

Happy Hollow Park



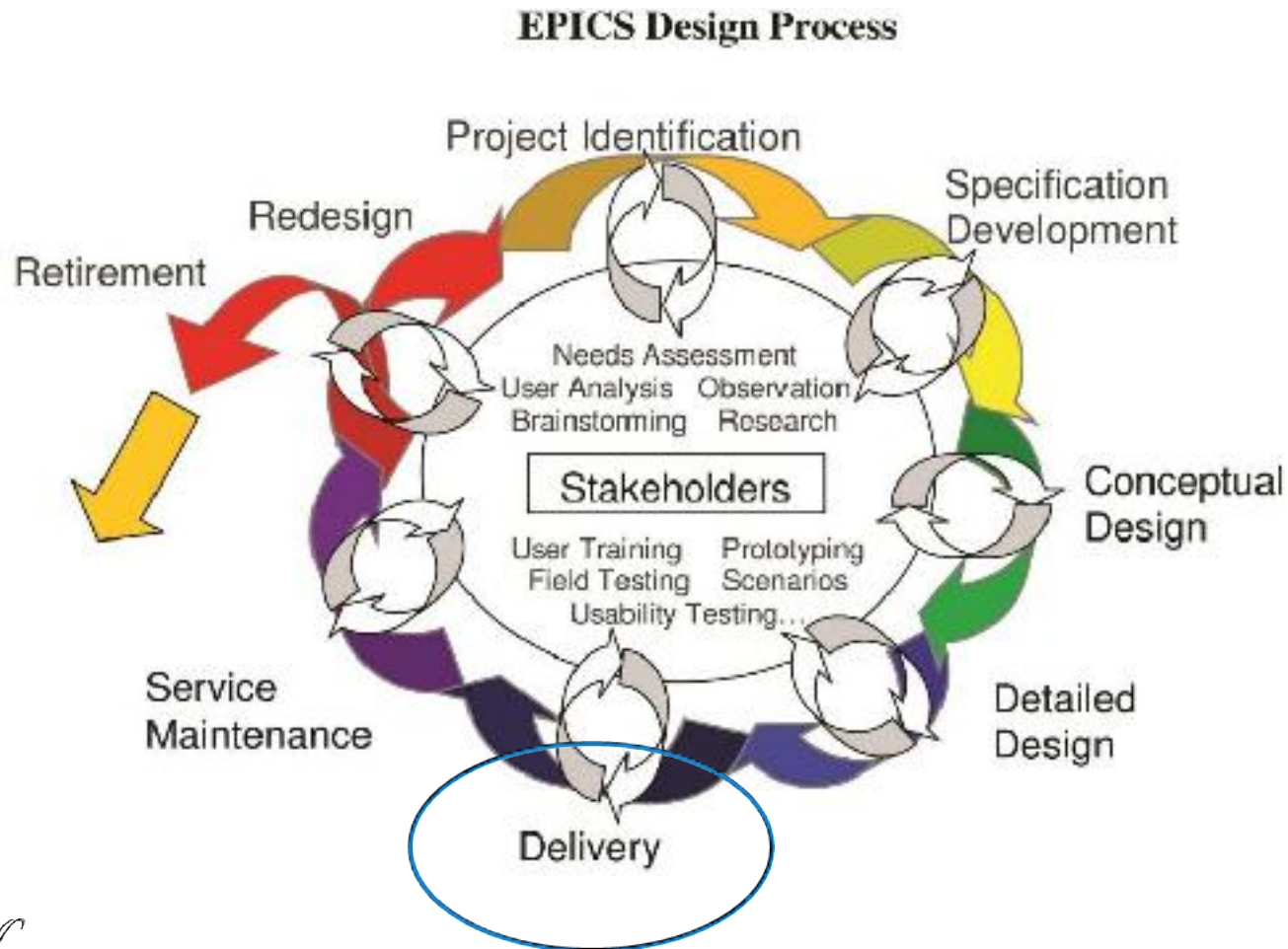
Introduction

- Monica Moran, Design Lead
 - *Sophomore, Environmental and Ecological Engineering*
- Karuna Srivastava, Financial Officer
 - *Freshman, Multidisciplinary Engineering*
- Nolan Miller, Project Partner Liaison
 - *Freshman, Materials Science Engineering*
- Ben Eaton, Archivist
 - *Senior, Natural Resources and Environmental Science*
- Alan Gross
 - *Freshman, Aerospace Engineering*
- Jacob Mickey
 - *Freshman, Civil Engineering*

Agenda

- Overview of team
- Community partner introduction
- Project background
- Semester progress
- Open discussion

