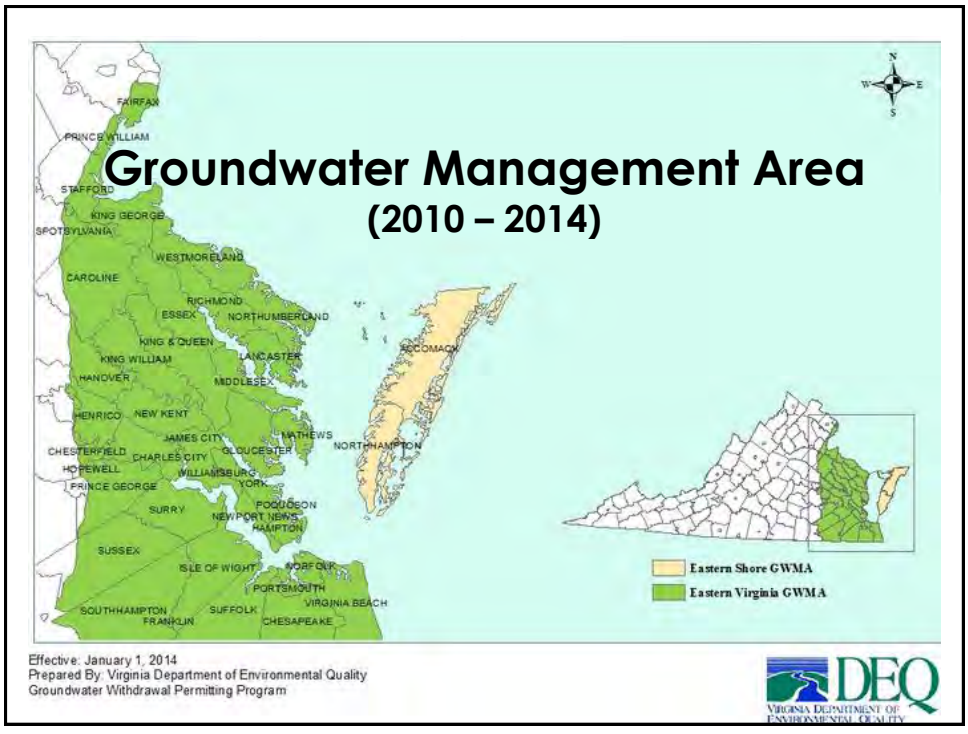
MIDDLE PENINSULA PLANNING DISTRICT COMMISSION

This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant FY13 NA13NOS4190135 Task 52 of the U.S Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

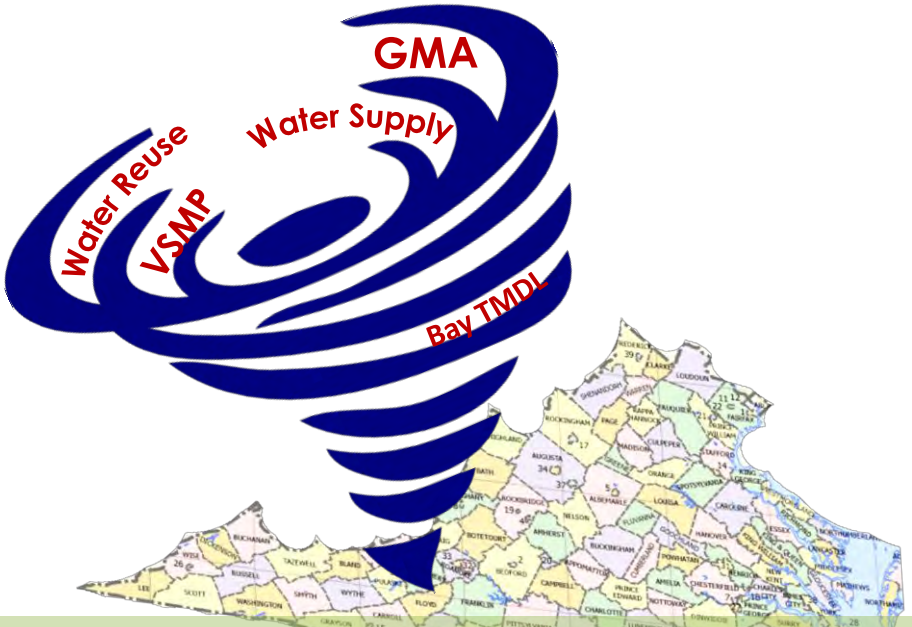



Chesapeake Bay Tributary Basins
Tributary Basin Boundary
Chesapeake Bay Watershed
Chesapeake Bay
State Boundary
Chesapeake Bay
Total Daily Maximum Loads
(2005)

