



Chapter 1

Purpose and Use of the Manual

Northwest Area (NWA) Inver Grove Heights Stormwater Manual

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Key Topics: vision and goals for the project area, location of the Northwest Area (NWA), history of the area, NWA Planned Unit Development Overlay District, this manual's relationship to the state manual, use of the manual and contact information

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I. Vision and Goal of the City of Inver Grove Heights' Northwest Area

In the not too distant past, the goal of an urban drainage system was to collect and route stormwater runoff to a downstream receiving stream, lake or wetland as efficiently as possible. When it became evident that this was not a sustainable water management practice, the approach changed to the routing of water into detention ponds. Although many of these ponds were designed according to EPA's Nationwide Urban Runoff Program (NURP) criteria based on 1980s studies, they too have some deficiencies in effective treatment and management of runoff.

Stormwater managers have learned that there are better ways to treat runoff water which is to let it soak into the ground as close to its source as possible and mimic the natural hydrology of the system. This not only limits the volume and rate of runoff that occurs, it also reduces the migration of polluting material that is picked up by runoff as it flows over urban surfaces and infiltration replenishes critical ground water supplies that are used as drinking water sources.

The issue facing Inver Grove Heights is that the geology of the Northwest Area has resulted in numerous landlocked/closed basin drainage systems; that is, stormwater runoff moves to low areas that in most cases do not have outlets at normal water levels. Water flows into these basins and leaves through a combination of seepage (infiltration) into the ground and evapotranspiration.

To take advantage of the good soils and geologic conditions in the City, the City has adopted a stormwater management approach that minimizes connected impervious surfaces, increases flow path and time over pervious surfaces, and decentralizes treatment (smaller localized treatment as opposed to large-scale facility development) as a first measure of control. Once these measures have been implemented as standard practice, further treatment of excess water will occur in the numerous existing natural basins.

The approach outlined in this manual provides an ecologically friendly means to mitigate the impact that development has on the water cycle. It integrates hydrologic function into site design and conserves natural resources and open space. Specific benefits of this approach are:

- ▶ Preservation of open space;
- ▶ Minimization of land disturbance;
- ▶ Protection of natural systems and processes, and incorporation of natural site elements into the hydrologic design;
- ▶ Customization of infrastructure to each site rather than uniform design;
- ▶ Decentralization of runoff collection;
- ▶ Management of surface water at its source; and
- ▶ Groundwater / aquifer recharge.

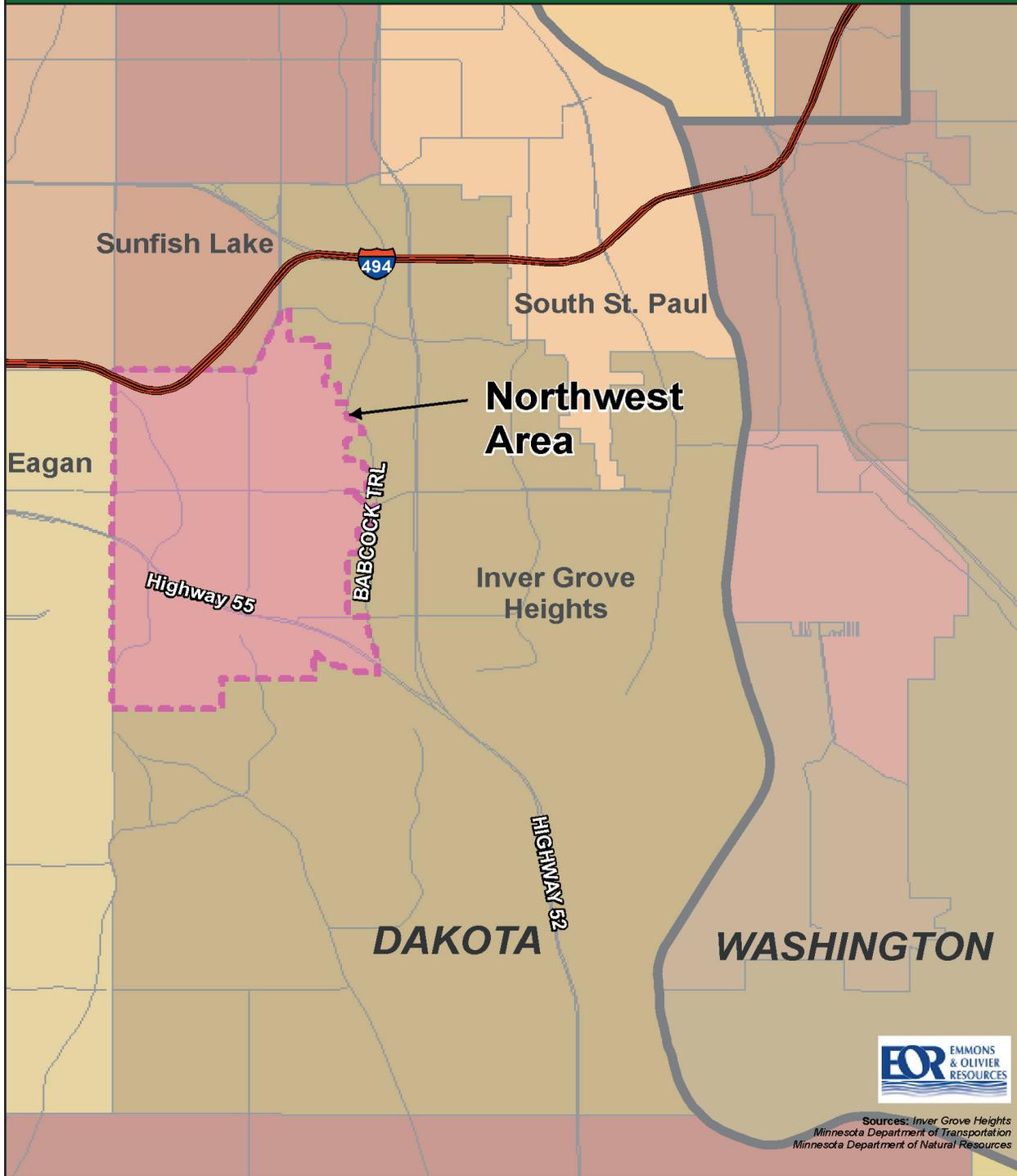
The list of practices included under the term "alternative" is extensive. Applications of special interest to Inver Grove Heights, because of its need to manage and reduce volume of runoff flowing to landlocked basins in the NWA, focus on infiltration.