EPICS Design Process



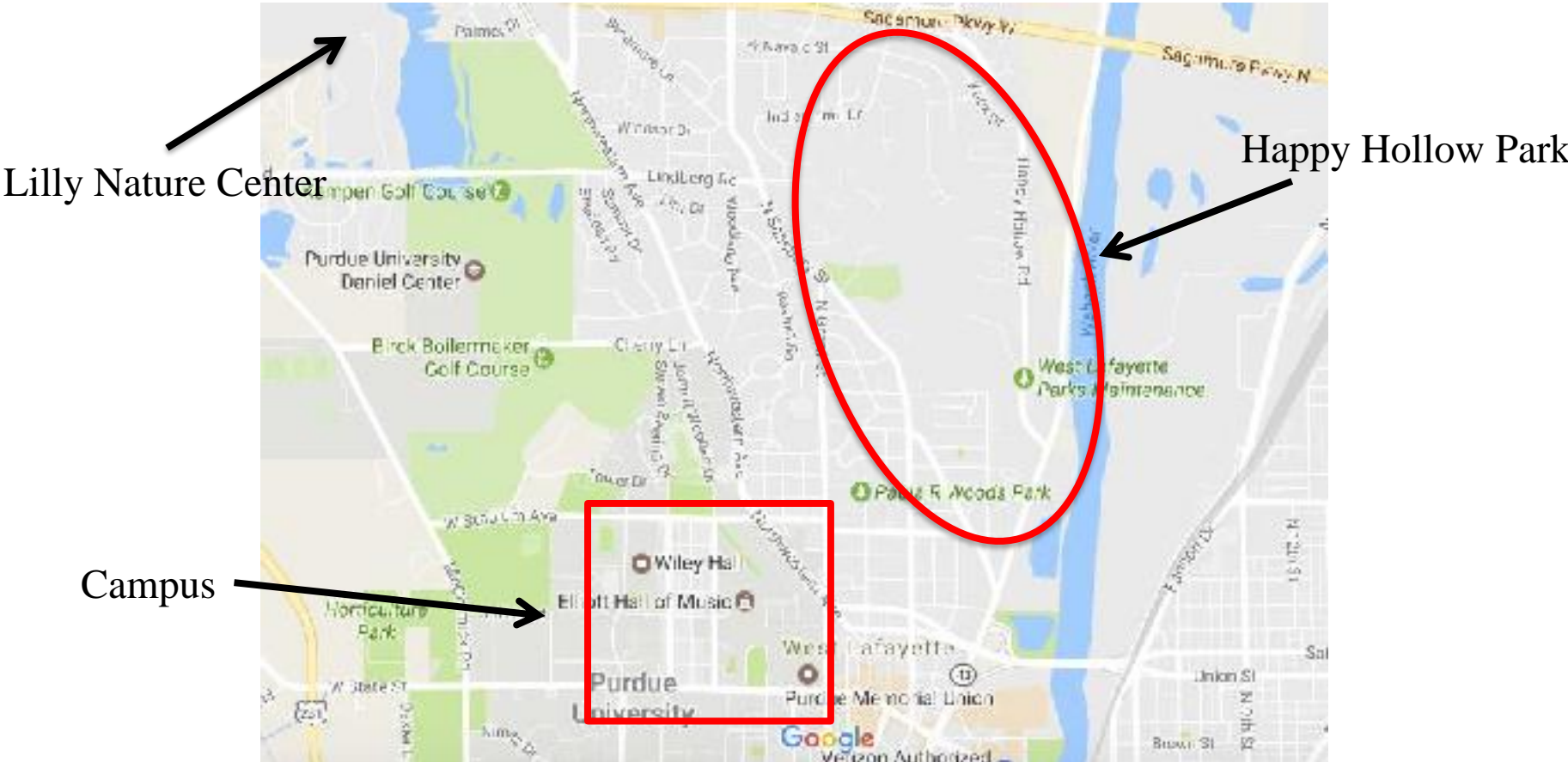
West Lafayette Parks and Recreation

- Serves to:
 - Enhance quality of life
 - Designate trails
 - Maintain the grounds of West Lafayette parks
- Working with Dan Duntun
 - Director of the Lilly Nature Center



Taken from: www.westlafayette.in.gov

Location



Happy Hollow Park

- Approximately 81 acres
 - Playground
 - Hiking/exercising trail
 - Shelters and other areas for entertaining
 - History of erosion
 - Progressively worsening for 30+ years



Taken at Happy Hollow Park, January, 2015
Information from: www.westlafayette.in.gov

Stakeholders

- West Lafayette Parks and Recreation Department
 - Utilizes solution
- Park Goers
 - Residents
 - Hikers
 - Bikers
 - Students

Project Background

- Motivation for project:
- Severe erosion throughout Happy Hollow Park
 - Types of erosion
 - **Hill-slope erosion**
 - Gullies
 - Stream bank erosion
 - Contributing sediment to the Wabash River
 - Largely natural, exacerbated due to manmade development
 - Affecting use of park (aesthetics and purpose)