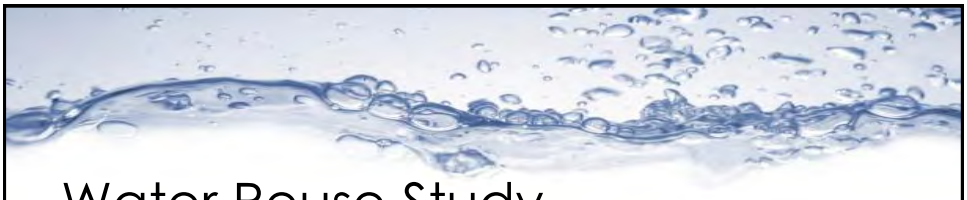

Water Reuse
(2008 – 2013)


Groundwater Management Area
(2010 – 2014)
FAIRFAX
PRINCE WILLIAM
STAFFORD
KING GEORGE
SPOTSYLVANIA
WESTMORELAND
CAROLINE
RICHMOND
ESSEX
NORTHUMBERLAND
KING & QUEEN
KING WILLIAM
LANCASTER
ACCOMACK
HANOVER
MIDDLESEX
HENRICO
NEW KENT
MATHEWS
JAMES CITY
NORTHAMPTON
CHESTERFIELD
CHARLES CITY
GLOUCESTER
HOPEWELL
WILLIAMSBURG
YORK
PRINCE GEORGE
POQUOSON
SURRY
NEWPORT NEWS
HAMPTON
SUSSEX
ISLE OF WIGHT
NORFOLK
PORTSMOUTH
VIRGINIA BEACH
SOUTHAMPTON
SUFFOLK
FRANKLIN
CHESAPEAKE
Eastern Shore GWMA
Eastern Virginia GWMA
Effective: January 1, 2014
Prepared By: Virginia Department of Environmental Quality
Groundwater Withdrawal Permitting Program
DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY


Virginia Stormwater Management Program
(2011 – 2012 – 2013 – 2014)

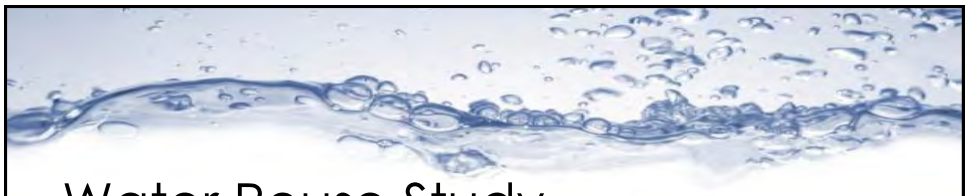


Local Governments and constituents adapt to meet mandates



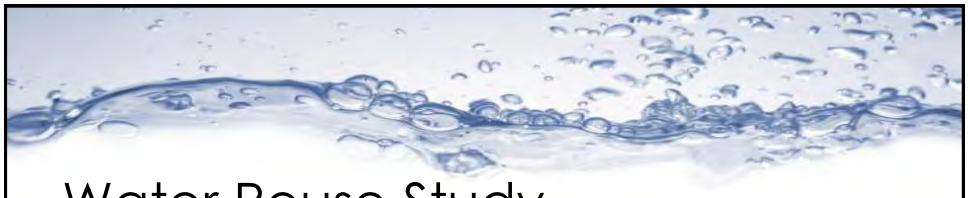
Water Reuse Study

- Funded March 2014 through the Virginia Coastal Zone Management Program
- Tightening water regulations
  - Virginia Stormwater Management
  - Groundwater Management Expansion (to include all Middle Peninsula Localities)



