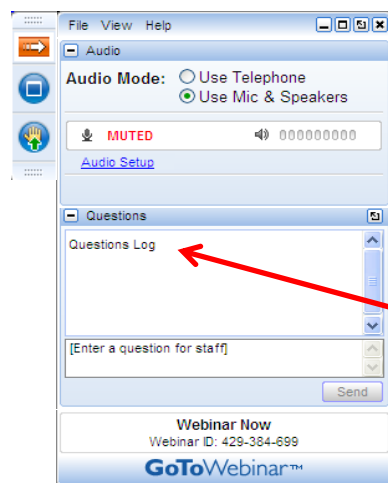


# User's Guide for Integrated Stormwater and Wastewater Planning

Tuesday, February 20, 2018  
1:00-2:30 pm ET



## How to Participate Today



- **Audio Modes**
  - Listen using Mic & Speakers
  - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this web seminar.**



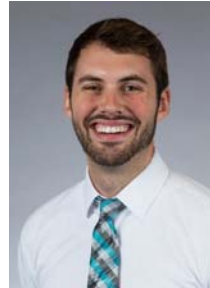
## Today's Speakers



Adrienne Nemura, P.E.  
Geosyntec Consultants



Phil Hubbard, P.E.  
Hampton Roads  
Sanitation District (VA)



Adam Blandford  
University of Cincinnati  
Economics Center



Jeff Rexhausen  
University of Cincinnati  
Economics Center



## Agenda

- 1:00 Welcome and Introductions
- 1:10 Overview and Summary of SIWM9R14 Findings and Tool  
*Adrienne Nemura, P.E., Geosyntec Consultants*
- 1:25 Case Study Development for HRSD  
*Phil Hubbard, P.E., HRSD*
- 1:45 Summary of Community Insight Survey  
*Adam Blandford & Jeff Rexhausen,  
University of Cincinnati Economics Center*
- 2:10 Panel Discussion
- 2:20 Questions and Answers
- 2:30 Adjourn



## WRF SIWM9R14 Project:

# Toolbox for Completing an Alternatives Analysis as Part of an Integrated Planning Approach to Water Quality Compliance

Adrienne Nemura, P.E.  
February 20, 2018 Webcast

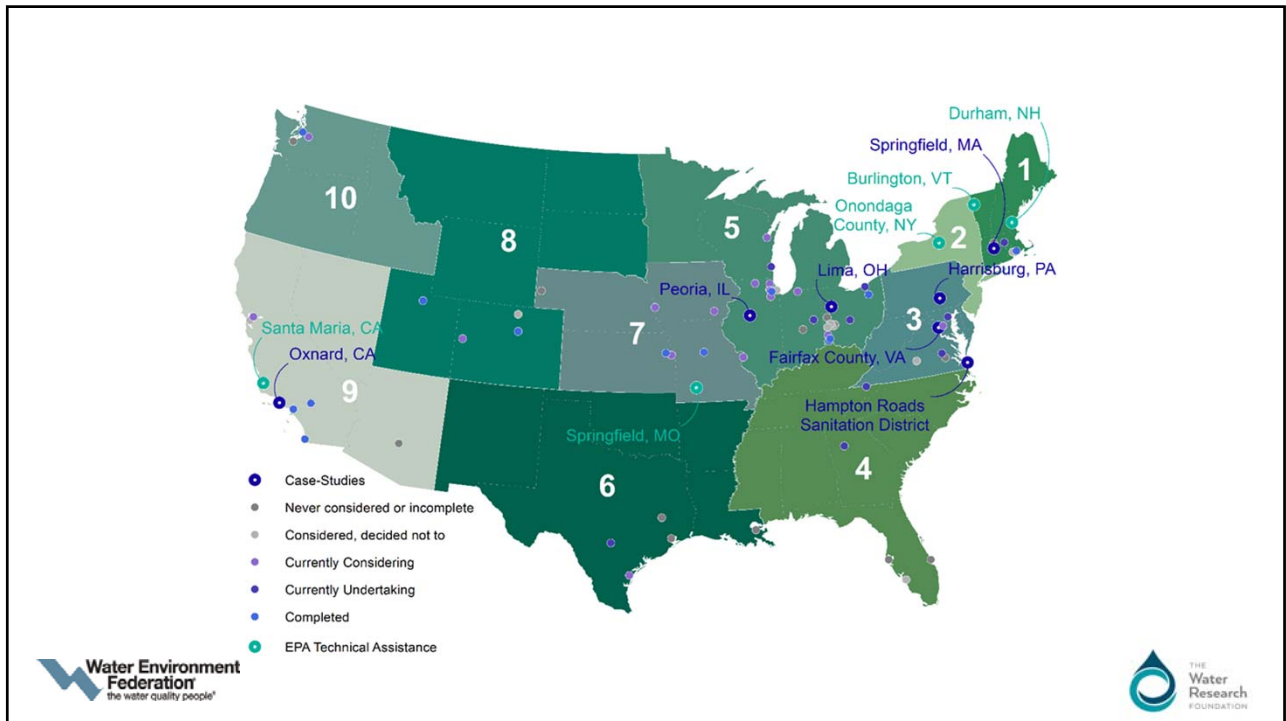
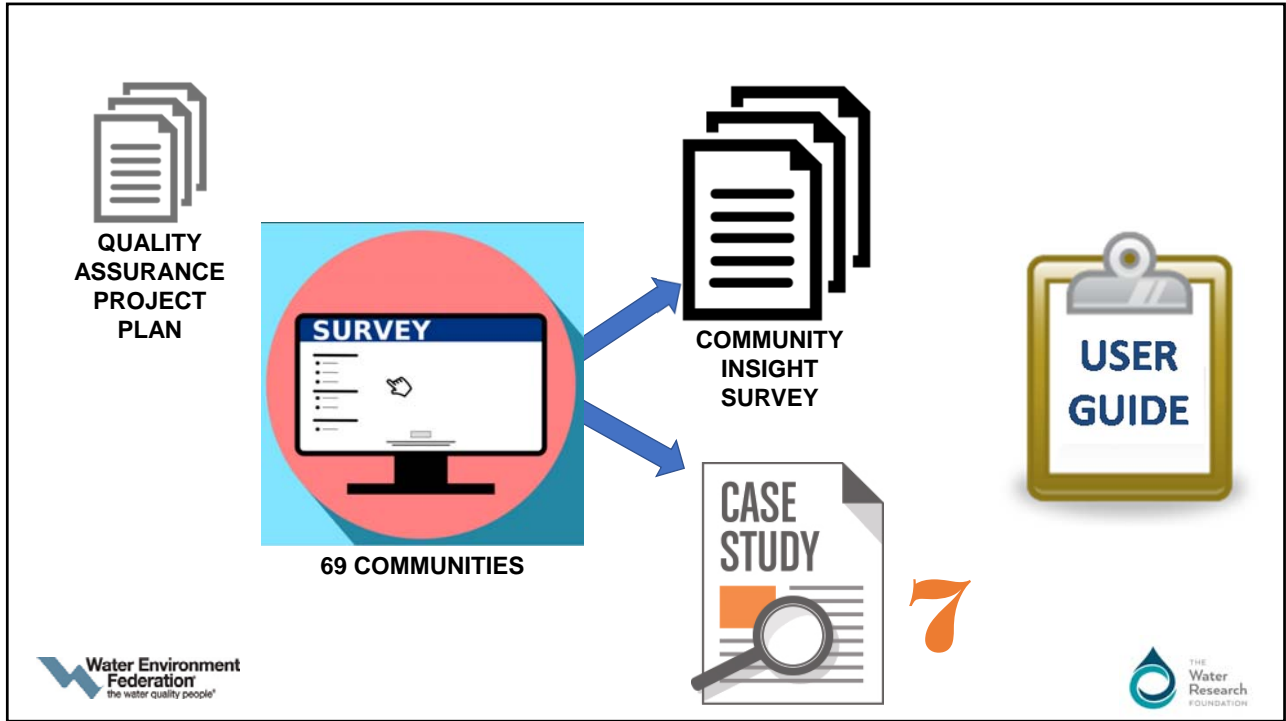
Geosyntec  
consultants



