



American Water Works
Association

Dedicated to the World's Most Important Resource®



AWWA Stormwater Management Standard: a tool to support utility operations

Chi Ho Sham, ERG, Lexington, MA
GWPC Annual Forum, June 21 to 23, 2022
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Agenda

- Overview of AWWA and Standards Council
- AWWA Utility Management Standards
- New Stormwater Management for Water Utilities Standard
 - History
 - Content
 - Current Status



American Water Works Association

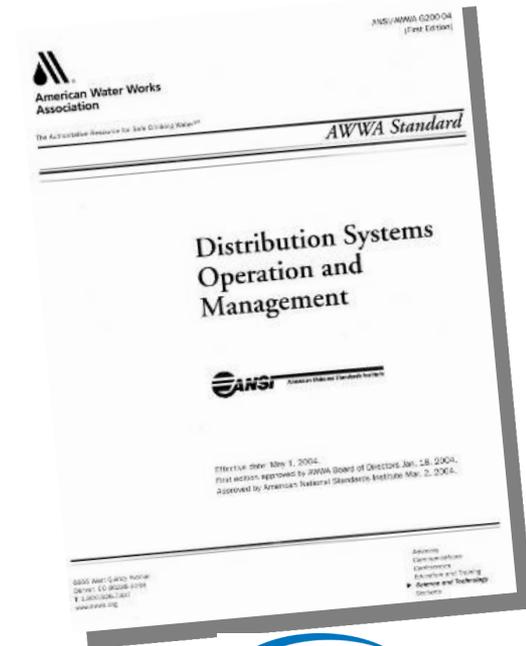
- The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water.
- Founded in 1881, AWWA is the largest organization of water supply professionals in the world.
- AWWA's membership includes over 4,300 utilities that supply roughly 80 percent of the U.S. drinking water and treat almost half of the nation's wastewater. Its 50,000 members represent the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water, our most vital resource.

American Water Works Association

- AWWA headquarters – Denver, CO – with a satellite office in Washington, D.C. (Government Affairs Office led by Tracy Mehan)
- There are 160 staff supporting various programs at AWWA – most of them are led by its 5,000 volunteers that are mainly spread across 6 councils – International, Manufacturer & Associates, Public Affairs, Water Utility, Technical & Educational, and Standards
- Standards Council – 72 committees with 1,600 volunteers working on 189 standards

AWWA Utility Management Standards

- Part of AWWA Standards (celebrated 100 years in 2020)
- A = Source; B = Treatment; C = Pipe and Accessories; D = Storage; E = Pumps; F = Plant Equipment; G = Utility Management
- Developed by AWWA volunteers: consultants, operators, managers
- American National Standards Institute (ANSI) certified
- Guidebooks (4 so far) developed to assist in self-assessment
- Consistent format



Purpose - Optimization of Utility Operations

- Fosters excellence in water utilities
- Encourages continuous improvement
- Provides confidence to utilities and regulatory agencies
- Instills consumers with confidence and satisfaction in their utility services
- Provides a framework for self-evaluation, counsel, and assistance to utilities



“Conformance with Utility Management Standards will enhance public confidence while demonstrating continuous improvement efforts”

AWWA Utility Management Standards Overview

- Voluntary effort
- For all utility types and sizes
- Self-assessment by operators
- Performance can be verified by peer evaluators
- “Above and beyond” regulations
- Can be implemented without major investments
- Avoid numeric and prescriptive values
- Outcome-oriented: water quality, public health protection





Testimonials

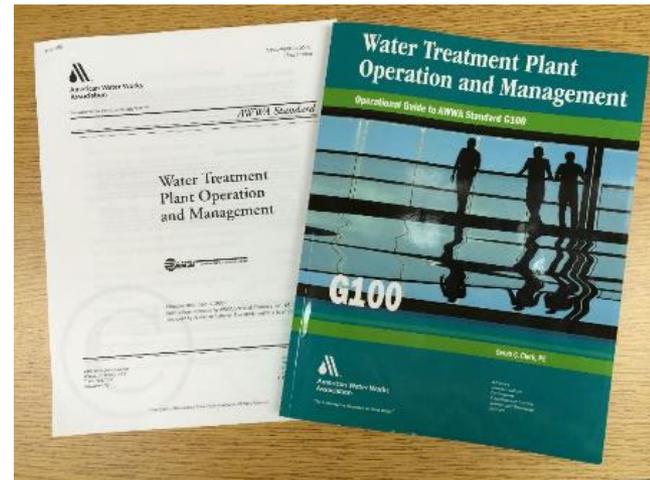


“Applying the G-Series voluntary standards to utility operations helps to manage utilities in a way which guarantees peace of mind”