Taken January, 2017

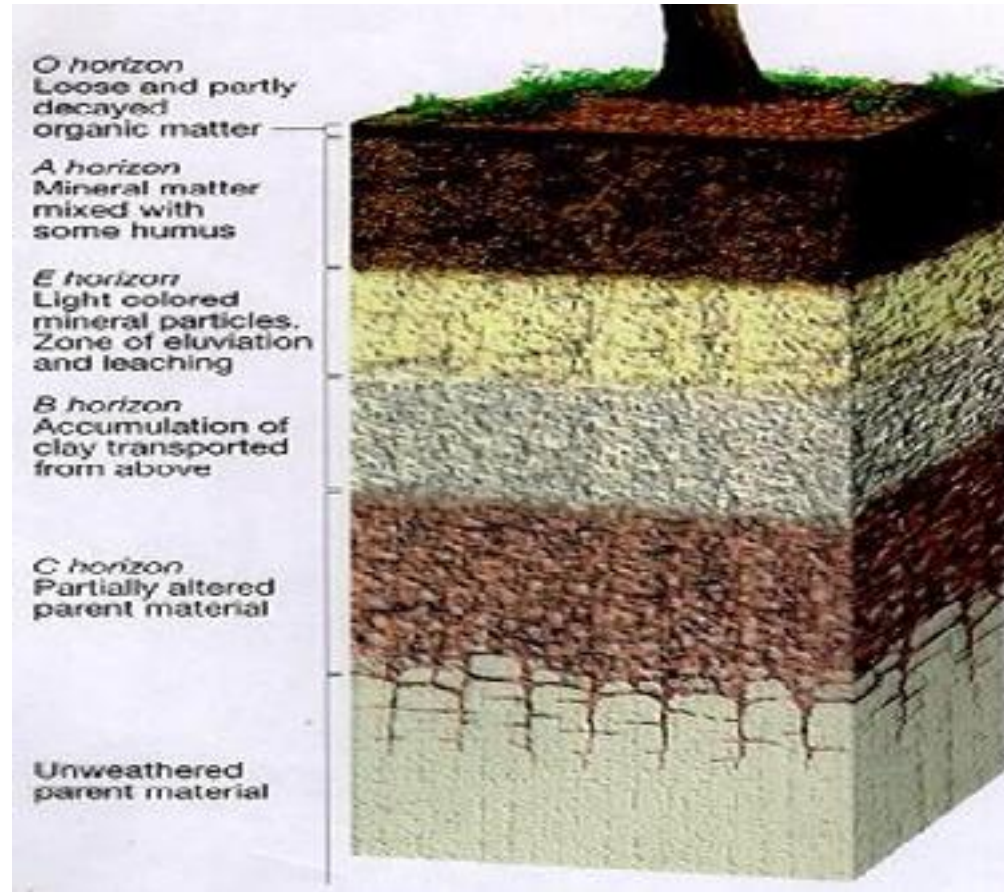
Main Problem: Erosion

- Erosion is:
 - “The process whereby materials of the earth's crust are loosened, dissolved, or worn away and simultaneously moved from one place to