

Integrated Municipal Stormwater & Wastewater Planning for Burlington, VT

Building on the Past, Preparing for the Future

LOCATION: BED Conference Room
August 27th, 1 PM





Welcome & Introductions



EPA Technical Assistance

- ▶ City of Burlington applied for technical assistance from EPA
- ▶ One of five awards in the country
- ▶ Year-long assistance from EPA contractor to “kick start” the integrated municipal stormwater and wastewater planning process in Burlington to address water quality challenges and Clean Water Act requirements
 - ▶ Stormwater impairments
 - ▶ WWTP and MS4 permit requirements
 - ▶ Combined sewer overflows
 - ▶ Phosphorus reductions required by Lake Champlain TMDL
- ▶ Contractor will be working with City staff during project



Integrated Municipal Stormwater & Wastewater Planning

- ▶ Planning approach to address stormwater and wastewater with a single decision-making process
 - ▶ Consolidates the various goals, priorities, actions and outcomes desired of separate Clean Water Act requirements into one planning exercise
 - ▶ Encouraged by EPA through the 2012 Memorandum and *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* but the approach is voluntary
- 

EPA 2012 Memo and Framework

- Identifies the operating principles and essential elements of an integrated plan
- Framework states that if a municipality decides to take advantage of this approach, the integrated plan that it develops can provide information to inform the permit and enforcement processes and can support the development of conditions and requirements in permits and enforcement orders
- "The integrated planning approach does not remove obligations to comply with the CWA, nor does it lower existing regulatory or permitting standards, but rather recognizes the flexibilities in the CWA for the appropriate sequencing and scheduling of work."



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN - 5 2012

MEMORANDUM

SUBJECT: Integrated Municipal Stormwater and Wastewater Planning Approach Framework

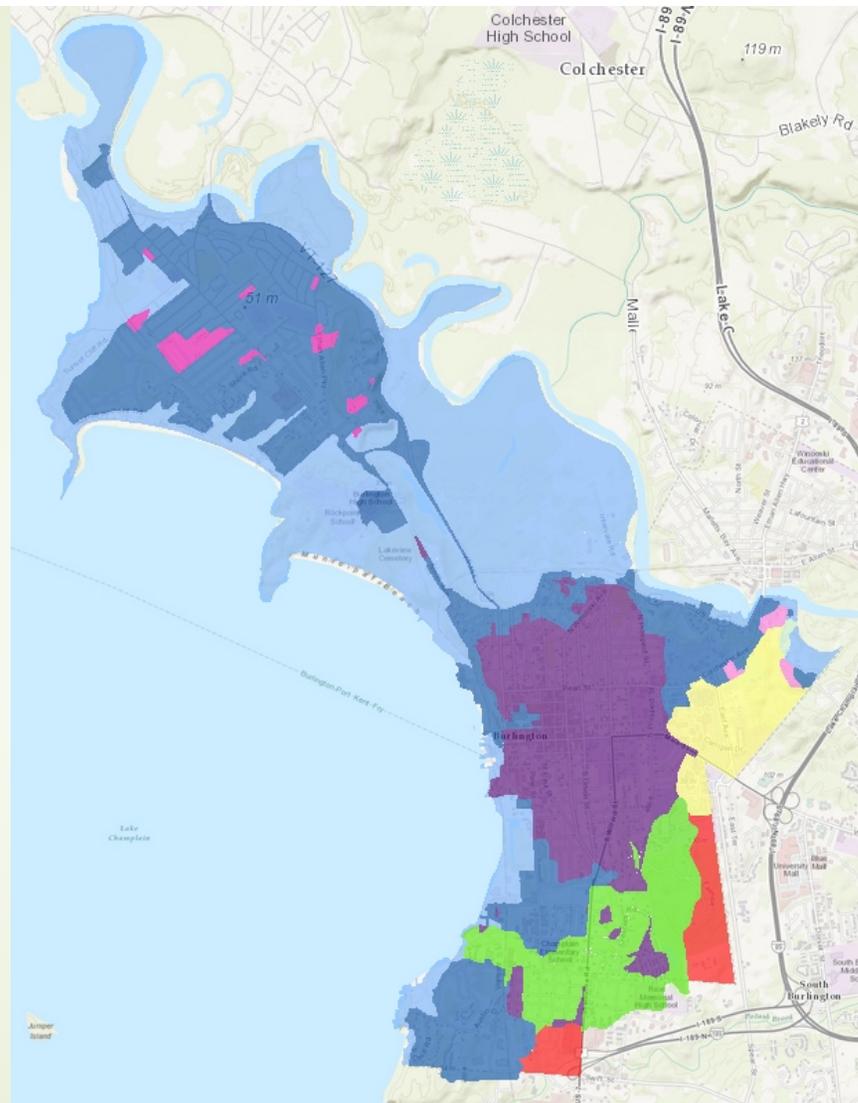
FROM: Nancy Stoner 
Acting Assistant Administrator
Office of Water

Cynthia Giles 
Assistant Administrator
Office of Enforcement and Compliance Assurance



Workshop Objectives

- ▶ Provide background regarding Burlington's water quality issues and wet weather management activities
- ▶ Educate participants about integrated planning approach and discuss how integrated planning could help Burlington address regulatory and water resource planning challenges
- ▶ Report results from online survey
- ▶ Solicit input from participants regarding project selection criteria



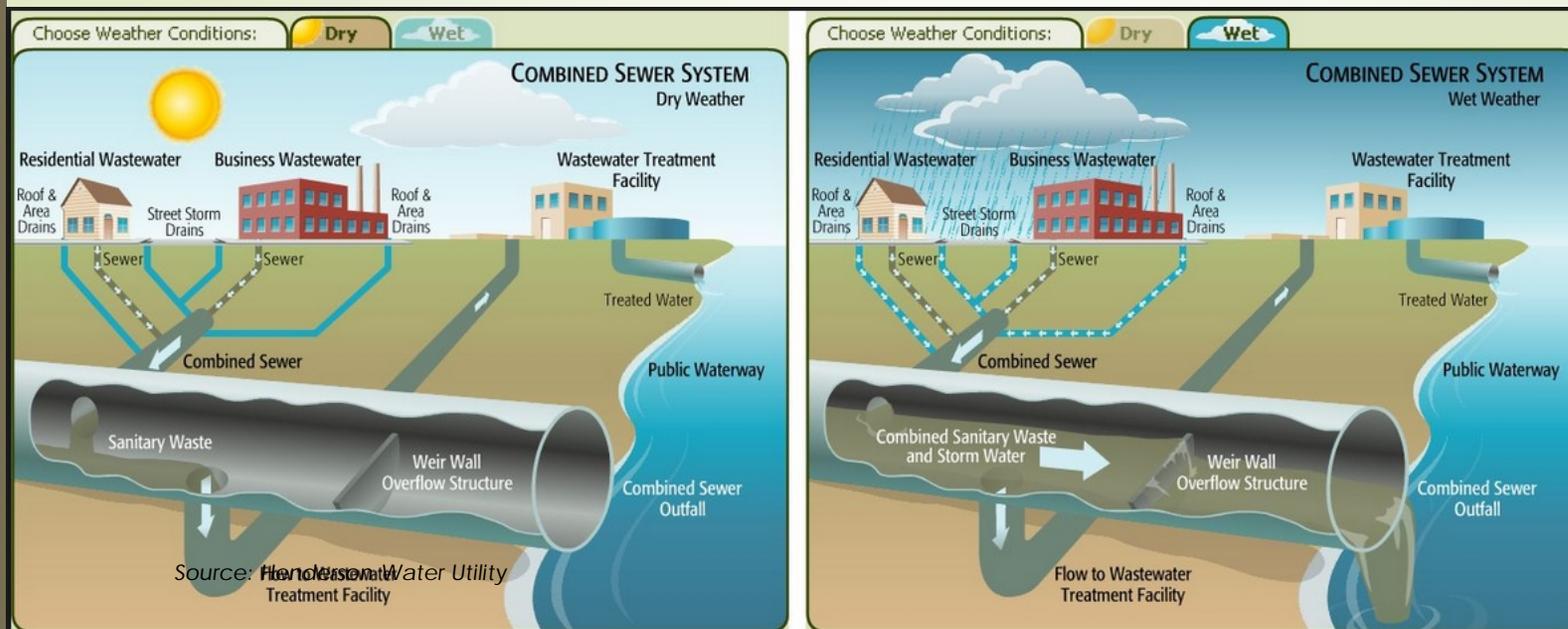
Burlington Sewersheds/ Watersheds

Drainage Area

	1.1 Main Plant	}	Combined Sewer
	1.2 North Plant		
	1.3 East Plant		
	2.1 Englesby Brook		
	2.2 Centennial Brook		
	2.3 Potash Brook		
	3 MS4 (Non Impaired)		
	4 Direct Discharge (Non Impaired)		

<http://www.burlingtonvt.gov/DPW/Mapping-Links>

Combined Sewer Issues: Combined Sewer Overflows and WWTP impacts



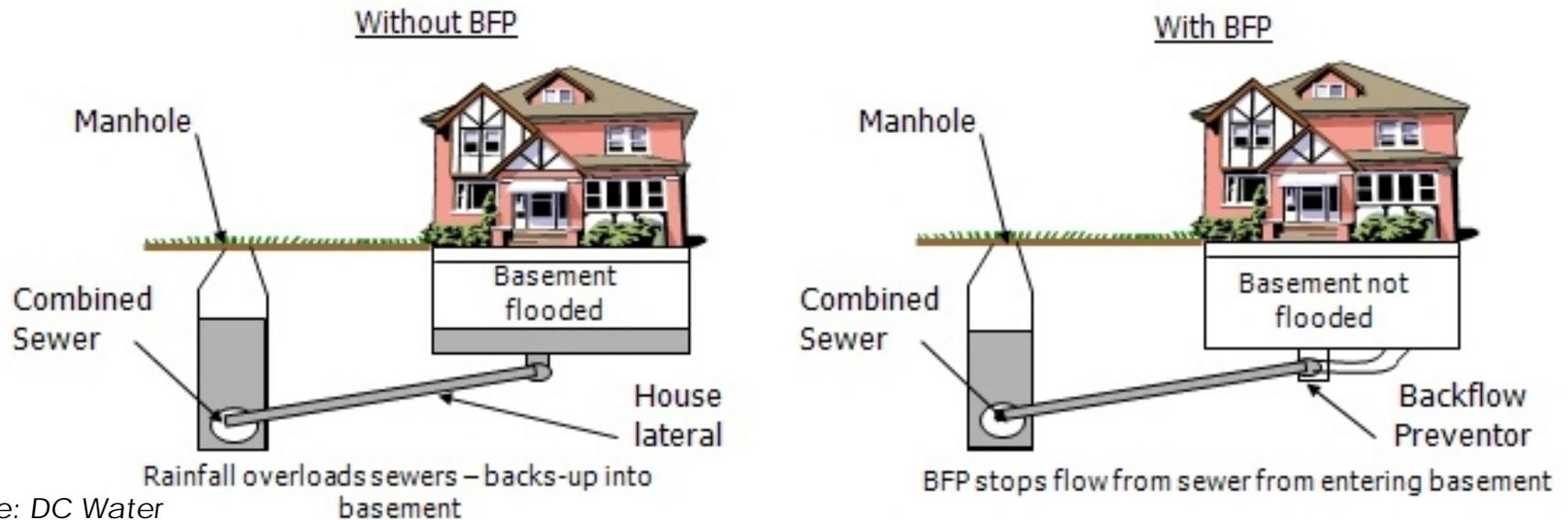
➤ 5 remaining untreated CSOs in Burlington

➤ WWTP nutrient treatment processes @ Main Plant are partially bypassed during large storm events

- Substantial investment have been made to reduce the # of Combined Sewer Overflow points and to reduce the frequency of overflows at the remaining CSOs.
- Sewer Separation has pros and cons