Location

The Northwest Area (NWA) is located on 3,410 acres in the northwest portion of Inver Grove Heights, Dakota County. The location of this area is shown in Figure 1.1. The area is bounded by Interstate 494 on the north, Babcock Trail on the east, the City's boundary with Eagan on the west, and extends to an area just south of Highway 55 on the south.



Figure 1.1 Location Map of the Northwest Area, City of Inver Grove Heights



Legend
Northwest Area

0 0.25 0.5 1 Miles



2006



The NWA is located within two watersheds: the Lower Mississippi River Water Management Organization (LMRWMO) encompasses the eastern ¾ of the area and the Gun Club Lake Water Management Organization (GCLWMO) encompasses the western ¼ of the area (see Figure 2.4). The approximate acreage of the NWA within the LMRWMO and GCLWMO is 2,650 acres and 760 acres respectively. The NWA within the LMRWMO watershed is sub-divided into a series of 154 subwatersheds. These subwatersheds are identified in Figure 2.5. The NWA within the GCLWMO watershed is sub-divided into a series of 47 subwatersheds which is also illustrated on Figure 2.5. The LMRWMO and the GCLWMO are considered to be tributary to the Mississippi and Minnesota Rivers, respectively.

As mentioned previously, a significant portion of the NWA is landlocked. The only small areas with stormwater discharge from the NWA within the LMRWMO watershed under existing conditions occur at two locations: Basin EP-080a (Rosenberger Lake) and a small portion of Subwatershed BP-005 within the study area into MnDNR Protected Wetland 241W. Stormwater discharge from the GCLWMO watershed under existing conditions occurs at five locations: Hornbeam Lake (Q-011) to the City of Sunfish Lake and four stormwater management basins (F-025, W-002, W-004a and W-006) to the City of Eagan.

History of Stormwater Management in the NWA

In 1998, the City of Inver Grove Heights completed a Comprehensive Plan that proposed to collect and route stormwater runoff to the Mississippi River via a large regional overflow pipe system. Given the landlocked, self-sustaining nature of this relatively undeveloped area, a number of residents petitioned the City to identify and evaluate alternative methods of managing stormwater in the area.

After approximately eight years of planning and evaluating alternative stormwater management scenarios, the City of Inver Grove Heights adopted a Planned Unit Development (PUD) Overlay District for the Northwest Area (*Subdivision 39*). The purpose of the Overlay District is to regulate development in a manner consistent with the City's Comprehensive Plan while creating a cost-effective stormwater system. As stated in Subdivision 39, the Overlay District "will encourage development which provides diverse housing styles, incorporates natural features as integral elements, promotes cluster development practices which preserve significant natural features by concentrating building locations, fosters pedestrian connections and uses on-site retention of stormwater in existing landlocked basins presented in open space areas". A copy of the PUD can be found in Appendix G.