## Integrated planning relies on diverse tools to facilitate sustainable & comprehensive approaches

- Social
- Technical
- Scientific
- Stakeholder
- Economic





## Community Priorities

ENVIRONMENT & PUBLIC HEALTH BENEFITS	UTILIZATION OF RESOURCES	FINANCIAL CAPABILITY & AFFORDABILITY
Maximize water quality benefits	Cost-effective solutions	Affordability for all, especially low-income groups
Other community needs, public health, & environmental benefits	Project prioritization	Concerns about rate increases & financial capability
Flexibility to revise priorities		
Achieve efficiencies & better allocate resources		

## Barriers

- Concerns of additional obligations
- Increased enforcement risks
- Uncertainty about outcomes
- Lack of knowledge by state regulators
- Lack of state flexibility or support
- Lack of EPA flexibility



## Peoria, IL

- Wastewater collection & stormwater
- \$200-\$250M combined sewer overflow plan



100% Green



## Did Not Pursue

- Fear of additional reporting requirements & regulatory oversight
- Need for state experience & trust

## Fairfax County, VA

- Wastewater collection & treatment and stormwater
- Busy board

## Considering IP (internally)

- Cost benefits of integrating planning & operations
- Merging stormwater and wastewater
- Ability to better re-prioritize and explain expected outcomes



234 square miles  
340,000 connections

## Capital Region Water, PA

- Wastewater collection & treatment, stormwater, and drinking water
- 80% combined sewers, partial consent decree
- Assuming MS4 permit
- Total maximum daily loads (TMDLs)

### Undertaking IP

- Establish priorities and affordable schedules
- Challenges coordinating across communities
- Regulatory expectations unclear



- Reduce CSO
- Improve water quality
- Green neighborhoods



## Hampton Roads Sanitation District (HRSD), VA

We continuously reduce human impact on the environment.



Goals: Recycle to Zero Discharge

- 9 WWTPs (~250 MGD)
- 17 cities & counties
- Sustainable Water Initiative for Tomorrow (SWIFT)

### Undertaking IP

- Improve water quality, address economic growth, be sustainable
- Slow or reverse land subsidence
- Improve public education on wastewater recycling
- Identify appropriate affordability metrics





## City of Oxnard, CA


- Wastewater collection & treatment, stormwater, drinking water, recycled water
- Groundwater Recovery Enhancement and Treatment (GREAT) program

Seawater Intrusion to Groundwater Recharge

### Completed IP

- Uniform planning approach for departments
- Improved council discussions regarding budgets
- Requires increased staff time







## Lima, OH

- Wastewater collection & treatment (also have stormwater and drinking water)
- Consent decree allows IP
- Avoid diversion of funding to future obligations & maintain affordable rates

### Completed IP

- City concerned about rate increases on low and fixed incomes
- Lack of EPA knowledge and flexibility for proposals and longer schedules



## Springfield Water & Sewer Commission (MA)

- Wastewater collection & treatment and drinking water
- Reallocate CSO funding to repair and rehabilitation
- Fiscal sustainability

### Completed IP & Accepted

- Cleaning helped reduce sanitary sewer overflows
- Experienced communication & interpretation issues with individual regulators at multiple government levels



RESIDE  
METER

**Out with the old, in with the new!**



**The Commission is updating water and sewer main pipes at several locations throughout the City of Springfield.**

[Learn More](#)

