



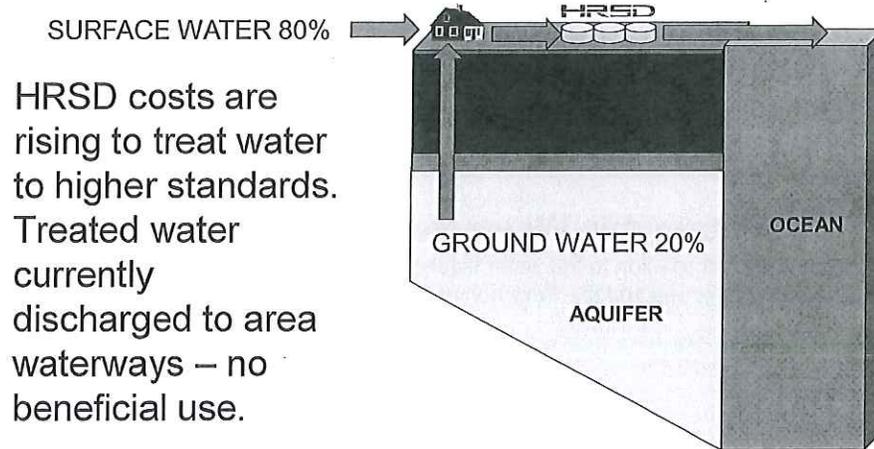
Sustainable Water Recycling

An integrated solution to the water issues challenging Hampton Roads and the Commonwealth of Virginia

Water Issues Challenging Virginia and Hampton Roads

- **Restoration of the Chesapeake Bay**
 - Harmful Algal Blooms
 - Localized bacteria impairments
 - Urban stormwater retrofits (cost and complexity)
- **Adaptation to sea level rise**
 - Recurrent flooding
- **Depletion of groundwater resources**
 - Including protection from saltwater contamination
- **Wet weather sewer overflows**
 - Compliance with Federal enforcement action