The following list of reports and events led to the development of the PUD and ultimately the NWA Stormwater Manual.

- ▶ 1998/2002 Comprehensive Plan Update
- ▶ May 2000 Northwest Area Task Force formed
- ▶ July 2000 Northwest Area Study
- ▶ September 2001 Northwest Quadrant Study
- ▶ November 2002 Northwest Quadrant Pilot Study Area Hydrologic & Hydraulic Analysis
- ▶ October 2003 Northwest Area Natural Wetland Resource Inventory
- ▶ February 2004 Northwest Quadrant Hydrologic & Hydraulic Analysis
- ▶ September 2004 – May 2005 Engineering Feasibility Study
- ▶ July 2005 Northwest Area Infrastructure Feasibility and Alternative Urban Areawide Review (AUAR)
- ▶ June 2005 public meetings
- ▶ February 2006 AUAR adopted by City Council
- ▶ August 2006 Technical Memorandum: 2005 Basin Monitoring
- ▶ August 2006 Inver Grove Heights Northwest Area Surface Water Modeling Report
- ▶ August 2006 Technical Memorandum: Inver Grove Heights Low Impact Development (LID) Stormwater Plan: Overflow Contingencies and Cost Analysis

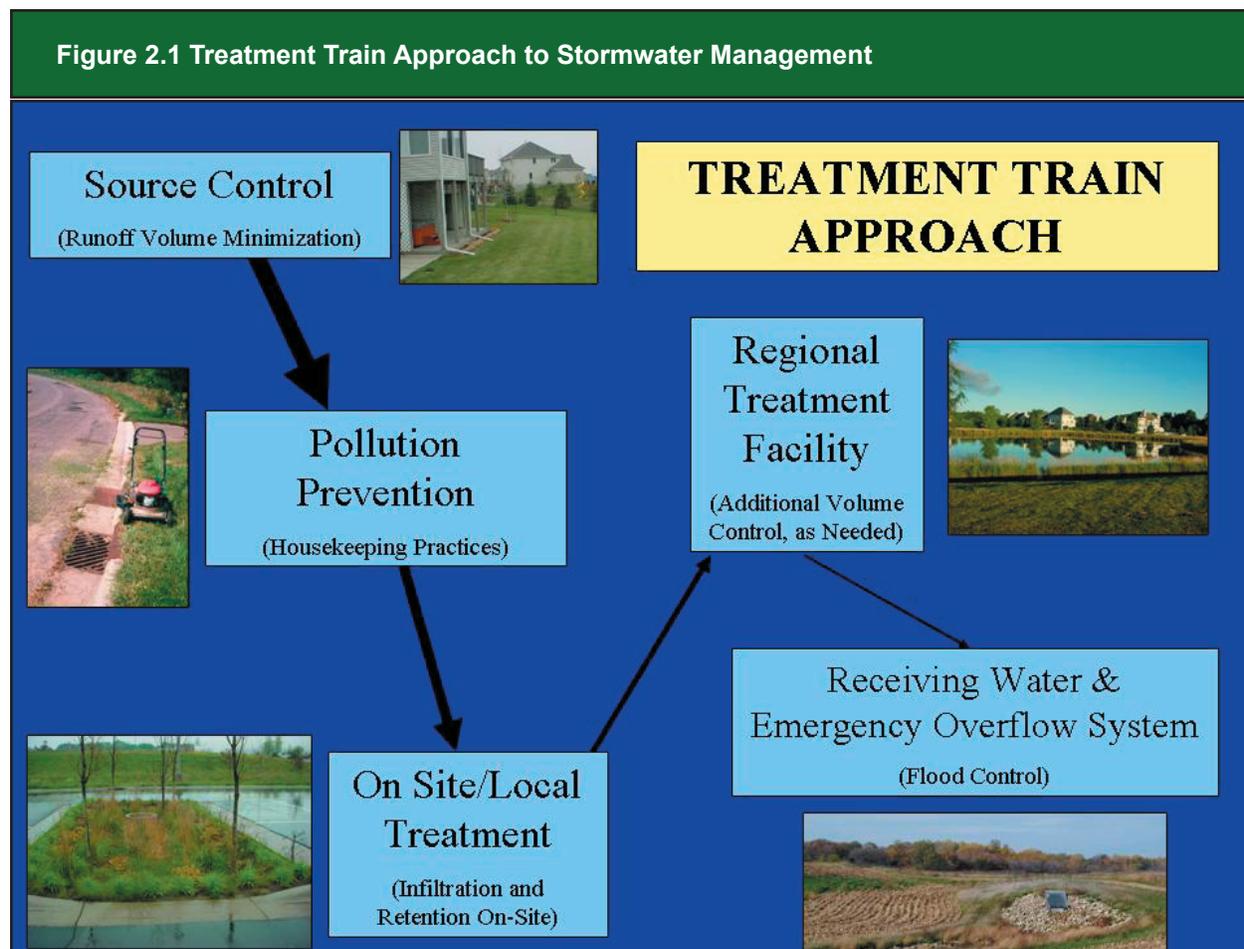


- ▶ September NWA Stormwater Manual
- ▶ 2006 Planned Unit Development (PUD) Overlay District for the Northwest Area (*Subdivision 39*)