- Assures continuity in performance optimization
- Encourages development of standard operating procedures
- Provides means to keep the institutional knowledge
- Introduces tools to maintain safe performance based on good practices and not just luck

Standards and Guidebooks

- **Water Treatment Plant Operation & Management**
- **Distribution System Operation & Management**
- **Source Water Protection**
- **Utility Management System**
- Business Practices
- Security Practices
- Communications & Customer Relations
- Emergency Preparedness Practices
- Water Conservation & Efficiency



- Reclaimed Water
- Direct Potable Ruse
- Wastewater Treatment Plant
- Wastewater Collection Systems
- Wastewater Pretreatment
- Stormwater Management

Stormwater Management Standard

- As stormwater becomes more important for water professionals, AWWA Standards Council authorized the development of a new Utility Management Standard on stormwater management.
- A committee has been formed in 2016.
- The committee recognized the One Water or Total Water concept but struggled to develop an all-encompassing standard for all water utilities, departments of public work, and highway departments.
- Given a standard is a living document and is subjected to a 5-year review/update cycle. The committee opted to develop the first edition of the standard for drinking water utilities.



Stormwater Management for Water Utilities

- The new standard (G-560-22) targets drinking water utilities and addresses the following issues:
 - Water quality
 - Water quantity
 - Design
 - Operation and maintenance
 - Emergency preparedness and response
 - Public outreach and communication



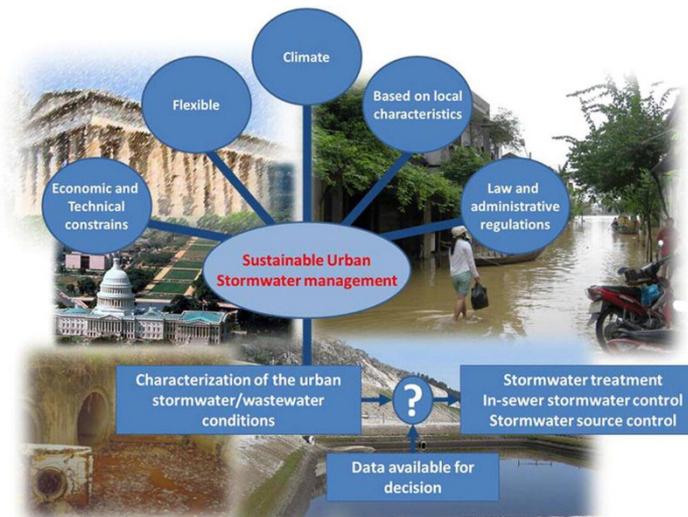
Stormwater Management – Water Quality (1)

- Water quality concerns
 - Management of on-site stormwater (e.g., under Clean Water Act programs)
 - Address stormwater-related water quality issues:
 - Eutrophication (nutrients)
 - Turbidity and sediment
 - Synthetic organic compounds
 - Bacteria
 - Metals
 - Temperature



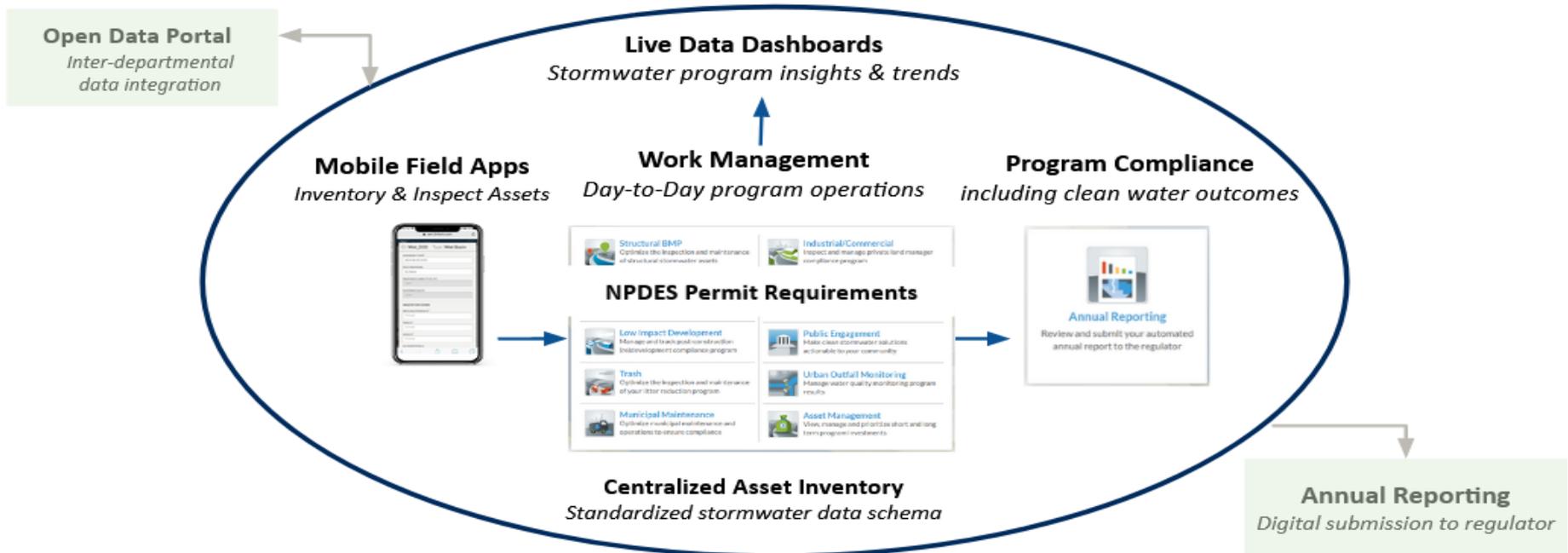
Stormwater Management – Water Quality (2)

