DISTRICT DEPARTMENT OF THE ENVIRONMENT

CONSOLIDATED TMDL IMPLEMENTATION PLAN & REVISED MONITORING FRAMEWORK

(STAKEHOLDER GROUP MEETING)

MEETING MINUTES

Meeting Date: November 3, 2014

Meeting Location: DDOE

Approval: Final

1 ATTENDANCE

Name	Organization	Present
Jeff Seltzer	DDOE	Y
Jonathan Champion	DDOE	Y
Hamid Karimi	DDOE	Y
Brian Van Wye	DDOE	Y
Martin Hurd	DDOE	Y
Mary Searing	DDOE	Y
Nicoline Shulterbrandt	DDOE	Y
Shah Nawaz	DDOE	Y
Sarah Bradbury	DDOE	Y
George Onyullo	DDOE	Y
Mohsin Siddique	DC Water	Y
Anouk Savineau	LimnoTech	Y
Dan Herrema	LimnoTech	Y
Tim Schmitt	LimnoTech	Y
Heather Bourne	LimnoTech	Y
Chancee Lundy	Nspiregreen	N
Veronica Davis	Nspiregreen	Y
Tim Fields	MDB, Inc.	Y
Ryan Campbell	MDB, Inc.	Y
Becky Hammer	NRDC	Y
Kaitlyn Bendik	EPA Region 3	N
Meredith Upchurch	DDOT	Y
Jenny Molloy	EPA	Y
Karl Berger	MWCOG	Y
Kate Rice	DC BIA	Y
Sarah Rispin	Potomac Riverkeeper	N
Mike Bolinder	Anacostia Riverkeeper	Y
Ross Mandel	ICPRB	Y
Hye Yeong Kwon	CWP	Y

Attendance sheet is attached (Attachment A)

2 MEETING PURPOSE

The purpose of this Stakeholder meeting was to provide a progress update on the revised monitoring program, discuss additional work that has been completed on the gap analysis, and present an update of Implementation Plan (IP) scenario development.

3 MEETING LOCATION

Building: District Department of Environment

Conference Room: 612

4 MEETING START

Meeting Actual Start: 1:08 PM

5 AGENDA

Welcome

Jonathan Champion, DDOE, welcomed everyone to the meeting.

- **Introductions:** Everyone stated their name, and the organization they represent.

- **Overview of the Agenda:** Mr. Champion provided an overview of the meeting agenda and the purpose of the meeting. The meeting focused on the revised monitoring program, the gap analysis, and scenario development.

Presentation (Attachment B – Presentation)

Revised Monitoring Program

Ms. Heather Bourne, LimnoTech, provided an update on the development of the revised monitoring program. At the August meeting, the Stakeholder Group was provided with an introduction to, and overview of, the revised monitoring program, which included summarizing existing monitoring programs, comparing those programs to the permit requirements, and identifying the data gaps and program redundancies. In September 2014, the project team provided the Stakeholder Group with access to the Crosswalk Analysis Report on the project website. The Crosswalk Analysis Report compares the MS4 permit requirements with existing monitoring programs, identifies redundancies and needed refinements, and provides recommendations.

- **Key Recommendations:** Ms. Bourne provided a brief recap of the key recommendations for developing the revised monitoring program, which included: evaluate monitoring program goals and objectives; identify opportunities for internal coordination; coordinate monitoring program with the TMDL IP; enhance elements of the Dry Weather Screening program; and develop an approach to evaluate the stormwater program.
- **Overview of the MS4 Permit Elements:** Ms. Bourne provided a brief recap of the MS4 permit requirements for the monitoring program. The overarching components are wet weather monitoring, receiving water monitoring, and dry weather screening (including source identification). Each of these has specific objectives as outlined in the MS4 permit. Also required under the current MS4 permit is for DDOE to develop an approach to evaluate the quality of the stormwater program. This is being developed as part of the Revised Monitoring Program Framework.
- The Revised Monitoring Program Framework is comprised of seven components:
    - Program Goals and Objectives: The goal of the revised monitoring program is to evaluate the effectiveness of the MS4 program. The objectives to meeting this goal are to evaluate the health of the receiving waters, calculate the wet weather loading estimates and conduct monitoring for source identification.
    - Wet Weather Monitoring: The Revised Monitoring Program will move from characterization of existing water quality to evaluating the effectiveness of the MS4 program. The MS4 permit requires wet weather monitoring to be

"statistically significant and interpretable". Ms. Bourne provided an overview of two approaches to site selection for wet weather monitoring. One approach is random selection. The other approach is stratified random selection, which is evaluated using the Generalized Random Tesselation Stratified (GRTS) statistical methodology, which takes into account factors such as drainage areas, land use, imperviousness of the area that drains to that outfall, and number of pollutants associated with that outfall. The result of both approaches would reduce the number of outfalls monitored from potentially hundreds to about 10-20.

- Receiving Water Monitoring: A new requirement of the MS4 permit is to evaluate the health of the receiving waters. The Revised Monitoring Program will be coordinated with DDOE's Ambient Monitoring Program. The project team proposes using biological and geomorphological indicators to evaluate receiving water health. This will follow a similar statistical approach as for wet weather monitoring.
- Dry Weather Screening: The Revised Monitoring Program will build upon the existing dry weather screening and source identification program. A strategic plan is being developed by DDOE that includes updates of existing documents including standard operating procedures. These updates will be reflected in the Revised Monitoring Plan.
- Trash Monitoring: The Revised Monitoring Program will build upon the existing trash monitoring program. Currently, trash monitoring occurs at outfalls in each of the District's three major watersheds. In addition to outfall monitoring, DDOE also currently collects data from the seven trash traps in the District.
    - Dr. Moshin Siddque asked if data were being collected on all the trash traps. Mr. Champion stated that the trash traps are currently maintained by grantees. The grants are established for 2-year cycles. The grantees do collect data as they clean the trash traps.
- Quality of the Stormwater Program: The purpose of evaluating the quality of the Stormwater program is to ensure DDOE is meeting the MS4 permit obligations including milestones and benchmarks. Ms. Bourne provided an example of an evaluation process from the Santa Clara Valley Urban Runoff Pollution Prevention Program in California. In addition, she provided examples of indicators from the Center for Watershed Protection, which includes social indicators such as public attitude surveys and site indicators such as BMP performance monitoring.
- Adaptive Management: The final section of the Revised Monitoring Program will address adaptive management. While some monitoring will be ongoing (e.g., wet weather monitoring), other monitoring needs more flexibility (e.g., special studies). Additionally, as data are collected they will be used to inform the needs of the monitoring program itself, the MS4 program, as well as the TMDL IP. Based on that feedback, adjustments to the monitoring program may be needed (e.g., DDOE may find that additional flow data need to be collected in a particular watershed, planning of new development in a particular area may trigger the need to conduct pre and post BMP implementation monitoring).

- **Next Steps:** The project team will continue to work with DDOE to develop a draft Revised Monitoring Program. It will be provided to the Stakeholder Group in early 2015 for review and feedback.

Gap Analysis

Ms. Anouk Savineau, LimnoTech, provided an update on the gap analysis. She provided a brief recap of information presented at previous Stakeholder Group meetings. An IP Modeling Tool was developed to track pollutant loads and load reductions in a consistent manner across the District. More detail is available in the Comprehensive Baseline Report, which is on the project website.

- **Overview of the Gap analysis**: The "gap" is the difference between the WLAs and the current conditions with best management practices (BMPs). The gap will be addressed by the IP. The gap for any individual WLA could be small or large.
  - **Gap Analysis Example:** Ms. Savineau provided some examples of the gap analysis. The current load is based on the IP Modeling Tool. Examples of the gap:
    - Upper Potomac (POTTF_DC)
      - For Total Nitrogen (TN) the gap needed to meet the WLAs is 87,900 lbs/year or 69% load reduction.
    - Dr. Siddique asked if the WLAs were based on what was in the MS4 permit or the IP Modeling Tool. Ms. Savineau stated the gap is based on the gap between the WLAs in the established TMDLs and the current loads based on the IP Modeling Tool. Jeffery Seltzer, DDOE, stated that DDOE is reexamining the WLAs to ensure that they are accurate and based on the best possible data; however that is a separate process that will not be addressed in the IP.
  - **Summary of Percent Load Reductions:** Ms. Savineau stated that based on the IP Modeling Tool, 43 pollutant/waterbody combinations have attained their WLAs. However, more than half of the pollutant/waterbody combinations need to be reduced by over 70% to meet their respective WLAs.
- **Reducing the Gap:** Ms. Savineau stated the two ways to reduce the gap are pollutant control (through treatment-based BMPs) or stormwater volume control (through retention-based BMPs). For the purposes of the analysis, both were evaluated separately.
  - Dr. Siddique asked what happens to the pollutants if the water is retained. Ms. Savineau stated that instead of going into the water body, the pollutant would be absorbed by the soil. Karl Berger stated that the Chesapeake Bay program examined what happens when water is retained during their evaluation of BMPs. He stated the pollutants are absorbed by the soil, but it is possible that the stormwater infiltrates to the ground water. Dr. Hamid Karimi, DDOE, stated that maintenance of some types of BMPs can involve cleaning out the BMP and disposing of the waste to prevent pollutants from being absorbed by the soil. Jenny Molloy stated that available data shows the microbiological organisms in the soil are able to manage the pollutants.
  - Ms. Molloy asked if source control is included in pollutant control. Ms. Savineau stated that source control is included in pollutant control, but only a few source control actions are currently included in the IP Modeling Tool. Ms. Savineau stated that there is a lack of robust scientific data to accurately quantify and model pollutant load reductions from source control actions. Ms. Malloy stated that the current research on source control actions should

be sufficient to construe reasonable assumptions that could inform and define the modeling algorithm.