Water Reuse Study

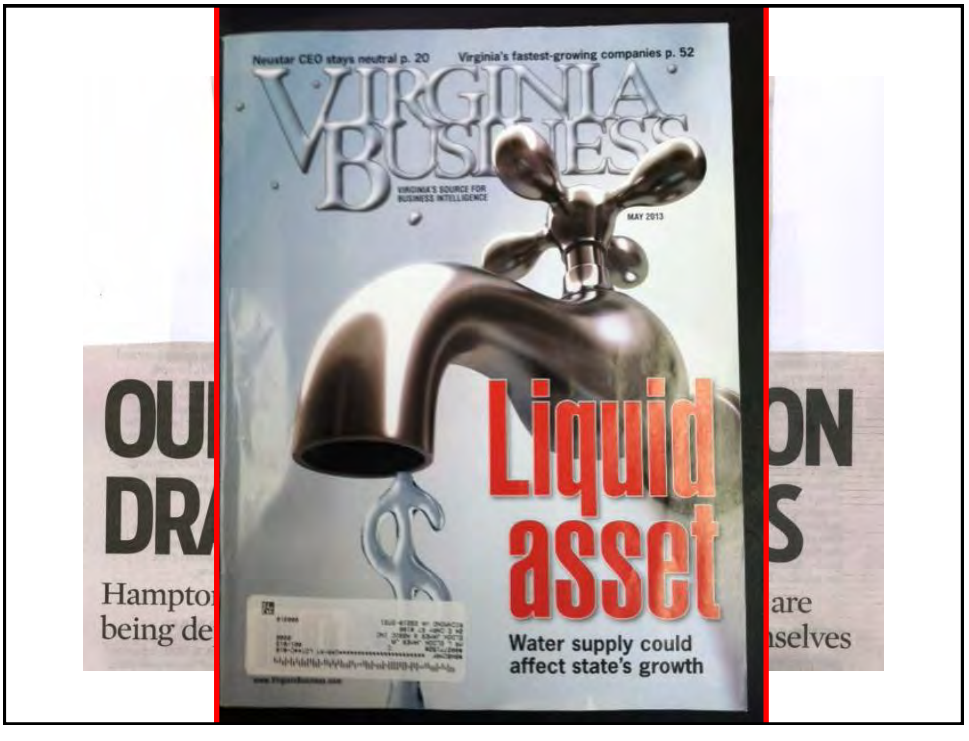
- Product #1: Research and Assess Water Reuse
  - What is it?
  - Associated regulations
  - Virginia case-studies
- Product #2: Water Reuse Stakeholder Committee
  - Local representatives
  - Opportunities for reuse
  - Discuss current regulations and local policy concerns