- Developing goals and objectives and encouraging adoption of a stormwater management action plan
 - Integrated stormwater management system (drainage and flood objectives)
 - Determine water quality design storm
 - Limit development on floodplains
 - Encourage disconnection of impervious surfaces
 - Collaborate with producers on ag impact reductions
 - Promote channel stabilization
 - Promote infiltration
 - Select and install BMPs
 - Encourage GI and LID
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Stormwater Management – Water Quality (3)

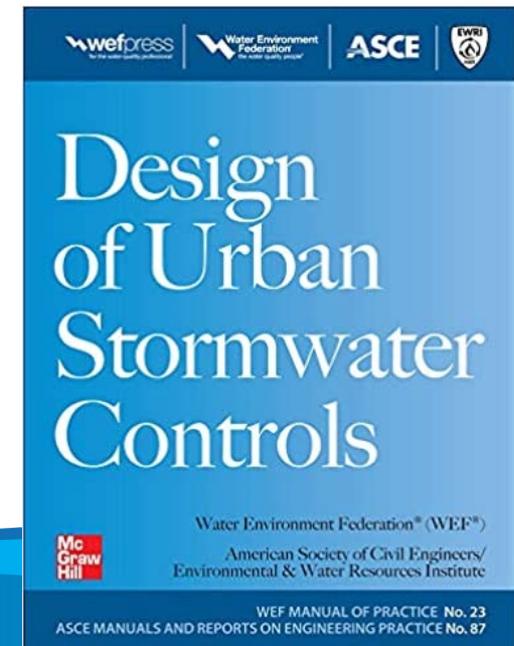
- Implementation of management action plan



Representation of an Integrated Stormwater Management System

Stormwater Management – Water Quality (4)

- Evaluation of outcomes and updates
 - Monitoring
 - Assessment of stormwater quality management programs and regulatory compliance
 - Maintain good relationship with stakeholders / collaborators
- Useful references



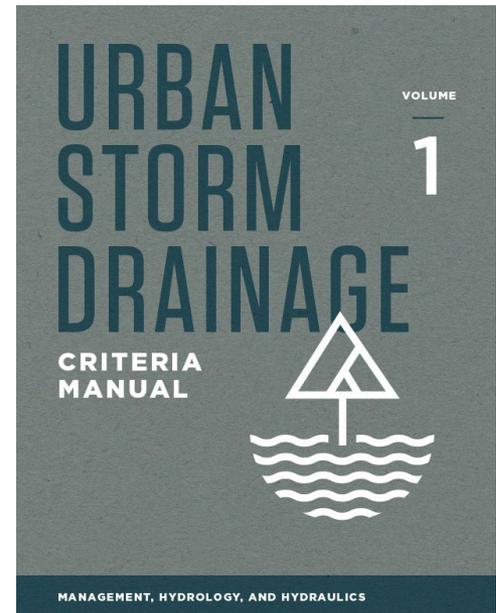
Stormwater Management – Water Quantity (1)