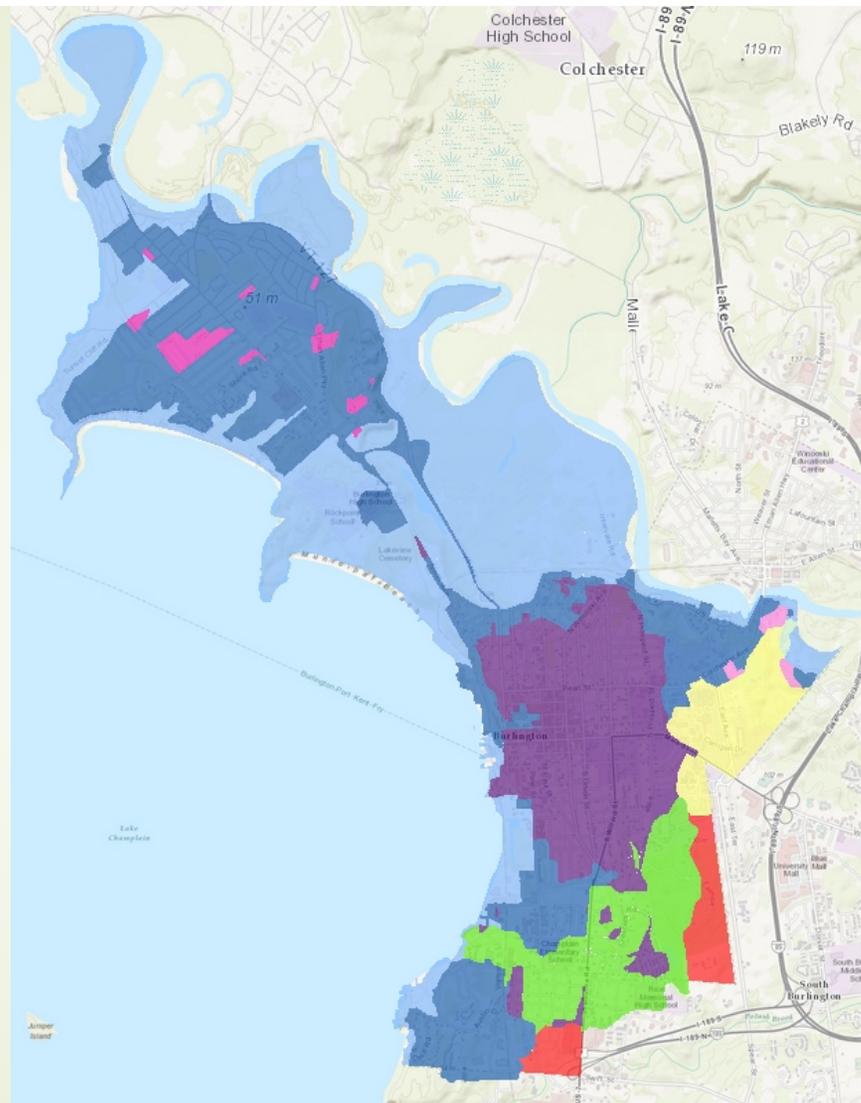
Untreated Overflow Reports at: <https://anrweb.vt.gov/DEC/WWInventory/SewageOverflows.aspx>

Combined Sewer Issues: Basement Backups



Source: DC Water

- ▶ Plumbing code requires that property owners install backwater prevention valves on fixtures that are lower than the elevation of the next upstream manhole cover in the street
- ▶ Low lying homes in the in the combined sewer system are particularly susceptible
- ▶ For more information: <http://www.burlingtonvt.gov/DPW/Information-Related-to-Sewage-Backups-During-Storm-Events>



➤ Burlington Sewersheds/Watersheds

Drainage Area

- | | | |
|--|-----------------------------------|-----------------------|
| | 1.1 Main Plant | |
| | 1.2 North Plant | |
| | 1.3 East Plant | |
| | 2.1 Englesby Brook | } Stormwater Impaired |
| | 2.2 Centennial Brook | |
| | 2.3 Potash Brook | |
| | 3 MS4 (Non Impaired) | |
| | 4 Direct Discharge (Non Impaired) | |

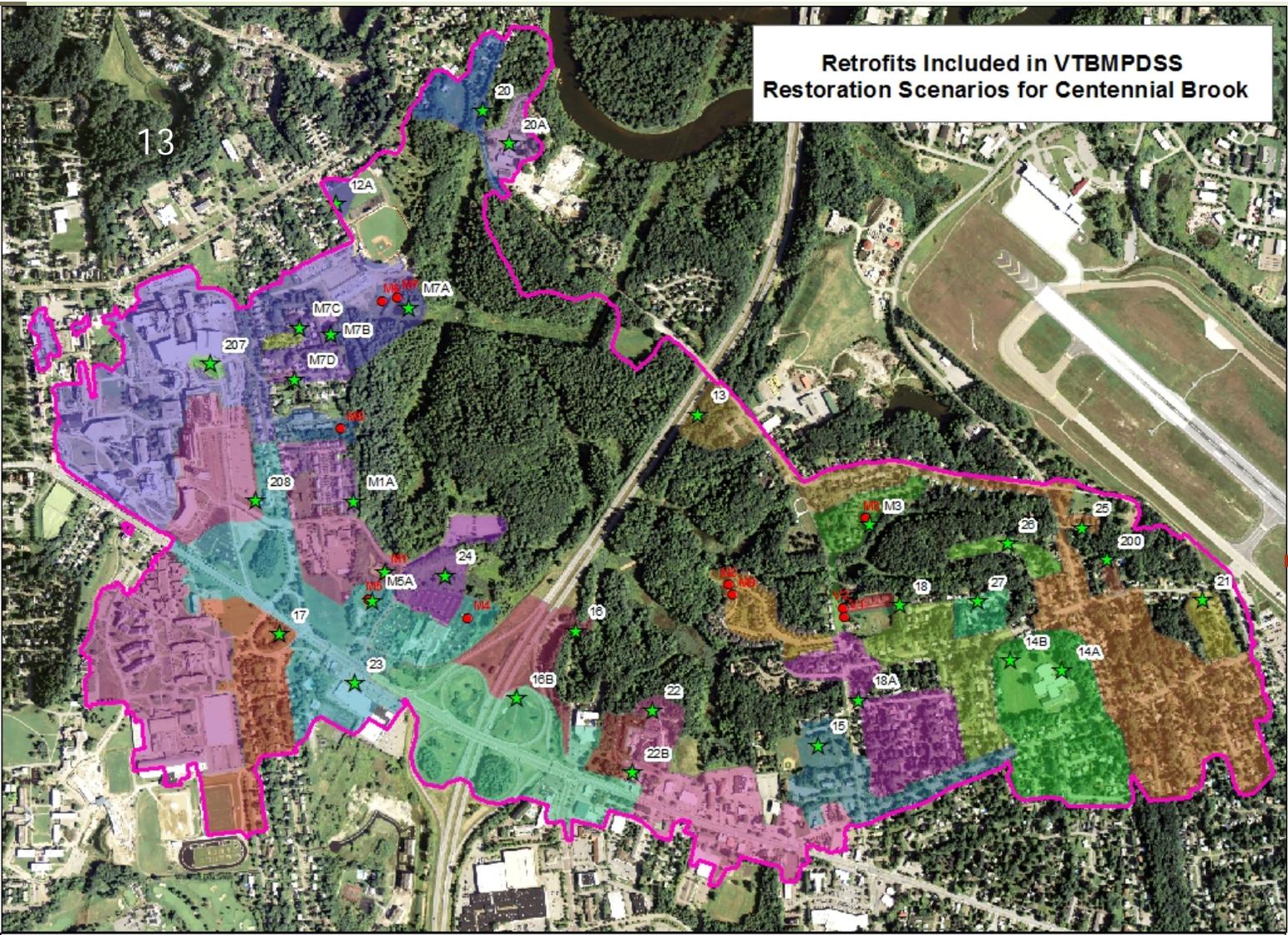
<http://www.burlingtonvt.gov/DPW/Mapping-Links>

A photograph of a stream in a forest. A large, fallen tree trunk lies across the stream, partially blocking it. The water is dark and appears to be flowing over a rocky or eroded bed. The surrounding forest is dense with green foliage. A person is visible in the background, standing near the stream. The overall scene suggests a natural, somewhat wild environment.

Stormwater Impaired Streams:

- ▶ Peak /flows are so high that the stream bed is eroded and scoured
- ▶ Aquatic life (macro-invertebrate bugs and fish) cannot survive

Retrofits Included in VTBMPSDSS Restoration Scenarios for Centennial Brook



Legend

- ★ Retrofit
- stream
- Wetlands_SoBu
- Existing BMP DA
- Retrofit DA
- Watershed
- Parcel ls

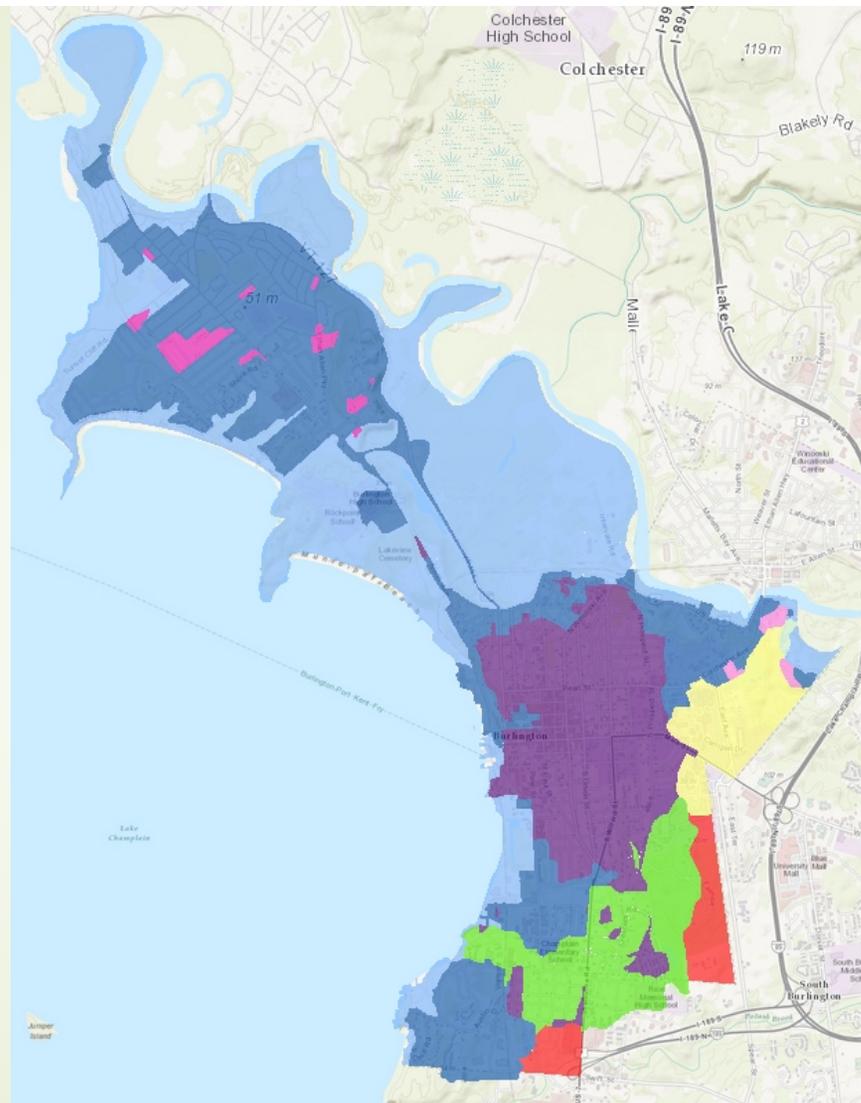
1,000 Feet

tce TRUDELL
CONSULTING ENGINEERS

Horsley Witten Group
Sustainable Environment Solutions

An Example: Centennial Brook Flow Restoration Plan

- 40 retrofits modeled
- >90% watershed impervious cover managed
- \$9.74 million total
 - Burlington = \$1.5 M
- Englesby and Potash FRPs are underway
 - Englesby estimated \$9 M
 - Watershed almost entirely in Burlington
 - Potash ~\$25 M total
 - Burlington has small % of this cost



