Industry Perspective

Let's Get Practical About Metals in Stormwater

Pamela Massaro - Wenck Associates, Inc
Thursday, November 3, 2016
11:30am Central

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

Agenda

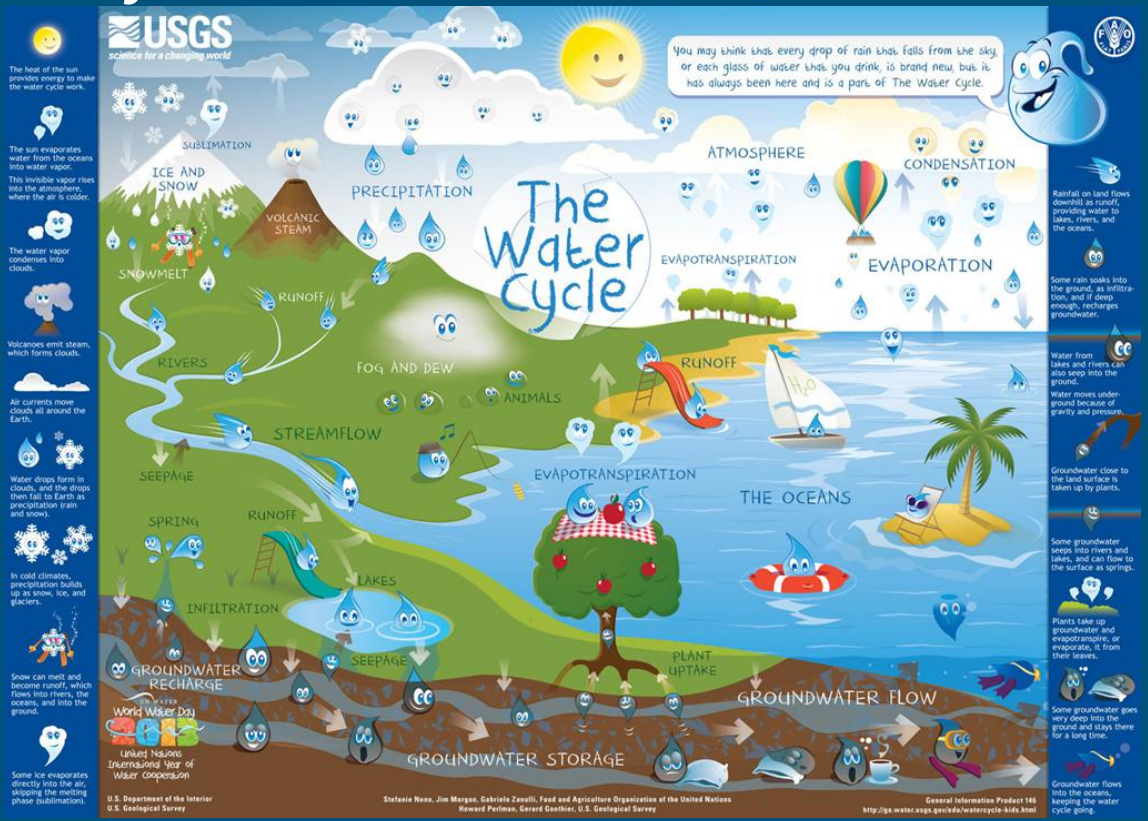
Stormwater Runoff -- Regulatory Framework

