

# National Water Program

Tools for Adapting Water Programs to a Changing Climate

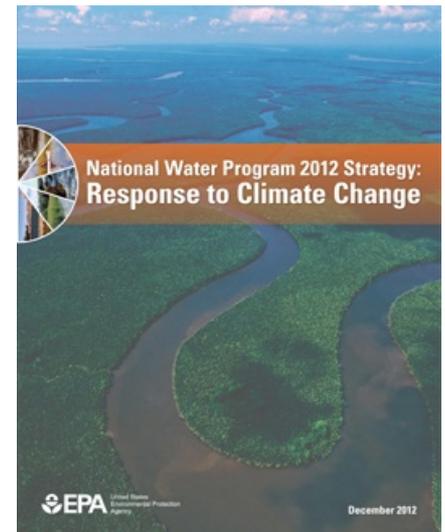
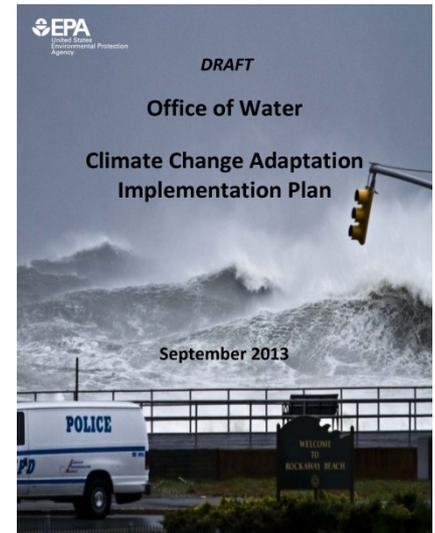
EPA Science Advisory Board;  
December 2013



Climate Change Extension (CCX) to the Stormwater Calculator

# Big Picture:

- Office of Water released draft *Climate Change Adaptation Plan*
- Builds on *2012 National Water Program Strategy: Response to Climate Change*
- Tools Fit Larger Effort to Adapt Water Programs to a Changing Climate





# Mission Statement

*To provide the water sector (drinking water, wastewater, and stormwater utilities) with the practical tools, training, and technical assistance needed to adapt to climate change by promoting a clear understanding of climate science and adaptation options.*



# Climate Ready Tools & Resources



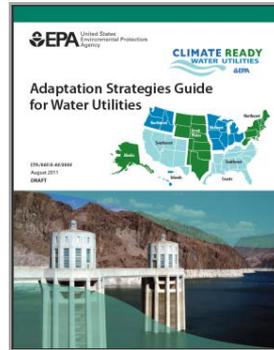
## Climate Ready Process

### Adaptive Response Framework



Explore Elements of Climate Readiness

### Adaptation Strategies Guide



Learn Climate and Adaptation Basics

### Toolbox

- Featured Resource**
- Region Map**
- Activities**
- Funding**
- Publications and Reports**
- Tools and Models**
- Training, Workshops and Seminars**

Research and Gather Information

### Extreme Events Workshop Planner



Collaborate with Partners

### Climate Resilience Evaluation and Awareness Tool



Assess Risks and Evaluate Opportunities



## *About CREAT*

- Software tool for conducting **risk assessment** of potential climate change impacts at a water utility
- Multiple climate scenarios provided to help **capture uncertainty**
- Assessments will help inform **adaptation planning**
- Results from CREAT help utilities compare potential **costs, risk reduction and energy implications** of different options





# Process





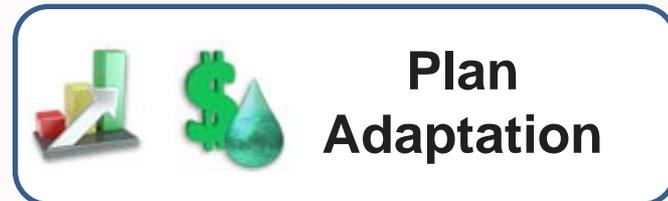
# What Can You Do In CREAT?