➤ Burlington Sewersheds/Watersheds

Drainage Area

- 1.1 Main Plant
- 1.2 North Plant
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Lake Champlain Phosphorus TMDL

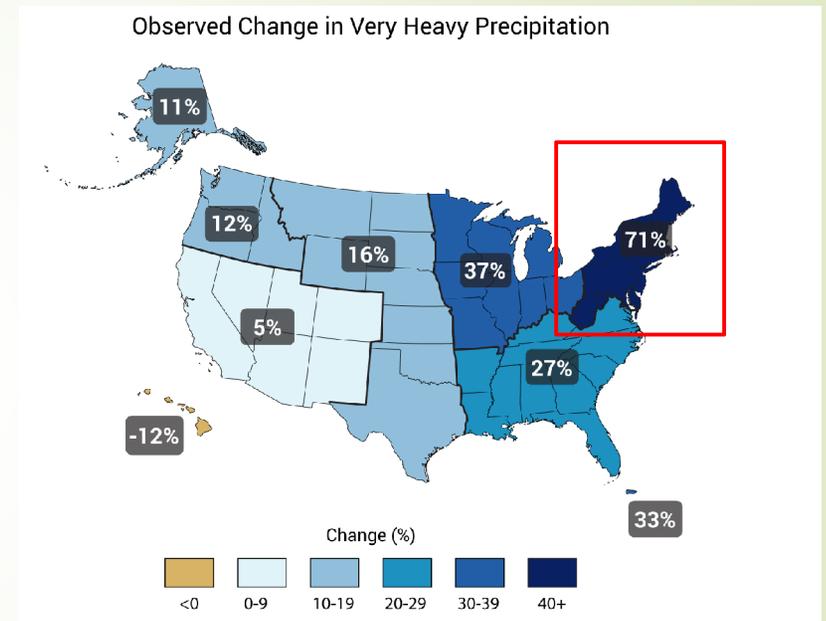
- Wastewater Treatment Plant Upgrades
 - 0.8 mg/L Phosphorus → 0.2 mg/L
 - Estimated cost ~\$38 million for 3 plants
- Retrofits of existing impervious surface (substantial \$\$\$)
 - Separate stormwater reductions and treatment (10-11%)
 - Combined sewer stormwater volume reductions/storage (10%)



Generalized Pollution from Stormwater Runoff/Urban land use

- Nutrients (PHOSPHORUS and Nitrogen) → Blue Green Algae blooms
- Bacteria (*E. coli*) → Beach closures
- Thermal pollution → fish habitat
- Sediment → habitat; also can cause flooding due to clogging of waterways/ culverts; nutrients and bacteria also bind to sediment
- Litter → harm wildlife
- Heavy metals
- Hydrocarbons from automobiles and also roadways and parking lots (asphalt sealants)
- Household hazardous waste (pesticides, auto fluids)

Infrastructure Issues: Localized flooding



Source: <http://nca2014.globalchange.gov/>

Infrastructure Issues: Aging Pipes & Outfalls



~53,000 linear feet of Corrugated Metal Pipe (CMP)



~50% have some sort of structural deficiency;
~10-20% need near term repair



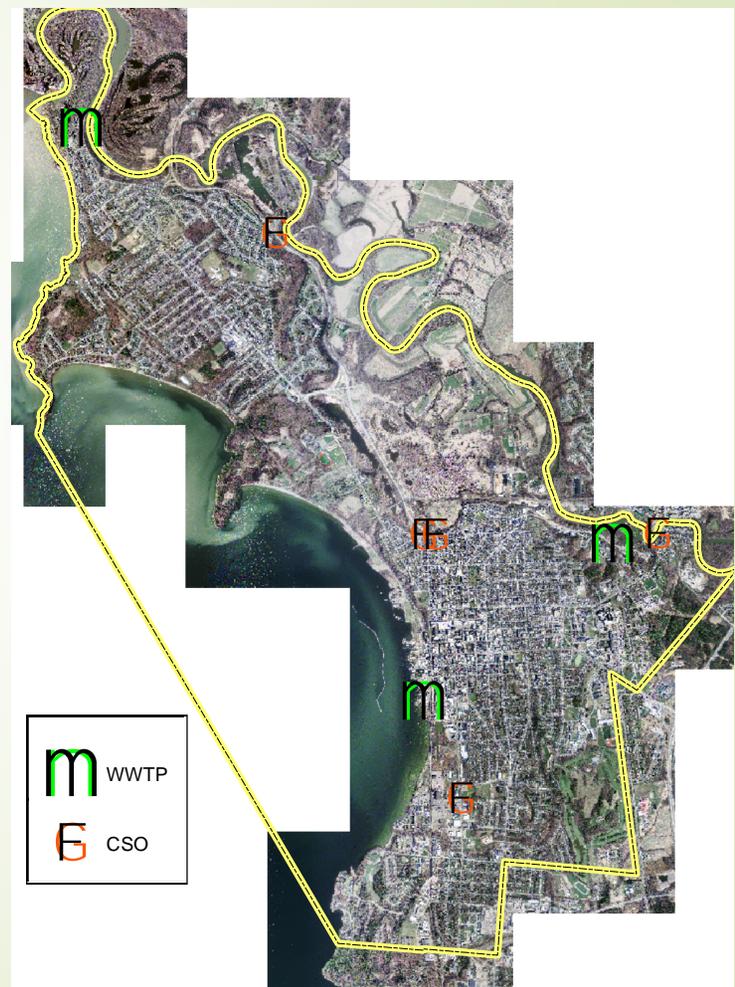
*102 outfall pipes
*10%+ outfall areas
are failed, with
others in poor
condition

→ water quality
impacts
(sediment)

→ in some cases
affecting public
and private
infrastructure

Burlington's Wastewater System

- ▶ 3 WWTPs with P removal to 0.8 mg/L or better
 - ▶ Main Plant (5.3 MGD)
 - ▶ East ("Riverside") Plant (1.2 MGD)
 - ▶ North Plant (2.0 MGD)
- ▶ 49 miles of sanitary pipe
- ▶ 45 miles of combined sewer pipe
- ▶ 25 pump stations
- ▶ 5 untreated CSO outfalls

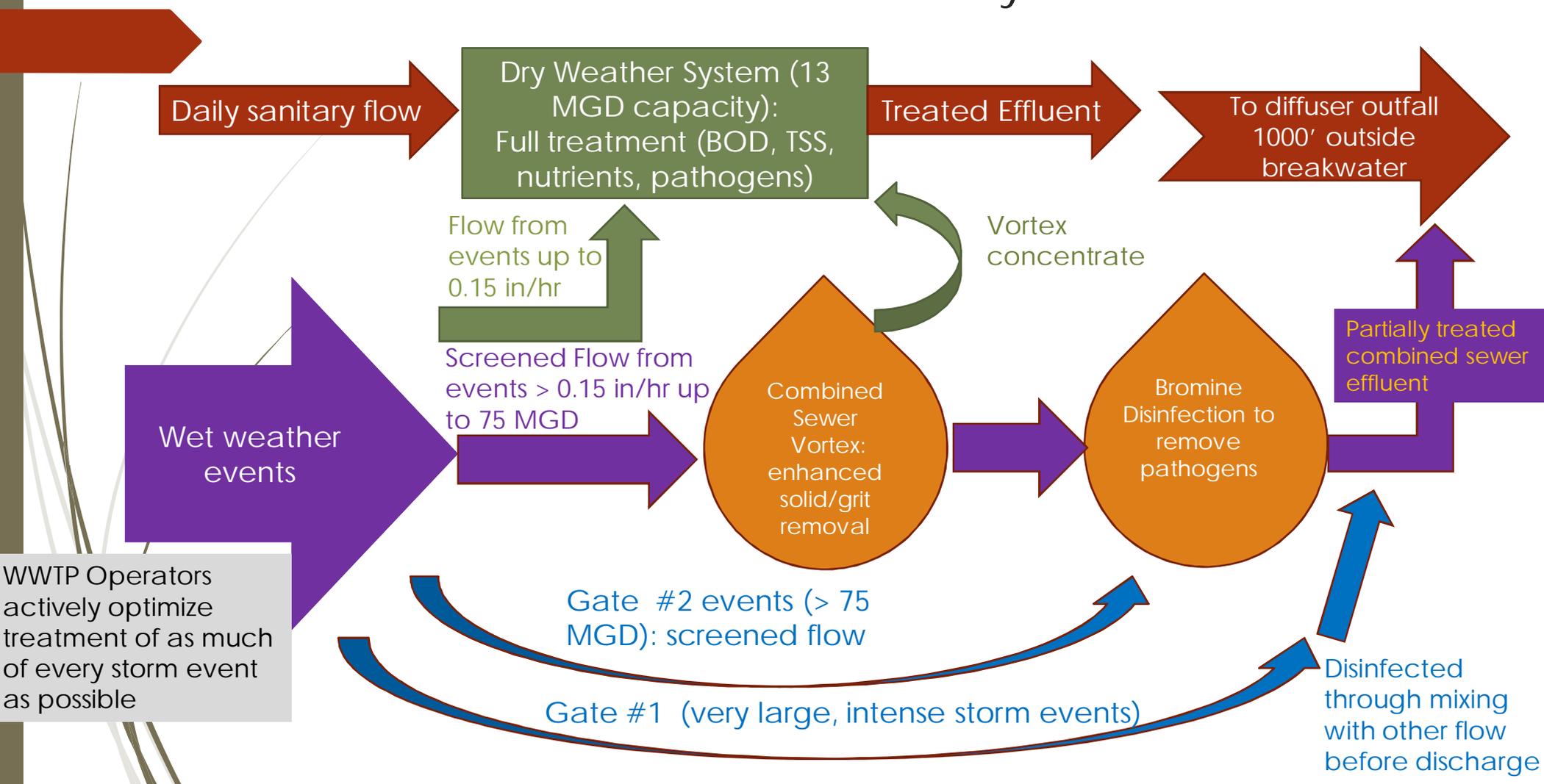


Main WWTP Plant



- Built in 1953, upgraded in 1974 and 1994
- Advanced secondary treatment (biological nutrient removal)
- Current Permit: 5.3 MGD, 0.8 mg/L Phosphorus monthly permit limit, with 0.6 mg/L annual average limit
- Has the largest extent of combined sewer
 - Main Plant CSS = 24% of wet weather/stormwater sewered area (26% combined sewer citywide)
 - Highest % imperviousness of any sewershed (57% impervious)
- 2 authorized CSO points @ Manhattan Drive, at Park and at North Champlain
- 1 additional CSO discovered @ Pine Street and Lakeside in late 2014, reported to the State; launching preliminary engineering study to look at abatement options

Treatment Process at Main Plant : Dry and Wet Weather





Wastewater Program

- Recent EPA collection system inspection: EPA feedback was very positive
- Real time monitoring of CSO events
- Update of 20 year old H/H model
- WW will be participating in the upcoming Water Resources Asset Management Plan development; development of capital plan
- RFP issued on 8/21/2015 to identify solutions to abating Pine Street CSO
- 20 year engineering evaluation RFP for Main, East, North plants
- On-going work on dewatering to reduce operating costs related to biosolids
- On-going CIPP lining of sewer pipes including force mains

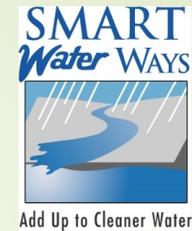


Separate Stormwater System Program

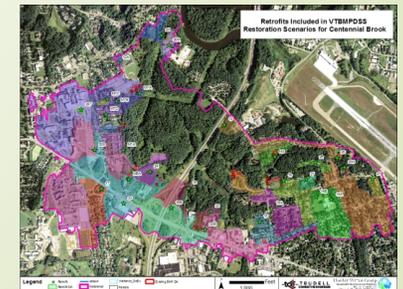
- ▶ Stormwater utility formed in 2009 to address compliance with MS4 permit and address on-going need for capital re-investment; also to meet future regulatory challenges
 - ▶ Flat fee charged for single family, duplex, triplex properties
 - ▶ Other properties pay based on impervious area measured from aerial photography
- ▶ 102 stormwater outfalls
- ▶ 2000+ storm drains
- ▶ 37 miles of separate storm sewer