## Data Gaps

- Element 1: Issues to be addressed in the plan
  - Lack of direction may hinder some communities
- Element 3: Stakeholder engagement
  - Lack of community support
  - Regulator knowledge



## Advice

- Begin with case studies
- Understand it takes time and money (but it is worth it)
- Engage regulatory agencies early on and have a plan
- Understand ultimate goal(s)
- Develop the necessary data
- Be open to engaging a broad group of stakeholders and have a solid plan for engagement
- Understand funding sources and limits



## Acknowledgements

- Jeff Rexhausen,  
Economics Center at the University of Cincinnati
- Patricia McGovern,  
McGovern, McDonald Engineers
- Fred Andes & Erika Powers,  
Barnes & Thornburg
- WE&RF Project Advisory Committee
- WE&RF Foundation Staff
- Stakeholder Advisory Committee

Adrienne Nemura, P.E.  
[anemura@Geosyntec.com](mailto:anemura@Geosyntec.com)  
 734.476.0357

**Geosyntec**  
 consultants

engineers | scientists | innovators





EPA Consent Decree  
Integrated Plan/Regional Wet Weather  
Management Plan

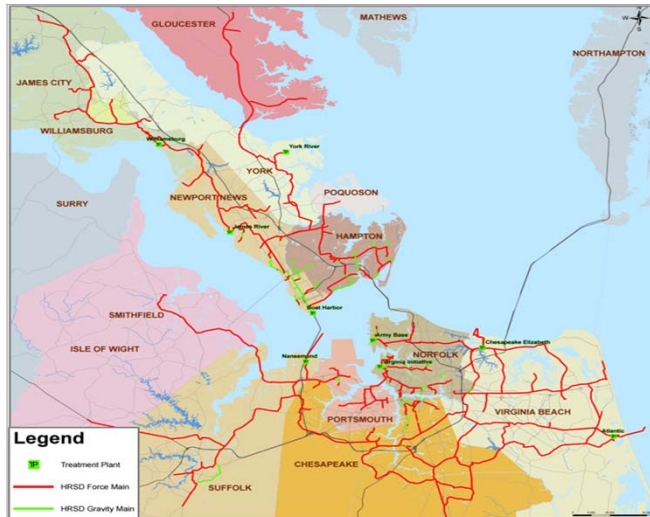
February , 20 2018

## Hampton Roads Sanitation District

- Serves Southeast Virginia
- 430 miles of force mains
- 81 PS
- 50 miles gravity pipe
- 9 major treatment plants



## Regional System



- 450,000 connections
- 5,800 miles gravity sewer
- ~ 4000 miles private sewers
- 1,580 public sewer pump stations
- ~ 1500 private sewer pump stations
- 1,120 miles of force main
- 3,100 sq. mile service area
- 1.6 million population
- 9 Wastewater Treatment Plants
- 250 MGD Permitted Capacity

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## Enforcement Happens.... Despite Great Performance

- EPA declared their intention to institute an enforcement action in September 2005
- Region comes together and develops a State Consent Order covering HRSD and 13 Localities in 2005, 2006 & Signed on September 26, 2007
- EPA and HRSD negotiate a Federal Consent Decree similar to the State Order in 2008 & 2009
- Federal Decree entered with court in February 23, 2010



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## Objective of the Consent Decree

- “HRSD, working in consultation with the Localities, to fulfill the objectives of the Clean Water Act with a goal of eliminating Sanitary Sewer Overflows (SSOs)”



## Regionalized Approach

- Localities and HRSD agreed in Memorandum of Agreement to Regionalized Approach
- HRSD will be responsible for capacity in the regional sanitary sewer system (Localities' systems and HRSD system)

## Major Change in Compliance Orders

- Special Order by Consent (SOC) modified in December 2014 focuses on Localities' Management, Operations and Maintenance (MOM) issues
  - Eliminates HRSD from SOC
  - Adds Norfolk to SOC and terminates prior Order
- Consent Decree Modification No. 4 references SWIFT and its relationship with the RWWMP. Requires that the approved RWWMP be a material modification to the CD subject to public comment and Court approval



## Overall Regulatory Status

- HRSD continues to implement requirements of Federal Consent Decree, which was originally entered with the court on February 23, 2010, as modified
- All Consent Decree required submittals have been on time



## Rehabilitation Action Plan

- Requires addressing specific features with condition defects identified in Consent Decree Condition Assessment Program (CAP)
- EPA/DEQ approved the plan in May 2015
- Addresses more than \$183M of required improvements in gravity mains, force mains, pump stations, and associated system components
- Implementation Plan has three phases through May 2025
- Sixteen projects complete with value more than \$42M



## Interim System Improvements

- Consent Decree includes requirement to complete 45 CIP projects totaling approximately \$399M.
- 42 projects will be completed by February 23, 2018 , two projects by December 2018 and one project by June 30, 2018
- Of the 45 projects, thirty-six (36) are completed and nine (9) are in construction
- All projects completed by February 23, 2018.



## Management, Operations, and Maintenance (MOM) Program

- MOM Program approved by EPA/DEQ in 2011
- The MOM Program was updated in July 2015 to reflect:
  - Organizational updates
  - Current programs and updated status of initiatives
- Performance measures are continuing to be tracked to evaluate the effectiveness of the programs
- Program update scheduled for 2018