Current state of wastewater in Hampton Roads



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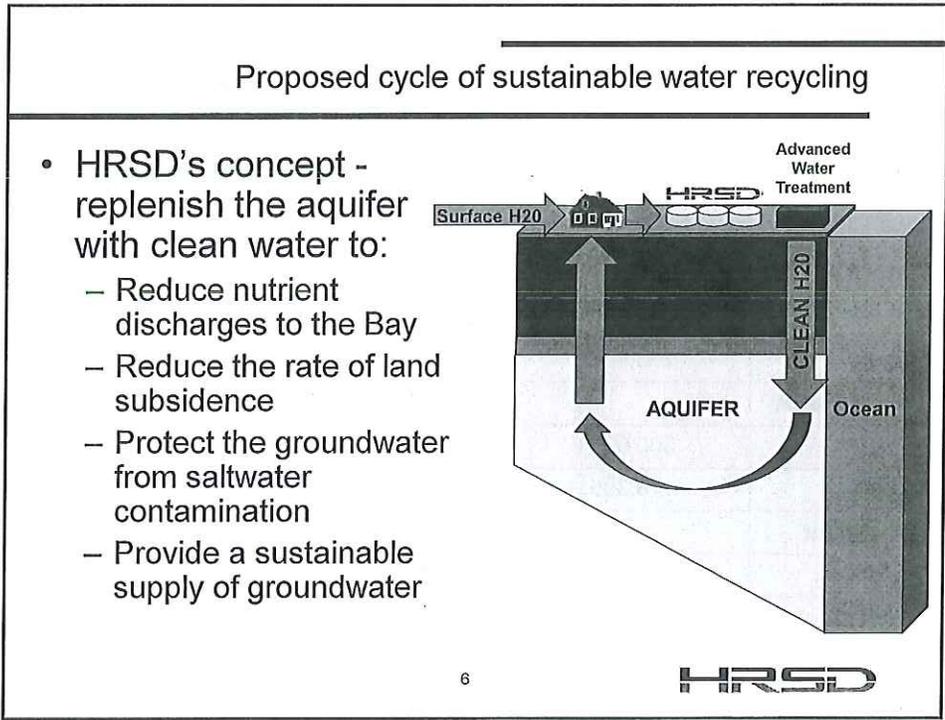
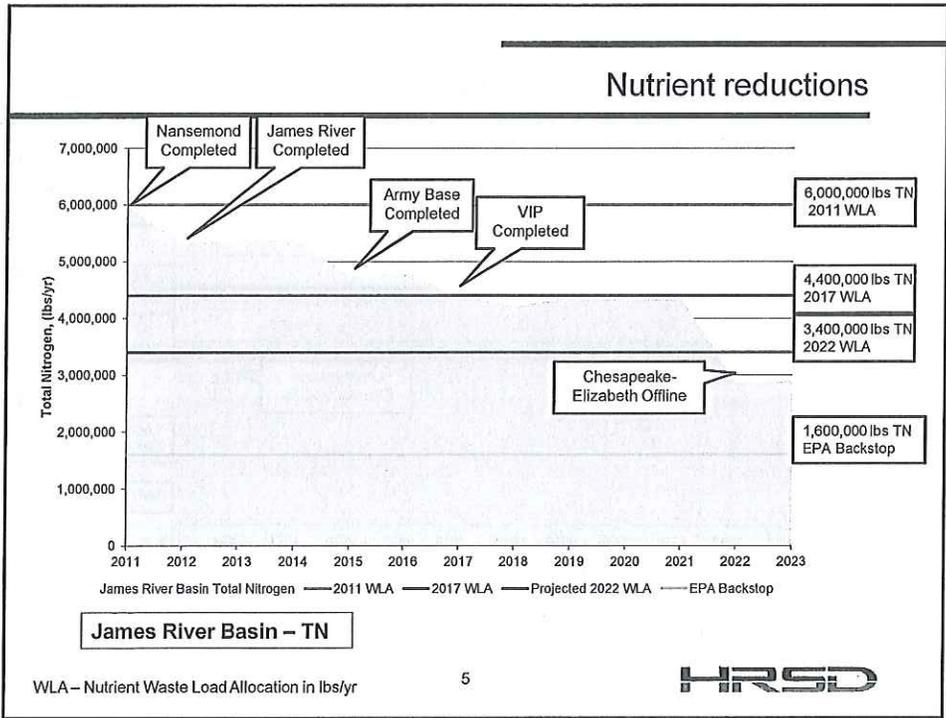
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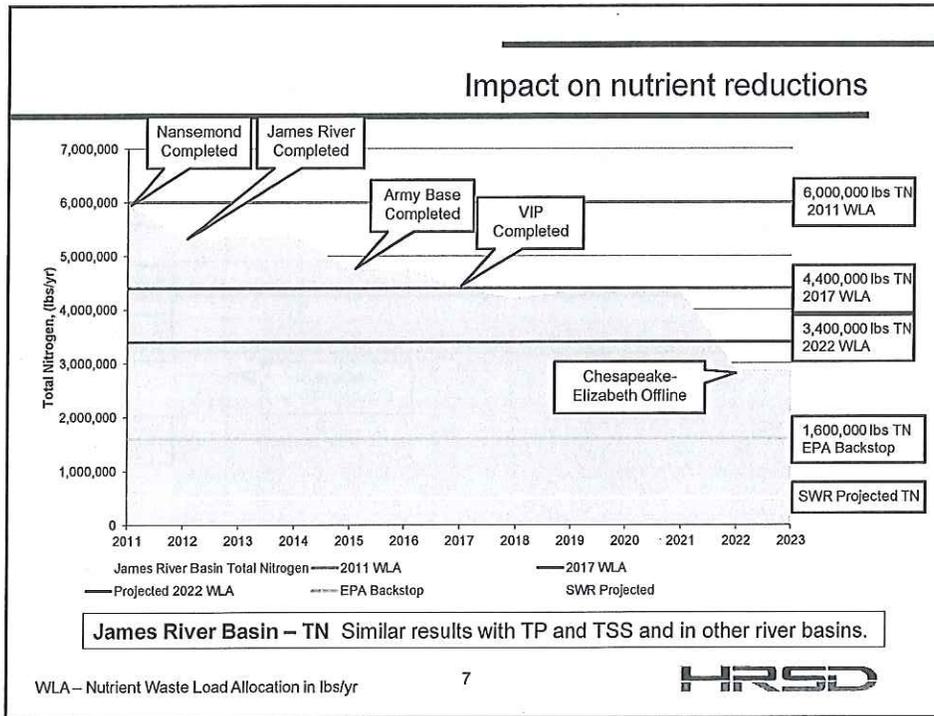
Regulatory uncertainty

