

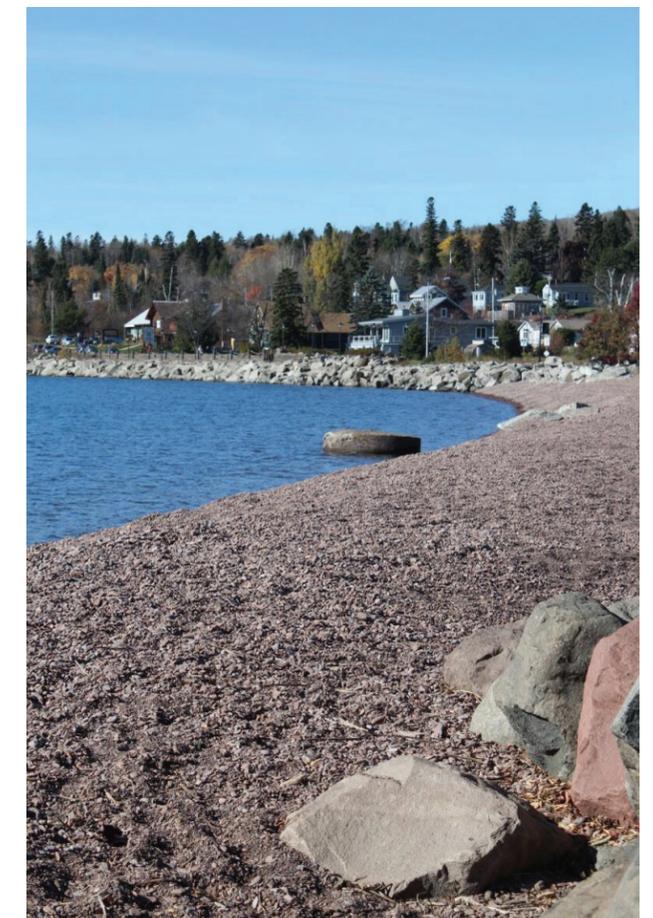
Issue/Concern	Recommendations	How Implementation of Recommendations Achieves the Goals	Reference to Stormwater Mgmt. Plan	10-Year Total Cost
Flooding	Combined scenario: 3rd St Inlet Bypasses Fixed, Diversions (A + B), 1 cfs pump + 1st St pipe upsizing and New BMPs	Achieves the goal for a 2-year, 24-hour design storm ^{9F} 10 (equivalent to 2.5 inches of rainfall being delivered in 24 hours)	Pages 80-85	\$2,038,650
Water Quality	Initiation of city wide residential raingarden program, construction of 20,000 ft ² of bioretention and 1,000 L.F. of tree trenches, improvements to 8 th Ave pond, two bank stabilization projects	Achieves annual TSS reduction of 5,000 lbs. to the harbor and contributes to flood reduction in the downtown area	Page 87	\$1,095,000
Natural Resources Health	Creechville Stormwater Pond retrofits; Water Quality Wetlands	Addresses flooding, existing channel instabilities, water quality by reducing sediment loads in the channel + Lake Superior, enhances wildlife habitat and recreational opportunities	Page 87	\$800,000
Regulatory Controls and Design Standards	Develop and implement policies and guidelines that address existing and future development/ redevelopment activity	Achieves no net increase in the rate and volume of stormwater runoff to downtown and meets predevelopment water quality standards	Page 90	\$95,000
Operations and Maintenance	Stormwater BMP maintenance, private stormwater BMP inspections, road and alley reconstruction, and street sweeping	Improve performance of the system and reduce pollutant loads to Lake Superior	Page 90	\$649,500
Community Awareness and Involvement	Public education and outreach, demonstration sites, working with volunteers	Improve behaviors and foster stewardship	Page 90	\$26,000
Monitoring and Data Assessment	Water quality sampling, flow monitoring, H/H model calibration	Collection of baseline info. for model calibration and tracking performance in achieving goals	Page 90	\$135,000

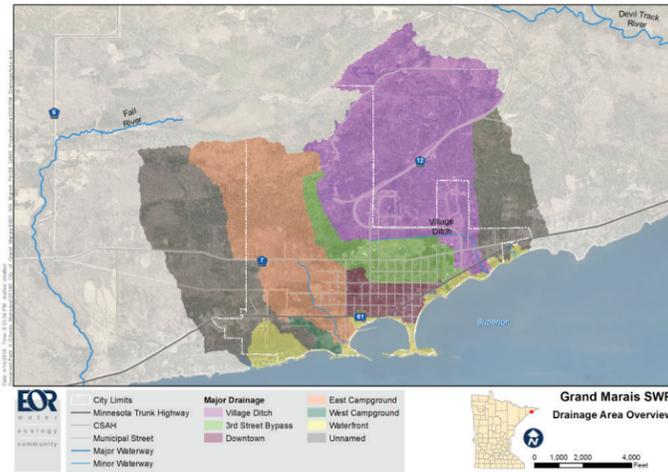
The City of Grand Marais and Cook Soil and Water Conservation District partnered in the development of the 2018-2027 Stormwater Management Plan for the Grand Marais Watershed. The City of Grand Marais adopted its last Stormwater Management Plan in 2001. This plan served as a guide to the City as it managed its infrastructure and surface water resources over the last 15 years. The 2001 Stormwater Management Plan made a number of recommendations for improvements to the system, most of which have been implemented by the City and its local partners.

