Watershed Management Primer

A Presentation to the Brown’s Creek Watershed District Citizen Advisory Committee

Presented by:

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Natural Watershed Characteristics

- **Size** and Shape of Watershed
- Topography
- Soils
- Vegetative Cover
Land Uses Occurring in Watershed

- Agricultural
- Undeveloped
- Residential of Varied Density
Stormwater Management Basics

• Impervious Surfaces
• Rates of Discharge
• Stormwater Volume
• Water Quality
Impervious Surfaces increase stormwater runoff.
Higher peak rate
Greater overall volume
High rates for longer time
FIGURE 2. Stylized relationship of imperviousness to stream health

Modified from Schueler 1992
Stormwater Discharge Rates

How fast the stormwater flows

Importance
Stream bank Stability
Storm sewer Capacity

Brown’s Creek Rule

Post development rates of discharge for the 1.5, 10 and 100 year storm events to be same as pre-development rate.

Notes -
Small storms provide the most frequent runoff events
Large storms result in the more destructive runoff events
Managing the range of storm events can be accomplished through simple structural means, i.e. multi-stage outlets.
Stormwater Volume

How much stormwater is produced

**Importance**
- Flooding
- Nutrient Loading
- Groundwater Recharge

**Brown’s Creek Rule**

*Sites must retain the additional runoff generated from a 1.5 year storm event as compared to pre-development conditions.*

*Runoff from 5% impervious surface is exempted.*

**Considerations**

Rule takes into consideration that there are varying levels of infiltration possible at a site based on soils.
Stormwater Quality

What is in the stormwater & How much

Importance
Lake and Stream Quality
Algal blooms, odor
Decreased recreational value, aesthetics

Brown’s Creek Rule

Loads of sediment, metals and nitrogen must be maintained.
Concentration of phosphorus must be below standard of receiving body

Considerations
May not be enough for some resources – ie St. Croix River target phosphorus reduction.
Pre vs Post Development site conditions.
Parking lot design

Bioretention systems

Permeable weir

“Natural” BMPs

Dry swales

Surface wetlands

Wet ponds

Animal management
Public Works BMPs

- Salt application
- Leaf collection
- Education
- Road repair
- Waste management
- Chemical storage
Surface Water Management BMPs

- Bioretention
- Infiltration
- Open Space preservation
- Erosion control
- Runoff Integration
- Minimize runoff
- Low impact development

Surface Water Management BMPs
Shoreland BMPs

- Vegetation stabilization
- Bio-engineering
- Slope stabilization
- Wetland restoration
- Re-vegetation
- Riprap
Channel Stabilization BMPs

Geotechnical stabilization

Rip-rap

Erosion control

Buffer

Vegetation
The goal of the Trout Habitat Preservation Project (THPP) was to restore a controlled overflow to control lake elevations on Goggins Lake, while reducing the impact to Brown’s Creek, a naturally producing trout stream or other significant resources in the watershed.
THPP—MN Association of WD
“2004 Project of the Year”

The project included an analysis of historic natural overland drainage routes & the design/implementation of a combined wetland creation-infiltration groundwater recharge system.

Created Wetlands/Infiltration Basins
Capital Improvement Project: Kismet Basin Outlet Project

The Kismet Basin Stabilization Project, completed in 2002, provided an overflow for the water bodies in the Kismet Basin area to alleviate local flooding. The solution included multiple cell infiltration basins and following natural function and route of flow.
Kern Center Pond (Before)
Kern Center Pond
(During)

Jan 6, 2005

May 5, 2005

May 5, 2005
District Water Monitoring Program
Volunteer Macroinvertebrate Stream Monitoring
Brown’s Creek Realignment

Goal: Reduce water temp & improve trout habitat in Brown’s Creek.

Old channel through golf course—Note lack of shade, and wide shallow channel.

New channel—Improved habitat with native shrubs & trees along banks.
Hydrologic & Hydraulic Study

Figure 7
Brown's Creek Watershed District
Comparison of the 1998 and 2003 H/H Models