Separate Stormwater System Program

- MS4 (Municipally Separate Storm Sewer System) permit since 2003
 - Public Education
 - RSEP, social media, fact sheets, dirty driveway notifications
 - Public Engagement
 - Chittenden County Stream Team
 - Adopt a Drain
 - Partnership with BLUE
 - Mapping and IDDE
 - Updated GIS in 2011-2013; hired SW/GIS Tech
 - Maps online at: <https://www.burlingtonvt.gov/DPW/Mapping-Links>
 - On-going outfall inspection and illicit discharge detection and elimination
 - Construction Stormwater
 - Post-construction Stormwater Management
 - Municipal Good-housekeeping
 - Requirements for meeting any approved TMDLs
 - Stormwater TMDLs → Flow Restoration Plans
 - Soon: Lake Champlain TMDL → Phosphorus Control Plans
 - Wet Weather in Combined Sewer



Chapter 26
Ordinance





Burlington Stormwater Regulations

- ▶ Chapter 26 applies to separate and combined sewer systems
 - ▶ Available at <https://www.burlingtonvt.gov/DPW/Stormwater-Management>
 - ▶ Construction Stormwater
 - ▶ Any project which disturbs > 400 sq.ft. must submit an Erosion Prevention and Sediment Control form which outlines how the project will minimize the risk of sediment leaving the site during construction
 - ▶ Post-Construction Stormwater
 - ▶ Additions/redevelopment of single family or duplex homes where the total resulting impervious 2500 sq.ft. must complete a residential stormwater questionnaire
 - ▶ Other projects which are adding or redeveloping impervious surface must submit a stormwater management plan
 - ▶ Manage 100% of the new impervious surface
 - ▶ Manage redeveloped impervious to the maximum extent practicable (target of 50% of the redeveloped area)



Burlington Stormwater/Wet Weather Program

- CIPP lining of SW pipes as \$ allows
- Planning and Implementation of WQ improvement pilot projects
 - Blanchard Beach WQ project
 - College Street Green Infrastructure Toolbox and opportunities plan
 - \$1.2 Million ARRA wet weather improvements
 - Right of Way Rain gardens (North St., Hyde St., Decatur St.)
 - Stormwater sidewalk (install Sept 2015 @ S. Winooski & Main)
- CWSRF Priority List
 - CIPP lining prioritization and implementation
 - Outfall prioritization and implementation
 - City-wide Integrated Project Planning and Implementation
- Puddles...

Burlington Stormwater Program: Future

- ▶ Asset Management Plan Development
- ▶ Advancement of SRF projects to inform capital plan and Integrated Plan
- ▶ Regulatory/Programmatic Future elements(?)
 - ▶ Requiring green infrastructure instead of “encouraging it”
 - ▶ Burlington SW Manual
 - ▶ More stringent requirements for redevelopment; with alternative compliance option such as payment of fee in lieu of that would fund “offset” projects
 - ▶ Retrofit requirement for certain size parcels? (to meet CWA requirements)
 - ▶ Specific requirements/feasibility criteria for public roadway projects

Burlington Stormwater Program: Future

- ▶ Incentives
 - ▶ Grant/Rebate program to incentivize retrofits on private property
 - ▶ Increasing the stormwater credits available to properties which retrofit
- ▶ Greenbelt policy → direct citizens to manage the green belt in a way which benefits stormwater
- ▶ Green infrastructure maintenance crew
 - ▶ Work with Parks team for maintenance of green infrastructure

US EPA Technical Assistance

- ▶ Burlington applied for integrated planning technical assistance from US EPA
- ▶ One of five awards in the country
- ▶ Year-long assistance from US EPA contractor to “kick start” the integrated municipal stormwater and wastewater planning process to address water quality challenges and Clean Water Act requirements
 - ▶ Stormwater permit requirements
 - ▶ Wastewater plant permit requirements
 - ▶ Combined sewer overflows
- ▶ Contractor will work with city staff on the project



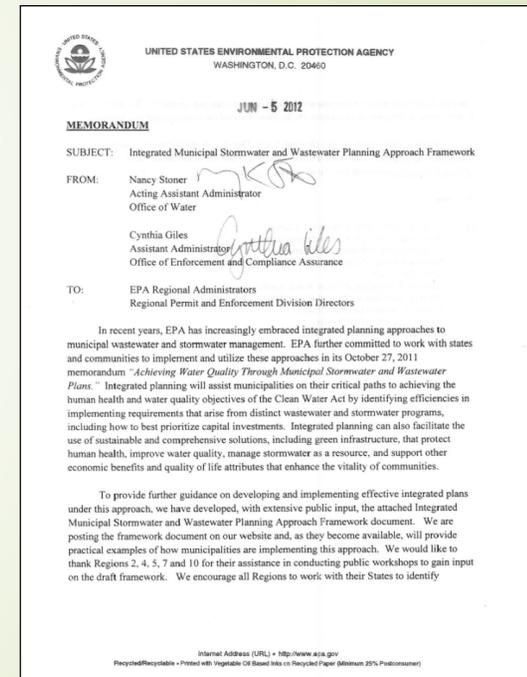
Introduction to Integrated Municipal Stormwater & Wastewater Planning

- ▶ Planning approach to address stormwater and wastewater with a single decision-making process
- ▶ Consolidates the various goals, priorities, actions and outcomes desired of separate Clean Water Act requirements into one planning exercise
- ▶ Encouraged by EPA through the 2012 Memorandum and *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* but the approach is voluntary



US EPA 2012 Memo and Framework

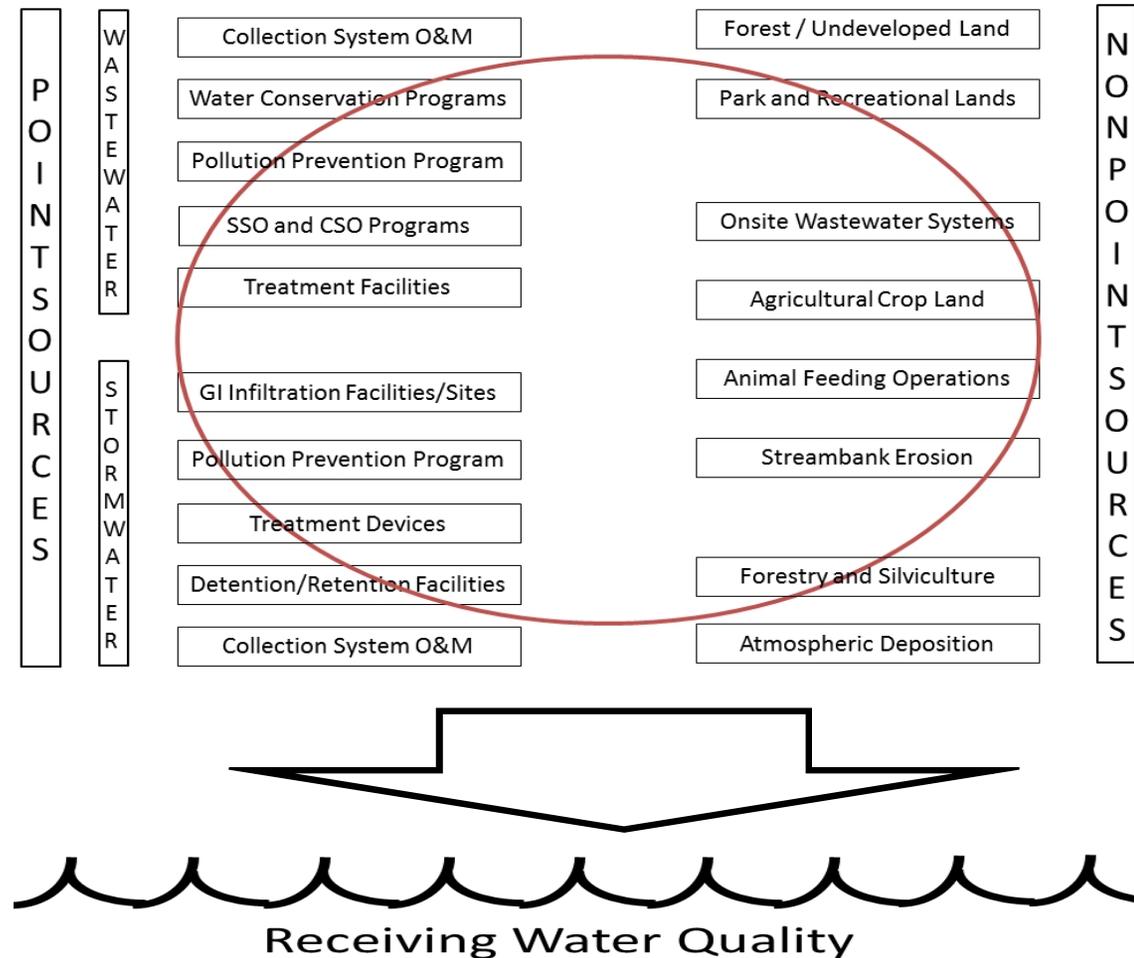
- Identifies integrated planning principles and key elements
- Integrated plan can provide information to:
 - inform permitting and enforcement processes
 - support the development of conditions and requirements in permits and enforcement orders
- "The integrated planning approach does not remove obligations to comply with the CWA, nor does it lower existing regulatory or permitting standards, but rather recognizes the flexibilities in the CWA for the appropriate sequencing and scheduling of work."



Potential Scope of Integrated Planning

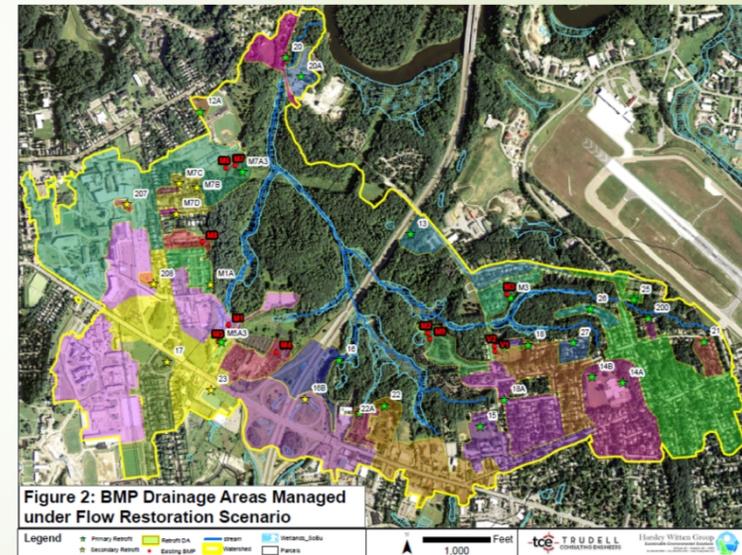
- ▶ "integrated plans may address source water protection efforts that protect surface water supplies, and/or nonpoint source control through proposed trading approaches or other mechanisms."