- Wastewater permits have 5 year terms
- New regulations can require extensive investment in new treatment processes
- Always concerned about the next issue on the horizon
 - Viruses
 - Pharmaceutical products
 - Further nutrient reductions
- Technology to detect advancing much faster than technology to remove

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Potential to offset stormwater reductions

	HRSD Bay TMDL Allocations	HRSD Post SWRI Loads (2030)	Available for other needs	Stormwater Reduction Needs*
Nitrogen				
James	3,400,000	500,000	2,900,000	63,039
York	275,927	25,000	250,927	19,114
Phosphorus				
James	300,009	50,000	250,009	13,088
York	18,395	2,000	16,395	3,887
Sediment				
James	14,000,000	700,000	13,300,000	5,269,142
York	1,400,000	98,000	1,302,000	1,413,762

* DEQ Regulated Stormwater w/o federal lands 8

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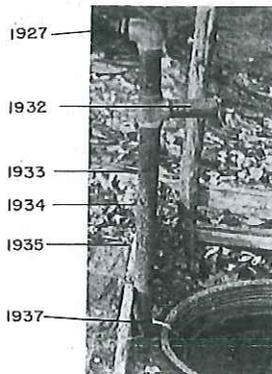
Groundwater depletion has been rapid



A. Overflow from artesian well in Isle of Wight County is wasted.

- Artesian wells in early 1900s – groundwater wells required valves not pumps!
- In about 100 years have gone from water levels at 31 feet above sea level to 200± feet below.

WESTERN VIRGINIA STATE UNIVERSITY



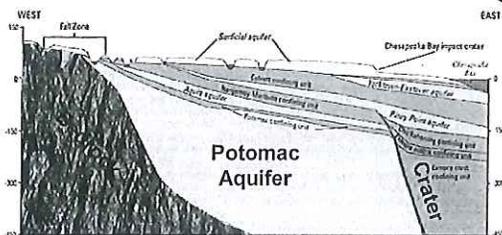
THE VIRGINIA DEPARTMENT OF CONSERVATION

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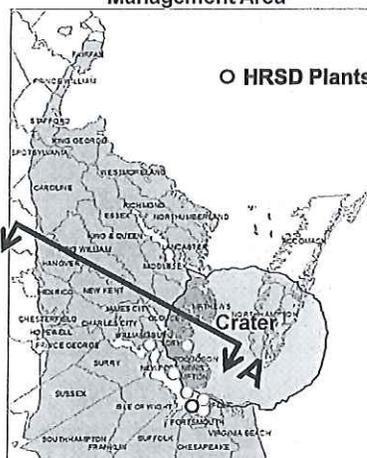
Hydrogeologic setting in the Coastal Plain of Virginia

- Fall Line (around I-95 corridor) to the Ocean
- Truncated by Chesapeake Bay Impact Crater (Bolide/Meteor)
- Essentially no natural recharge – Aquifer water is 40,000 years old



Section A-A

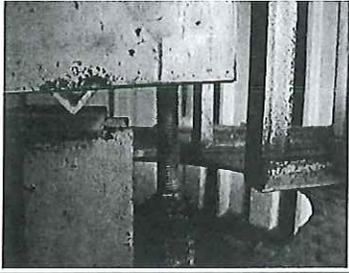
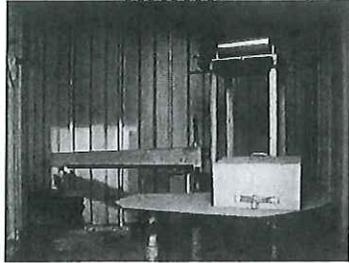
Eastern Va Groundwater Management Area



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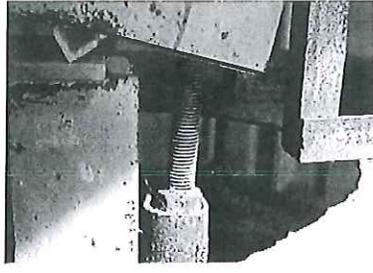
Evidence of groundwater impacts on subsidence

2002



USGS found ground level rose 32 mm between 2002 and 2015 coinciding with reduced groundwater withdrawal by Franklin paper mill.