- **Pollutant control:** Ms. Savineau stated that pollutant control includes BMPs and source control. Typical BMPs are 40-70% effective at removing conventional pollutants and 0-40% effective at reducing organic pollutants. BMPs typically max out at 70-80% reduction of pollutants. Current modeling shows that the currently implemented BMPs generally achieve less than 2 percent pollutant load reduction that is needed. Source control is also a method to reduce loads before they get into stormwater. However, Ms. Savineau stated that source control actions are hard to quantify in the IP Modeling Tool because there is little quantifiable data on the effectiveness of source controls at pollutant removal. However, street sweeping is one example of a source control practice that can be modeled. A variety of source control actions will be included in the TMDL implementation plan.
    - Discussion: Dr. Siddique asked if there is a way to look at data from coal tar bans. Ms. Savineau stated that this might be possible but that most sources of pollutants, including PCBs and mercury, are from disperse sources, including contributions from air deposition. Tim Schmitt, LimnoTech, stated that the TMDLs themselves do not identify specific pollutant sources. When looking at type of pollutants, many are legacy pollutants such as pesticides that have been banned for years. Ms. Molloy stated that part of the TMDL implementation process has to be identifying the pollutant sources. Dr. Siddique stated that the Office of Finance should have some historical records of industrial land users to assist with identifying pollutant sources.
    - **Stormwater Controls (Retention):** Ms. Savineau stated that for the purposes of analyzing stormwater control, the pollutant load was converted to a stormwater volume that needs to be removed to meet WLAs. Based on the IP Modeling Tool, 2 inches of stormwater would need to be retained over the entire MS4 area to meet all the WLAs. If the 1.2-inch stormwater retention standard were implemented across the entire MS4 area, 208 WLAs would be attained.
        - Dr. Karimi stated the 1.2-inch standard is based on when properties develop or redevelop. He asked if the Federal Government was required to meet a 1.7-inch standard. Ms. Molloy stated the Federal Government is required to meet the 1.2-inch retention standard.
- **Challenges:** Mr. Champion provided an overview of some of the challenges in meeting existing WLAs. He stated the volume of stormwater control needed to meet the WLAs exceeds the volume control needed for the combined sewer system under the Long Term Control Plan and the pollutant load reductions needed exceed what can be achieved through standard BMP efficiencies. This underscores the need to focus on what can be accomplished in the near term in addition to reexamining original impairment listings or revisiting TMDLs. Some WLAs will be met before others and the project team has to identify what is achievable, and assign endpoint dates to all TMDLs, while focusing in the short term on what will be achieved in 5-10 years.
    - Discussion: Dr. Siddique stated that if there are doubts about the assumptions used to develop the TMDLs, DDOE should revisit them. Ms. Savineau responded that the work for the implementation plan is based on the current WLAs. Mr. Champion added that the IP Modeling Tool is

providing a framework to determine the reductions that DDOE is getting from different programs and tracking over time. Brian Van Wye, DDOE, stated that this process allows DDOE to understand the magnitude and the necessary reductions needed to meet the WLAs. Ross Mandel asked if it was possible to examine receiving water monitoring data to see if it was meeting the standards. Dr. Siddique stated that with portions of the receiving waters in Maryland it would be hard to determine if the District is meeting its WLAs.

Scenario Modeling

Ms. Savineau provided an overview of the four scenarios that were modeled to determine how effective they are at reducing the gap between current loads and the WLAs. The project team examined four scenarios separately in five-year increments between 2015 and 2040.

- Predevelopment Conditions Scenario: This scenario assumes the entire MS4 area is returned to forest. All the WLAs are attained except bacteria in some of the tributaries. Because it shows that some bacteria WLAs cannot be attained even if the land is returned to predevelopment conditions, this scenario highlights that there may be some issues with the bacteria TMDLs.
- Development/Redevelopment Scenario: This scenario examines load reductions from future development and redevelopment that is likely to trigger the DC stormwater regulations and result in additional stormwater retention. Using data from Office of Planning, National Capital Planning Commission, DDOT and universities, the project team projected parcels that are likely to be developed over time and thereby trigger the stormwater regulations. This scenario currently shows that approximately 18% of the MS4 will be developed or redeveloped by 2040. The result from the IP Modeling Tool is that all pollutant loads are reduced where land is developed, but only 54 WLAs will be attained by 2040.
    - Discussion: Becky Hammer asked if the IP Modeling Tool accounted for the stormwater retention credit-trading program. Ms. Savineau replied that this program was still new and that very little data was available to make projections about how this program would impact load reduction. Mike Bolinder asked if it was possible to model the half (.6" of the stormwater runoff) required to be retained on-site. Ms. Savineau responded that the other half still has to be projected somewhere in space, and so for the purposes of the IP Modeling Tool it was assumed the entire 1.2-inch was retained on-site.
- BMP Implementation Scenario: The purpose of this scenario is to determine the pollutant load reduction from planned or ongoing BMP implementation that is not required as part of a regulated development or redevelopment project. Ms. Savineau stated that the project team examined programs such as RiverSmart, grant-funded BMP implementation, university plans, and DDOT's green alleys program. Since many of the BMPs were opportunistic, it was difficult to determine a future rate of implementation since many agencies and universities do not have set targets or plans for implementation. The IP Modeling Tool shows that all loads are slightly reduced through ongoing BMP implementation not associated with development/redevelopment, but no additional WLAs are expected to be attained by 2040.
    - Discussion: Ms. Molloy asked about the apparent disconnect between the results of the IP Modeling Tool and the plan to meet the Bay TMDL included in the District's Phase I Watershed Implementation Plan. The Phase I WIP showed that the District could attain the Chesapeake Bay TMDL WLAs and recent progress

reporting by DDOE indicates the District is still on target to meet these WLAs. Ms. Savineau responded that the IP Modeling Tool uses a different set of assumptions than does the Bay Model, with the biggest being a different set of EMCs for sediment, nitrogen, and phosphorus. The IP Modeling Tool has EMCs based on local monitoring data. Mr. Champion added that DDOE is wrestling with how to reconcile the Chesapeake Bay process and the IP Modeling Tool. Ms. Savineau stated that the IP Modeling Tool is District-specific whereas the Chesapeake Bay is modeling a larger area. Mike Bolinder asked if this scenario includes DC Water's proposed Green Infrastructure implementation. Mr. Champion responded that DC Water's proposed implementation is focused on the CSO areas. Ms. Savineau added that DC Water sewer rehabs were included if they are in the MS4 area. It was assumed if DC Water is doing significant sewer rehab, that DDOT would reconstruct the roadway.

- Watershed Implementation Plans Scenario: Ms. Savineau stated the final scenario included existing WIP projects. The WIP BMPs will treat about 4% of the total MS4 area. Based on the IP Modeling Tool, all loads are reduced slightly, however only 1 additional WLA is expected to be attained by 2040.
- Summary: Ms. Savineau provided a summary of the scenario development. The largest and most dependable driver for BMP implementation is the new stormwater regulations. One potential issue is that most of the MS4 area is residential area, where development/redevelopment is not assumed to have a large impact. In addition, there is no targeted funding for BMP implementation in the residential area beyond the RiverSmart program. Also, half of the impervious area is public right of way; however, there is no additional targeted funding provided to DDOT to control runoff.
    - Discussion: Dr. Karimi asked if the Green Area Ratio was included. Ms. Savineau responded that it was captured in the "Ongoing BMP Implementation" scenario. However, it is a new program so there is not much historical data. Meredith Upchurch stated that DDOT does get funding for neighborhood retrofits. Ms. Savineau responded that it is small compared to the entire public right of way. Dr. Karimi asked if Federal properties were included. Ms. Savineau stated that they were included. Mike Bolinder asked if Bolling Joint Base Anacostia was included. Ms. Savineau responded the base is not quite in the MS4 area. Veronica O. Davis, Nspiregreen, added that the District owns most of the land projected for development or redevelopment. Dr. Karimi responded there might be opportunities to do more on District properties. For example, as District buildings need new roofs, green roofs are installed.
- Mr. Van Wye stated that DDOE has tightened up the loophole for smaller properties (less than 5000 ft^2). He also noted that the existing BMP database has only very coarse-level information on the BMP attributes, which makes it difficult to define specific programs and targeted areas that drive BMP implementation. However, DDOE is rolling out a new BMP database tracking system this year that will allow DDOE to better define BMP implementation rates that can be used in the IP Modeling Tool.

General Discussion

- Dr. Siddique asked if DDOE considered an exchange or trade program with Prince George's County. Dr. Karimi responded that five years ago a watershed permit was discussed. However, any water body in DC needs to be managed by DC. Currently, EPA is looking at how Montgomery County & Prince George's County will develop their

permits. Dr. Siddique stated that there could be an opportunity for Maryland to do more than what they are required.