## Regional Wet Weather Management Plan (RWWMP)

- Integrated Plan/RWWMP submitted to EPA/DEQ on September 28, 2017





## Amendment 4

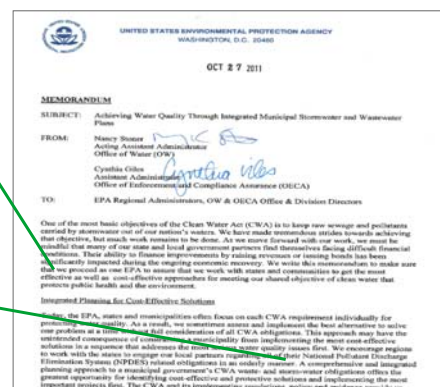
- Added reference to SWIFT
- May reference the Integrated Plan as necessary to explain the sequencing or schedules in the RWWMP
- Schedule in the RWWMP shall accommodate expenditures on and revenues from SWIFT **provided that** HRSD demonstrates that greater human health or environmental benefits will be gained through SWIFT before completion of the RWWMP and HRSD provides a schedule for both SWIFT and RWWMP that is as expeditious as possible as determined through an acceptable Financial Capability Assessment and good engineering practice
- Identify and list high priority projects to be implemented concurrently with SWIFT



## EPA's Approach to Integrated Planning

*"...we proceed as one EPA to assure that we work with states and communities to get the most effective as well as cost-effective approaches for meeting our shared objective of clean water that protects public health and the environment"*

*"A comprehensive and integrated planning approach ... offers the greatest opportunity for identifying cost effective and protective solutions and implementing the most important projects first"*



## Water Issues Challenging Virginia and Hampton Roads

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



## Sea Level Rise Threats to Hampton Roads are Significant



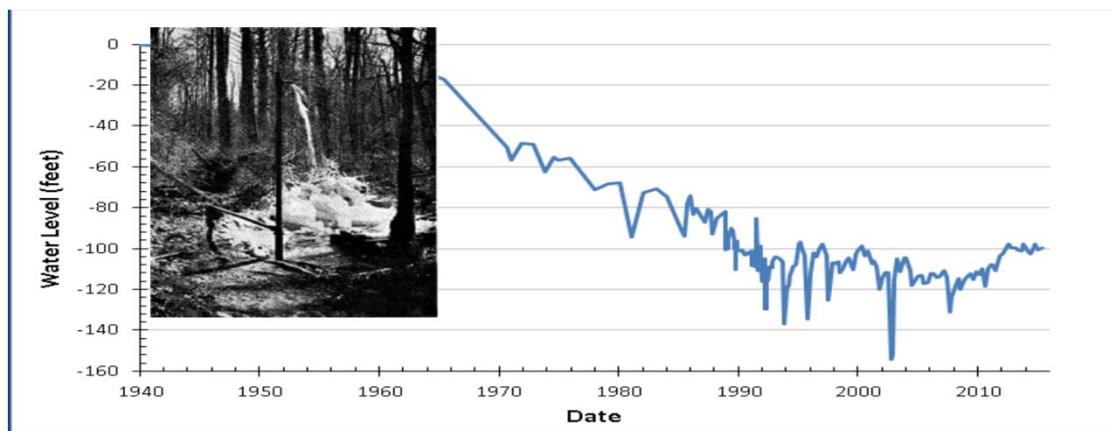
## Recurrent Flooding is a Real and Current Problem



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## Overpumping Has Led to Major Declines in the Potomac Aquifer

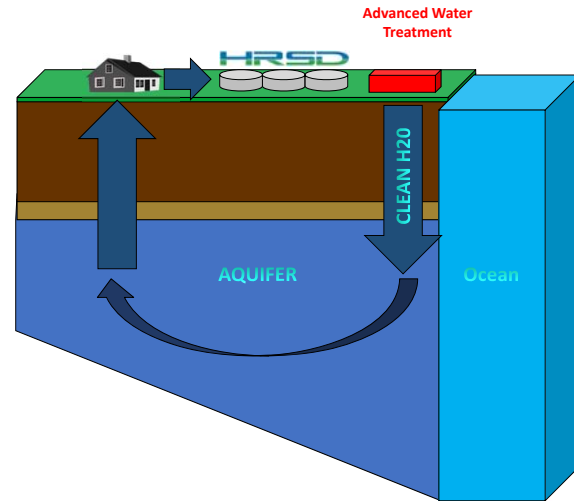


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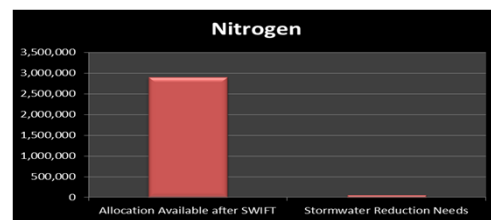
## SWIFT – Sustainable Water Initiative for Tomorrow

- Treat water to meet drinking water standards and replenish the aquifer with clean water to:
  - Provide regulatory stability for wastewater treatment
  - Reduce nutrient discharges to the Bay
  - Reduce the rate of land subsidence
  - Provide a sustainable supply of groundwater
  - Protect the groundwater from saltwater contamination



## Hampton Roads' Localities Stormwater Nutrient & Sediment Reductions

- Required in Virginia's Watershed Implementation Plan (WIP)
- Localities expected to spend \$2.0B (proposed IP reduces to \$500M)
- SWIFT will essentially eliminate HRSD's dry weather discharges
- Virginia has required laws, regulations and infrastructure to facilitate trading
- Draft agreements provided to Localities
- Term credits used to meet TMDL schedule
- Permanent credits offset once SWIFT is in place



## Potential to Offset Stormwater Reductions

	HRSD Bay TMDL Allocations	HRSD Post SWIFT Loads (2030)	Available for other needs	Stormwater Reduction Needs*
<b>Nitrogen</b>				
James	3,400,000	500,000	2,900,000	63,039
York	275,927	25,000	250,927	19,114
<b>Phosphorus</b>				
James	300,009	50,000	250,009	13,088
York	18,395	2,000	16,395	3,887
<b>Sediment</b>				
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