another” –United States Geological Survey



Taken at Happy Hollow Park, January 2014

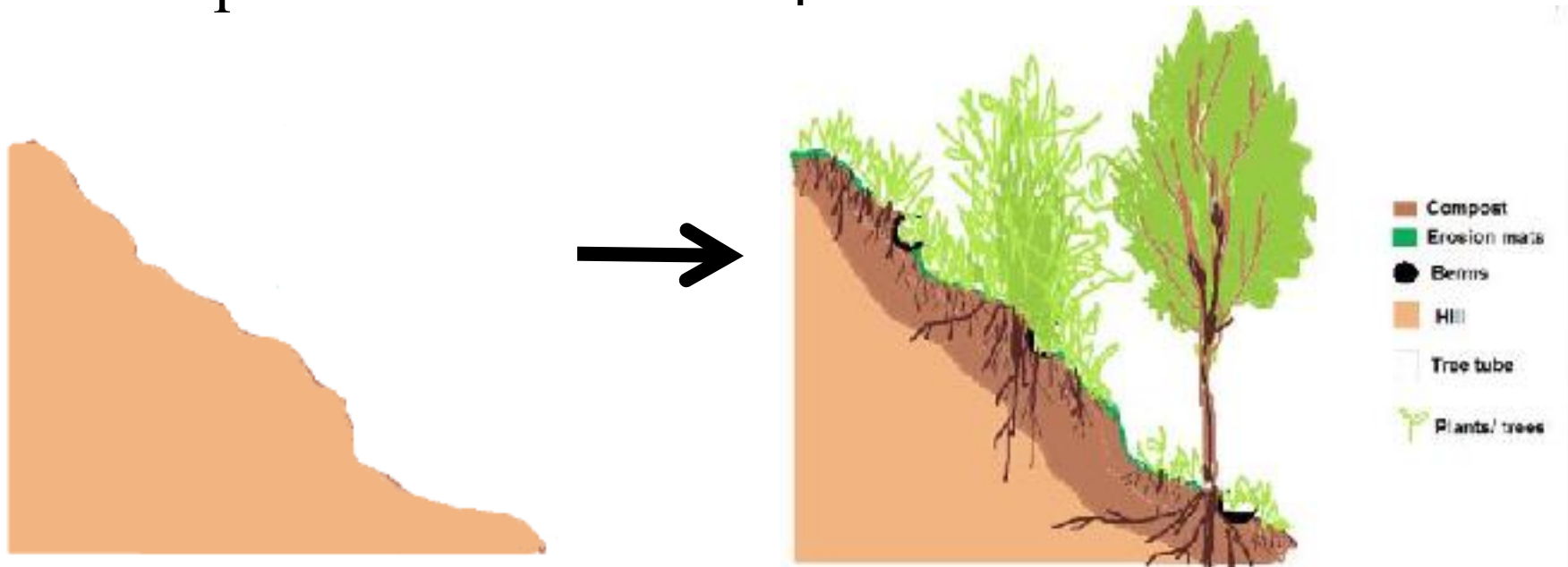
Severity Level of Erosion



Taken from: http://www.ctahr.hawaii.edu/mauisoil/images/a_profile_clip_image002_0000.jpg