Recyling Industry & the Environment

5 Project Examples – Nebraska & Minnesota

Summary of BMPs for Metals

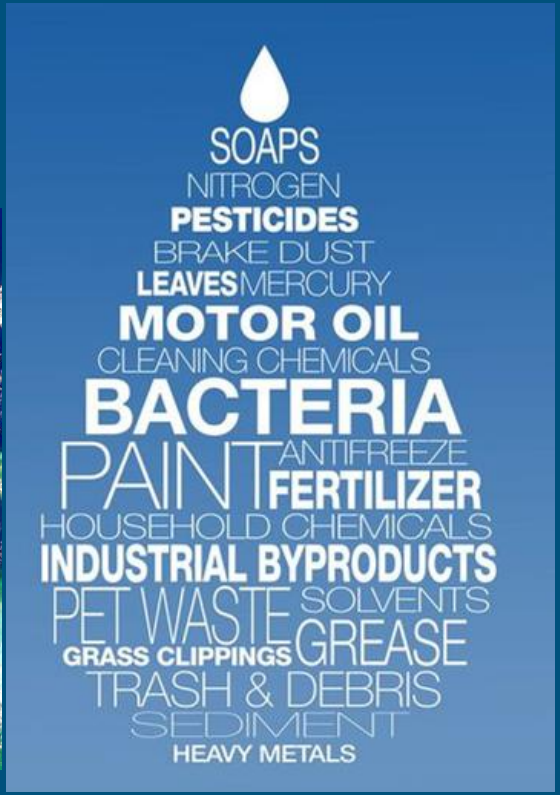
Water Cycle


USGS
science for a changing world
You may think that every drop of rain that falls from the sky, or each glass of water that you drink, is brand new, but it has always been here and is a part of The Water Cycle.
The Water Cycle
The heat of the sun provides energy to make the water cycle work.
The sun evaporates water from the oceans into water vapor.
This invisible vapor rises into the atmosphere, where the air is colder.
The water vapor condenses into clouds.
Volcanoes emit steam, which forms clouds.
Air currents move clouds all around the Earth.
Water drops form in clouds, and the drops then fall to Earth as precipitation (rain and snow).
In cold climates, precipitation builds up as snow, ice, and glaciers.
Snow can melt and become runoff, which flows into rivers, the oceans, and into the ground.
Some ice evaporates directly into the air, skipping the melting phase (sublimation).
SUBLIMATION
ICE AND SNOW
VOLCANIC STEAM
PRECIPITATION
ATMOSPHERE
CONDENSATION
EVAPOTRANSPIRATION
EVAPORATION
SNOWMELT
RUNOFF
RIVERS
FOG AND DEW
ANIMALS
RUNOFF
STREAMFLOW
SEEPAGE
EVAPOTRANSPIRATION
THE OCEANS
SPRING
RUNOFF
LAKES
INFILTRATION
SEEPAGE
PLANT UPTAKE
GROUNDWATER RECHARGE
GROUNDWATER FLOW
GROUNDWATER STORAGE
World Water Day
United Nations International Year of Water Cooperation
Rainfall on land flows downhill as runoff, providing water to lakes, rivers, and the oceans.
Some rain soaks into the ground, as infiltration, and if deep enough, recharges groundwater.
Water from lakes and rivers can also seep into the ground.
Water moves underground because of gravity and pressure.
Groundwater close to the land surface is taken up by plants.
Some groundwater seeps into rivers and lakes, and can flow to the surface as springs.
Plants take up groundwater and evapotranspire, or evaporate, it from their leaves.
Some groundwater goes very deep into the ground and stays there for a long time.
Groundwater flows into the oceans, keeping the water cycle going.
U.S. Department of the Interior
U.S. Geological Survey
Stefanie Neno, Jim Morgan, Gabriele Zanolli, Food and Agriculture Organization of the United Nations
Howard Perlman, Gerard Gonthier, U.S. Geological Survey
General Information Product 168
http://ga.water.usgs.gov/edu/watercycle-kids.html

Stormwater

Precipitation on a Landscape produces Surface Runoff which Mobilizes Constituents