## High Priority Project Selection Criteria and Weightings

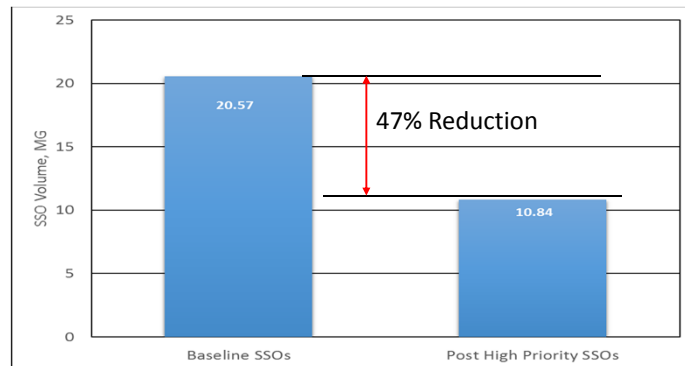
- Modeled SSO Load Reduction (50%)
- Modeled Location (30%)
  - Proximity to public beaches(VDH)
  - Proximity to public surface drinking water sources
  - Proximity to open shellfish grounds
  - Proximity to high priority waters
  - Drains to bacteriologically impaired water
  - Reduces I/I to SWIFT plant proximate to open shellfish grounds
- I/I Reduction (20%)



## Potential High Priority Project Impact

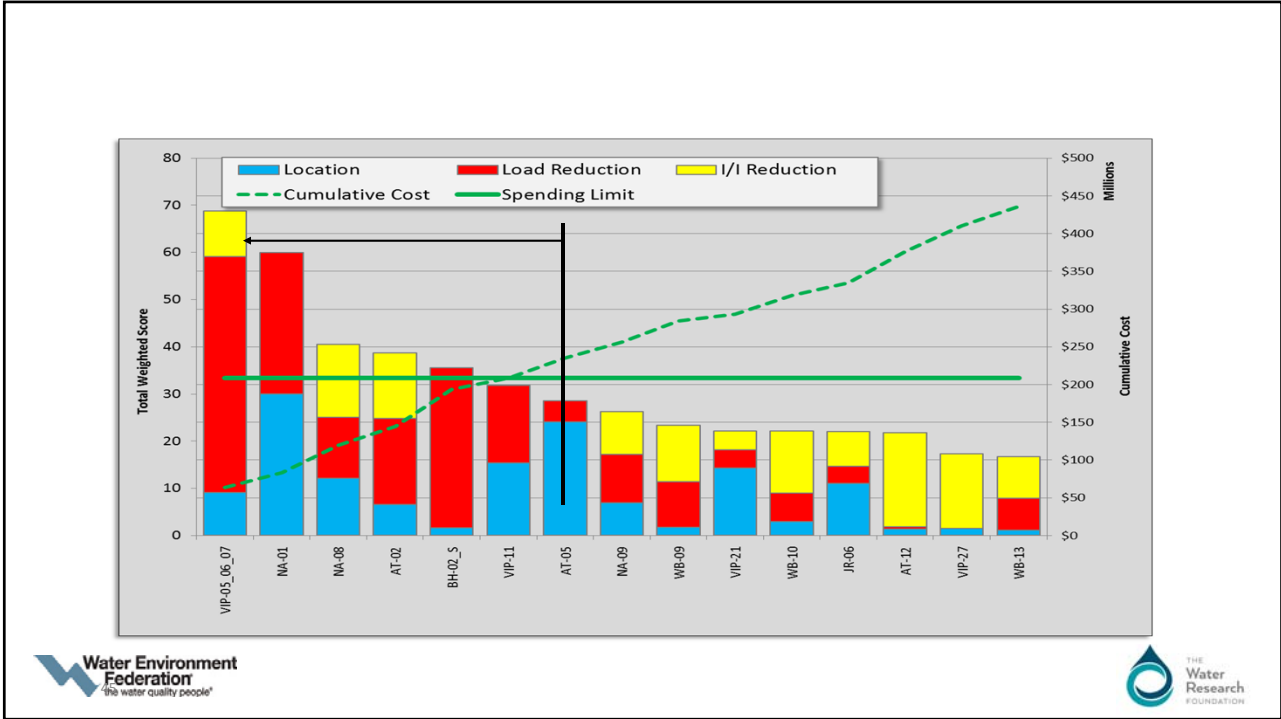
Load reduction as compared to RHM baseline simulation

- Volume Eliminated  
10.84MG
- 47% Reduction to  
modeled baseline



## High Priority Project Areas





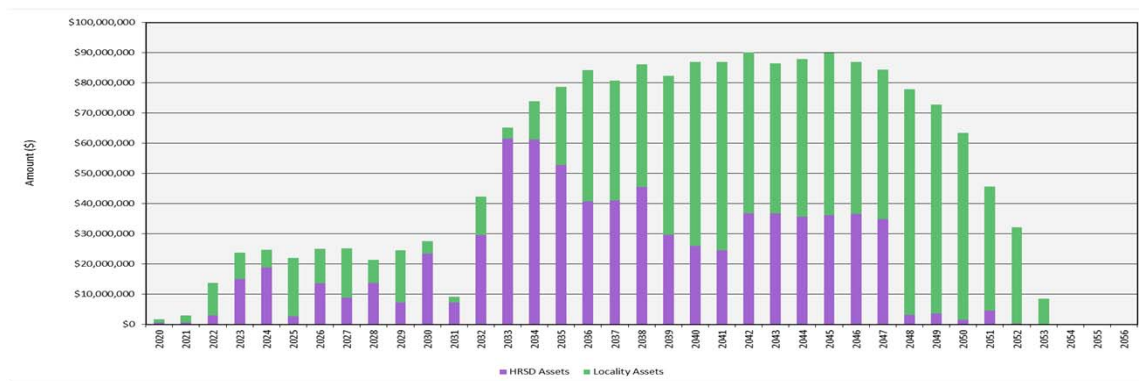
## Overall RWWMP Costs

# Regional Wet Weather Management Plan

- Overall = \$1.82B
  - Wet Weather Capacity Improvements = \$963.7M
  - I/I Reduction Program = \$852.3M
- Scheduled 176 Projects
  - 532 Elements grouped and sequenced w/ hydraulic considerations
- Implementation Timeframe
  - 2020-2030 High Priority (6 Projects)
  - 2030-2053 Remaining RWWMP Projects