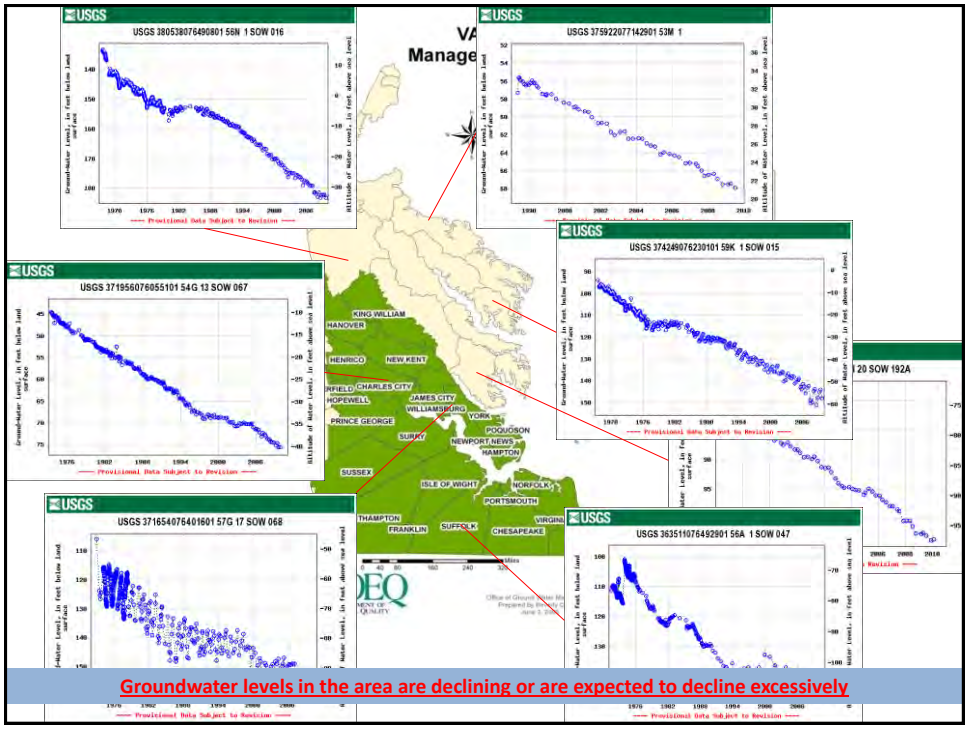


Water Reuse Study

- Gathered information
- Held two steering committee meetings:
  - Valerie Rourke, Coordinator for Water Reuse and Land Treatment at DEQ
  - Larry Dame, New Kent County Utility Director
- Held multiple meetings with stakeholders


WATER SUPPLY
WATER SUPPLY
WATER SUPPLY


Neustar CEO stays neutral p. 20
Virginia's fastest-growing companies p. 52
VIRGINIA BUSINESS
VIRGINIA'S SOURCE FOR BUSINESS INTELLIGENCE
MAY 2013
Liquid asset
Water supply could affect state's growth



Water Supply Planning

- Where is your water coming from now?
- Where is your water coming from in the Future?
- And who else is claiming your water?
- And what are you going to do about it? The plan?

FINDINGS:

Middle Peninsula Water Supply

- **Available water supply** – 34 MGD to 59 MGD
- **Water Demand** – 35.537 MGD
- Projected Total demand would exceed 100% of the low end of the range
- **An additional 1.5 MGD of new supply would be required by 2040**
- King William would exceed capacity before 2020 at current rates of increase, while West Point would exceed capacity between 2020-2030

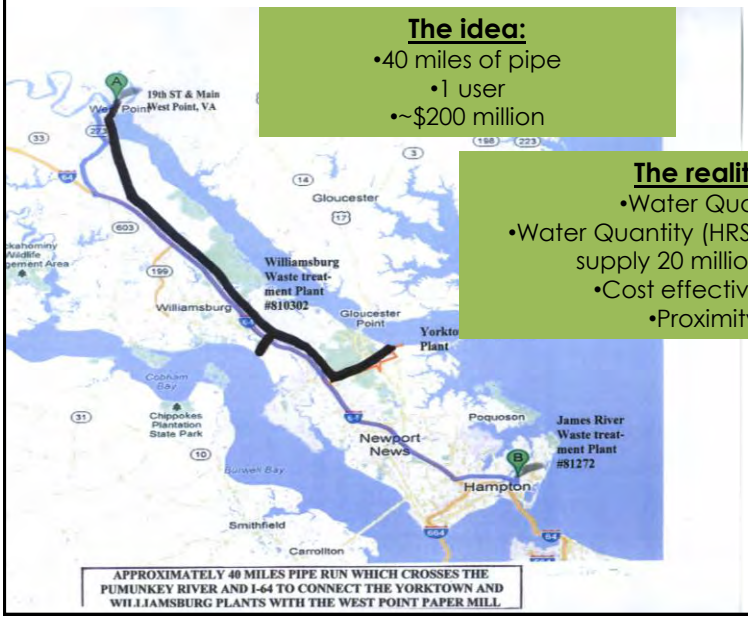
Water Reuse

- Nestle' Purina Pet Care Co. and the King William Treatment Plant
- New Kent County
  - End users: golf courses and horse track

Reclaimed Water to RockTenn?

The idea:
- 40 miles of pipe
- 1 user
- ~$200 million

The reality:
- Water Quality
- Water Quantity (HRSD could only supply 20 million GPD)
- Cost effectiveness
- Proximity