Watershed Management Activities



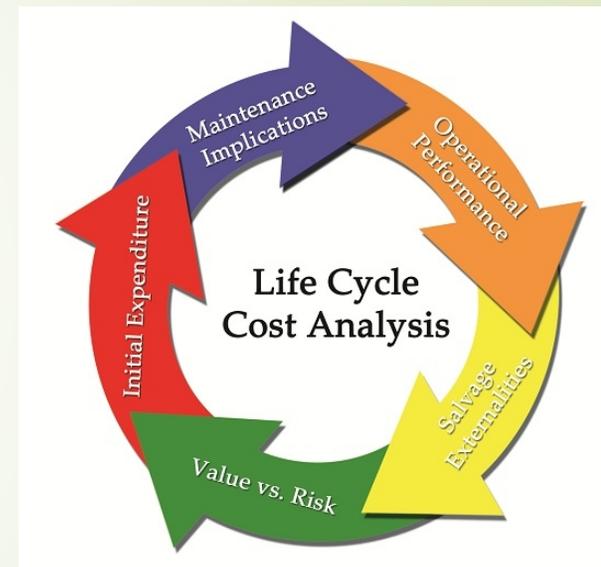
Integrated Planning: Overarching Principles

- Maintain regulatory standards
- Address the most pressing problems first
- Local initiative, supplemented by state/federal permit requirements / adjustments
- Innovation (e.g., green infrastructure) is encouraged



Integrated plans should:

- Reflect state input and priorities
- Provide for meeting water quality standards
- Maximize effective use of funds through alternatives analyses
- Incorporate sustainable technologies
- Consider and address community impacts
- Comply with technology-based requirements
- Include a financial plan and appropriate fee structure
- Provide for meaningful stakeholder input



Integrated Plan Elements

- Description of water quality, human health, and regulatory issues to be addressed by the plan
- Existing wastewater and stormwater systems and performance info
- Communication and community input process (e.g., review criteria)
- Process for identifying, evaluating, selecting, and implementing projects
- Success measures (water quality, BMP performance, etc.)
- Adaptive improvements, based on new information



Integrated Plans and TMDLs

- “Where a TMDL has been established and there is an accompanying implementation plan that provides a schedule for an MS4 to implement the TMDL, or where a comprehensive, integrated plan addressing a municipal government’s wastewater and stormwater obligations under the NPDES program has been developed, the permitting authority should consider such schedules as it decides whether and how to establish enforceable interim requirements and interim dates in the permit.”



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 26 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Revisions to the November 22, 2002 Memorandum “Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs”

FROM: Andrew D. Sawyers, Director
Office of Wastewater Management *ASawyers*
Benita Best-Wong, Director
Office of Wetlands, Oceans and Watersheds *BBestWong*

TO: Water Division Directors
Regions 1 - 10

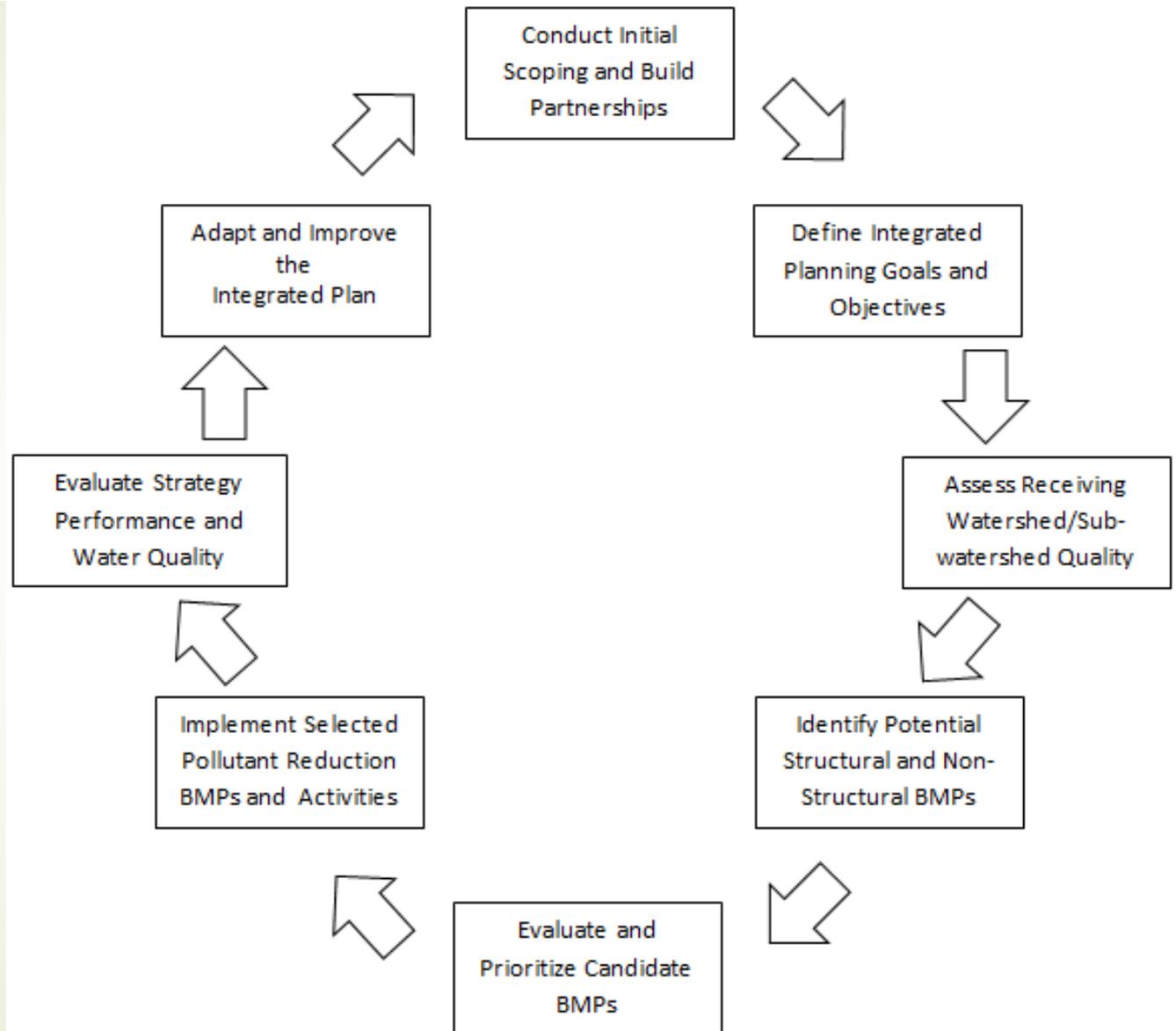
This memorandum updates aspects of EPA’s November 22, 2002 memorandum from Robert H. Wayland, III, Director of the Office of Wetlands, Oceans and Watersheds, and James A. Hanlon, Director of the Office of Wastewater Management, on the subject of “Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs” (hereafter “2002 memorandum”). Today’s memorandum replaces the November 12, 2010, memorandum on the same subject; the Water Division Directors should no longer refer to that memorandum for guidance.

This memorandum is guidance. It is not a regulation and does not impose legally binding requirements on EPA or States. EPA and state regulatory authorities should continue to make permitting and TMDL decisions on a case-by-case basis considering the particular facts and circumstances and consistent with applicable statutes, regulations, and case law. The recommendations in this guidance may not be applicable to a particular situation. EPA may change or revoke this guidance at any time.

Background

Stormwater discharges are a significant contributor to water quality impairment in this country, and the challenges from these discharges are growing as more land is developed and more impervious surface is created. Stormwater discharges cause beach closures and contaminate shellfish and surface drinking water supplies. The increased volume and velocity of stormwater discharges causes streambank erosion, flooding, sewer overflows, and basement backups. The decreased natural infiltration of rainwater reduces groundwater recharge, depleting

Integrated Planning: an iterative process



Benefits of integrated planning

- ▶ Considers typically separate actions necessary to comply with regulatory requirements together to:
 - ▶ Optimize local benefits
 - ▶ Maximize the use of municipal resources
 - ▶ Efficiently and effectively comply with regulations

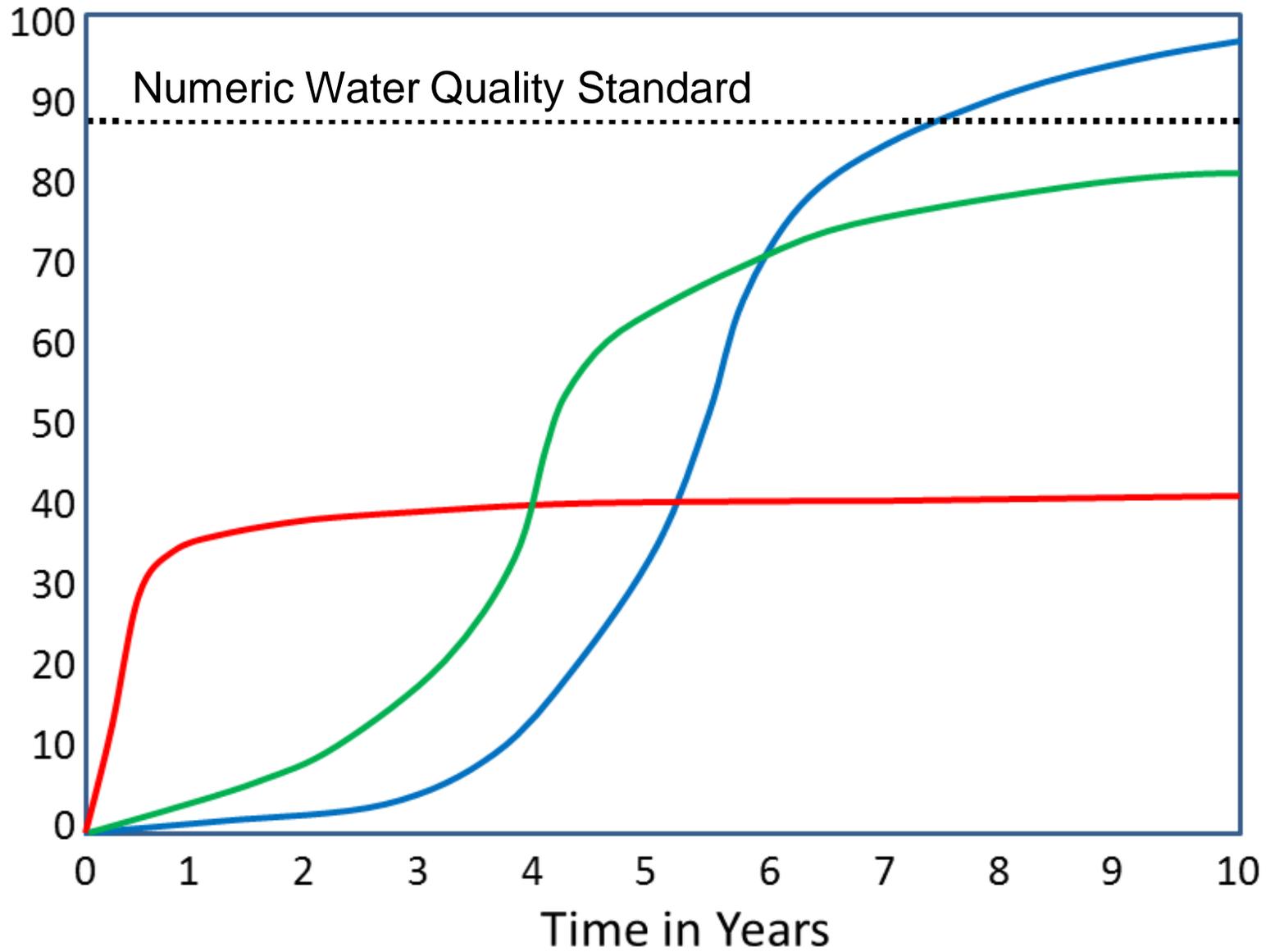


Challenges addressed by integrated planning

- Many of the necessary actions and outcomes are inter-related
- Complexity of decision-making when considering multiple goals
 - Water quality criteria
 - High/low stream flows
 - Flood control
 - Cost-effectiveness
 - Asset management
 - Community benefits
 - Quality of life
 - Economy, jobs
 - Others . . .