Next Steps

- November/December: The project team will refine the IP scenarios and design the Revised Monitoring Program. In addition, the team will provide a draft scenario Analysis Report and Final Comprehensive Baseline Report.
- Early 2015: The project team will provide a Draft Implementation Plan and a Draft Revised Monitoring Program for stakeholder feedback.

6 POST MEETING ACTION ITEMS

Action	Assigned To	Deadline
Send the meeting minutes, presentation, and list of attendees out to participants	Chancee` Lundy	
Update the project website	Chancee` Lundy	

7 DECISIONS MADE

- None

8 NEXT MEETING

Next Meeting: TBD

9 MEETING END

Meeting End: 3:05pm

10 ATTACHMENTS

- A – Sign-in Sheet
- B – Presentation with Agenda

District Department of the Environment
District Consolidated TMDL Implementation Plan and Monitoring Program
Stakeholder Kickoff Meeting
November 3, 2014

Name	Organization	Phone	Email	Alternate Rep.
Tim Schmitt	LimnoTech	202-833-4148	tschmitt@limno.com	
Tim Fields	MDB, Inc.	202-715-3859	tfields@michaeldbaker.com	
Ryan Campbell	MDB, Inc		rcampbell@michaeldbaker.com	
Becky Hammer	NRDC	202.513.6254	rhammer@nrdc.org	
Mary Searing	DDOE		mary.searing@dc.gov	
Hamid Karimi	DDOE	202/535-2277	hamid.karimi@dc.gov	
Mohsin Siddique	DC WATER	787-2634	MohsinSiddique@dcwater	
Jeff Seltzer	DDOE	202-535-1603	jeffrey.seltzer@dc.gov	
Jonathan Champion	DDOE	202 535 1782	jonathan.champion@dc.gov	

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District Department of the Environment
District Consolidated TMDL Implementation Plan and Monitoring Program
Stakeholder Kickoff Meeting
November 3, 2014

Name	Organization	Phone	Email	Alternate Rep.
MARTIN HURD	DDOE	202 299-3344	martin.hurd@dc.gov	
Kate Rice	Bohler DC/DCBIA	202 525-5700	krice@bohlerdc.com	Dan Duke dduke@bohlerdc.com
Sarah Bradbury	DDOE WQD		sarah.bradbury@dc.gov	
Ross Mandel	ICPRB	(301) 984-1908 x.18	rmandel@icprb.org	Andrea Nagel anagel@icprb.org
George Onyullo	DDOE/WQD	202-727-6529	georgeonyullo@dc.gov	
Karl Berger	MWCOG	202-962-3350	Kberger@mwcog.org	
Jenny Molloy	EPA	202 564 1939	molloy.jennifer@epa.gov	
Meredith Upchurch	DDOT			
Mike Bolinder	Anacostia Riverkeeper			

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Monitoring, Gap Analysis, and Scenario Development

District Consolidated TMDL Implementation Plan and Monitoring Program

November 3, 2014

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PURPOSE OF MEETING

- Revised monitoring program
- Discussion of gap analysis
- Scenario development

REVISED MONITORING PROGRAM

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Revised Monitoring Program Approach

1. Summarize existing monitoring programs (MS4 and non-MS4)
2. Compare to permit requirements
3. Identify data gaps and program redundancies (Crosswalk Comparison document)
4. **Develop Revised Monitoring Program**

Key Recommendations from the Crosswalk Comparison

- Evaluate monitoring program goals and objectives
- Identify opportunities for internal coordination
  - Develop data sharing and management plan
  - Interdepartmental Stormwater Work Group
- Coordinate monitoring program with TMDL IP
- Enhance elements of Dry Weather Screening Program (e.g., documentation, follow-up monitoring)
- Develop approach to evaluate the “quality of the stormwater program”

Overview of the MS4 Permit Elements

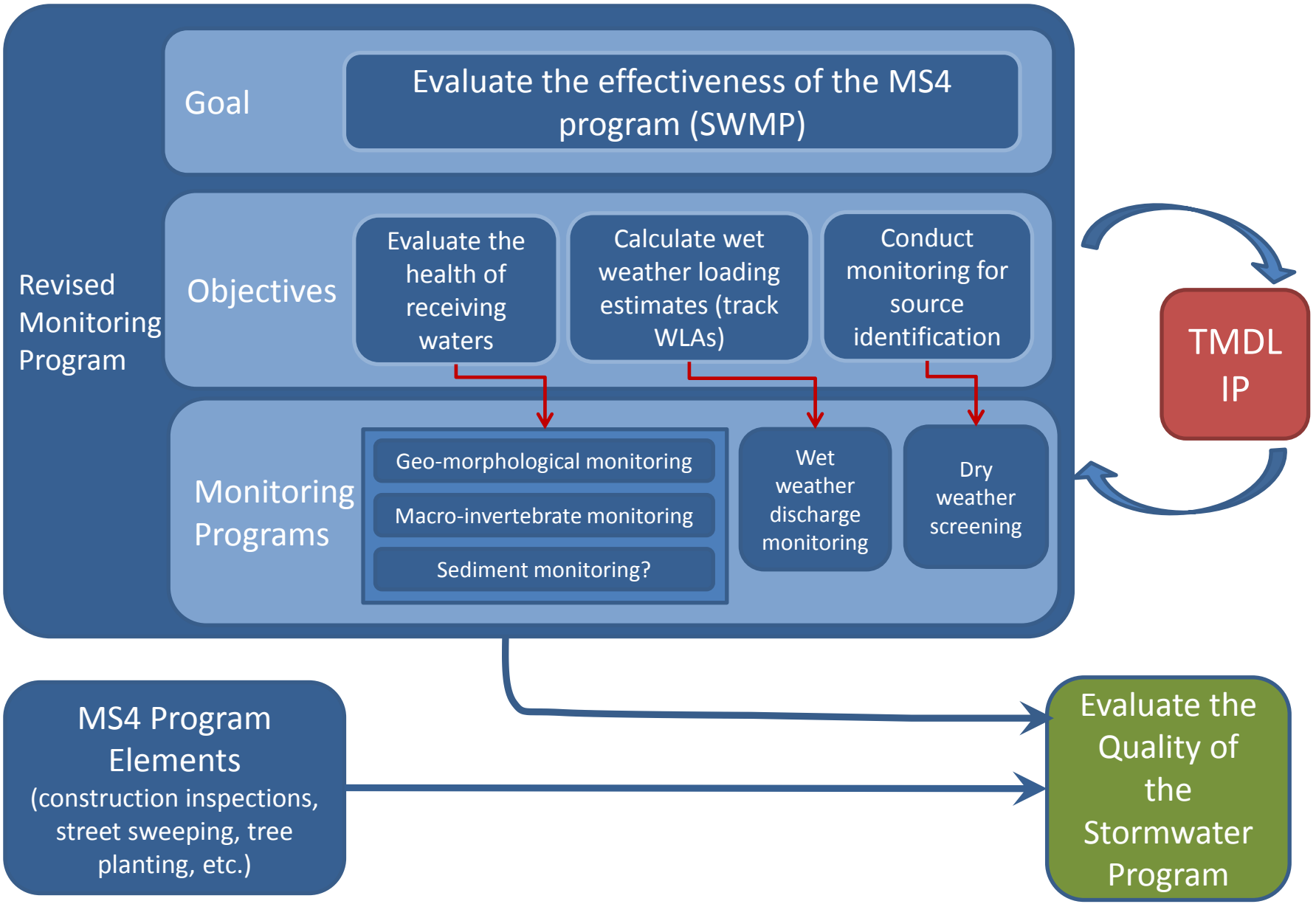
Wet Weather Monitoring	• Make wet weather loading estimates from the MS4 • Track progress toward meeting WLAs
Receiving Water Monitoring	• Evaluate health of receiving waters • Include biological and geomorphic monitoring indicators
Dry Weather Screening	• Screen for illicit discharges and improper connections • Conduct source identification

- Evaluate the quality of the Stormwater Program

Revised Monitoring Program Framework

- Program Goals and Objectives
- Wet weather monitoring
- Receiving water monitoring
- Dry weather screening
- Trash monitoring
- Quality of the Stormwater Program
- Adaptive Management