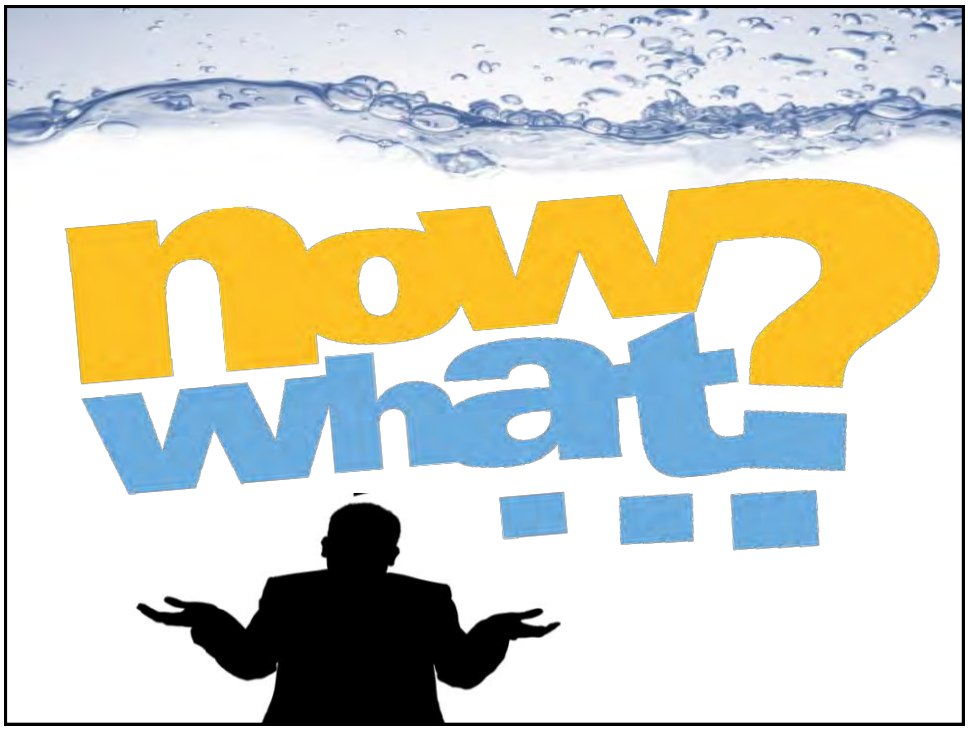
Other Efforts

- Local and Regional Resolutions
  - Middlesex County & Middle Peninsula PDC, 2013
    - *Requesting that the Virginia Department of Environmental Quality take proactive measure to* ***restore artesian head pressure and the reduce high chloride concentrations in the Potomac aquifer***
  - Middlesex County, 2014
    - *Urging the Governor, our secretary of Natural Resources, the Director of Virginia Department of Environmental Quality (DEQ), our Senator and our Delegate* ***to save our potable water supply by sensible reuse of water for agricultural and industrial purposes, while lowering the total load of nutrients reaching the Chesapeake Ba****y.*

Other Efforts

- State Water Commission, July 2013
  - Commented on Local Government Perceptive to Groundwater
    - History of water quantity and quality of groundwater

LIMITED RESPONSE


now
what?
. . .