Source: NASA satellite picture



Source: Spring Lake Stormwater

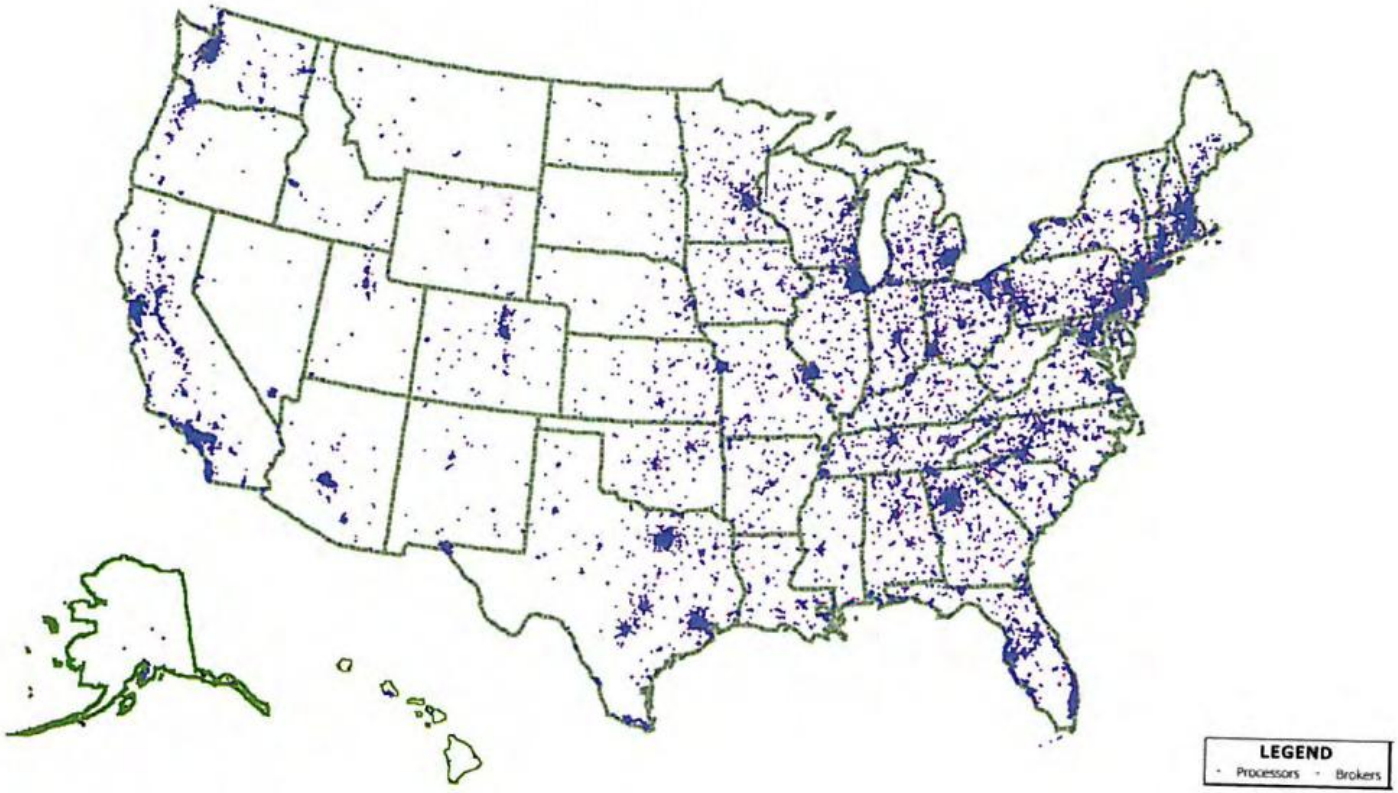
NPDES

Under section 402(p) of the Clean Water Act, the EPA and the authorized states regulate stormwater discharges from regulated

- Municipal Separate Storm Sewer Systems (MS4s)
- Industrial Activities
- Construction Sites