Percent Improvement in Water Quality



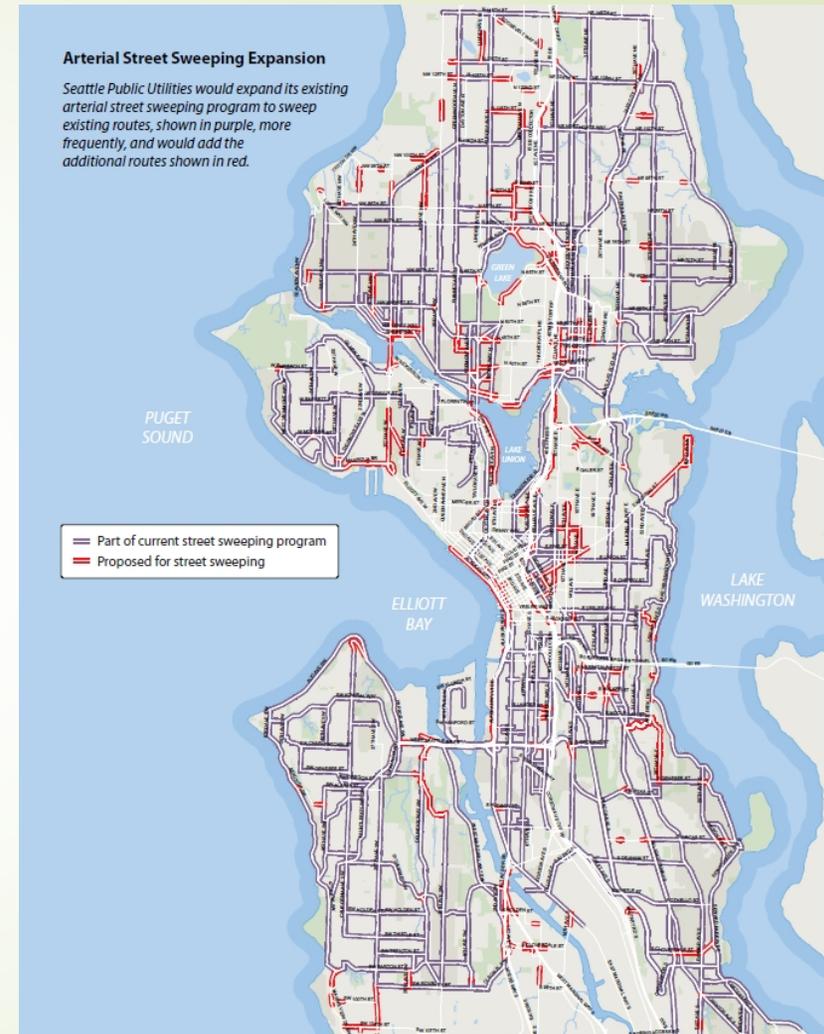
Numeric Water Quality Standard

Consider three potential project types to reduce nutrients in a receiving water body:

- WWTP Upgrade
- Green Stormwater
- Ag Nutrient Trading

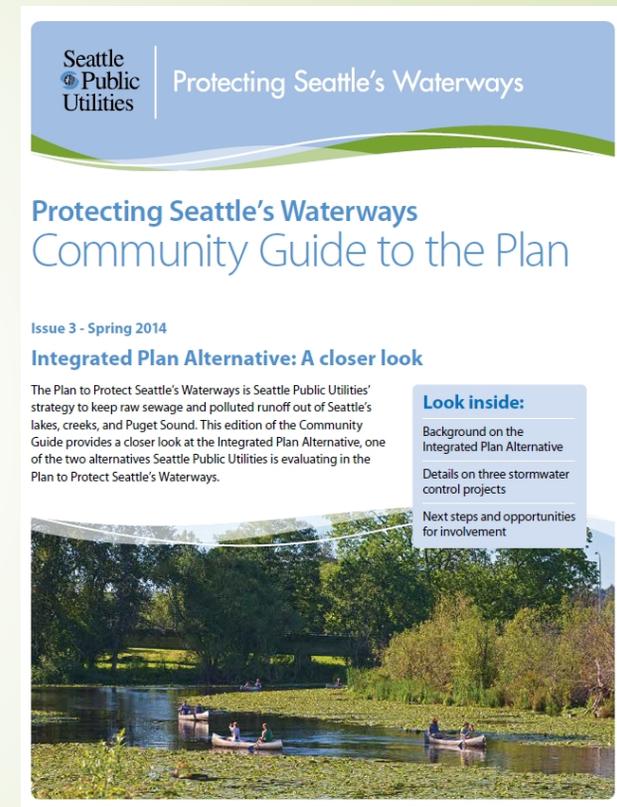
Example: Seattle's Integrated Plan

- Driven by combined sewer overflows, long-term control plan requirements
- Focused on a) selected CSO reductions; b) separate storm sewer system projects; c) stormwater pollution prevention; d) deferring some CSO projects
- Formalized in a judicial consent decree



The Seattle plan will:

- Identify areas of Seattle where projects are needed to reduce combined sewer overflows.
- Evaluate alternatives for reducing sewage overflows in these areas.
- Identify additional areas where projects to control and treat polluted stormwater runoff will improve water quality.
- Recommend a schedule for designing and constructing projects.
- Estimate program costs and associated impacts on Seattle Public Utilities' customer bills.



Seattle projects include:

- Three CSO reduction projects serving 11 neighborhoods
- South Park water quality facility
- Natural drainage / infiltration projects
- Arterial street sweeping expansion in targeted areas

Comparing Water Quality Benefits

The three proposed stormwater projects would reduce more pollutants than the six sewage overflow control projects proposed for deferral.

	Three Stormwater Control Projects	Six Deferred CSO projects
Annually, the Integrated Plan Alternative would treat:		
	108 million gallons	2.4 million gallons
Annually, the Integrated Plan Alternative would remove:		
Fecal Coliform Bacteria	71 billion fecal coliform	5.6 billion fecal coliform
Zinc	100 pounds	1 pounds
PCBs	0.2 pounds	0.001 pounds
Phosphorus	150 pounds	15 pounds
Total Suspended Solids (TSS) - solids that are suspended in stormwater. Pollutants, such as PCBs tend to attach to the suspended solids in stormwater.	130,000 pounds	1,100 pounds

Example of an integrated source water protection and water quality program

- New York City Filtration Avoidance Program
- In operation since 1993
- 1,972 square miles covering 3 watersheds
- 92% Farm Participation
- \$1.7B Capital Investment
- \$40M Annual O/M
- Water filtration system would have cost approximately \$10,000,000,000



What's the bottom line?

- ▶ Planners need to present a credible, verifiable approach for improving water quality
- ▶ Can result in flexible implementation of permitting/regulatory compliance schedules, and adjustment of permit activity sequences

AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WASTEWATER MANAGEMENT DIVISION
103 SOUTH MAIN STREET
WATERBURY, VERMONT 05671-0405

Permit No. 3-1247
File No. 04-03
Project ID No. EJ95-0270
NPDES No. VT0100307

Name of Applicant: City of Burlington
PO Box 878
Burlington, VT 05402

Expiration Date: September 30, 2009

DISCHARGE PERMIT

In compliance with the provisions of the Vermont Water Pollution Control Act as amended (hereinafter referred to as the "Act") and the Federal Clean Water Act, as amended (33 U.S.C. §1251 et seq), the City of Burlington, Vermont (hereinafter referred to as the "permittee") is authorized by the Secretary, Agency of Natural Resources, Waterbury, Vermont, to discharge from the Burlington *Riverside* Wastewater Treatment Facility to the Winooski River in accordance with the following general and special conditions.

This permit shall become effective on October 1, 2004.

Jeffrey Wennberg, Commissioner
Department of Environmental Conservation

By: Christine Thompson
Christine Thompson, Director
Wastewater Management Division

Date: 6/21/04

Integrated Planning in Burlington: the first steps

- Scoping out the views of stakeholders
- Input will help the project team to:
 - Understand primary concerns and priorities of various stakeholders
 - Recognize community-supported integrated goals
 - Identify and prioritize a suite of criteria for evaluating and selecting projects that address the goals



Stakeholder input: a key ingredient for integrated planning

- What's important to the local community?
- Are there factors besides monthly bill totals that need to be considered?
- Which project evaluation factors deserve the most consideration?
- Which factors are less important?

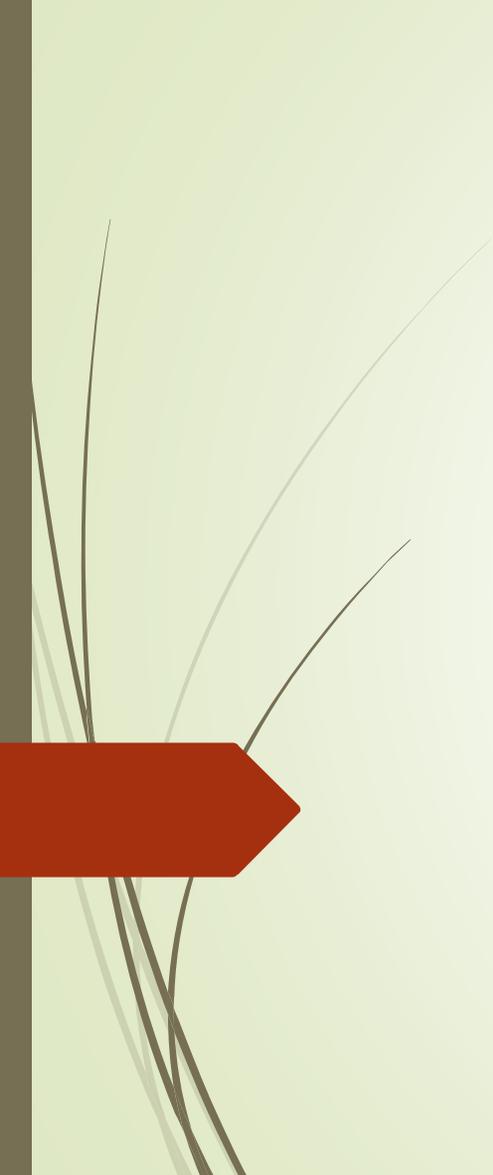


Benjamin D. Bloom

We're looking for input!

- ▶ Project evaluation criteria will be selected by stakeholders (yes, YOU!)
- ▶ General weighting factors will be assigned
- ▶ City staff will review and finalize criteria
- ▶ Weighted criteria will be incorporated into a decision-making tool for the city to use when considering new capital projects



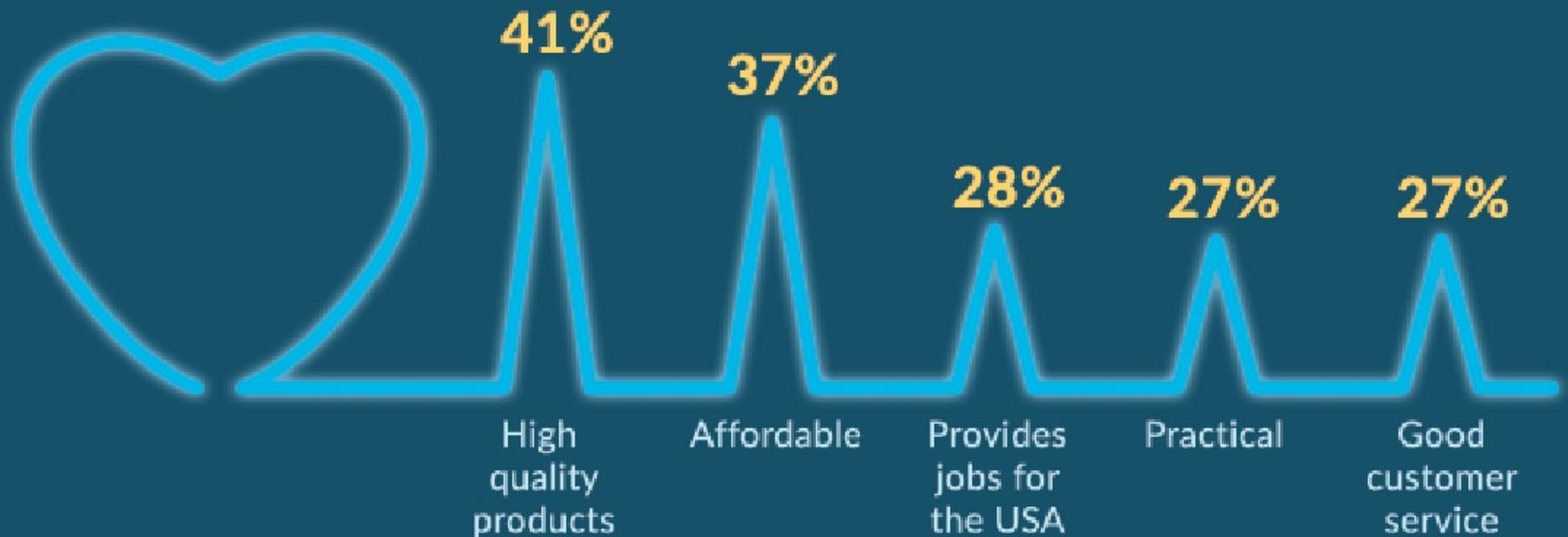


Integrated Planning:

Project Review and
Evaluation Criteria

▶ WHAT AMERICAN CONSUMERS DESIRE IN A BRAND ◀

THE GENERAL POPULATION VALUES QUALITY AND PRICE





Article **Talk**

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Multiple-criteria decision analysis

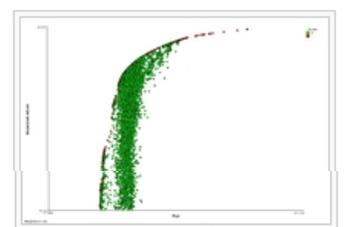
From Wikipedia, the free encyclopedia

"MCDM" redirects here. For the use in cosmology, see meta-cold dark matter.