Vision for Project

- Mitigate erosion on hill slopes
- Allow reestablishment of topsoil and vegetation on the park's hill sides to trap sediment



Criteria

- Withstand water flow and prevent soil detachment
- “Natural” and camouflaged
- Long lifespan (plant re-establishment)
- Safe around people/pets/wildlife
- Easy to install
- Does not leave harmful residue/pollutants

Constraints

- Must trap (average) 2 inches of soil
- Must allow for plant re-establishment on site

Hill Locations



North Hill



Taken at Happy Hollow Park, April 2016

Middle Hill



Taken September 2013



Taken October 2016

South Hill



Taken January, 2017



Taken October, 2016

Prototype 1 – Spring 2015 (Page)



Taken June 2015



Taken August 2015

Prototype 2 – Spring 2016 (Page)



April 2016



September 2016



Semester's Progress

- Estimated amounts of each material needed
- New Plant Weighted Decision Matrix (WDM) because of soil pH
- Ordered all materials
- Completed final drafts for educational component
- Pamphlets and door hangers delivered
- Outreach for volunteers and media coverage
- Volunteer days to install materials and plant

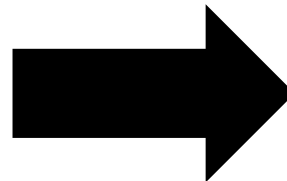
Signage



Please do not disturb the experimental plot on the hillside!

- Walking off-trail on hillsides is a major cause of erosion in Happy Hollow Park.
- Purdue EPICS is constructing an experimental plot on this hillside to test different solutions to the park's erosion problem.

EPICS



Pamphlet Design (Page)

Your Efforts

What you can do:

- Switch from using sprinklers in your gardens to using a soaker hose or hand water the plants.
- Use rain barrels to catch and hold rain for later use.

For more information, call EPICS, at 1-800-444-4444, or visit us online at <http://www.epics.purdue.edu>

- Use erosion control blankets as matting to prevent soil from being washed away.
 - Benefits: less soil loss
- Plant rain gardens to catch rain water and allow it to naturally soak into the ground.

EPICS Efforts

What is being done already?

Purdue's Water Resources Management team is working to establish new programs to help address the park's clean water flow and erosion in an efficient manner. The plan includes a series of small-scale and strategic projects.



Some of the projects include:

- Erosion
- Inlet's inlet
- Service lines
- Openings

EPICS will work with the local community to help address these issues.

Temporary structures being implemented to help address erosion.

Install storm drains. Signage to help protect one of the park's most beautiful hills. Restore storm drain (Dennis Hill).

EPICS PURDUE


Purdue Water Resources Management Team


EPICS is an acronym for **Engineering Projects in Community Service**. It is a program that allows Purdue students to serve the community within their fields of interest.

Erosion Problems and the Consequences...

How you can help

Happy Hollow Park





What is soil erosion?

Soil erosion is a natural process where the top layer of soil is removed by water and wind. It happens when the soil is washed away by rain or wind. This can lead to a loss of fertile soil and a decrease in crop yields.

How do we control erosion?

What is the solution?

- Plant trees and shrubs
- Use mulch
- Use erosion control blankets
- Use silt fences
- Use straw bales
- Use geotextiles

In Five Years...

Contaminated Waterways

High levels of sediment in the Wabash and lead to bridge failures and a decline in fish biodiversity. This would lead to the loss of jobs and a decrease in natural beauty.


Excessive Sediment

Excess sediment in the Wabash and lead to bridge failures and a decline in fish biodiversity. This would lead to the loss of jobs and a decrease in natural beauty.