## Program Cash Flow by Spending Type

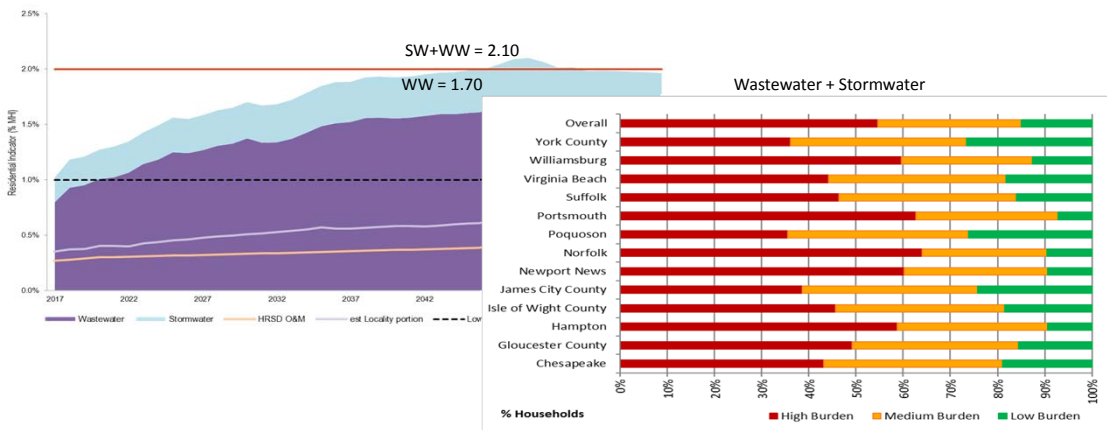




# Affordability Review

## High Burden Preliminary Impact

Peak Residential Indicator Year: 2049



## Income Quintiles

Quintile	Average Income	Upper Limit	Peak RI, Integrated Plan/RWWMP
Lowest	\$14,183	\$26,219	9.2%
Second	\$36,722	\$47,510	3.5%
Third	\$59,118	\$72,168	2.2%
Fourth	\$89,292	\$109,998	1.5%
Highest	\$176,797	N/A	0.7%
Top 5 Percent	\$185,056	N/A	0.7%

Quintile brackets from ACS 5-Year 2015; MSA: Virginia Beach-Norfolk-Newport News, VA-NC Metro Area (part); Virginia

\$1,302 Peak CPH WW+SW

@ Regional MHI: 2.10%

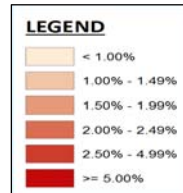
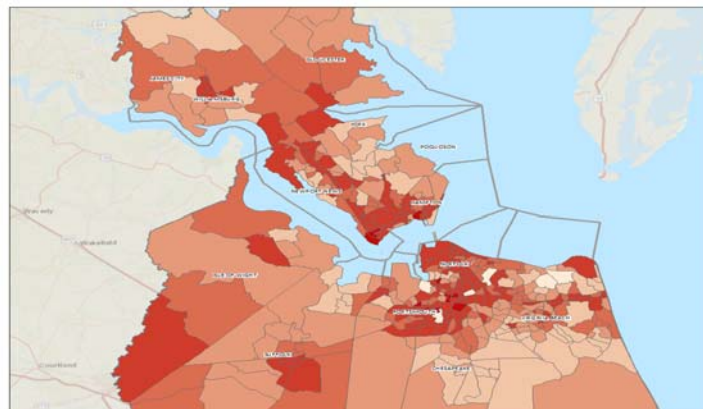
@ Lowest Quintile: 9.18%



## Census Tract Household Utility Cost Burden

- Costs are already high burden for some
- Much broader impact at implementation peak

Peak CPH Wastewater + Stormwater



## Adaptive Management Approach

- Applying iterative decision-making in the face of multiple uncertainties and adjusting the course of solutions in the future to adapt to changing conditions



## Uncertainties

- Sea level rise and recurrent flooding
- Magnitude and spatial patterns of growth
- Future of numerous major DoD facilities
- Long term trend in I/I
- Regional economic vitality and household income and employment levels
- Regional environmental and public health priorities



## Adaptive Management

- HRSD and Localities have entered into nutrient trading agreements to apply SWIFT reductions to stormwater requirements
- Prioritize the projects that provide the highest benefit to human health and the environment
- Allows for appropriate sequencing of projects/programs
- Provides for adaptive management strategies to adjust programs based on results and changing circumstances

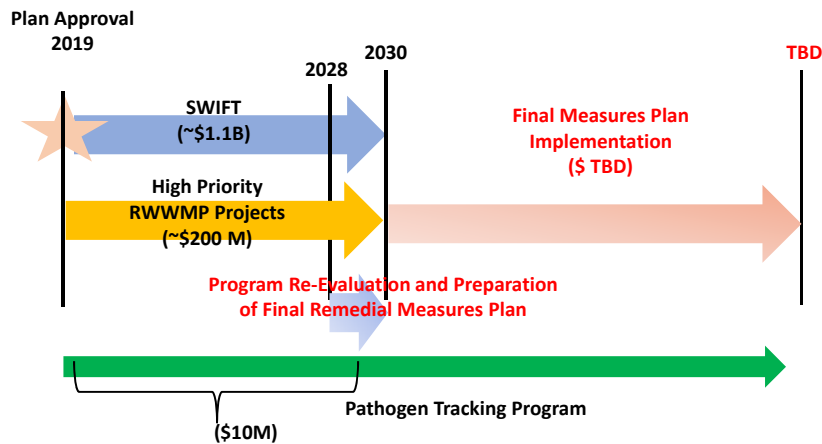


## Regional Adaptive Plan

Phase	Activities	Cost, \$M	Schedule
1	Planning, Condition Assessment, Prompt Repairs, Interim System Improvements, Rehab Action Plan	\$700	2008 - 2025
2	SWIFT and High Priority Projects	\$1,308	2020 - 2030
3	Re-Evaluation and Development of Final Remedial Measures Plan for Priority Capacity Related SSOs	\$2	2028 - 2030
4	Implementation of Final Remedial Measures Plan	TBD	TBD