8,000+ Recycling Facilities

Source: 2016 ISRI Scrap Yearbook



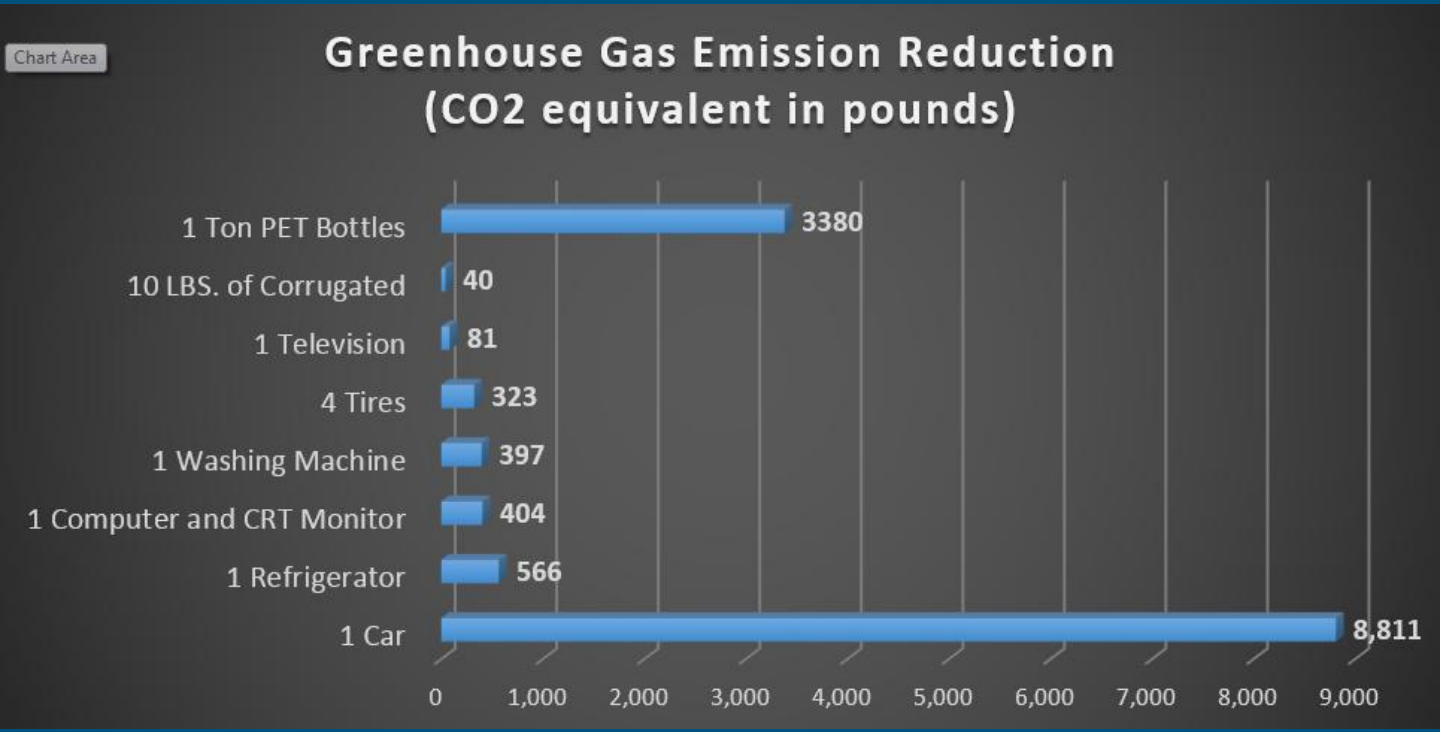
Recycling Fact Sheets

www.jason.org/recycling

Source: Institute of Scrap Recycling Industries (ISRI) and JASON Learning

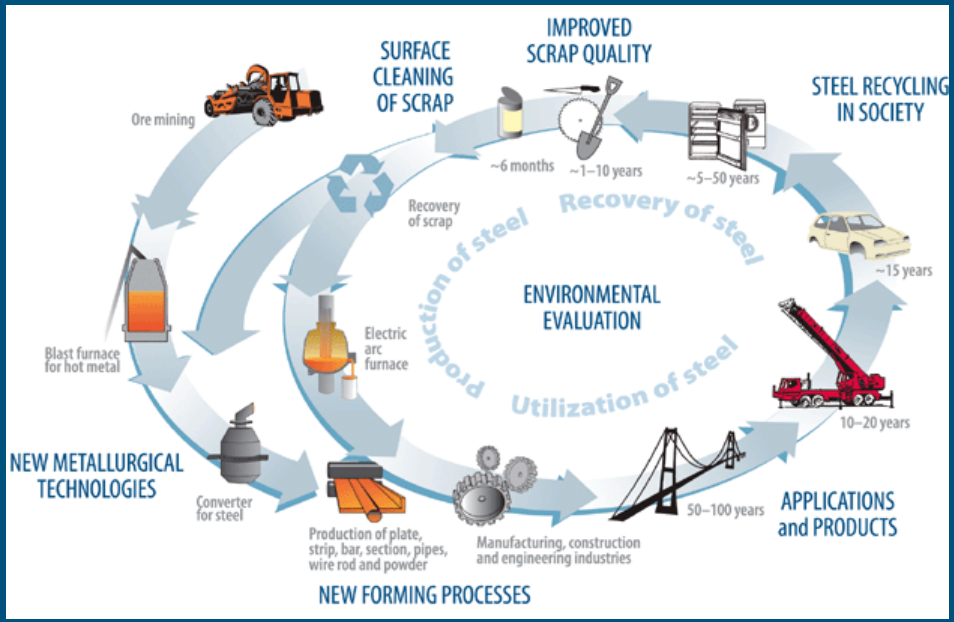
Recycling = GHG Reductions

Source: BIR, U.S. EPA Durable Goods Calculator, WARM Calculator
http://epa.gov/climatechange/wycd/waste/tools.html



Life Cycle of Steel

2013 Recycling Rate
- for cars: 85 percent