- Explore local climate data
- View links to publications, models and other tools



- Catalog data and assumptions
- Understand and assess climate impacts



- Compare adaptation options
- Generate reports to support decisions



# Climate Data Sources

- Many sites provide access to climate projection data online
- Users may be uncertain about
  - Which data to use: Model? Time period?
  - How to access data?
  - How to apply data?
- CREAT provides data for utilities within a risk assessment framework
- If available, users can enter and use their own data as well





Watershed  
Climate Change  
Adaptation  
Workbook

# The Climate Change Adaptation Workbook

Key takeaways—

- Designed as a tool for place-based organizations (communities, watershed groups, etc.).
- Meets EPA commitments to provide guidance on doing vulnerability assessments.
- Provides guidance for writing action plans based on the vulnerability assessments.
- Based on a risk management standard published by the International Organization for Standardization (ISO).

## WORKBOOK foundation

Every place-based organization is unique

- impacts, situation, context, purpose, resources
- need a generic system

Watershed organizations (e.g. NEPs) will probably face 100+ discrete risks

- need a system that will guide planning

NEP has four cornerstones:

- (1) Focus on the watershed
- (2) Integrate science into decision-making
- (3) Foster collaborative problem solving
- (4) Involve the public

## Why this WORKBOOK ?

Lots of recognition from experts that an iterative risk management and vulnerability assessments are the way to go for climate change adaptation.

(IPCC, NRC, ICCATF, NOP, GAO, etc.)

EPA has committed to develop tools and to help communities respond to climate change

- EPA Strategic Plan
- EPA Climate Change Adaptation Plan
- NWP climate change strategy
- Freshwater Action Plan
- National Ocean Policy implementation

# Climate Change Adaptation

For CRE, climate change adaptation has two parts

- Vulnerability Assessment
- Action Plan (includes executing the plan)

Vulnerability Assessments—

Assess climate risks: identify, analyze, evaluate

An Action Plan—

Uses the vulnerability assessment to set priorities, and to identify, develop, and implement responses

Adaptation reduces (eliminates) risks from climate change.

## WORKBOOK contents, based on ISO 31000

Preface; Introduction

Step 1\* Communication and Consultation

Step 2 Establishing the context for the Vuln. Assess.