Program Goals and Objectives

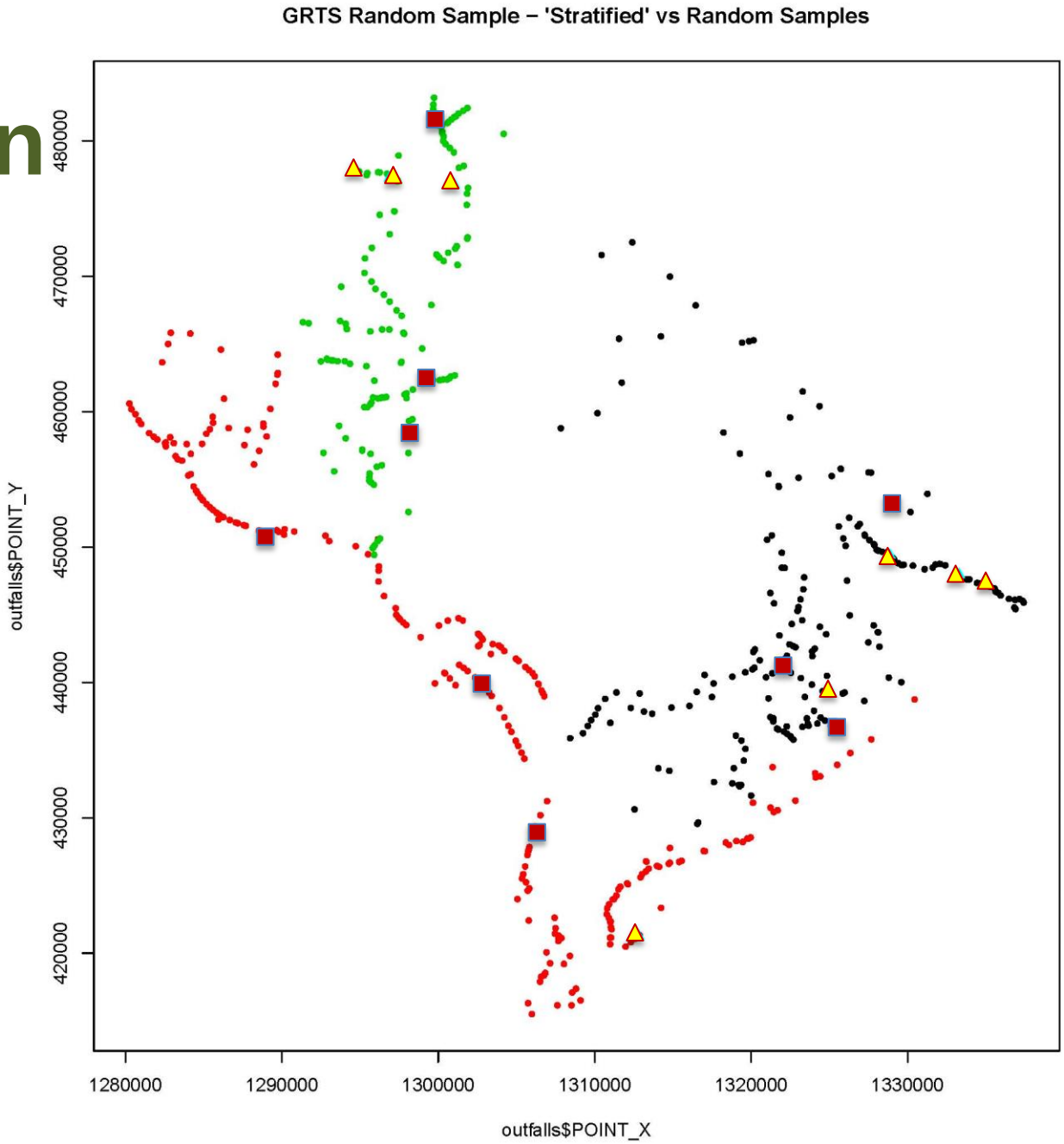


Wet Weather Monitoring Program

- Move from “characterization” to evaluating the effectiveness of the program
  - Monitor for TMDL pollutants to track WLAs
  - “Statistically significant and interpretable”
- Special Studies
  - Shorter-term, focused monitoring efforts
  - Example: pre-and post BMP implementation at neighborhood/catchment scale

Site Selection

- Developing approach to site selection
- Statistical approach
  - Random selection (▲)
  - Stratified random selection (■)



Wet Weather Monitoring Power Estimates

- Optimize statistical analysis using power estimates and varying the:
  - Number of events per year (3, 4, 6)
  - Number of stations (5, 10, 15)
  - Number of years
  - Detectable differences in mean (5%, 10%, 25%)

Receiving Water Monitoring

- Evaluate the impact of the MS4 on the health of receiving waters
- Coordinate efforts with DDOE's Ambient Monitoring Program
- Proposed indicators
  - Biological
  - Geomorphological
- "Statistically significant and interpretable"

Dry Weather Screening

- Build upon existing dry weather screening/source identification program
- Incorporate additional follow-up monitoring
- Develop a Strategic Plan

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Trash Monitoring Program

- Build on existing monitoring program
- Outfall monitoring in each of the 3 watersheds
- Data collection from 7 trash traps

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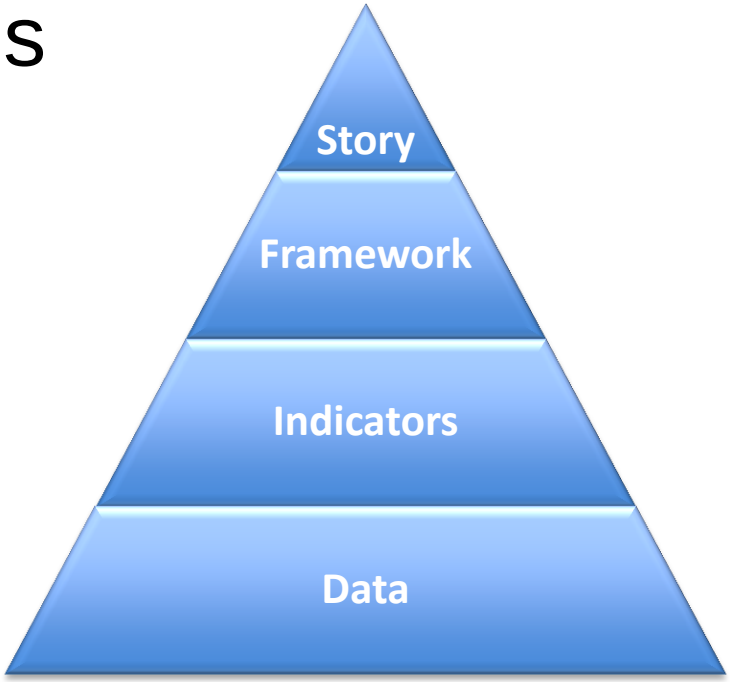
Quality of the Stormwater Program

- Meet MS4 permit obligations
- Meet benchmarks & milestones



Source: Santa Clara Valley Urban Runoff Pollution Prevention Program, Stormwater Environmental Indicators Demonstration Project – Final Report

Indicators

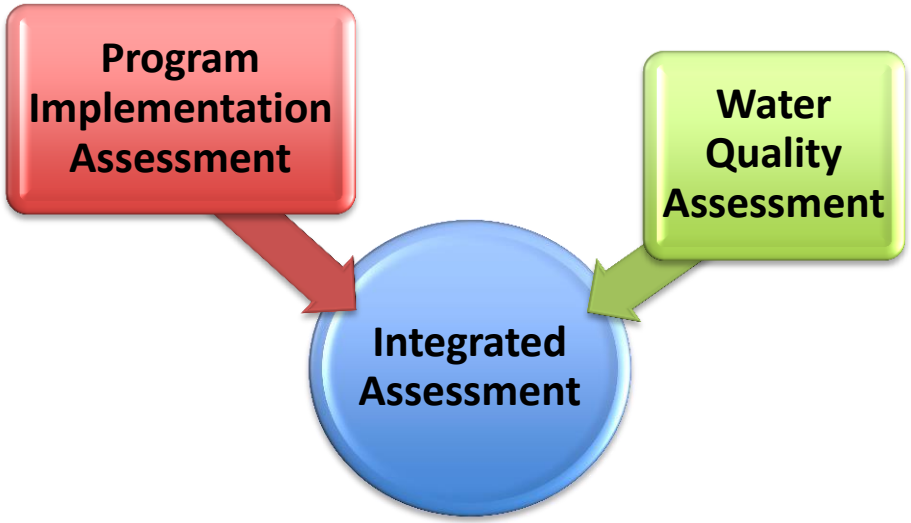
Monitoring Data

Indicator Category	Indicator Name
Water Quality Indicators	Water quality pollutant constituent monitoring
	Pollutant loadings
Physical and Hydrological Indicators	Stream widening/down-cutting
	Physical habitat monitoring
	Impacted dry weather flows
Biological Indicators	Fish assemblage analysis
	Macroinvertebrate assemblage
	Composite indicator
Social Indicators	Public attitude surveys
	Industrial/commercial pollution prevention
	Public involvement and monitoring
Programmatic Indicators	Number of illicit connections identified/corrected
	Number of BMPs installed, inspected, maintained
	Permitting and compliance
	Growth and development
Site Indicators	BMP performance monitoring
	Industrial site compliance monitoring

Source: Adapted from Center for Watershed Protection, An Introduction to Stormwater Indicators, 2000