## Sequence Places the Greatest Water Quality Benefits First



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

# Community Experience with Integrated Planning

February 20, 2018

Jeff Rexhausen, retired  
Adam Blandford,  
Economics Center, University of Cincinnati



## 2016 Survey of Community Insights On Integrated Planning

part of a larger project to create an Integrated Planning Toolbox

Funded by:

Project Manager: Adrienne Nemura



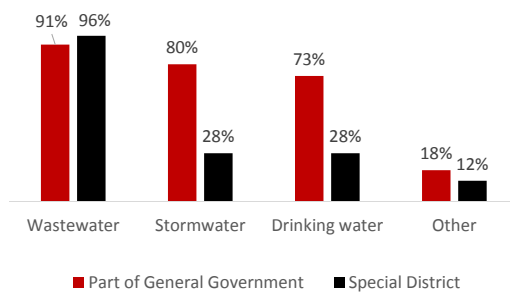
## Context for the Survey

- EPA's integrated planning initiative: more questions than answers
- Community Insight Survey: largest and most comprehensive to date
  - Open-end and closed-end questions
  - Produced a range of insights



## Survey Respondent Characteristics

- General Governments: 44
- Special Districts: 25



### Size (population served)

large (500,000 +)	30%
medium (100,000 - 499,000)	30%
small (25,000 - 99,000)	25%
very small (< 25,000)	15%

### Status

Completed plan	26%
Currently undertaking	17%
Currently considering	26%
Decided not to	14%
Never considered	16%



## Affordability is a Major Concern

- 41% - Primary CWA challenge (WQ 2<sup>nd</sup>)
- 70% - Top driver for integrated planning (fin mgt 2<sup>nd</sup>)



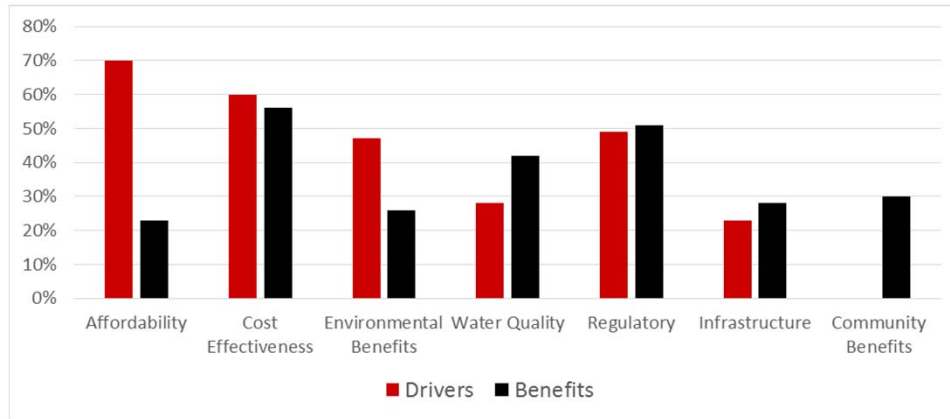
## Top Community Priorities

- Financial Capability and Affordability
  - Affordability for all & especially low income groups
- Environmental and Public Health Benefits
  - Maximize water quality benefits
- Utilization of Resources
  - Setting priorities; cost effective resource allocation





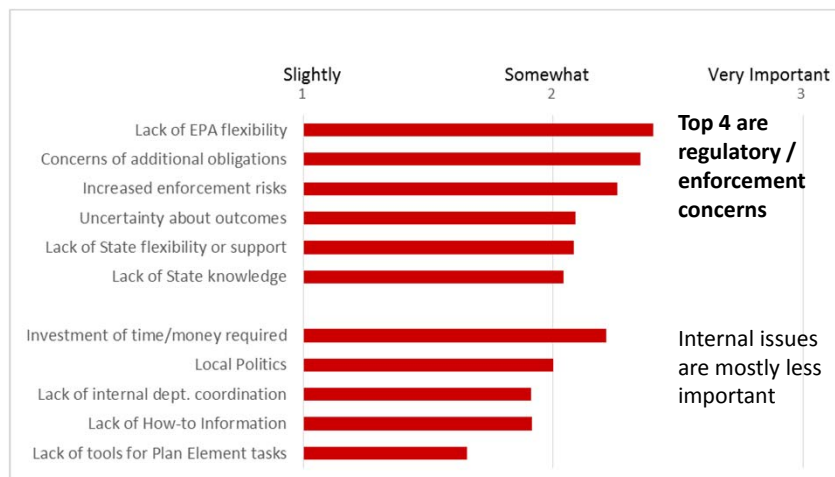
## Drivers and Expected Benefits



- Finding: there is an appetite for IP because of challenges, but ...