BOAT RAMP
THE POINT WHEN MANY AUSTRALIANS REALISE THERE IS A WATER SHORTAGE
18/08 2006-483 © John Ditchburn

Attachment 2:
Coastal Plain Groundwater Status Presentation

Coastal Plain Groundwater Status

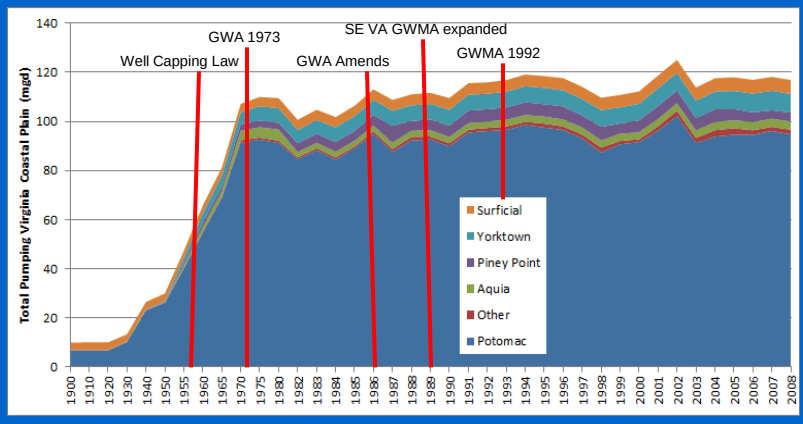
Middle Peninsula PDC
August 26, 2014

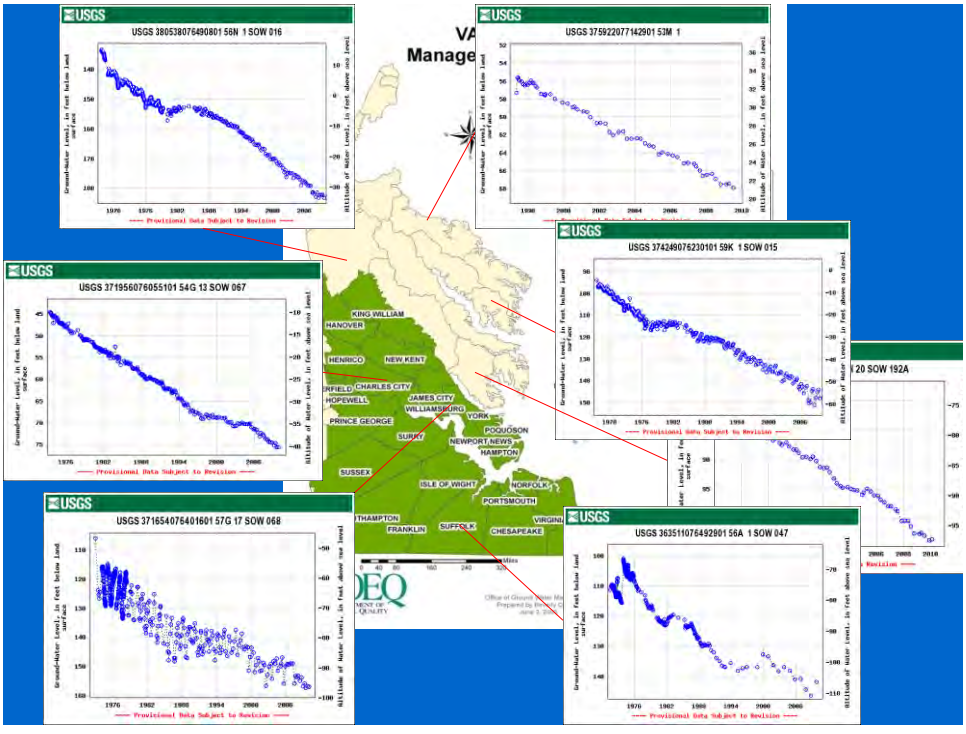
DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Presentation Road Map

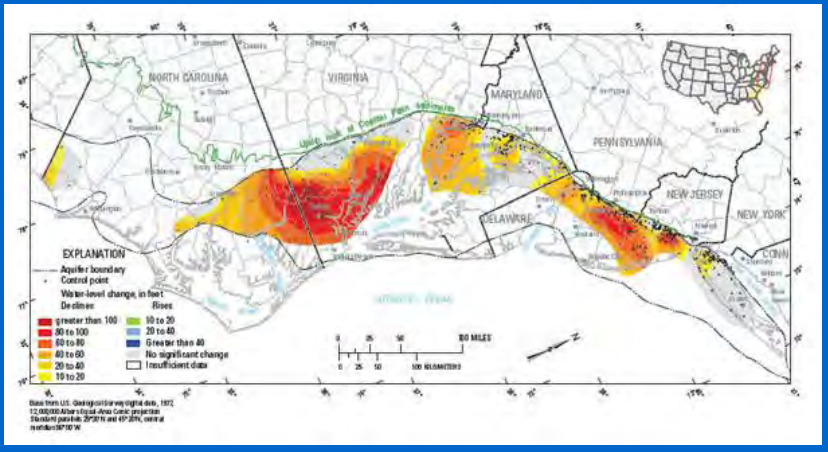
- Background of GW Regulation
- Resource Status
- What the Local and Regional Plans Told Us
- Actions Taken and Future Options
- Feed back