Framework

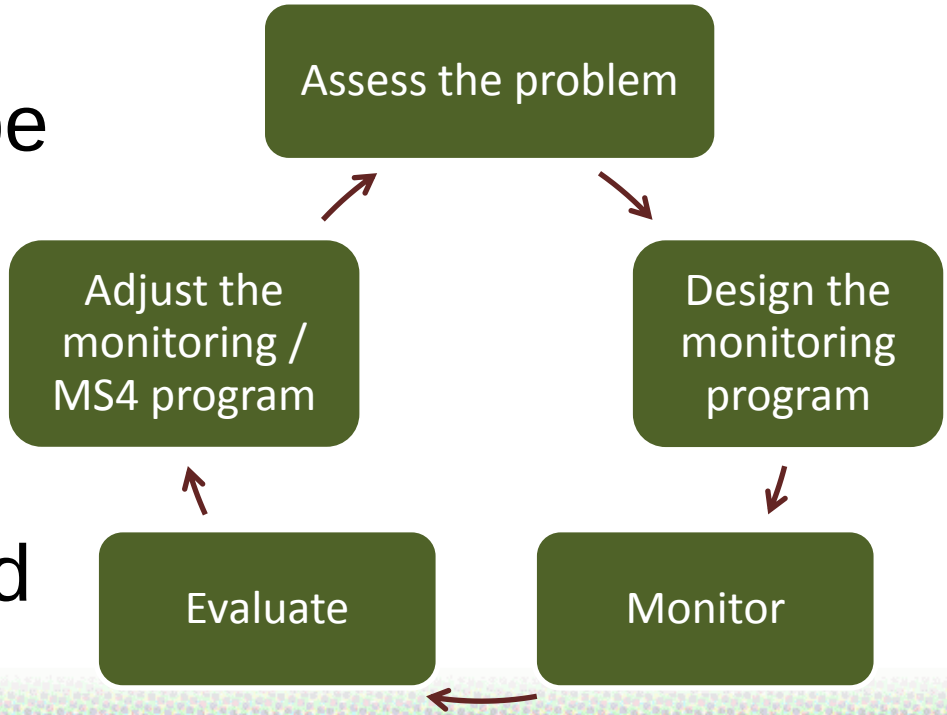
- Integrated Assessment
  - Program implementation
  - Water quality (wet weather, receiving waters, etc.)
- Tells a story



Source: California Stormwater Quality Association Stormwater Program Effectiveness Assessment

Adaptive Monitoring

- While some monitoring will be ongoing, other monitoring needs to be more fluid
  - Special studies
  - Illicit discharge monitoring
- Data can also be used to refine programs



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Next Steps

Continue to work with DDOE staff to develop draft Revised Monitoring Program

Solicit stakeholder input

GAP ANALYSIS

Brief Recap

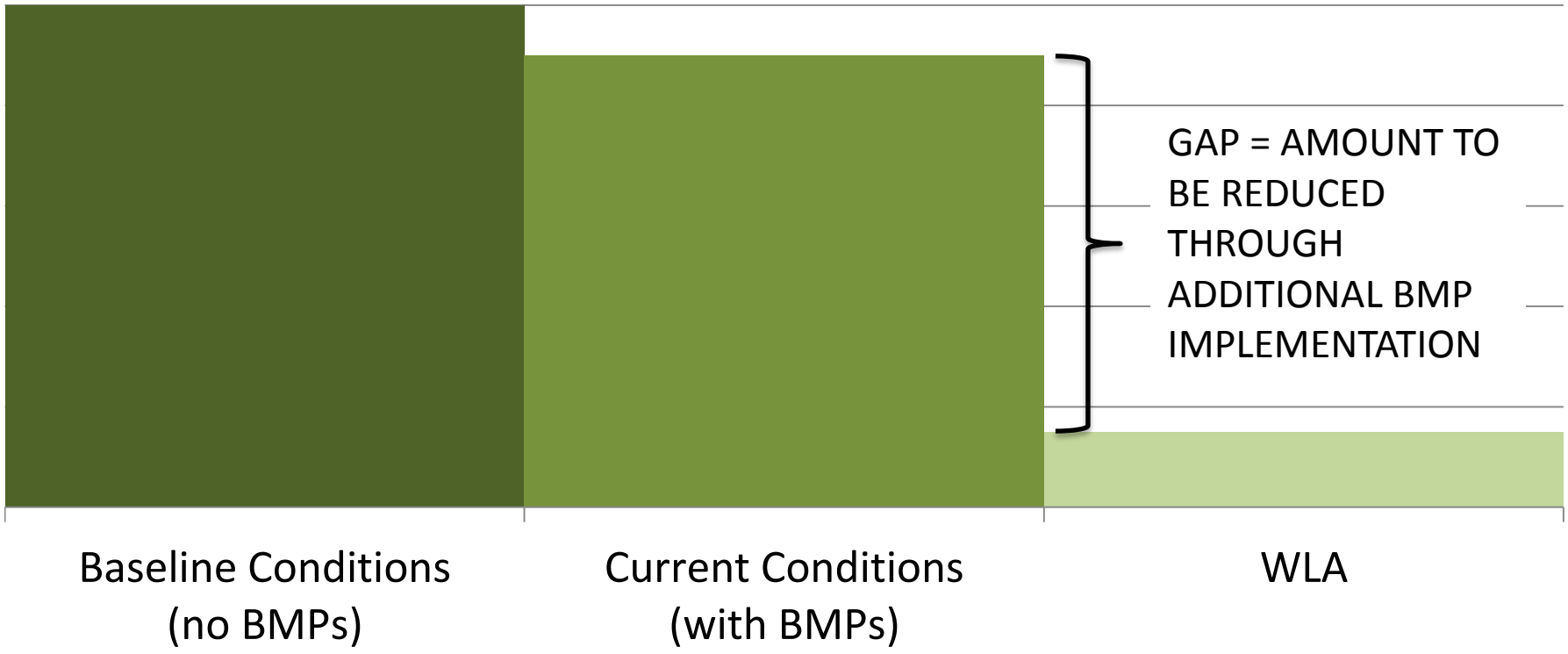
- GIS technology improved the District's understanding of the MS4 system
- MS4 outfall monitoring provided data to update EMCs for conventional pollutants and metals.
- An IP Modeling Tool was developed to track MS4 pollutant loads and load reduction in a consistent manner across the District.
- The IP Modeling Tool was applied to establish the baseline (no BMP) condition for all MS4 WLAs
- The inventory of existing BMPs was used to determine current load reductions and determine the "gap" between current conditions and the WLAs

TMDL Background

- Reviewed District TMDL studies and documented issues/inconsistencies with:
  - Watershed / sewershed delineations
  - EMCs
  - Precipitation
  - Model selection and application
  - Data supporting original impairment listings

Overview of the Gap Analysis

Gap = Modeled Current Load – Original TMDL WLA



Gap Analysis – Example

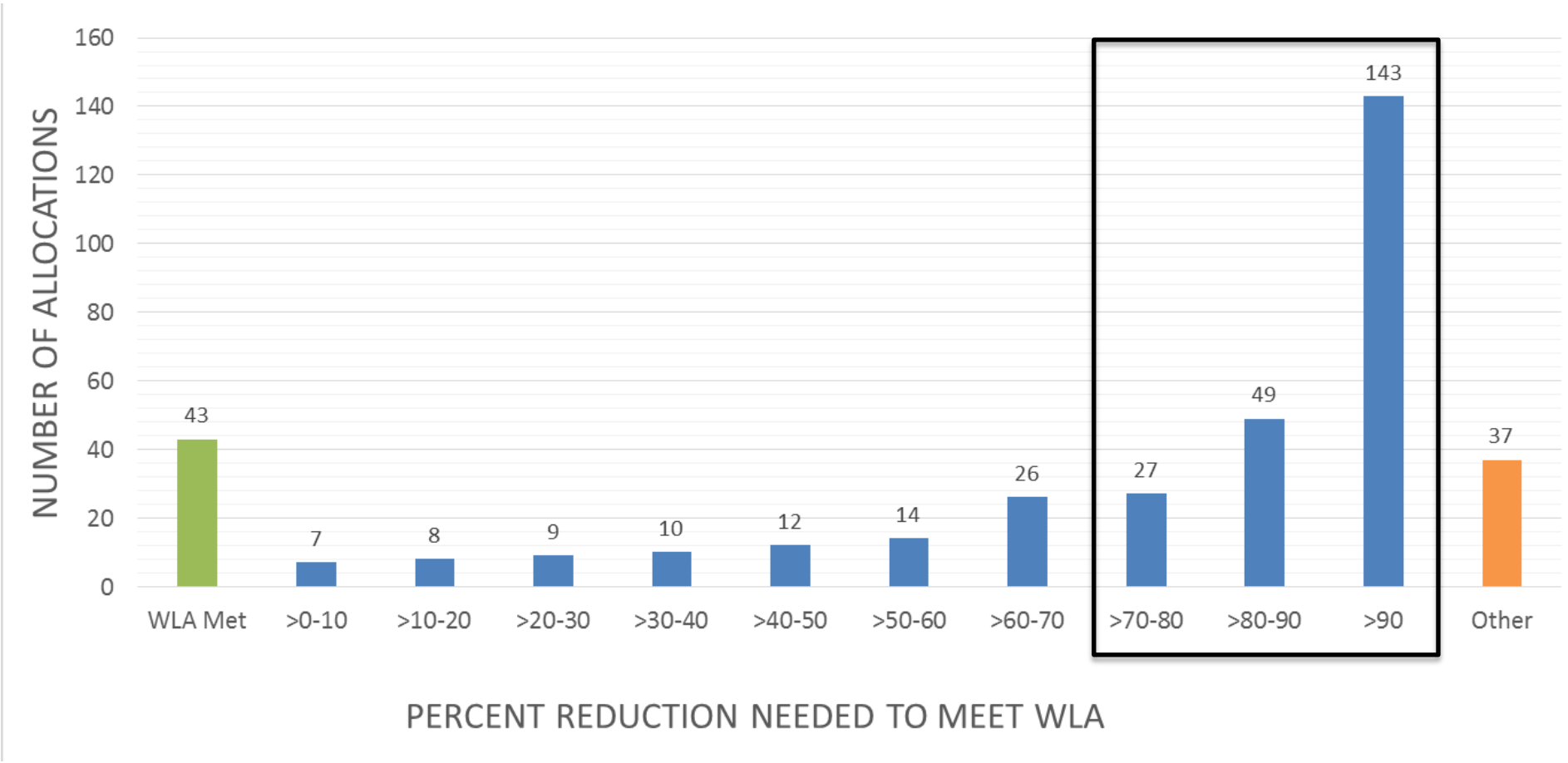
Water Body	Pollutant	Current Load (lbs/yr or Billion MPN/yr)	WLA (lbs/yr or MPN/yr)	Gap (lbs/yr or Billion MPN/yr)	% Load Reduction Needed
POTTF_DC	TN	127,300	39,400	87,900	69%
ANATF_DC	TSS	2,212,422	1,682,470	529,952	24%
Upper Rock Creek	Pb	198	10	188	95%
Upper Anacostia	FC Bacteria	1,885,100	467,000	1,418,100	75%

