PERVIOUS MATERIALS







PERVIOUS MATERIALS: HOW THEY WORK



PERVIOUS MATERIALS STANDARDS





PERVIOUS MATERIALS MAINTENANCE

- Regular Maintenance
 - Regular Street Sweeping
 - Periodic Vac Truck Maintenance
 - Subsurface Drain Inspection
- Long Term Maintenance

 - Specialized Vac Truck **Attachments**

- Milling/Resurfacing
- Do not stage materials on them
 - Landscaping
 - Plowed Snow
 - Leaking Vehicles
- Paver Filler Stone Replacement Grass/Lawn Clippings or Waste







Sweeper Path Images from www.elginsweeper.com

TREATMENT TRAIN: USING MULTIPLE SYSTEMS



Over 1000 BMPS in CARMEL



QUESTIONS?



NEXT PRESENTATIONS

Scott Minor

Landscaping with Native Plants

Claire Lane Invasive Plant Concerns & Helpful Local Programs

Jill Hoffmann Lawn Care Considerations





DESIGNING WITH NATIVES

A few strategies to garner broad appeal

Native plants are a new aesthetic



HOW TO OVERCOME OBSTACLES

There are four basic strategies to helping improve public acceptance of native plantings:

- Massing and rhythm
- ► Keep it flowering
- Choose the right plants
- Control the edges
- ► IT'S ALL SUBJECTIVE



MASSES AND RHYTHM



MASSING: MONOCULTURE



MASSES AND RHYTHM

Basic Principles

- Plant in repeating groups of individual plants
- Use odd numbered groups: 3, 5, 7, 9, etc. of the same plant. Use multiple species but stay within scale of the site.
- ▶ The larger the group, the stronger the massing effect
- Stack by height. There's a lot of variation within a species, so think 1-2' versus 3-5' and so on.
- ► Be aware that plants move around: MAINTENANCE IS KEY

The result is that the eye recognizes a SENSE OF ORDER no matter how large the landscape.

KEEP IT FLOWERING



KEEP IT FLOWERING

Basic Principles

- Understand flowering periods and plan for overlap
- Cover the three growing seasons. Bonus points for winter interest!
- Keep in mind: many species bloom for LONG periods, so it's easy to create overlap with just a few species.

It's harder to complain about weeds when there are FLOWERS AND COLOR!

CHOOSE THE RIGHT PLANT



CHOOSE THE RIGHT PLANT

How tall will it get? How does it spread? What do the leaves look like? When does it flower and how long do the flowers last?

The key is knowing a plant's growth habit and WHERE IT WILL BE PLANTED.

CONTROL THE EDGE



CONTROL THE EDGE



CONTROL THE EDGE

Basic Principles

- Use shrubs—even non-native shrubs—to frame and contain a planting with more diversity
- Short grasses can also be used: prairie dropseed and sideoats gramma are good choices. Native species work best.

A clean line suggests a SENSE OF PURPOSE.



You can also do none of these things and STILL HAVE A BEAUTIFUL, INTERESTING, HIGH FUNCTIONING LANDSCAPE.

(Know your client)

MAINTENANCE IS THE KEY

Thanks to Eco Logic for sharing these slides

Native Plant Communities for Stormwater Solutions



Wetland Mitigation

Indiana University Bloomington, IN





Eco Logic

Keys to Successful Monitoring

- First year seedling identification
- Early identification of noxious weed species

• 2nd and 3rd year seedling identification of more conservative species is necessary for establishing diverse plant communities



Maintenance Program:

Scenario # 1- Small Urban BMP High Visibility 6-12 site visits per season

Main Activities:

- Weed Management
- Mulching
- Plant replacements
- Trash Removal
- Maintaining Drainage



Maintenance Program:

Scenario # 2- Large Urban BMP Low to Medium Visibility 3-4 site visits per season

Main Activities:

- Weed Management
- Mowing or Prescribed Burning
- Over-seeding/Plant Replacement
- Maintaining Drainage



Myths: About Native Plant Communities

- They require no maintenance once established
- •They require the same knowledge, methods and equipment as traditional landscaping

FALSE!

FALSE!



Chemical Treatment of Invasive Plants

- Effective on a Broad Spectrum of Species
- Always Focus on Systemic Herbicides
- Does Not Cause Soil Disturbance
- Selective Herbicides can Protect
 Native Species
- Always Read and Understand the Herbicide Label



Questions for a Contractor:

- Experience with stormwater BMPs
- Knowledge of native and invasive plant species
- Experience controlling invasive plants
- Licensed by the Office of the Indiana State Chemist
- Ability to identify 1st and 2nd year seedlings

QUESTIONS?

LAWN CARE CONSIDERATIONS



Fertilizers!






WHO ELSE IS PLEDGING?