Multiple-criteria decision-making or **multiple-criteria decision analysis (MCDA)** is a sub-discipline of [operations research](#) that explicitly considers multiple criteria in decision-making environments. Whether in our daily lives or in professional settings, there are typically multiple conflicting criteria that need to be evaluated in making decisions. Cost or price is usually one of the main criteria. Some measure of quality is typically another criterion that is in conflict with the cost. In purchasing a car, cost, comfort, safety, and fuel economy may be some of the main criteria we consider. It is unusual that the cheapest car is the most comfortable and the safest one. In [portfolio management](#), we are interested in getting high returns but at the same time reducing our risks. Again, the stocks that have the potential of bringing high returns typically also carry high risks of losing money. In a service industry, customer satisfaction and the cost of providing service are two conflicting criteria that would be useful to consider.

In our daily lives, we usually weigh multiple criteria implicitly and we may be comfortable with the consequences of such decisions that are made based on only [intuition](#). On the other hand, when stakes are high, it is important to properly structure the problem and explicitly evaluate multiple criteria. In making the decision of whether to build a nuclear power plant or not, and where to build it, there are not only very complex issues involving multiple criteria, but there are also multiple parties who are deeply affected from the consequences.

Structuring complex problems well and considering multiple criteria explicitly leads to more informed and better decisions. There have been important advances in this field since the start of the modern multiple-criteria decision-making discipline in the early 1960s. A variety of approaches and methods, many implemented by specialized [decision-making software](#),^{[1][2]} have been developed for their application in an array of disciplines, ranging from politics and business to the environment and energy.^[3]

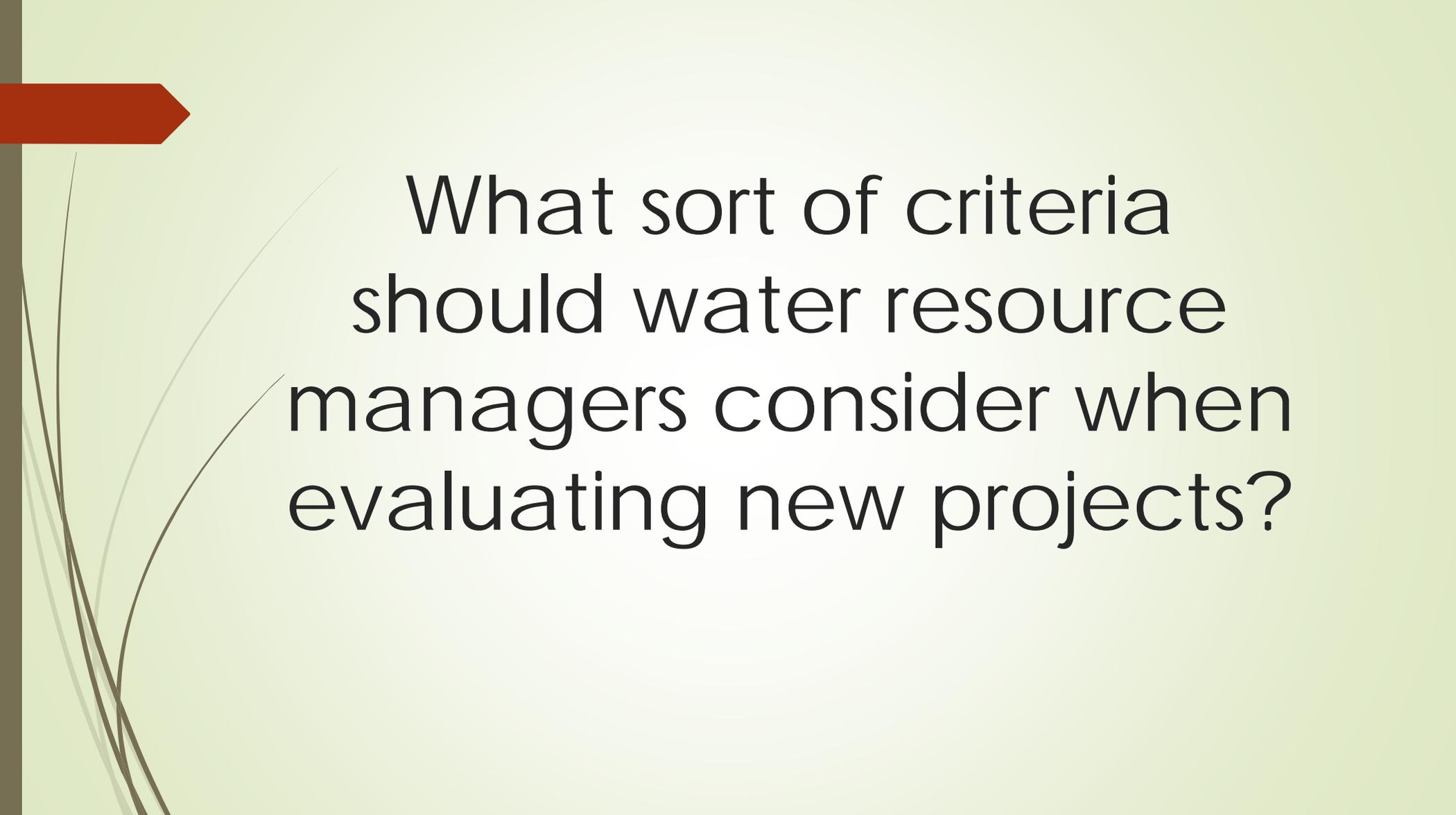


Plot of two criteria when maximizing return and minimizing risk in [financial portfolios](#) (Pareto-optimal points in red)

Contents [\[hide\]](#)

- 1 Foundations, concepts, definitions
 - 1.1 A typology
 - 1.2 Representations and definitions
 - 1.3 Generating nondominated solutions

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What sort of criteria should water resource managers consider when evaluating new projects?

Project Evaluation Criteria

Evaluation Criteria Category	Indicators or Metrics for Each Criterion
Environmental Performance	<ul style="list-style-type: none">• Project will measurably reduce discharges of targeted pollutant(s) and/or improve receiving water quality• Project is able to handle diverse flows and pollutant loads, and has a low failure risk and high reliability• Project is able to withstand extreme weather patterns/changes over the long term• Project meets overall sustainability goals – energy use, materials, environmental footprint, etc.• Project fits into greenway, park, recreation, ecosystem restoration, transportation, other plans

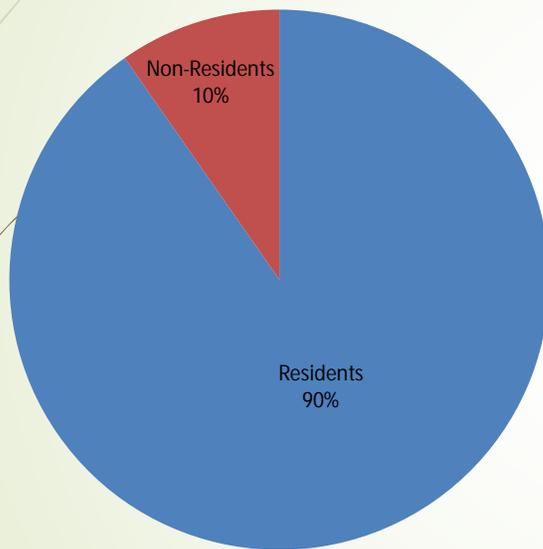
Project Evaluation Criteria

Evaluation Criteria Category	Indicators or Metrics for Each Criterion
Life Cycle Costs	<ul style="list-style-type: none">• Project implementation costs to ratepayers in terms of cost per gallon for treatment or cost per pound of pollutant removed is low to moderate• Cost to ratepayers per gallon or per pound of pollutant removed during project operation is low to moderate• Cost to ratepayers per gallon or per pound of pollutant removed to maintain the system is low to moderate• Grants, loans, or other programs are available to cover some capital or other costs (e.g., land acquisition, construction, staff training, etc.)• Outside parties are willing to cost-share or otherwise help with construction, operation, maintenance, etc.

Project Evaluation Criteria

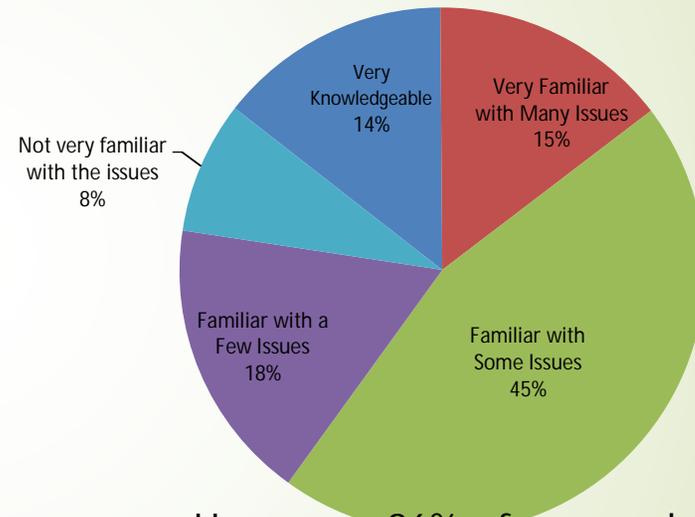
Evaluation Criteria Category	Indicators or Metrics for Each Criterion
Supplementary Benefits	<ul style="list-style-type: none">• Project eliminates or reduces flooding in residential, commercial, or other areas• Project has a low visual profile, and low/no odors, noise, or other operational nuisances• Project creates positive economic impact and local jobs during construction and operation• No or few traffic disruptions, dust, noise, other impacts during the project construction period• Project enhances city's image and relationships within the community

Integrated WQ Plan Survey: (7/29 – 8/25/2015)