- Water quantity
 - **Stormwater quantity management is concerned with the safe drainage of excess waters and capture of runoff for possible beneficial use.** Stormwater runoff peak flows and volumes of greater than pre-development levels may create hazards to the functions and operation of utility facilities, such as reservoirs, canals, treatment plants and pump stations.
 - A utility may practice **stormwater harvesting** by capturing runoff and managing it as a resource. Therefore, the stormwater management strategy for a water utility should incorporate objectives to:
 - **Manage stormwater that may threaten water supplies**
 - **Cooperate with adjacent property owners to manage stormwater**
 - **Integrate stormwater management into its sustainability program**

Stormwater Management – Water Quantity (2)

- Water quantity considerations
 - Historic flow regimes
 - Rates of runoff
 - Stormwater conveyance infrastructure
- Guidance is available from government agencies and professional associations. A comprehensive guide for stormwater quantity management is provided by the **Urban Storm Drainage Criteria Manual (USDCM)**, which is published by the Mile High Flood District (formerly the Urban Drainage and Flood Control District).



Stormwater Management – Design (1)

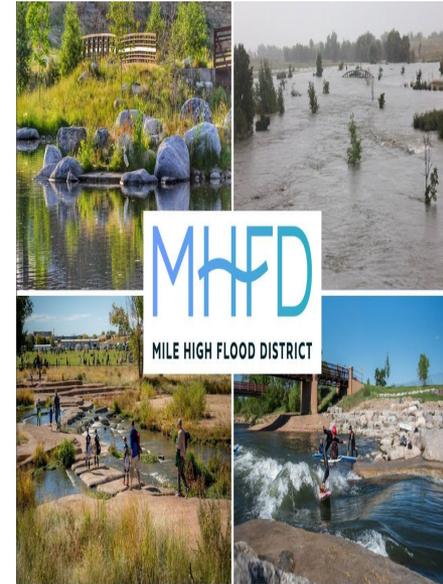
- Design - Detailed design guidance is widely available from organizations such as:
 - American Society of Civil Engineers (ASCE)
 - Water Environment Federation (WEF)
 - American Public Work Association (APWA)
 - Association of State Floodplain Managers (ASFPM)
 - National Association of Flood & Stormwater Management Agencies (NAFSMA)
 - United States Environmental Protection Agency (USEPA)
 - Natural Resources Conservation Service (NRCS)
 - United States Department of Transportation (USDOT),and in engineering reference books focused on urban storm drainage and flood control and stormwater quality management.

Stormwater Management – Design (2)

- Design (Good design is based on time-tested principles and policies – from USDCM)
 1. **Drainage is a regional phenomenon** that does not respect artificial boundaries
 2. A storm drainage system is a **subsystem of the total urban water resource system** (e.g., land use, open space, transportation).
 3. Every urban area has **an initial (i.e., minor) and a major drainage system**. The major system carries more water and operates when the rate or volume of runoff exceeds the capacity of the minor system.
 4. **Runoff routing** is primarily a **space allocation** problem.
 5. Planning and **design** of stormwater drainage systems **should not be based on** the premise that **problems can be transferred** from one location to another.
 6. An urban storm drainage strategy should be a **multi-objective and multi-means effort**.

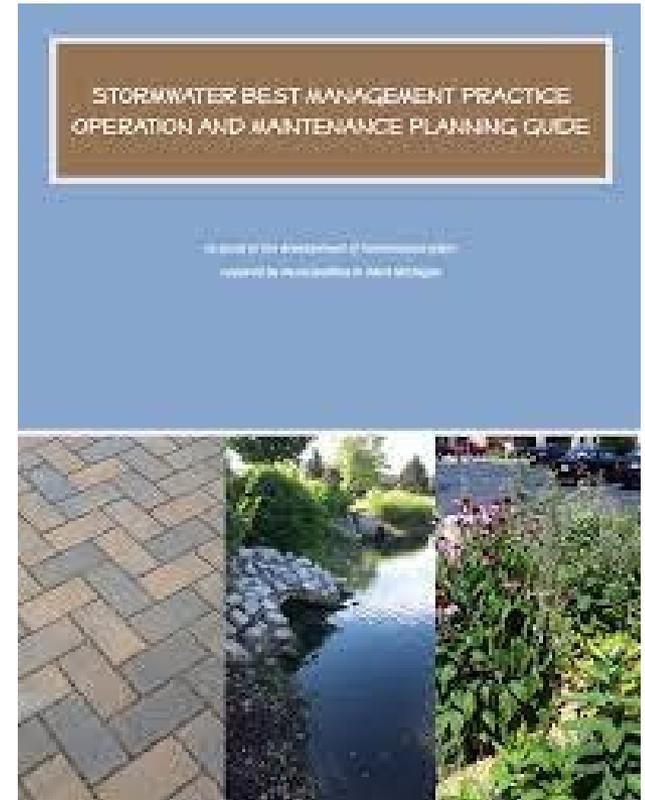
Stormwater Management – Design (3)