- for appliances: 82 percent
- for steel cans: 70 percent
- for structural steel: 97.5 percent



Project Examples

1) Metal Recycling Facility, NE

Scrap on Pavement

Material Storage under Cover

Street Sweeper

Filter Sock in Catchbasins

Stormwater Pond Forebay

Rock/Sand Filter

- Stormwater Pond (1.66 million gallons capacity)
- Lift Station
- Space Reserved for Filtration Devices

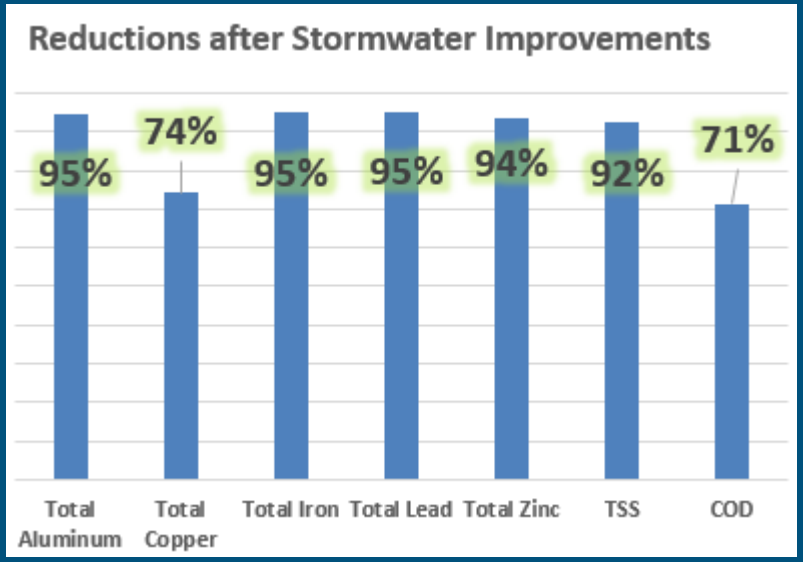
Biofiltration /
Infiltration Swale
(0.6 million gallons)