Background of Groundwater Regulation

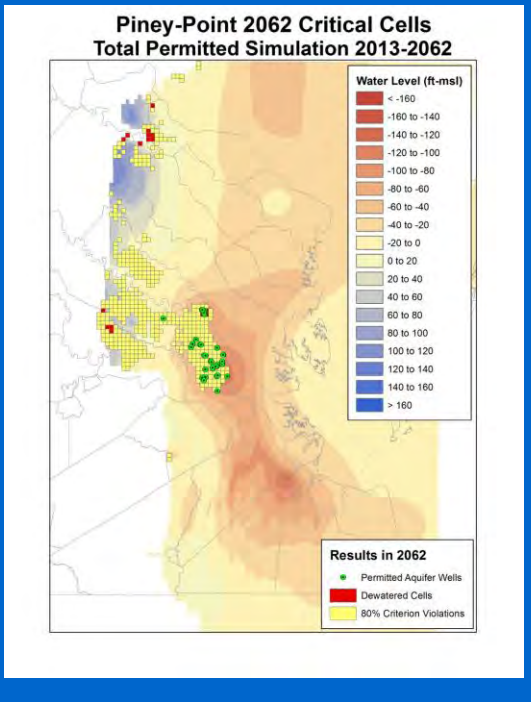




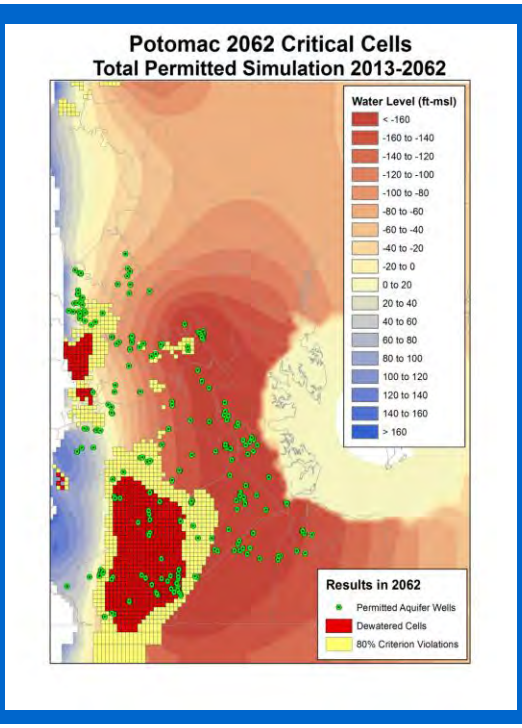
Largest Water Level Declines in Mid-Atlantic



2013 Total Permitted: Piney Point

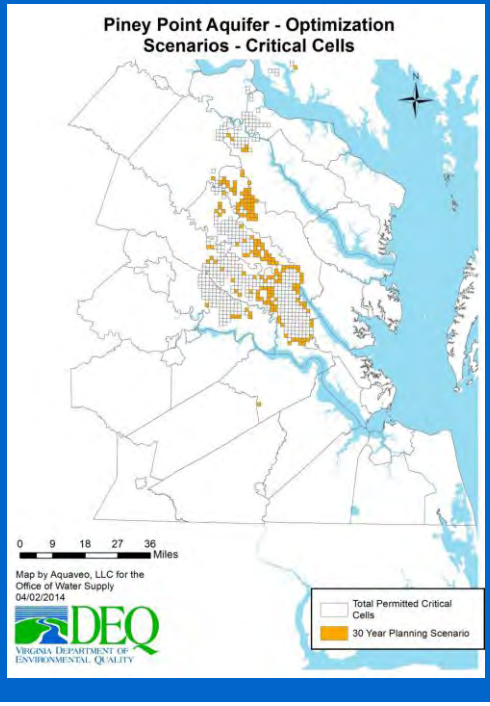


2013 Total Permitted: Potomac



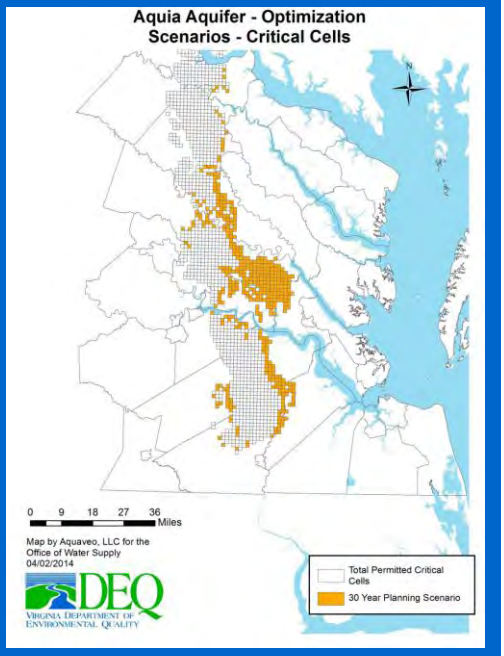
What Plans Told Us (1)