Step 3 Risk Identification

Step 4 Risk Analysis

Step 5 Risk Evaluation: Comparing Risks

Step 6 Establishing the Context for the Action Plan

Step 7 Risk Evaluation: Deciding on a Course

Step 8a Finding Adaptation Actions

Step 8b Selecting Adaptation Actions

Step 9 Preparing and Implementing an Action Plan

Step 10 Monitoring and Review

Appendices

# Climate Change Extension (CCX) to the Stormwater Calculator

Joint Project: Office of Water and  
Office of Research and  
Development

# EPA's National Stormwater Calculator

- **Description**

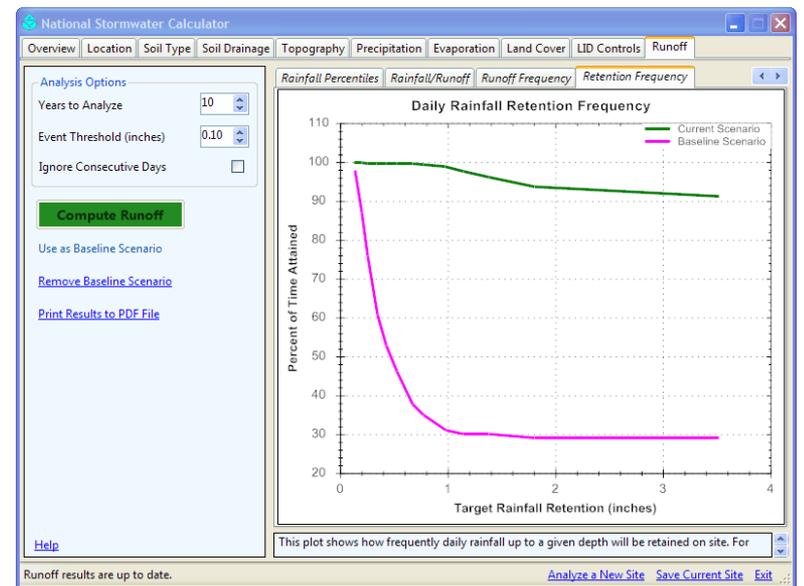
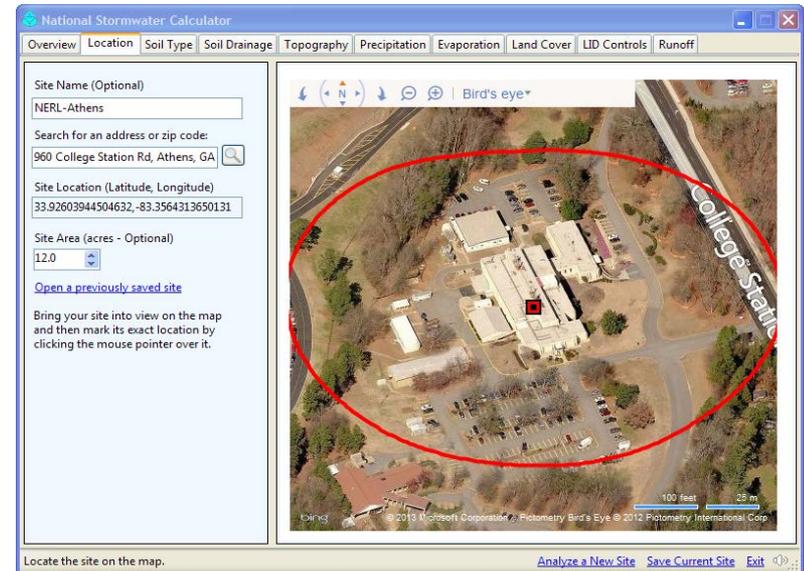
Simple to use program for computing rainfall runoff from individual properties under different development and LID control scenarios.

- **Features**

- Can be run by non-modelers.
- Accesses national databases for local soil and meteorological data.
- Includes LID controls (rain gardens, green roofs, porous pavement, etc.).
- Runs SWMM in the background to simulate the site's response to a full set of hydrologic conditions.

- **Potential Uses**

- EISA compliance at federal facilities
- State post-construction retention stds.
- Local stormwater fee credit programs



# EPA's National Stormwater Calculator

## • Limitations

- Applies only to individual properties, not to larger water/sewersheds.
- Provides only screening level analysis.
- Doesn't cover all types of GI solutions (swales, trees, compound LIDs).

## • Disclaimer (stated on opening page)

Users should check with their local stormwater control agencies as to whether its results will be accepted (e.g., EPA is NOT mandating its use).

## • Outreach

- Launched July 24, 2013.
- 4,000 downloads after one month.
- Workshops and webinars held/planned.

**Porous Pavement**

Design Guidelines for Porous Asphalt with Subsurface Infiltration

RIVERBEDS OPEN BED RECHARGE BED

UNCOMPACTED MATERIAL IS CRITICAL FOR PROPER INFILTRATION

FILTER FABRIC LINES THE SUBSURFACE BED

POROUS ASPHALT PAVEMENT

LINE GRAY GRAVELD FUTURE ADJUSTMENT WITH 40% VOID SPACE FOR STORMWATER STORAGE AND RECHARGE

Continuous Porous Pavement systems are excavated areas filled with gravel and paved over with a porous concrete or asphalt mix.

Modular Block systems are similar except that permeable block pavers are used instead.

Normally all rainfall will immediately pass through the pavement into the gravel storage layer below it where it can infiltrate at natural rates into the site's native soil.