- Design (continues)
 7. Design of the storm drainage system should consider the features and **functions of the existing drainage system.**
 8. In conjunction with **new development and redevelopment, coordinated efforts** should be made to minimize increases in, and reduce where possible, stormwater runoff volumes, flow rates, and pollutant loads to the maximum extent practicable.
 9. The stormwater management system should be **designed beginning with the outlet or point of outflow** from the project.
 10. The stormwater management system requires **regular maintenance.**
 11. **Floodplains should be preserved** whenever feasible and practicable.



Stormwater Management – O&M (1)

- Operating Procedures. All stormwater management control facilities shall be constructed and operate in accordance with the **approved plans and meet regulatory requirements**.
- Maintenance Plan. A maintenance plan is **required** for each stormwater control facility the utility manages. The maintenance plan for each facility and/or facility type will be **unique**, but should include the following items:
 - Designated authority responsible for inspections and maintenance;
 - Inspections checklist/log;
 - Maintenance activities log and schedule;
 - Corrective and preventative maintenance standards and procedures



Stormwater Management – O&M (2)

- Monitoring is essential for **evaluating the effectiveness** of the Stormwater Management Program and individual system components. Physical, chemical, and biological monitoring coupled with data analysis is the most direct methods for this assessment. Several resources are available from the USGS, USDA-NRCS, National Research Council and USEPA that offer guidance for establishing a monitoring plan.
- The utility should make use of **specific metrics or Key Performance Indicators (KPI)** when assessing the performance of a stormwater facility and/or the entire stormwater conveyance system. A KPI is the combination of a metric and a specific objective or goal. The KPI can be used to track the performance of a stormwater facility (or system) over time and it can be used as a tool to decide when corrective action should be taken.



Stormwater Management – Emergency Preparation and Responses (1)

- Outlined in **ANSI/AWWA G440-17 Emergency Preparedness Practices**
- There are an unfortunately large range of **accidents and natural disasters** that can adversely affect water supply systems. The environmental fates of hazardous materials lost during flooding event can directly affect local water supplies.
- Therefore, water utilities need to develop **contingency plans** for a range of potential accidents or disasters as related to stormwater. Some of these will need to be coordinated with emergency response agencies, rail operators, or power utilities, for example.
- **AWWA Manual of Water Supply Practices M19 *Emergency Planning for Water and Wastewater Utilities*, 5th edition, 2018**, addresses “best practices for the prevention, mitigation, response, and recovery of utility operations during critical incidents and is intended for use by utilities of any size.”
- Another resource for emergency planning and response for the water utility is the 2016 **EPA material on *Emergency Response for Drinking Water and Wastewater Utilities***.

Stormwater Management – Emergency Preparation and Responses (2)

- Episodic events (first flushes)
- Seasonal events (spring snowmelt)
- Extreme rainfall events (recurring intervals)
- Flooding of treatment facilities
- Changes in hydrometeorology in a warming world



Stormwater Management – Public Outreach / Communication

- Public outreach is an often overlooked, yet important part, of a successful stormwater program. **Properly targeted and effective communication** can increase the effectiveness of a stormwater program as well as fostering public input on areas of importance, from funding to infrastructure improvements. Outreach can also **influence behavior** and **increase awareness** of the public's responsibility for stormwater and water quality.
- Public outreach programs can incorporate various components, including: Brochures, Construction Notice, Public Service Announcements (PSAs), Events, Storm drain marking programs, Social media, Public Meetings, Signs in Public Parks, Gifts (such as bookmarks, key chains, pens, sponges, coloring books, magnets, annual report, and conferences)
- Under Municipal Separate Storm Sewer (MS4) program, public reach requirements

Stormwater Outreach Team (SWOT)



Recap

- The new standard (G-560-22) targets drinking water utilities and addresses the following issues:
 - Water quality
 - Water quantity
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Stormwater Management Standard – Next Step

- In publication cycle; to be released shortly
- Will re-convene the committee and add additional members with diverse perspectives, experiences, and knowledge
- Use G560-22 as a base to develop the next edition that will be more encompassing - including relevant “One Water” stakeholders and collaborators
- If you are interested in being a part of the Stormwater Management Standard Committee (under the Standards Council), please submit an online application or contact Frank Kurtz, AWWA Standards Engineer at fkurtz@awwa.org



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Thank you for your attention and interest.
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