Two Ways to Address Gap

- Pollutant control
  - Reduce the concentration or amount of pollutants in stormwater
- Stormwater volume control
  - Reduce the volume of stormwater

POLLUTANT CONTROL

Summary of Percent Load Reduction Needed to Meet Annual WLAs



Pollutant Control BMPs

- Typical BMP efficiencies for treatment-based BMPs (filtration, wetlands, proprietary BMPs, etc)
  - Conventional pollutants: typically 40% - 70%
  - Organic pollutants: typically 0% - 40%
- Source control
  - no/insufficient data, often can't model

Findings

- The pollutant load reduction gaps for nearly all of the annual MS4 TMDL WLAs are substantial.
  - More than half need over 70% reduction
- The existing BMPs represent a start but generally achieve less than 2 percent of the pollutant load reduction that is needed.

STORMWATER CONTROL

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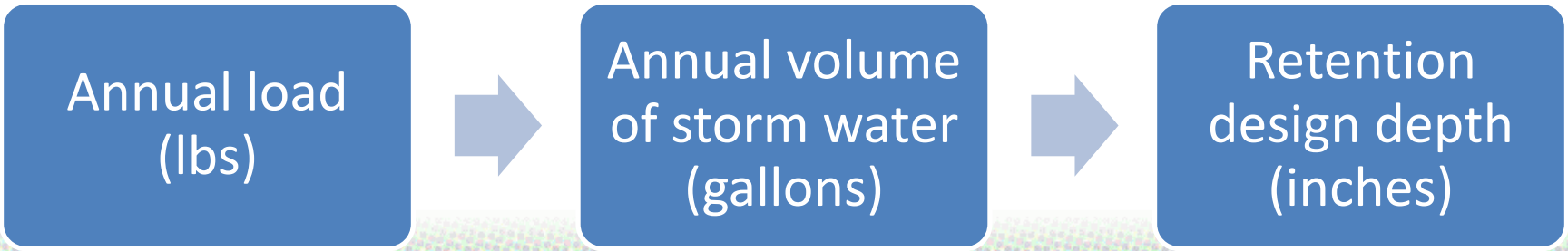
Converting the pollutant load to a stormwater volume

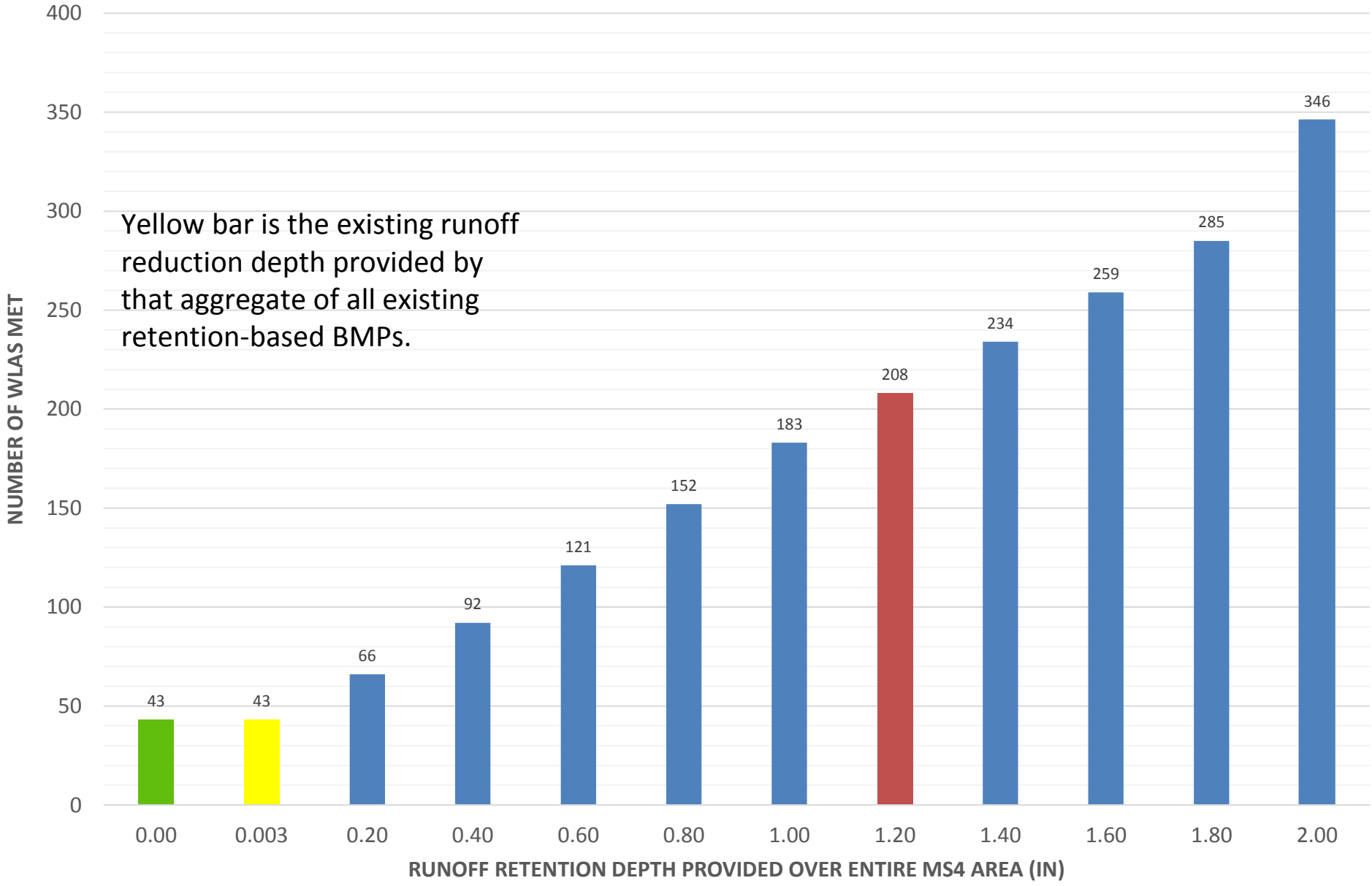
- Convert pollutant load to stormwater volume that needs to be removed from system
  - Eliminates the need to look at many different pollutants
- Convert annual volume to a retention design depth



Result of Gap as volume

- Need upwards of 2 inches retention over entire MS4 to meet all WLAs
  - Controlling pollutant is often bacteria or PAHs

WLAs met with each incremental increase in runoff retention depth provided over entire MS4



Findings

- Retention of 1.2 inches of runoff volume across the entire MS4 area would not be sufficient for nearly 40 percent of the MS4 WLAs.
- With full implementation, the volume of storm water control needed exceeds the volume control needed for the combined sewer system.

Comparison of CSO and MS4 Control

Watershed	CSO Volume to be Controlled (MG)	CSO Control as a Percent	MS4 Volume to be Controlled (MG)	MS4 Control as a Percent
Anacostia	2,088	97.5	2,895	76.4
Potomac	984	92.5	962	30.8
Rock Creek	44	90.0	1,569	91.3
Total:	**3,116**		**5,426**	

Challenges

- The level of pollutant load reductions needed often exceeds BMP efficiencies
- The volume of storm water control needed exceeds the volume control needed for the combined sewer system
- Questionable impairment listings and WLAs

Implications on TMDL IP

- TMDL implementation is underway and will continue into the future
- For the IP, focus will be on what can be achieved
  - Some WLA's will be met sooner than others
  - All pollutant loads will be reduced to various extents
  - Load reduction will require combination of treatment control, volume control, and source control
  - Compliance dates for all WLAs will be developed

Additional Actions

- Re-examine basis for original listing
- Re-visit scientific basis of the TMDLs and WLAs