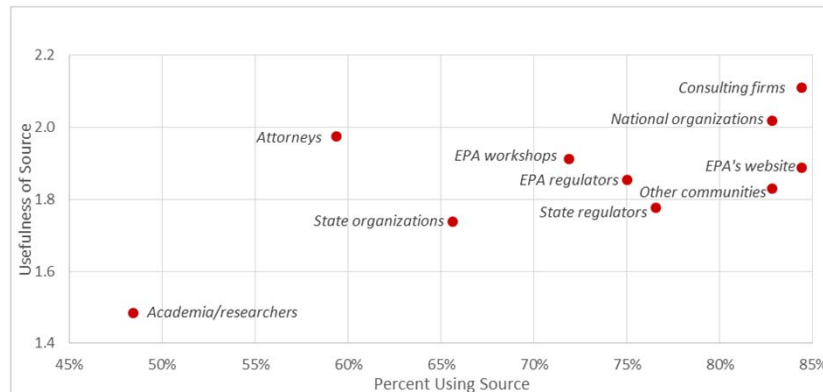


## Barriers to Integrated Planning



## Sources of Information on Integrated Planning

- How frequently consulted and how useful



## Insights from Those Who Have Considered or Undertaken Integrated Planning

- Where have you experienced problems or frustrations?
- What could have made a difference for you?
- What tools do you wish you had? What improvements or tools are most needed?
- Bureaucracy – EPA (esp. regions) and DOJ, community; less of an issue with state regulators
- **Cooperation, partnership, flexibility from regulators**
- Cited: templates, examples, case studies, technical tools
- **A liaison dedicated to coordinating regulatory and permit issues with enforcement people**

## Advice from Respondents

- Advice to Others
  - “Be creative. This is an opportunity to create a site-specific program that is reasonable, affordable, and sustainable.”
- Advice to EPA
  - Change culture; codify; improve guidelines
  - **“Communities that choose the integrated planning process also need to be supported in this effort.”**
- Final Thoughts
  - More communication about IP & its effectiveness, especially, document how communities obtained regulatory relief
  - “Good communities and state level officials who are working together do not need to have this at the Federal level ... if they can work things out at the state level.”



## Findings Relevant to Potential Legislative Proposals <sup>1</sup>

### Integrated Plans

- The most significant barriers to integrated planning involved regulatory and enforcement concerns
- Need for information sharing is strongly affirmed in the survey – desire for more useful information from EPA
- Concept of a municipal ombudsman seems important
  - Responses called for regulatory flexibility and “a liaison dedicated to coordinating regulatory and permit issues”
  - Advice to EPA that “Communities ... need to be supported in this effort”



## Findings Relevant to Potential Legislative Proposals <sub>2</sub>

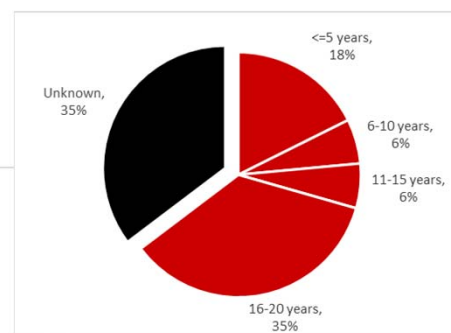
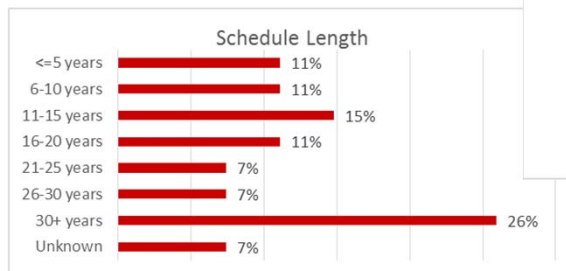
### Financial Capability Guidance

- Importance of affordability issues was repeatedly identified in response to various questions
- Some of the highest priorities for communities were affordability for low income groups and more adequately assessing financial capability than is possible with current Guidance
- Sizes of community programs are leading many to look at schedule lengths well beyond the 20-year period cited in the Guidance, as well as consent decree extensions that are quite substantial

## Schedule / Consent Decree Extension

### • Consent Decree Extension

### • Targeted length



## Other Notes on Potential Legislative Proposals

- Neither the Integrated Planning Approach nor the 2014 FCA Framework contains a clear statement about affordability
- FCA Framework's emphases on sustainability, flexibility, and a continuum of financial capability are not followed by regulators
- In a 2016 survey, 85% + said regulators showed:
  - Unwilling to balance CWA with other environmental issues
  - Unwilling to consider other community needs
  - Insistence on spending even when costs outweigh benefits
  - Lack of consideration of impacts on vulnerable households
  - Lack of consideration of impacts on businesses



## Connections to Other Efforts



- Commissioned to conduct independent study to create definition and framework for community affordability
  - Facilitated forums
  - Stakeholder discussions
  - Consult national organizations
- Identified the need for
  - More permitting and less enforcement
  - More case studies
  - Less stovepiping
  - Movement towards "One Water" concept



## WRF - User's Guide for Integrated Wastewater and Stormwater Planning

- Report should be available to subscribers soon (and for purchase by others)
- Toolbox, case studies later
- Subscribers can also ID issues for WRF's future research agenda



## Thank You!

- Jeff Rexhausen, retired, and
- Adam Blandford, Research Associate  
Economics Center, University of Cincinnati



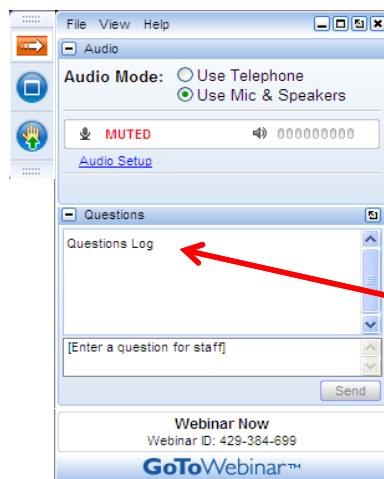
## Panel Discussion

What are the main similarities and differences between EPA's "Integrated Planning Framework" and "Integrated Water Resources Management (IWRM)" as we often hear from the water sector?

Can the implementation of EPA's Integrated Planning Framework show any tangible cost saving / financial benefits for utilities and municipalities?



## Questions for Our Speakers?



- Submit your questions using the Questions Pane.



Thank You