Pavement layers are usually 4 to 6 inches in height

Pavement Thickness (inches) 4

Gravel Layer Thickness (inches) 18

% Capture Ratio 30

[Learn more ...](#)

Size for Design Storm Restore Defaults Accept Cancel

National Stormwater Calculator

Overview Location Soil Type Soil Drainage Topography Precipitation Evaporation Land Cover LID Controls Runoff

Analysis Options

Years to Analyze 10

Event Threshold (inches) 0.10

Ignore Consecutive Days

Compute Runoff

Use as Baseline Scenario

[Remove Baseline Scenario](#)

[Print Results to PDF File](#)

Site Description Summary Results Rainfall Percentiles Rainfall/Runoff Runoff Frequen

Statistic	Current Scenario	Baseline Scenario
<b>Annual Averages</b>		
Average Annual Rainfall (inches)	45.19	45.19
Average Annual Runoff (inches)	2.96	22.34
Percent of All Rainfall Retained	93.44	50.57
<b>Daily Event Statistics</b>		
Days per Year with Rainfall	68.86	68.46
Days per Year with Runoff	6.10	48.57
Percent of Wet Days Retained	91.15	29.05
Smallest Rainfall w/ Runoff (inches)	0.36	0.11
Largest Rainfall w/o Runoff (inches)	2.34	0.30
Max. Retention Volume (inches)	3.02	1.62

This table summarizes runoff results for your site. The Annual Averages portion of the table

Runoff results are up to date. [Analyze a New Site](#) [Save Current Site](#) [Exit](#)

# Climate Change Extension to the SWC (CCX)

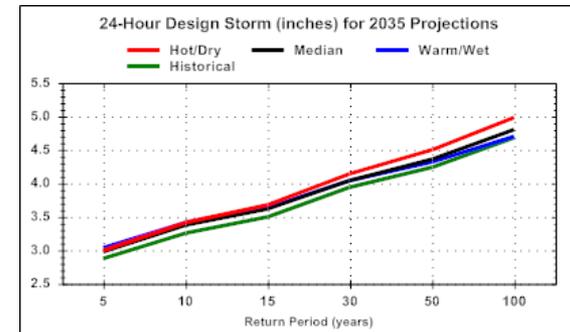
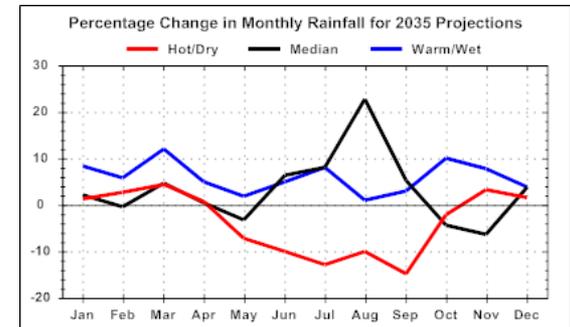
- Adds a new tab to the existing SWC for Climate Change
- Allows user to select from six different climate change scenarios that span the outcomes from over 100 runs of the IPCC models.
- Uses the CREAT database to determine the change that each scenario has on both monthly mean rainfall and on the annual max. daily rainfall at different return periods for the site-specific local rainfall record.
- Calculates the long-term hydrologic response of the site to a rainfall record modified by the monthly mean changes.
- Calculates the response of the site to the climate-induced max. 24-hour rainfall at different return periods (5, 10, 15, 30, 50, and 100 years).
- Scheduled to be operational by December 2013.