Overflow area rip rap

20%-30% Compost

70%-80% Clean Sand

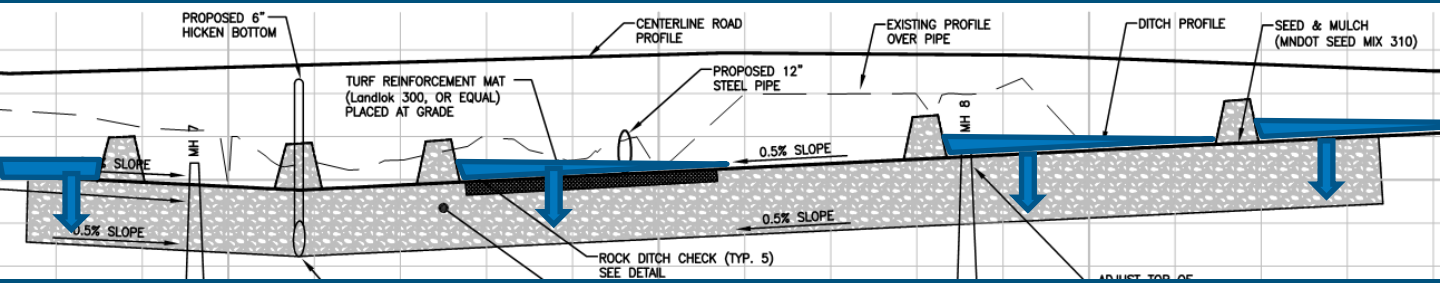
2) Metal Recycling Facility, MN



2012

Main Haul Routes Paved

Biofiltration Rock Check Swale with Underdrain



Divert non-contact roof water

Run on sampling

Pavement

Biofiltration System with Rock Checks & Underdrain

Barriers to Protect

20%-30% Compost

70%-80% Clean Sand

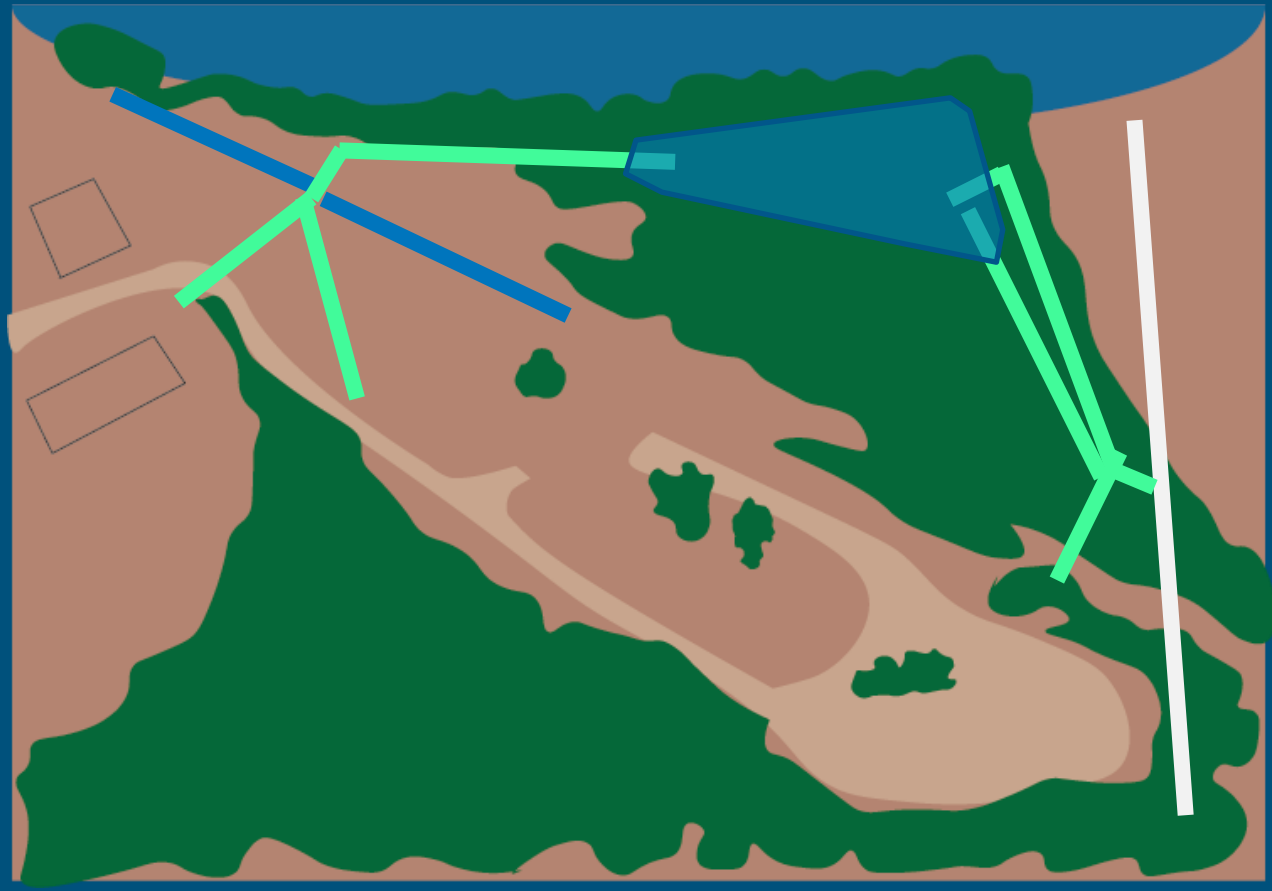
3) CONCEPT PLAN for a Metal Recycling Facility, MN