2015

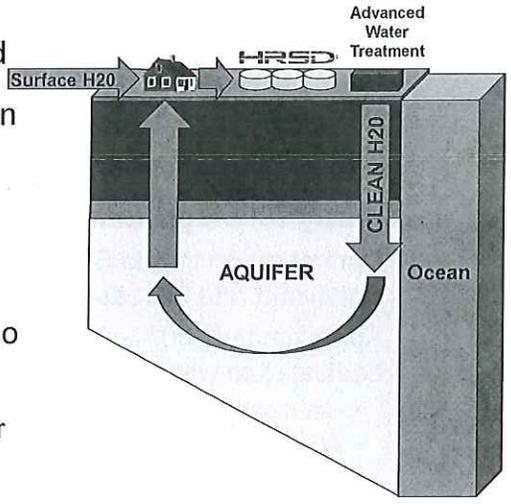


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Advanced water treatment to produce DRINKING WATER

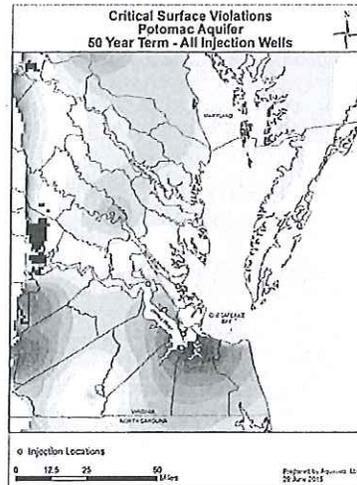
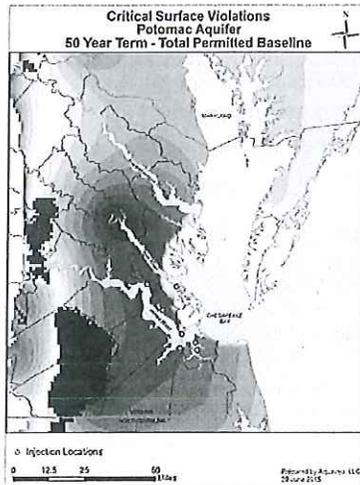
- Advanced treatment used throughout world, many locations in USA and even in Virginia to produce water that exceeds drinking water standards
 - Upper Occoquan Service Authority/Fairfax Water
 - Loudoun Water
- Aquifer replenishment also done in many places including Virginia
 - City of Chesapeake Aquifer Storage and Recovery system - over 2.8 billion gallons pumped to date



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Potomac Aquifer water levels before and after injection



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Cost Summary

- Total project in the \$1 billion range (120 mgd)
 - For 7 plants (not Ches-Liz or Atlantic)
- Annual operating costs \$21 - \$43 M
- Can only be achieved if EPA allows enough flexibility to integrate into wet weather work
 - Cannot afford to add SWRI into existing plan without significant rate increases and potential downgrade
 - Approximately 50% of HRSD \$4.4B CIP will be dedicated to wet weather
 - Not most important water quality issue
 - Plan would be to accomplish critical wet weather issues and SWRI in early years and delay remaining wet weather work

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Conclusion – Summary of Benefits

- Regulatory stability for treatment processes
- Significantly reduced discharge into the Chesapeake Bay (only during wet weather)
 - Creates source of nutrient allocation to support other needs (**STORMWATER**)
 - May increase available oyster grounds
- Potential reduction in the rate of land subsidence
- Sustainable source for groundwater replenishment
- Protection of groundwater from saltwater contamination

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Timeline

- Complete next phase of study with consultant by end of 2016
- Room scale pilot projects – operating in May 2016
- 2017
 - Public outreach
 - **Endorsement from Hampton Roads localities**
 - Endorsement from DEQ/VDH to move forward
 - Groundwater Committee recommends recharge project
 - EPA agrees to integrated plan to meet Consent Decree requirements
 - Phase 3 WIP includes this project to achieve TMDL goals
- 2018
 - Demonstration pilot (2 year study)
- 2020
 - EPA/DEQ/VDH formally approves Certificate to Construct for SWR
- 2020 to 2030
 - Construction through phased implementation
- 2030 Fully operational
 - 120 MGD of clean water put into the aquifer

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Questions?

*Future generations will inherit clean waterways
and **be able to keep them clean.***

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<http://www.hrsd.com/SWR.shtml>

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