FERTILIZER IMPACTS

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MORE LAWN CHOICES



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Frequently Asked Questions about Fertilizers



- What is fertilizer?
- What is phosphorus?
- How do I know if the fertilizer is phosphorus free?
- Which number on the bag of fertilizer is phosphorus?
- Is "low phosphorus" the same as "no-phosphorus" in terms of protecting the environment?
- Is organic fertilizer the same as no phosphorus?
- What is soil testing and why should I care?
- Can I take my soil somewhere to get tested?
- To have a good looking lawn, do I even need to fertilize?
- Do I need phosphorus for my lawn to stay healthy/green?
- Do I need special equipment or different application method?
- Is phosphorus free fertilizer more expensive?
- Are there better times to fertilize? Time of day, time of year, weather conditions?
- What are the best practices for lawn care?
- How does fertilizer move around and affect our water quality?
- What are the levels in Indiana's waters?
- What is the government doing about phosphorus levels in our waters?
- What can I do as a homeowner that will help reduce phosphorus levels in our waters?
- Does bad taste or smell of my drinking water have anything to do with phosphorus in the water?

What is fertilizer?

PHOSPHOROUS AS A 'LIMITING FACTOR'

A 500 pound "batch" of wet algae requires:

- 1 pound phosphorus
- 7 pounds nitrogen
- 40 pounds carbon



Leaves = >50% of Annual Phosphorus Load to Urban Stream









LET'S TALK A LITTLE ABOUT IRRIGATION...



WESTFIELD WATER - SUMMER DEMAND PROFILE MON, WED AND FRI PATTERNS



LAWN IRRIGATION CHALLENGES FOR PUBLIC WATER SUPPLY

- Lawn Irrigation = Biggest Driver of Peak Day Water Demand (50%-75%)
- Hourly Lawn Irrigation Patterns (2am 6am)
- Daily Lawn Irrigation Patterns (Mon, Wed and Fri)

Water System Stress (Max Pressure/Flow, Water Main Breaks, Elevated Storage, etc.)

RESULT: Lower Water System Reliability (Short & Long-Term)

Reliable Long-Term Water Supply Requires New Resources & Infrastructure RESULT: Higher Water Utility Costs and Customer Rates





WHO ELSE IS PLEBGING?



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WATER USE IMPACTS

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OUTDOOR SAVINGS



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OUTDOOR CONSERVATION ACTIONS

Please select each action you will or already do and be sure to fill out the additional information requested. Even if you don't water your lawn at all, please mark 'I already do' for the first 3 items below. This will allow us to acknowledge all the water savings from your efforts.

Only water my lawn in the late evening (after 10 pm) or early morning (before 9 am).

Not water my lawn on hot or windy days to avoid rapid evaporation and reduce water waste.

Stop watering my lawn in late summer for the 6 weeks from early August to mid September.

Put a layer of mulch around trees and plants because bark, peat moss and other types of mulch slows down evaporation.

Not run the hose while washing my car. I'll use a bucket of water and a quick hose rinse at the end.

Use a broom to sweep off driveway and/or patio instead of using the hose to avoid wasting water.

l already do this	0
will do this	
My lawn is .25	 acres in size.
Vour water savi	ngs is 840 gallons per year!
Not water my la	wn on hot or windy days to avoid rapid evaporation and reduce water waste
Not water my la	wn on hot or windy days to avoid rapid evaporation and reduce water waste
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Not water my la already do this will do this My lawn is .25	wn on hot or windy days to avoid rapid evaporation and reduce water waste



AND ONE MORE ACTION THAT MATTERS...





Pesticides Application Impacts









Find the right contractor...

Page 12

CONTRACTORS



Things to Consider Before You Hire A Landscape Contractor

Some stormwater BMPs might require a contractor to perform necessary maintenance. This applies to hard features like pipes and water quality units as well as green features like rain gardens. Not all contractors are created equal in this regard.

- 1. Ask them to describe their experience with stormwater BMPs
 - · Make sure they are knowledgeable about the types of BMPs on the property
- 2. Ask about their knowledge of native plants
 - · Request photos or references for past native plant projects and qualifications (degrees, certifications, etc.)
- 3. Ask them to describe their experience controlling invasive plants
 - · Request photos or references for past invasive plant removal projects
 - · Request that any plant cuttings be hauled off site and disposed of properly to prevent future infestations elsewhere
 - · Confirm or suggest that they participate in the Central Indiana Cooperative Invasive Species Management Area (CISMA)
 - What methods, tools, strategies are used to remove invasives? Are chemicals used? What cultural and mechanical means
 of management are used, if any? Do they only cut brush or will they treat systemically?
- 4. If hiring for a new planting, ask about:
 - Staff capable of identifying first and second year seedlings; request the name of the staff and ensure they will be assigned to your project.
 - · Plugs or seed (drill or broadcast)? How do you ensure that seeds germinate at the highest possible rate?
 - Herbicide or tillage to remove existing vegetation? How many herbicide applications?
 - . If herbicide is used adjacent to a water source (e.g. pond, stream), are aquatic sensitive herbicides (e.g. RoundUp Custom



Take a Conservation Pledge at Indiana.ClearChoicesCleanWater.org

Thank You!