Sand/Rock Filters

Bioretention

Filtration Devices

Stormsewer and Filtration MHs



Sand/Rock Filters

Filtration Basin

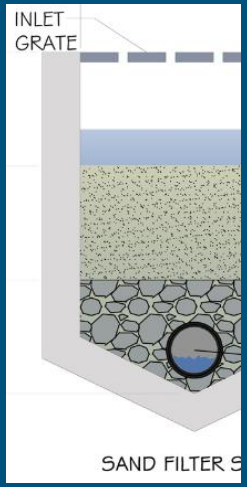
Stormsewer

Pavement

Stormsewer

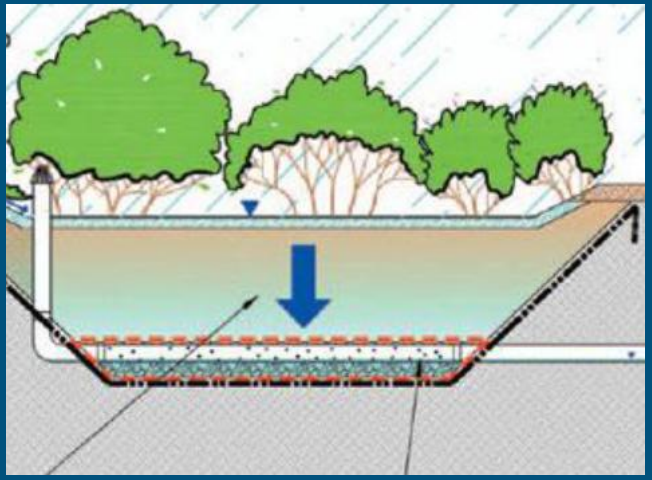
UG Filtration Vaults

Compost Sand



Two Types of Sand/Rock Filter System

Boulder Barriers to Protect Bioretention



Revised Traffic Flow
Bituminous Pad for Salt Stockpile

Stormwater Filtration Basin (sand and biochar)