Select a future climate change scenario to apply:

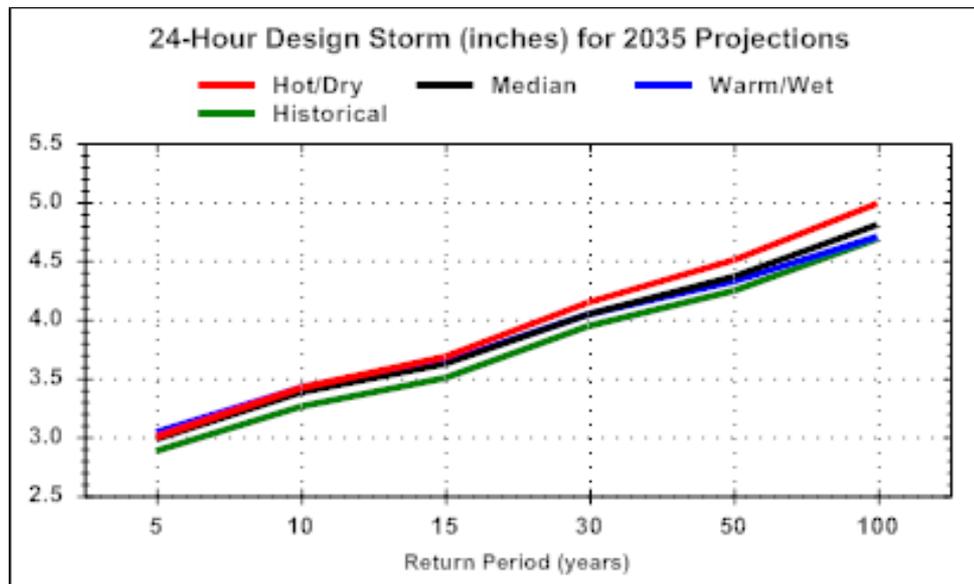
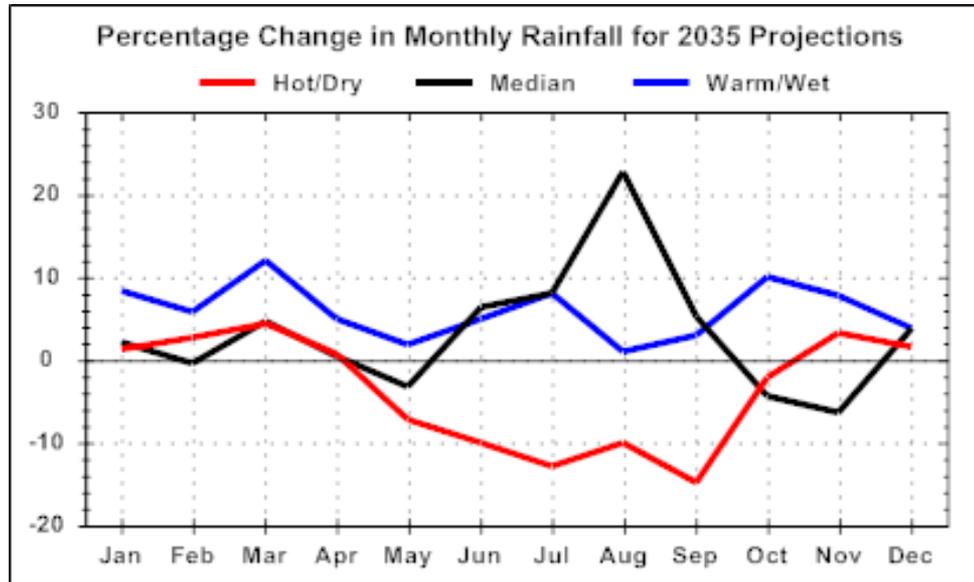
- No change
- Hot and dry
- Median change
- Warm and wet

Select the year to which the climate change scenario is projected:

- 2035
- 2060



# Climate Change Extension to the SWC (CCX)



# Thank you!

## **Water Program Climate Adaptation:**

- Jeff Peterson; Office of Water

## **•Climate Ready Water Utilities:**

- Curt Baranowski; Office of Groundwater and Drinking Water

## **Climate Workbook:**

- Michael Craghan; Office of Wetlands, Oceans and Watersheds

## **•Stormwater Calculator:**

- Rachael Novak, Office of Science and Technology
- Lewis Rossman, Office of Research and Development



Climate Change  
Extension (CCX) to the  
Stormwater Calculator