Today there are still stormwater management issues related to aging infrastructure, increased land development pressure, flooding, public safety, property damage, pollutant loads to Lake Superior and beach closures that need to be addressed. An additional public health concern is that the public water intake for the City of Grand Marais on Lake Superior is located within half a mile of the harbor storm water outlets into Lake Superior. Pollutant laden stormwater runoff quickly discharges to Lake Superior and may be routed to the public water supply system intake. This updated Stormwater Management Plan addresses these issues, as well as others identified during the community engagement process, by evaluating existing and proposed drainage conditions and making prioritized recommendations for policies, upgrades and improvements to existing infrastructure and new Stormwater Best Management Practices (BMPs) that will address existing and future landuse needs.

Objectives for the 2018-2027 Stormwater Management Plan are as follows:

- Characterize the drainage area to better understand how the system operates under existing and future conditions.
- Utilize a hydrologic and hydraulic model to assess storm sewer infrastructure and potential water quality and water quantity improvement projects.
- Engage the public and local business owners in the identification of stormwater-related issues and potential solutions.
- Develop a 10-year implementation plan that identifies the steps the City of Grand Marais needs to take to address existing and anticipated stormwater management issues.





Drainage Area Overview

Total drainage area to Grand Marais is 3,220 acres

Main Drainage Features as illustrated on figure:

- Village Ditch (Nature Boy Creek)
- 3rd Street Bypass
- East and West Campground Drainages
- Downtown Drainage Area
- Waterfront Drainages

Existing Storm Sewer System Components

- At least 72 culverts 24” in diameter or larger
- Over 41,800 linear feet of storm sewers
- 379 mapped catchbasins
- 68 mapped manhole junctions

Five regional stormwater ponds:

- 1,2 Large ponds constructed along the south side of Gunflint Trail;
3. Pond located on the SW corner of the intersection of Hwy 61 and 8th Ave. W
4. Pond located adjacent to the North House Folk
5. Pond located south of the intersection of E 1st Street & 1st Avenue E (behind Cook County Whole Foods CO-OP)

Stormwater Conveyance in Grand Marais
 Several streets (e.g., Highway 61, 8th Avenue W, 5th Street, and 3rd Street) serviced by typical curb and gutter design with regularly spaced catch basins that discharge to trunk storm sewers.

Large portion of the drainage area, relies on overland flow (e.g. gutters, roadside ditches or sheet flow) to convey water to the nearest catch basin, culvert, ditch, or other element of the drainage infrastructure (e.g., 1st Street, 2nd Street, and 4th Street)

Numerous catch basins have inlet capacity issues (in large part due to steep avenues) which cause stormwater runoff to bypass the storm sewer system on a regular basis. (See Section 4.2.6 Inlet Capacity Assessment pages 54-56)

Most of the City’s stormwater is discharged to Lake Superior untreated.

Maintenance of the stormsewer system is an ongoing issue: substantial sediment sources and low pipe slopes in the downtown area result in significant sediment accumulation which limits the performance of storm sewer infrastructure.

Ponding of the downtown parking lot occurs for smaller rainfall events (e.g. 0.25 inches) and the smallest event to produce more than a foot of ponding in the parking lot in 2017 was a 1-inch rainfall event. (See Section 4.3 Analysis of Downtown Flooding on pages 62-64)

There are seven high priority issues and concerns identified in the Stormwater Management Plan. The goal(s) for each of these issues and concerns is provided below:

Flooding

- No more than 12 inches of flooding in the downtown parking lot for no more than 12 hours for a 2-year, 24-hour rainfall event.

Water Quality

- Maintain or improve lake water quality conditions by reducing pollutant loads to Lake Superior.
- Identify the source of fecal contamination causing beach closures by partnering with the University of Minnesota to complete microbial source tracking during a future beach closure to determine the source of fecal contamination, such as birds, humans, or dogs.
- Reduce the number of beach closures.
- Better characterize the quality and quantity of tributary discharge to Lake Superior by working with Cook County SWCD and state agencies to conduct water quality sampling in the following locations to better detect the impacts of stormwater runoff on lake water quality in the near shore zone: Village Creek ditch, Grand Marais Beach tributary outfall, Lake Superior nearer to the two tributary outfalls.

Natural Resources Health

- Reduce erosive flows, flooding and pollutant loads downstream of the Gunflint Trail by employing a natural channel design approach to harness the additional functions that the Village Ditch drainage system could provide including restoring adjacent wetland systems, re-connecting with the floodplain and restoring natural habitat.
- Address stormwater management needs in the Industrial Park by evaluating wetland impacts, considering on-lot treatment options as well as regional opportunities to mimic pre-development hydrology prior to discharge to the Village Ditch system.

Regulatory Controls and Design Standards

- Develop policies and guidelines that address existing and future development including redevelopment. Consider the need to adopt smaller thresholds and/or the development of an overlay zone and performance standards specific to flood-related concerns in the downtown area.
- Develop an effective Stormwater Plan Review Process including development of draft ordinances, estimated plan review process, inspection and maintenance requirements and finally adoption of ordinances through a public process.

Operations and Maintenance

- Maintain existing storm sewer management system including ponds and pond outlet structures.
- Require maintenance agreements and development planning to ensure that stormwater management structures and facilities are maintained in perpetuity as originally designed.
- Eliminate sediment sources associated with gravel shoulders and alleys via conversion to a paved or porous paved surface.

Community Awareness and Involvement

- Build local capacity for stormwater management by hosting public education and outreach events and allowing for public participation and involvement.

Monitoring and Data Assessment

- Work with Cook SWCD and state agencies to collect water quality data and flow data at select locations (see Goals 14 and 15 on page 79).
- Refine H&H model and revise calibration upon completion of flow data collection.