Groundwater Impacts



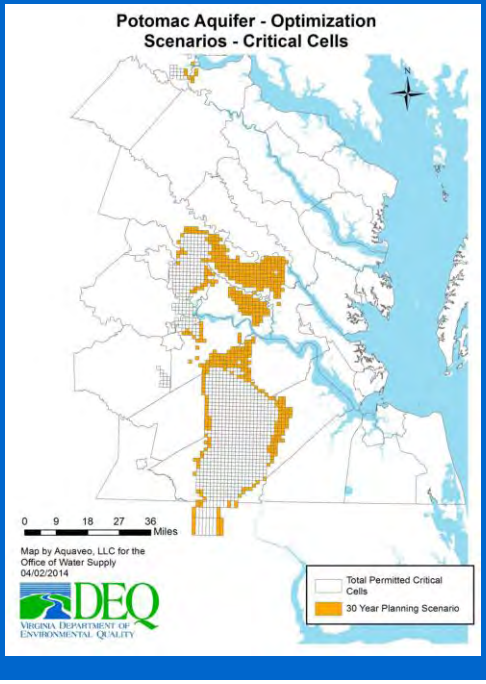
What Plans Told Us (2)

Groundwater Impacts



What Plans Told Us (3)

Groundwater Impacts



Conclusions On Resource Status

- Water levels continue to decline in the primary aquifers.
- Land is subsiding.
- Salt water intrusion is occurring.
- Primary aquifers are not being pumped sustainably for the long-term.

Short-term Actions Taken

- Amend GWMA regulations to:
  - Expand the management area
  - Determine regulatory compliance using full area of impact
  - Use land surface instead of pre-pumping head
  - Add greater clarity on expectations for use of alternative sources and water conservation
- Allow for drought contingencies in permits
- Implement use of new (2009) model
- Economic Impact Analysis

Short-term Actions Taken (2)

- Reinstate GW quality sampling within chloride network starting with 20-25 samples/year
- Collaborate with other agencies:
  - Specific data on well location and construction
  - Un-captured withdrawals
  - Site selection for economic development

Short-term Actions Under Review

- Add subsidence and intrusion package to the model
- Begin moving existing pumps above the top of the Potomac Aquifer (single)
- Improvements to groundwater withdrawal reporting and permitting
- Continue to increase chloride monitoring
- Review program and funding resources

Other Longer-term Policy Options

- Optimize withdrawals among users or spread out withdrawals
- Evaluate potential benefits of aquifer storage projects
- Evaluate drawdown criteria for subsidence and salt water intrusion
- Continue to increase annual chloride monitoring

Other Longer-term Policy Options (2)

- Facilitate greater use of alternatives such as wastewater reuse, surface water conjunctive use, and water recycling
- Consider additional regulatory changes
- Evaluate need for an across the board reduction target and implementation schedule

Scott Kudlas
Office of Water Supply

Scott.kudlas@deq.virginia.gov

Attachment 3:
Potomac Aquifer and Cones of Depression

August 21, 2014

To: David K. Paylor
Director Department of Environmental Quality

Scott Kudlas
Director of Water Supply (DEQ)

cc. Marty Farber
Legislative Services

Mr. Farber of Legislative Services has asked that I review with you the ideas presented in the attached "**PROPOSALS FOR EXTENDING THE LIFE OF THE POTOMAC AQUIFER". T**hese include reducing the present draw by 35 million gallons per day, blocking further salt intrusion from the Chesapeake Bay impact crater, and proactively filling the voids at the centers of the two intersecting "cones of depression". We believe that all these objectives as well as providing an alternative water source for industry and agriculture can be achieved by the proper treatment of wastewater, aka "reuse water".

While the primary thrust is the protection of the Potomac Aquifer, completion of this project will also result in elimination of an estimate 2.5 million pounds per year of nutrients discharged into the Chesapeake Bay. This number also represents about half of Virginia's remaining commitment needed to comply with EPA's Total Maximum Daily Load. And, with an average cost of about $250 to remove a pound of nutrients from the Bay - a saving of $625 million in nutrient removal costs could be realized, enough that it might be possible to pay for the entire suggested aquifer renewal program outline in the text. However, if we continue to allow the Potomac Aquifer to degrade and lose this source of potable water, it will cost Virginians a half billion dollars per year to procure an alternative source.

I look forward to a meeting with you at your earliest convenience.

Sincerely,

Peter W. Mansfield