SCENARIO MODELING

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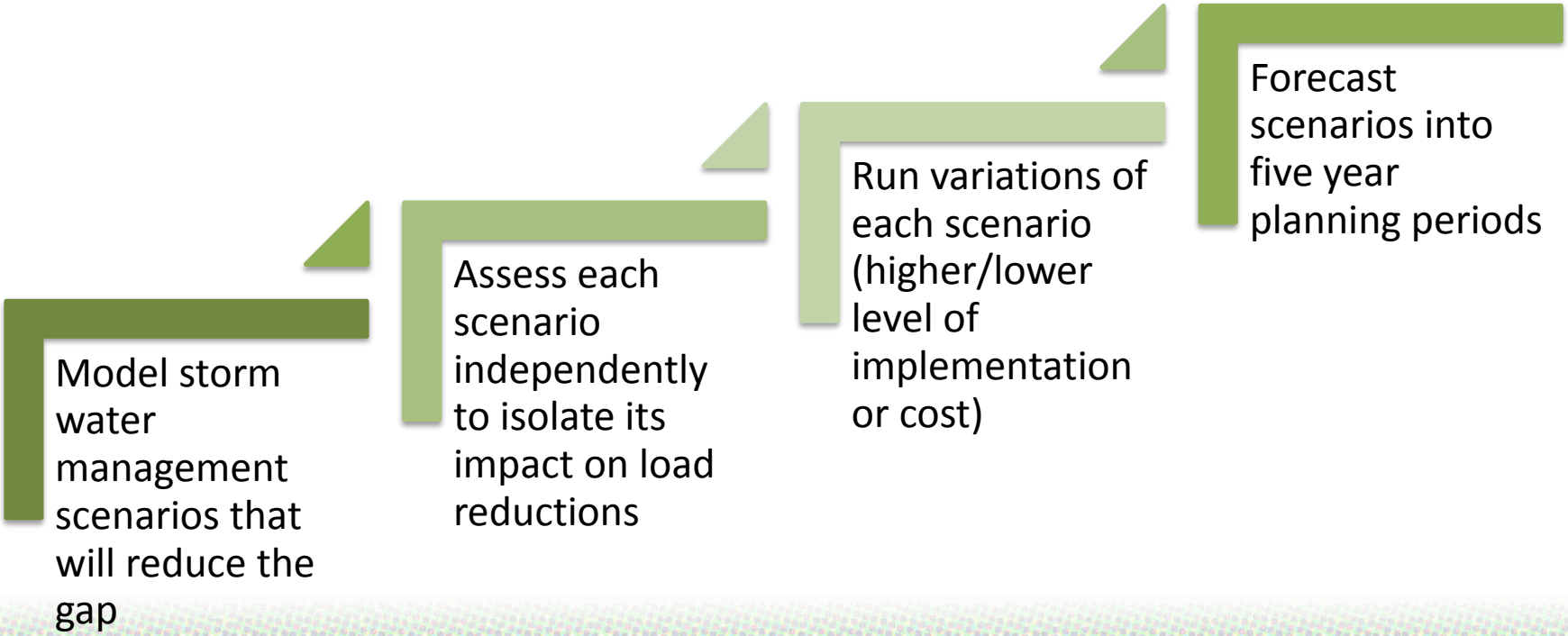
Scenario Modeling



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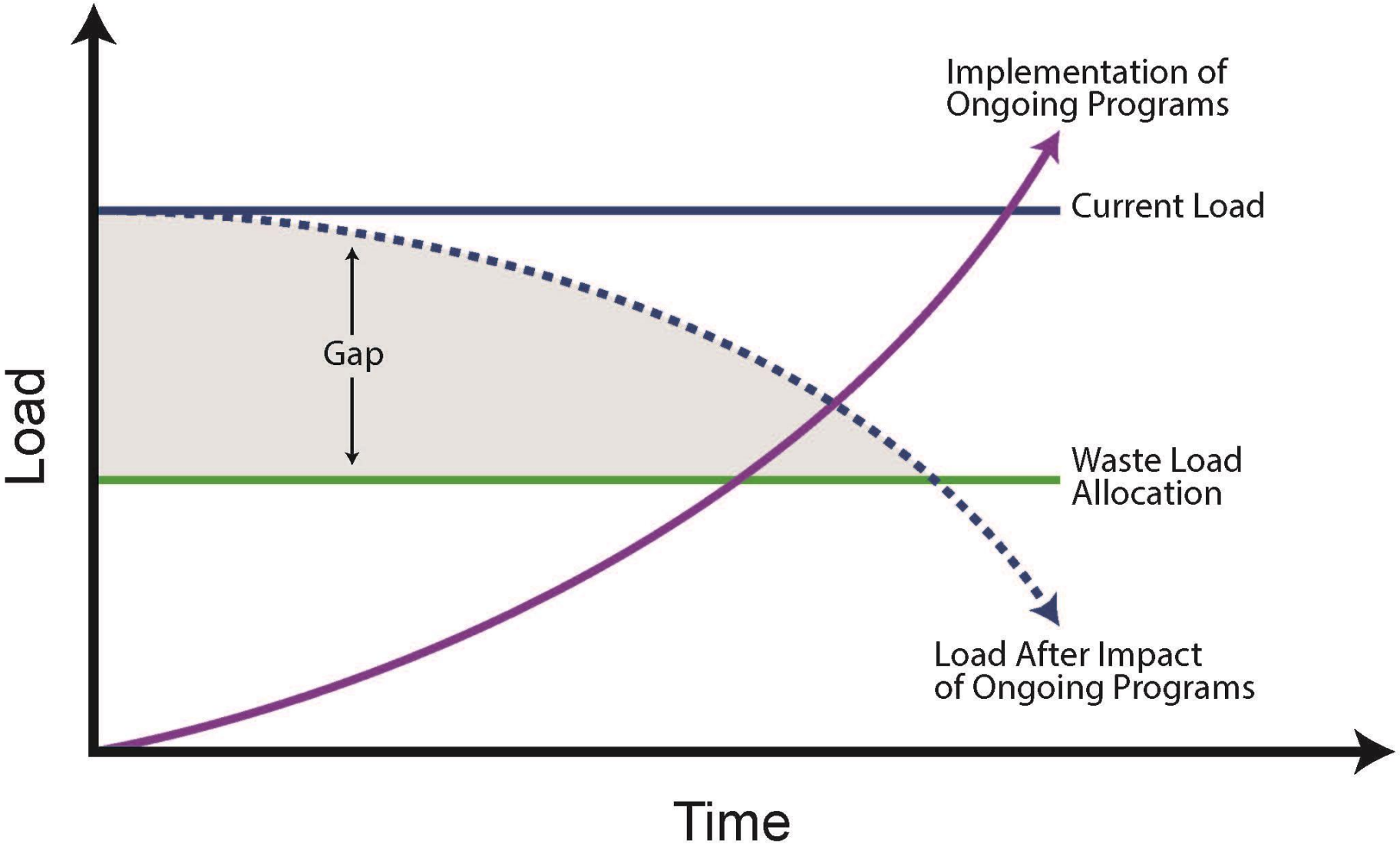

Implementation of
Ongoing Programs
Current Load
Gap
Waste Load
Allocation
Load After Impact
of Ongoing Programs
Load
Time

Four “Initial” Scenarios

1. Return to pre-development conditions
2. BMP implementation driven by future development and redevelopment activity and the application of the new stormwater regulations
3. Ongoing BMP implementation from other existing drivers
4. BMP implementation from projects identified in District Watershed Implementation Plans

Pre-Development Conditions Scenario

- Assume entire MS4 is forested and apply appropriate EMCs for forest
  - Runoff volumes will be less
  - Pollutant concentrations will be less (or non-existent)

Model Results

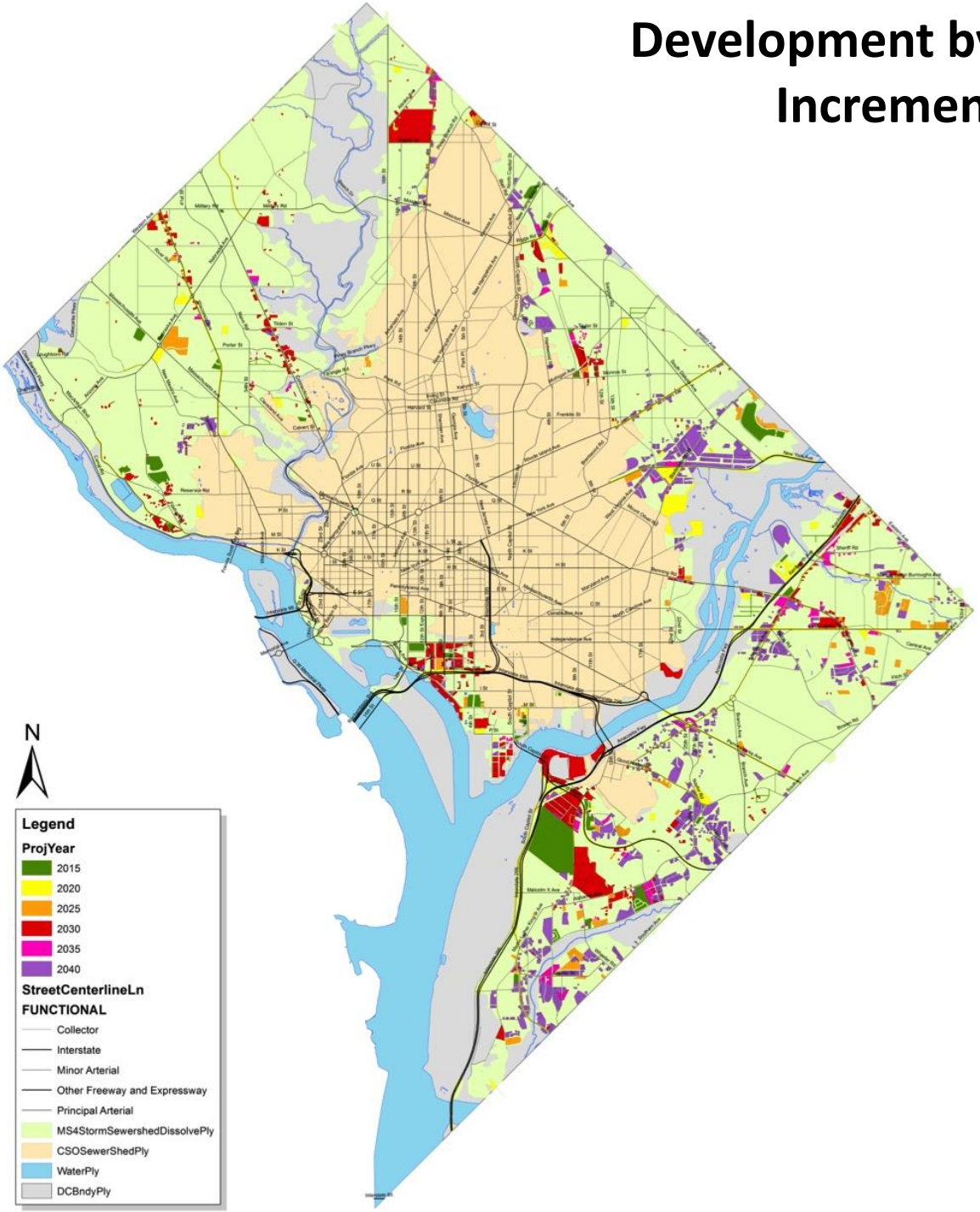
All WLAs are attained except for fecal coliform bacteria in the Anacostia tributaries