Total Respondents = 258

Level of familiarity with WW, SW and water resource management issues

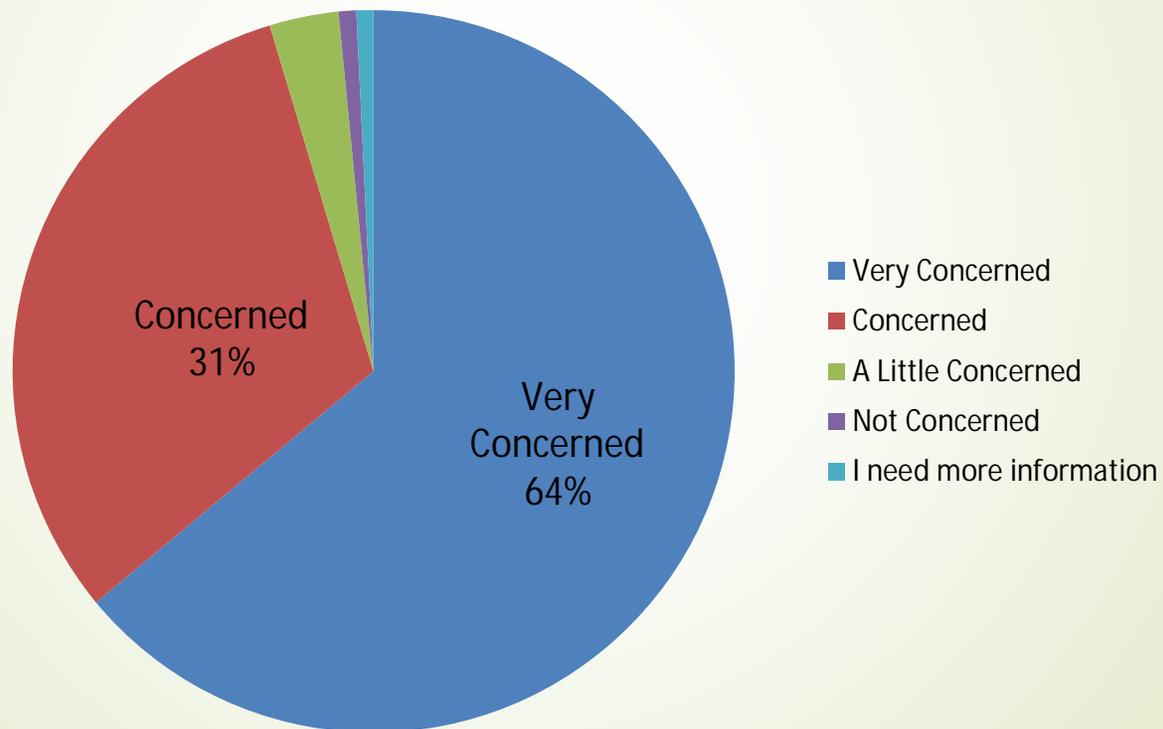


However, 86% of respondents reported that they had not attended one of the public presentations or reviewed the archived webinar/taped presentations.

Integrated WQ Plan Survey: (7/29 – 8/25/2015)

57

How concerned are you with the general water quality of our local streams, the Winooski River and Lake Champlain?



Integrated WQ Plan Survey: Issues

Rank	Water Resource Issues	Weight	Survey Score
1	General pollution of our waterway ecosystems (lakes, rivers, streams) due to pollutants (sediment, oils/grease, bacteria, nutrients, thermal) in urban stormwater runoff	10%	967
2	Untreated CSOs (release of untreated mixture of stormwater and wastewater-sewage) to the Winooski River and the Intervale Wetlands during intense or large storm events due to excess stormwater from impervious surfaces	10%	940
3	Blue green algae blooms in the Lake in general (not necessarily beach closures) which can affect ecosystem health and Lake recreation and tourism	9%	870
4	Beach closures due to E. coli bacteria	9%	868
5	Release of PARTIALLY TREATED stormwater and wastewater from our Main Wastewater Treatment Plant during large storm events due to excess stormwater from impervious surfaces	9%	863
6	Beach closures due to blue green algae (phosphorus pollution)	9%	855
7	Condition of our collection system infrastructure (wastewater and stormwater pipes and stormwater outfalls)	8%	834
8	Acute and/or toxic levels of chloride in local streams due to winter salting of roadways and sidewalks	8%	761
9	Stream bank erosion and loss of fish habitat in our small local streams (Englesby, Centennial, Potash Brooks) due to excess volumes of stormwater runoff	8%	753
10	Basement flooding (where a mixture of sewage and stormwater surcharges into basements with plumbing fixtures) due to combined sewer surcharges caused by excess stormwater runoff from impervious surfaces	8%	741
11	Localized flooding due to undersized stormwater management infrastructure	7%	736
12	Sediment runoff from construction projects during storm events	7%	646

Integrated WQ Plan Survey: Project Criteria

Rank	Project Criteria	Weight	Survey Score
1	Addresses multiple water resource issues at the same time	12%	842
2	Addresses the water resource issues *I* feel are most critical as identified above	12%	824
3	Removes multiple pollutants at the same time (for example a project that targets removal of multiple pollutants vs. only phosphorus removal)	12%	811
4	Integrated with other upcoming City infrastructure projects such as streets/road projects, parks improvements, public building improvements	12%	801
5	Costs to build, operate and maintain the project compared to amount of a pollutant removed	12%	789
6	Increases green/open space in the urban environment	11%	755
7	Provides green-house gas reduction benefits	11%	734
8	Improves walkability and bike-ability of streetscape	11%	732
9	Increases local property values/storefront values through improved aesthetics	8%	552



You have earned
a
10 minute break





Refining Weights for Project Review Criteria

- ▶ Need to come to preliminary consensus on how to weight project review criteria
- ▶ 258 of respondents in the community have provided initial numbers via the survey
- ▶ Will be using you, as key stakeholders in your field, to further refine these numbers as you feel is necessary



Step 1: Additional project review criteria (As a large group)

- ▶ Do any additional criteria need to be added?
 - ▶ Improving aesthetics specifically in lower income neighborhoods
 - ▶ Synchronicity with other City Plans (Plan BTVs, Urban Forestry Master Plan)
 - ▶ Job creation
- ▶ Consider your own stakeholder groups objectives



Step 2: Consider preliminary weights and revise individually with rationale

- ▶ Each person will be given a worksheet with the project review criteria and the associated, preliminary weights generated from the survey
- ▶ You will be asked to independently and anonymously make any changes to the weights you deem appropriate
- ▶ You will need to include a rationale for each change



Step 3: Summary of consistent proposed changes

- ▶ The facilitators will collect your worksheets and determine if there are any consistencies within the changes.
- ▶ Any consistencies will be reported to the group, confirmed as consensus and documented on flip charts.
- ▶ No further discussion will be had on these criteria



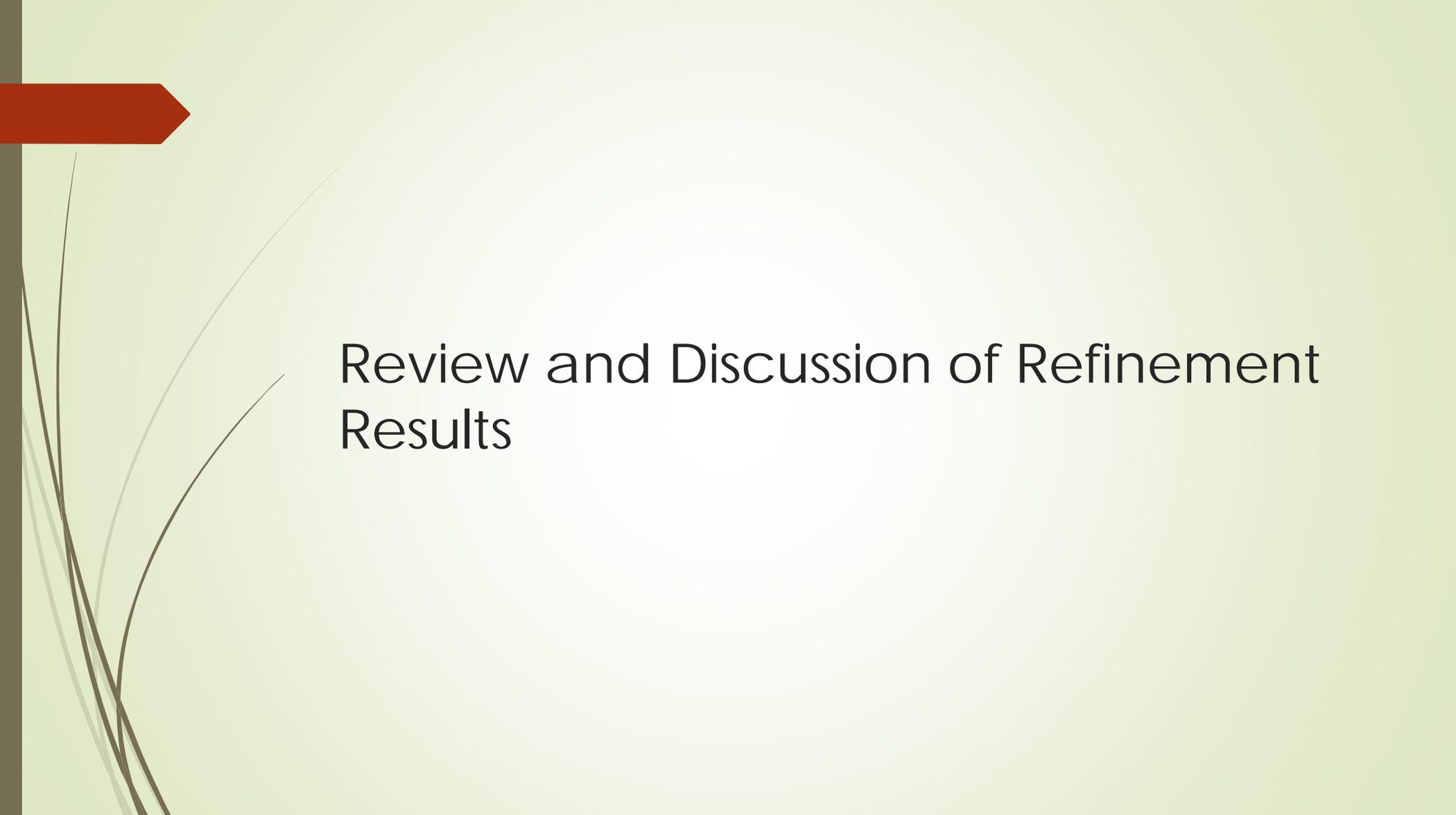
Step 4: Discussion of persistent variations

- ▶ For each criteria without consensus, the facilitators will report the variations and the rationale provided by the group
- ▶ Participants will be encouraged to comment and discuss
- ▶ Repeat Steps 2 – 4 until consensus is reached on all criteria



Preliminary Weights from Survey

Rank	Project Criteria	Weight	Survey Score
1	Addresses multiple water resource issues at the same time	12%	842
2	Addresses the water resource issues *I* feel are most critical as identified above	12%	824
3	Removes multiple pollutants at the same time (for example a project that targets removal of multiple pollutants vs. only phosphorus removal)	12%	811
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Review and Discussion of Refinement Results

Integrated WQ Plan Survey: Issues

- ▶ Discussion

- ▶ Are there any additional issues not listed in survey that we should consider?
- ▶ Not a lot of divergence separating issues → what does this mean?



Okay to spend public \$ on private land for high priority projects?

- ▶ 59% supported grant/rebate programs for both residential and commercial grants/rebates
- ▶ 29% said it would depend on the details
- ▶ What are the concerns here?

Integrated WQ Planning: What could this look like in Burlington?

- ▶ If, and only if, the future data/planning level exercises support the feasibility of meeting our WW and SW WLAs in an integrated/lumped approach:
 - ▶ Request WWTP compliance schedule that prioritizes WWTP phosphorus optimization at 3 plants for upcoming 5 year permit cycle with requirements to perform combined sewer stormwater and separate stormwater retrofit pilot projects and complete the Burlington Integrated WQ Plan by deadline prior to WWTP permit renewal; then:
 - ▶ Integrated SW/WW permit with overall lumped Waste Load Allocations
 - ▶ Continued maximization of P removal through optimization to get as close to 0.2 mg/L without technological nutrient removal upgrade
 - ▶ Enhanced combined sewer and stormwater retrofit projects (above and beyond the requirements of the TMDL) to offset any pounds of P from WWTP to be implemented on a schedule which matches our financial capability
 - ▶ Possible trading with other Main Lake WWTPs and/or Agriculture



Public Involvement Next Steps

- ▶ Continue analyzing survey data and publish summary report
- ▶ On-going public involvement/input requirements as party of Integrated Plan framework requirements
 - ▶ Future formal input through DPW commission meetings
 - ▶ Online/Web presence
 - ▶ Education on the issues
 - ▶ Project details/citywide map and priority scores
 - ▶ Opportunity for input