



## Minnesota's Stormwater Manual and Design Standards Address Climate Change Adaptation

### Overview

MPCA's Construction and Municipal Stormwater programs promote Low Impact Development, including a number of best management practices (BMPs) that retain precipitation and stormwater runoff on site to help address climate change concerns. Two key initiatives include the development of a new web-based Minnesota Stormwater Manual and Minimal Impact Design Standards (MIDS). MPCA's actions are designed to help prepare Minnesota communities and ecosystems for extreme precipitation events associated with climate change.

### Background

Observed trends and projections of climate change in Minnesota point to warmer winters, higher annual temperatures, more extreme weather events, and greater annual precipitation with faster melting snowpack. Impacts associated with runoff are a particular concern as urban discharges may cause physical, chemical, and biological changes in receiving waters thereby limiting the attainment of uses. In response, MPCA is evolving their design criteria and monitoring and assessment for stormwater BMPs as a key adaptation activity to help address water quality degradation.

Since July 2009, Minnesota State agencies have been collaborating on climate adaptation efforts through the statewide Interagency Climate Adaptation Team (ICAT) led by MPCA (in addition to the internal MPCA Climate Adaptation Team). ICAT's 2013 Report identified changes in the amount, frequency, and intensity of precipitation as key impacts to stormwater management by potentially exceeding the design capacity of stormwater treatment structures, as well as influencing future structure design.

### The Stormwater Manual Helps Address Climate Adaptation

MPCA's Stormwater programs recently launched a new web based version of the [Minnesota Stormwater Manual](#) to guide stormwater managers through regulations, BMPs, recommended designs, and techniques that constitute resilient stormwater management. Using Mediawiki as a format, the Minnesota Stormwater

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Manual is designed to be user-friendly and flexible in order to direct users to the information they are seeking, providing fewer roadblocks to achieving better water quality.

The stormwater improvements promoted in the Manual are important methods to address precipitation events that may otherwise cause minor flooding or large quantities of pollutants to runoff into surface waters. A potentially substantial climate change impact is a change in the character of snow accumulation and timing of snow melt. The Manual incorporates recent findings and data from within Minnesota on the impact of climate change on precipitation (Atlas 14) and meltwater runoff. The Manual also introduces research on flow and temperature models and groundwater recharge, as well as assessments on the effectiveness of each BMP. Financial support for stormwater research may be appropriated each year through the State's Clean Water Land and Legacy Amendment Fund. The MPCA internally decides their research priorities and necessary updates, and may form a technical team with diverse expertise from both internal and external stakeholders.

To address the impact of extreme precipitation and the rise of impervious surfaces on receiving waters, MPCA is promoting low impact development (LID) and green infrastructure as approaches consistent with stormwater BMPs to sustain natural hydrology. Stormwater capture and reuse is also identified as an



opportunity to reduce runoff and reduce demands on potable water supply. Although the manual covers all aspects of stormwater management, LID is a key component. The Manual provides up-to-date specifications and guidance on design, construction, maintenance, and monitoring of stormwater BMPs.

Captured in the Manual are Minimal Impact Design Standards (MIDS) based on low impact development (LID) — an approach to storm water management that mimics a site’s natural hydrology as the landscape is developed. The MIDS were jointly created by a stakeholder group composed of academia, municipalities, state agency participants, and other key external interests to reach consensus on performance goals. MIDS represent the next phase of stormwater management and contain four main elements:

- A stormwater volume performance goal for new development, redevelopment and linear projects that will provide enhanced protection for Minnesota’s water resources.
- New modeling methods and credit calculations that will standardize the use of a range of innovative stormwater techniques.
- Design specifications for a variety of green infrastructure best management practices (BMPs).
- A [Community Assistance Package](#) to provide ordinances and tools that help integrate LID principles, including the MIDS performance goals and calculator tool, into a package that can be used by communities to help them measure progress toward MIDS performance goals for stormwater volume.

These new design standards, performance goals, and tools not only promote LID and new stormwater techniques, but also help create consistency in stormwater design and performance across the State. The performance goals specify what level of treatment must be achieved, or precipitation retained, to offset runoff from impervious surfaces due to new construction, redevelopment, and linear projects. The State’s construction stormwater permit now requires the first inch of volume to be retained for storm events, and the municipal stormwater permit requires new construction that disturbs more than one acre to result in no net increase in total phosphorus, total suspended solids, and volume. Redevelopment projects are expected to achieve the same reduction.

MPCA also developed a [MIDS calculator](#) tool to help quantify the reduction in pollutant loads and runoff from various LID practices. The calculator includes convenient links to specific design specifications for LID practices found within Manual. MPCA is currently working on an updated version of the manual, and also providing training on the Manual, MIDS, and the calculator.

### How does the calculator work?