TMDL Segment	Pre-Development Load (billion MPN/100 ml)	WLA (billion MPN/100 ml)
Fort Chaplin Tributary	102	0.0027
Fort Davis Tributary	53	0.0012
Fort Dupont Tributary	45	0.0011
Fort Stanton Tributary	30	0.0004
Hickey Run	753	0.0108
Nash Run	304	0.0036
Pope Branch	117	0.0058
Texas Avenue Tributary	56	0.0044
Watts Branch – Upper	203	0.0044
Watts Branch – Lower	638	0.0119

Development and Redevelopment Scenario

- Determine the load reductions expected to occur from future development and redevelopment activity and the application of the new stormwater regulations
  - Project where and how much development and redevelopment will occur over the foreseeable future
  - Assume 1.2” BMP design standard

Development by 5 year Increment



Model Results

- All loads are reduced but only 11 WLAs additional to be attained by 2040 (54 total)

Segment	Pollutant	Year
Washington Ship Channel	Heptachlor Epoxide	2015
Lower Beaverdam Creek	BOD	2020
Watts Branch - Upper	Dieldrin	2020
Texas Avenue Tributary	Arsenic	2025
Anacostia Lower	Copper	2030
Anacostia Upper	Dieldrin	2030
Nash Run	Lead	2030
POTTF_MD	TN	2030
ANATF_DC	TSS	2040
Hickey Run	Dieldrin	2040
Oxon Run	Zinc	2040

Ongoing BMP Implementation Scenario

Determine the load reduction expected from planned or ongoing BMP implementation from drivers other than the "major land disturbance", eg:

- RiverSmart programs
- Grant-funded programs (i.e.: stream restoration)
- University stormwater management or sustainability plans
- Federal agency stormwater management or sustainability plans
- DDOT's green alley program or other sustainability plans

Methodology Findings

- Amount of BMP implementation through these programs is much less than through the development/redevelopment scenario
- Implementation rate by agency difficult to quantify
  - Overlapping programs
- Future rate of implementation difficult to quantify
  - Most agencies do not have firm projections or targets
  - Funding for implementation is uncertain

Methodology Findings

- Area controlled is approximately ~40 acres/year
  - Top 5 BMPs by area treated include infiltration trench, proprietary, filtering, bioretention, green roofs
- Stream restoration is ~1,500ft/yr

Model Results

All loads are slightly reduced but no additional WLAs are expected to be attained by 2040

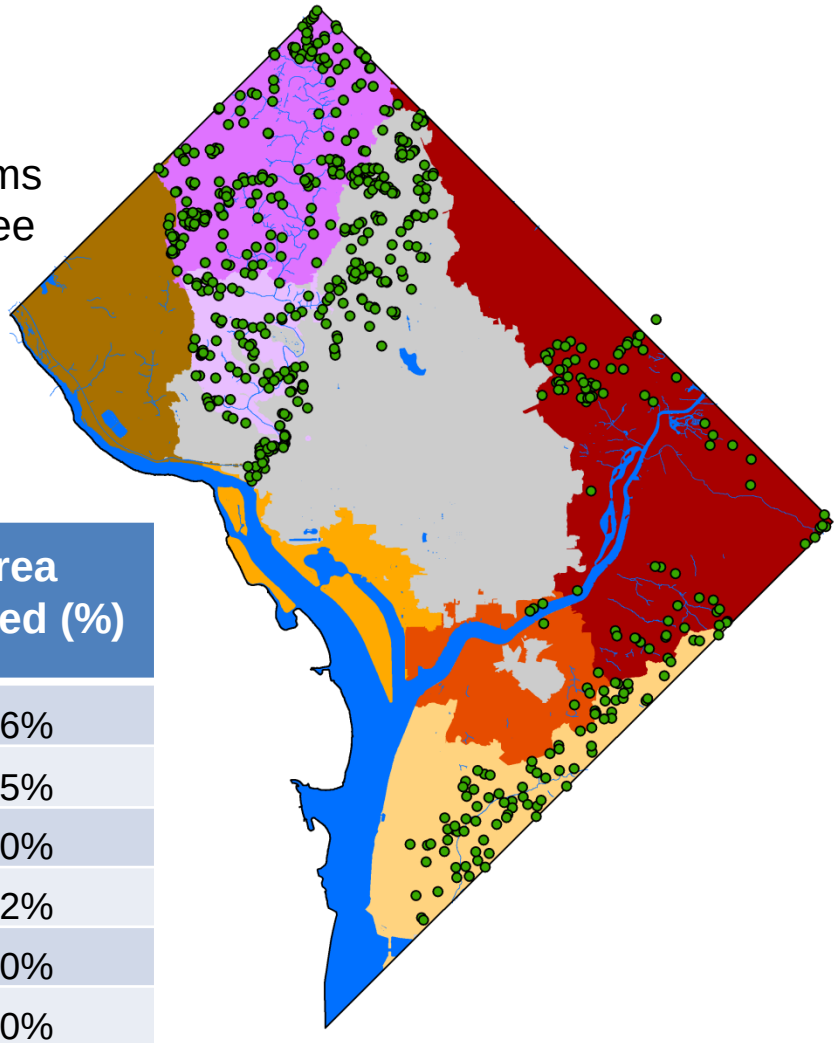
WIP Projects Scenario

Determine the load reductions that could be achieved from projects identified in the District WIPs

Watershed	WIP
Anacostia	TMDL WLA Implementation Plan (DDOE 2005)
	Anacostia River Watershed Restoration Plan (USACE 2010)
	Anacostia River WIP (DDOE 2012)
Rock Creek	TMDL WLA Implementation Plan (DDOE 2005)
	WIP (DDOE 2010)
Potomac	Oxon Run WIP (DDOE 2010)

Major Findings

- WIP BMPs will treat ~4% of total MS4 area
- 12 different types of BMPs identified
  - Bioretention is most prevalent overall
  - Other prevalent BMPs include filtering systems in Anacostia; wet ponds in Oxon Run, and tree planting/preservation in Rock Creek



	BMP Area (ac)	Watershed Area (ac)	Area Treated (%)
Anacostia Lower	35	2,199	1.6%
Anacostia Upper	328	9,308	3.5%
Potomac Lower	156	3,909	4.0%
Potomac Upper	6	3,623	0.2%
Rock Creek Lower	86	1,713	5.0%
Rock Creek Upper	285	4,779	6.0%

Model Results

All loads are slightly reduced and 1 additional WLA is expected to be attained by 2040 (44 total)

Segment	Pollutant	Year
Texas Avenue Tributary	Arsenic	2030

Overall Observations From Scenarios

- Largest and most dependable driver for BMP implementation are the new stormwater regulations
- Other programs will also result in BMP implementation but at a lesser rate and coverage
- WIP projects cover significant area but funding and opportunities are uncertain
- Few DC or federal agencies have firm targets or schedules for BMP implementation
- Most of MS4 is residential
  - No targeted program or funding beyond RiverSmart. How to control runoff from these areas?
- Half of impervious cover is public right of way
  - Driven by DDOT Capital Improvement Plan
  - No additional targeted program or funding. How to control runoff from these areas?

NEXT STEPS

Upcoming Deliverables and Timing

November-December

- Refine scenarios and model runs
- Scenario analysis report
- Revised Monitoring Program design
- Finalization of Comprehensive Baseline Report

Early 2015

- Draft Implementation Plan
- Draft Revised Monitoring Program
- Stakeholder review/input

Questions/ Comments?