PLEASE HELP PROTECT OUR WATER SUPPLIES



Indiana.ClearChoicesCleanWater.org





Indiana.ClearChoicesCleanWater.org



POND DESIGN, FUNCTION, AND MAINTENANCE

OUTLINE

- Detention Pond Definition and Purpose
- How Much Water is the Site Generating?
- Why Does the Pond Fill Up?
- Additional Pond Design Requirements
- Water Quality Aspects of Detention Ponds

Maintenance

DETENTION POND DEFINITION AND PURPOSE

- What is a detention pond?
 - Excavated hole or basin from a development project
- Why is a detention pond needed?
 - Flood Control: Traps the water for a period of time
 - Water Quality Filtering: Removes pollution from stormwater



HOW MUCH WATER IS THE SITE GENERATING?

Drainage Area

- Portion of the site that drains to the pond
- Should be entire developed area



HOW MUCH WATER IS THE SITE GENERATING?

What is the drainage area of this pond?



HOW MUCH WATER IS THE SITE GENERATING? GROUND TYPE



Low Site Runoff



High Site Runoff

HOW MUCH WATER IS THE SITE GENERATING? STORM SIZE

Storm Size (In a day)

- Water Quality = 2 year (1" rain)
- Conveyance System = 10 year (4" rain)
- Flood Control = 100 year (7" rain)



HOW MUCH WATER IS THE SITE GENERATING? FLOW RATE

Flow Rate

We use all of the previous factors to compute how much water flows from the site.



WHY DOES THE POND FILL UP?

- Flood control and water quality
- Inflow Versus Outflow
 - Water leaves the pond at the same time it comes into the pond.
- Release Rates
 - Water comes into pond much faster than it can leave the pond per local ordinances
 - The release rate of the pond is controlled by the outlet control structure of the pond.



WHY DOES THE POND FILL UP?

Storage

- The difference between the amount of water coming into and exiting the pond is the storage amount.
 - For example, this is equivalent to filling the bath tub with the drain partially closed such that the tub can slowly fill with water, but still have some water draining out.



ADDITIONAL POND DESIGN REQUIREMENTS

- 10 foot wide flat safety ledge around the entire pond.
- Bank slopes below the water line and safety ledge can be steeper than the slopes above the water line.





ADDITIONAL POND DESIGN REQUIREMENTS-FLOOD ROUTING

Flood Routes

- Easements protect emergency flood routes if pond overtops
- Only happens during very extreme events or if the pond outlet becomes clogged



ADDITIONAL POND DESIGN REQUIREMENTS-FLOOD PROTECTION

Flood Protection Grade

- Buildings must be 1 foot above grade of emergency overflow route
- ▶ Homes must be 2 feet above pond 100 year flooding height



WATER QUALITY ASPECTS OF PONDS

8 to 10 feet in depth

- Ponds remove 80% or more of Total Suspended Solids (TSS) as well as removal of nutrients, bacteria, and metals, oils, organics
- Pollutants settle out with retention time and decay
- Many biological processes occurring



REASONS WE NEED WATER QUALITY PONDS





REASONS WE NEED WATER QUALITY PONDS



REASONS WE NEED WATER QUALITY PONDS



MAINTENANCE ASPECTS OF PONDS

- Sedimentation
- Muck/sludge
- Aquatic Vegetation and Algae
- Trash
- Erosion and Bank Management
- Outlet Clogging



MAINTENANCE ASPECTS OF PONDS: SEDIMENTATION

Harmful Effects

- Shallow Depths
- Vegetation Growth
- Less chemical trapping
 - Lower retention time
- Inlet Blockages/Flooding

- Treatment Options
 - Mechanical Dredging/Excavation and Haul
 - Hydraulic Dredging
 - Biological Sludge Techniques



MAINTENANCE ASPECTS OF PONDS: SEDIMENT EFFECTS


MAINTENANCE ASPECTS OF PONDS: SEDIMENT LOCATIONS



MAINTENANCE ASPECTS OF PONDS: SEDIMENT REMOVAL



MAINTENANCE ASPECTS OF PONDS: AQUATIC VEGETATION/ALGAE

Harmful Effects

- Offensive odors
- Discoloration/Unsightly
- Oxygen depletion due to decomposition
- Fish kills
- Bad drinking water tastes
- Toxic algae

- Treatment Options
 - Chemical*
 - Biological*
 - Cutting
 - Harvesting*
 - Dredging
 - Aeration*





MAINTENANCE ASPECTS OF PONDS: AQUATIC VEGETATION/ALGAE





MAINTENANCE ASPECTS OF PONDS: CHEMICAL TREATMENT



MAINTENANCE ASPECTS OF PONDS: AQUATIC VEGETATION HARVESTING



MAINTENANCE ASPECTS OF PONDS: TRASH

Harmful Effects

- Unsightly
- Leaves pond into rivers and lakes
- Clog outlets causing flooding

- Treatment
 Options/Expectations
 - Hand collection
 - Most is probably near the shoreline
 - May need waders or boat for difficult to reach trash



MAINTENANCE ASPECTS OF PONDS: TRASH

