

# IMPLICATIONS OF PRECIPITATION CHANGES IN SOUTHEAST MICHIGAN AND OPTIONS FOR RESPONSE: A GUIDE FOR MUNICIPALITIES

## Table of Contents

1. What is NOAA Atlas 14?
2. Precipitation changes in Southeast Michigan
3. Changes to Key Storm Definitions
4. Implications for Floodplains
5. Implications for Detention and Conveyance
6. Solutions: Green Infrastructure
- 7. Solutions:  
Stormwater  
Regulations**

*This fact sheet is part of a guide supporting decision makers and water resource managers as they adapt policies and practices in stormwater management in response to a changing climate.*  
[hrwc.org/stormwater-and-climate](http://hrwc.org/stormwater-and-climate)

## SOLUTIONS IN STORMWATER MANAGEMENT: STORMWATER RULES

---

Across the region, patterns in precipitation have been changing. Historical records and projected trends indicate that these changes require modifications to the practice of stormwater management. Below is a description of how one county revised standards and rules to improve the design of stormwater management systems.

---

In 2014, the Washtenaw County Water Resources Commissioner's (WCWRC) office completed an effort to improve stormwater standards for new and redevelopments. The revised standards utilize NOAA Atlas 14 precipitation data and design storms and call for more on-site management of stormwater than previously.

### **Why revise stormwater standards?**

The previous standards were finalized in 2000 and much has been learned since then about controlling stormwater runoff for water quality treatment and flood control. New techniques have been developed that were not addressed in the 2000 rules and better precipitation data has become available. Also, some issues were routinely discovered in the permit review process that staff believed could be better addressed prior to project design.

### **How were the standards revised?**

Staff at the WCWRC office did extensive research on national best practices and policies and compiled these by application. Staff also evaluated the design review process and noted numerous problems in the design and development processes that led to suboptimal stormwater controls. All this research was developed into several draft revisions that were shared with stakeholders and practitioners for feedback and "groundtruthing." Final draft rules were presented in a series of workshops, where additional feedback was gained before the rules were finalized in August of 2014.

### **How did the Standards change?**

The most significant changes fall into 5 categories:

- The permit review process. The new rules require a pre-design meeting. This is done to identify potential problems and determine potential solutions ahead of time, to avoid conflict and revision delays.
- Updated design storms. See the description under Atlas 14 use below.
- New infiltration requirements. The new rules require design of and use of infiltration practices to capture and treat the first-flush, or first 1" of developed site runoff.

### *Dive Deeper*

Washtenaw County Water Resources  
Commissioner's Rules and Guidelines -  
Procedures and Design Criteria for  
Stormwater Management Systems

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules/frontpage](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules/frontpage)

NOAA Atlas 14 data and analysis  
[hdsc.nws.noaa.gov/hdsc/pfds](https://hdsc.nws.noaa.gov/hdsc/pfds)

- Use of different models for stormwater storage sizing in the application process. The new rules use an application process that explicitly uses the NRCS Curve Number Method for calculating site runoff and required treatment and storage volumes. Focus on the model rather than a standard storage design allows developers to have flexibility in stormwater design and get credit for infiltration volume.
- New best management practices are highlighted. The new rules provide examples for a wide range of stormwater treatment practices and how they can be used to meet the new requirements. The rules make it easy for practitioners to find practices for their designs that will work for their particular site, maximize infiltration and water quality treatment, and potentially save money.

### **How was Atlas 14 data used and why?**

The Atlas 14 storm intensity and rainfall frequency curves are incorporated into the new design storm values. Two storm sizes are used in the rules: the bankfull (50% or 2-year recurrence interval) event, and the 1% or 100-year recurrence interval event. The 50%, 24-hour storm event (increased from x to 2.35") is used in sizing water quality treatment and infiltration designs. The 1%, 24-hour storm event (increased from x to 5.11") is used in sizing storage for flood protection. These figures were updated from the previous atlas figures and are built into sizing calculations in the application. Because Atlas 14 events are larger, new designs require a greater volume of treatment and storage.

### **How do the new standards help communities adapt to climate change?**

These new standards apply to all new development and redevelopment projects under county jurisdiction. Designs will result in a greater amount of stormwater storage, infiltration and treatment – helping communities to reduce runoff from more and larger storm events and increase stream baseflows to help protect them from longer periods of drought.

### **Example**

An examination of a housing development in Washtenaw County indicated that the new standards would have resulted in design changes to provide 29% more stormwater storage and complete infiltration of the first inch of rain.

The City of Ann Arbor changed their official code to align with the WCWRC new stormwater rules expanding the reach of the rules and ensuring Ann Arbor developments adhere to improved standards even if county rules change.