48-hour drain time
Impermeable Liner

4) Recycling Facility, MN

2012

Paving

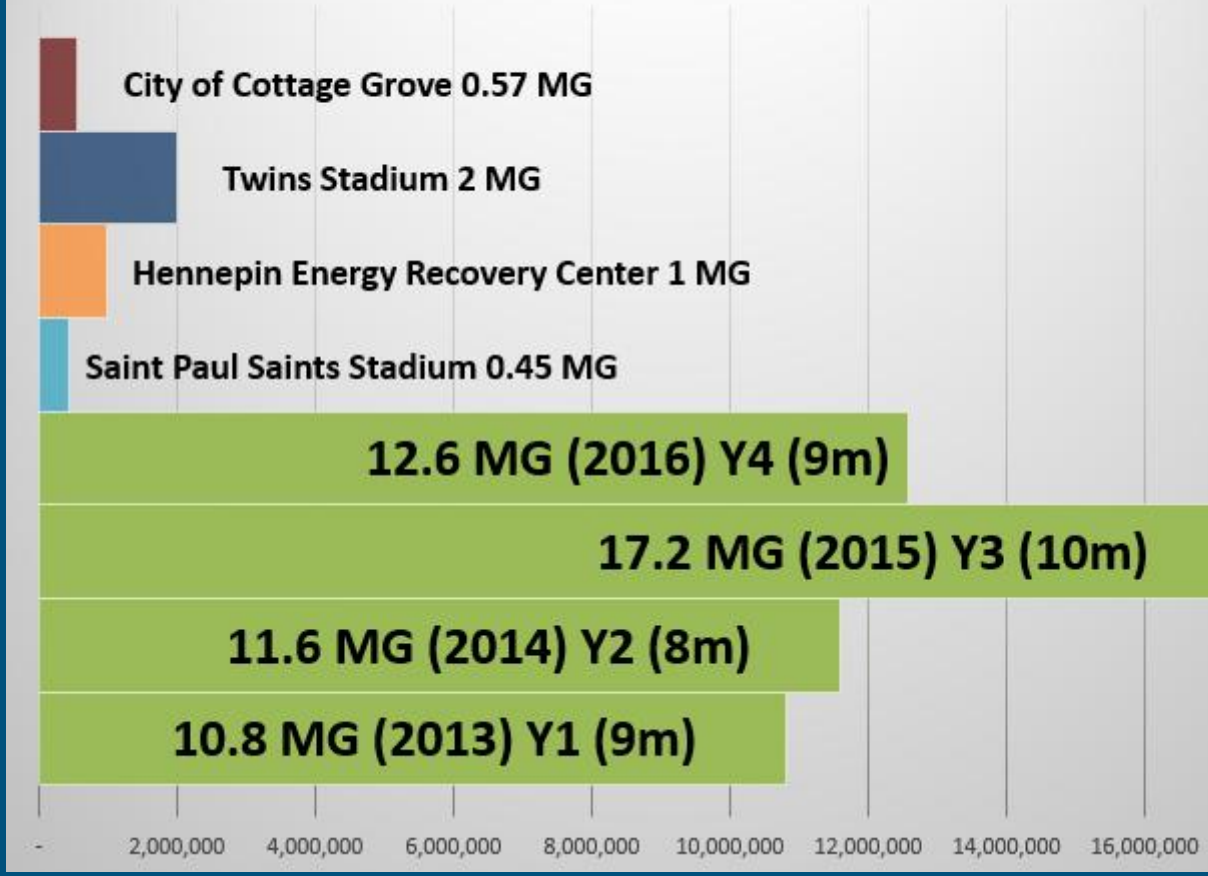
Stormsewer

Lift Stations

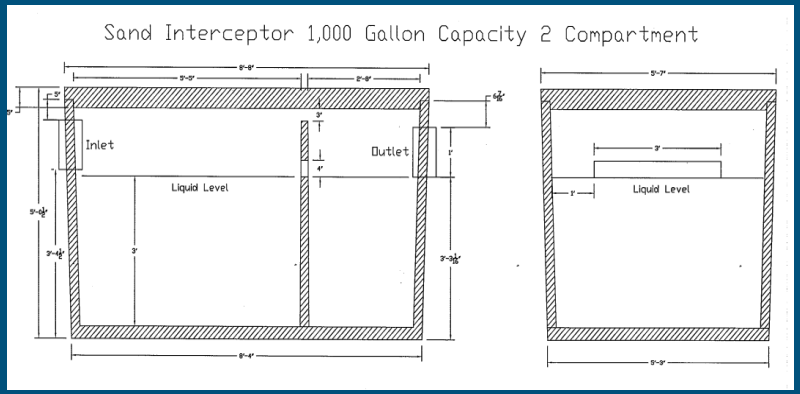
Lined Pond

Stormwater Reuse

Annual Stormwater Reuse



5) Foundary Facility, MN



Pavement
Stormsewer
UG Sand Filter

Considering
Biochar
Downspout
Filters

Reducing Metals

MPCA BMPs: Treating Al & Zn

- Source control by **limiting** metal **exposure** to stormwater
- Modify processes, storage or handling
- **Minimize or eliminate** usage of metal-containing products processes
- Replace or paint galvanized surfaces
- Consider using forklift tires made from non-rubber materials
- Implement vegetative buffer strips to capture sediment particles
- Add recycling to recover and recycle specific metals from the production processes

Source: MPCA

Galvanized Products

Percent Reduction Metals by BMP

BMP group	Copper>	Zinc
Bioretention[a]	95	95
Filtration[b]	45	85
Infiltration[c]	100	100
Stormwater ponds	55	65
Stormwater wetlands	40	40

Source: MPCA Minnesota Stormwater Manual

Questions?

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Exceptional outcomes.