Stormwater Management in the NWA

The City's Surface Water Management Plan for the Northwest Area applies a "treatment train" approach designed to mimic the natural hydrology of the existing system. This approach is more holistic in that its application begins at the planning stages of development and applies a number of Better Site Design techniques (BSDs) and Best Management Practices (BMPs) to minimize connected impervious surfaces, increase the flow path and time stormwater is in contact with pervious surfaces, and decentralizes treatment in local and regional infiltration areas. As Figure 2.1 illustrates, the treatment train approach begins with simple runoff volume reduction and methods that prevent pollution from accumulating on the land surface and becoming available for wash-off during a rainfall event. Additional stormwater runoff is treated in a mix of simple to complex local BMPs that treat and reduce the volume of stormwater locally before discharging to a regional stormwater management facility.

One of the main tenants of the PUD is to maintain a certain amount of open space as the NWA develops. Specifically, the PUD states that "at least 20 percent of the buildable development area within the PUD shall be preserved as additional natural area/open space". Of this natural area/open space, "50 percent may be used for passive or active recreation or the location of stormwater management facilities".



Source: Adapted from Minnesota Stormwater Manual 2006

Another tenant of the surface water management plan is to reduce runoff volume (to predevelopment volumes for the 5-year 24-hour rainfall event) and treat stormwater as close to its point of generation as possible before discharging to downstream water bodies or landlocked basins. A more detailed discussion of this requirement is provided in Chapter 7 of the Manual and a more detailed discussion of the treatment train approach is provided in Chapter 3 of the Manual.

II. Relationship between NWA Stormwater Design Manual and the Minnesota Stormwater Manual

The Minnesota Stormwater Manual was published in November of 2005. This manual was developed by the Minnesota Pollution Control Agency to facilitate compliance with the National Pollutant Discharge Elimination System (NPDES) permitting program. Although the material collected and presented in the Minnesota manual is very comprehensive, it is broad in scope due to the geomorphic and hydrologic variability within the state and the need to provide guidance for all possible site design constraints. For example, Inver Grove Heights need not consider design variations due to shallow granitic bedrock or lack of annual rainfall as other parts of the state would. In addition, the State Manual has more of a water quality focus than a volume control focus which is the main goal of the City's stormwater management plan. Given these considerations, there is a significant amount of cutting-edge information addressing a variety of stormwater management scenarios applicable to the NWA.

In order to facilitate compliance with the standards set forth in the PUD, the City of Inver Grove Heights developed a similar type of document using the State Manual as its foundation. To date, the City of Inver Grove Heights is the first municipality in Minnesota to adapt the State Stormwater Manual for its local stormwater management purposes. By using the State Manual as the foundation, the City of Inver Grove Heights was able to develop a cost-effective guidance tool that is tailored to the unique geomorphic and hydrologic characteristics of the NWA and the volume control standards designed to mimic the system as a whole. As a result, the NWA Stormwater Manual includes the BMP design guidance, CADD drawings, construction and maintenance checklist and costing information provided in the State Manual but also contains information addressing typical constraints in the NWA, guidance on the application of BSD techniques and a detailed example of the application of pretreatment and volume control standards to a typical development in the NWA.

III. NWA Stormwater Design Manual Organization

As development occurs in the Northwest Area, it will be necessary to ensure that the standards set forth in the PUD are met, adequate onsite volume control is provided and site-specific characteristics should be assessed to determine the most appropriate type and siting of BMPs.

This stormwater design manual provides guidance in the selection, design and construction of site specific, alternative stormwater management BMPs and is intended to be a comprehensive manual which not only summarizes the requirements and design recommendations for the NWA, but also details operation and maintenance requirements and specifications.

Developers will be responsible for coordinating with the City to ensure that the final drainage and runoff management system is designed and constructed in accordance with the stormwater management plan identified in the Comp Plan and the PUD.

Electronic copies of the Manual may be obtained on the City's web-site at <http://www.ci.inver-grove-heights.mn.us/dev/nwarea.html>.



If there are questions regarding the content of this Manual or the City of Inver Grove Heights' permitting program, contact:

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