Change Ahead

With the right investments and planning, we can prevent erosion and protect our waterways. This will ensure a clean and healthy future for the community.

Would you like this to happen to you?



In Five Years...

Clean Waterways


Lower sediment levels and a healthier water quality, that a decrease in fish biodiversity.

Thriving, Scenic Ecosystems

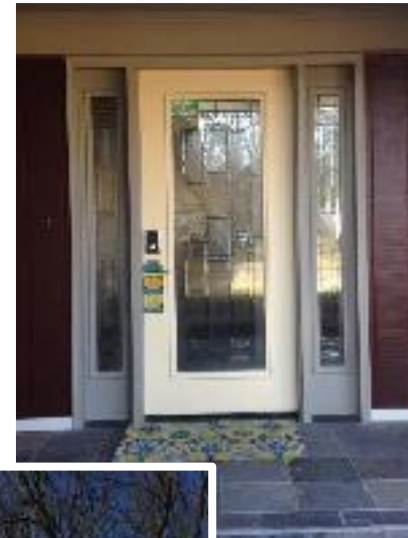
With clean waterways and manageable water flow, parks can prosper, allowing a more scenic and pleasant park for the community. There will be a fresh stream of jobs and a healthy future.

Sturdy

Sturdy erosion control structures will protect the park's most beautiful hills. This will ensure a clean and healthy future for the community.



Door hangers (Page)



Materials

- 8" x 5' Filtrex berms
- Erosion mats
- Stakes
- Compost
- Plants, trees, and shrubs
- Miracle Tubes



Budget

Item	Number needed	Cost
Door hangers	500	103.47
Pamphlets	50	37.50
Erosion mats	3	190.00
Berms	37	1,543.44
Trees: wildlife packet	1	101.03
Tree tubes and rebar	115	437.02
Compost	14	69.58
Plants	980	1,649.40
Miscellaneous		315.64
	Total	4,447.08

Plants Used Spring and Fall 2016

- Creeping red fescue
- Annual ryegrass
- Columbine
- Jacob's ladder
- Blue wood aster

- Flowering dogwood
- Allegheny serviceberry
- Spicebush



Taken from:

<http://m5.i.pbase.com/g6/26/411626/2/78880705.9YK57Ybu.jpg>

Taken from:

http://www.mtcubacenter.org/images/plant-finder/Cornus_florida_2.jpg

Plants (Page)

- Beak Grass
- Bur-reed Sedge
- Red Columbine
- Short's Aster
- Downy Skullcap



http://www.midwestgroundcovers.com/_ccLib/image/plants/DETA-2159.jpg



<http://www.easywildflowers.com/quality/aqu.ca4.jpg>



http://www.wildflower.org/image_archive/320x240/SAW/SAW_00430.JPG



<http://www.easywildflowers.com/quality/skullariaincana.jpg>

Trees and Shrubs

Jasper-Pulaski State Nursery: wildlife packet

- American plum
- Common chokeberry
- Elderberry
- Black chokeberry
- Hazelnut
- Washington hawthorn
- Hackberry
- Black cherry
- Gray dogwood
- Pawpaw
- Persimmon
- Shagbark hickory



<http://cdn.mommypotamus.com/wp-content/uploads/2014/09/elderberry-syrup-recipe.jpg>

<http://www.carolinanature.com/trees/caov0280s.jpg>

Volunteer Days – March 31 & April 1



Volunteer Days – April 8



Volunteer Days – April 8



Before & After



March 31, 2017



April 8, 2017



April 16, 2017

Media Coverage

- Volunteer day
 - 1 minute news story
 - Transcript
 - Aired on Television, posted on website and Twitter



News Story

<http://www.wlfi.com/story/35103489/students-volunteers-help-prevent-soil-erosion-at-happy-hollow-park>

Final Report

- Includes:
 - Background
 - Past semesters' progress
 - Bill of materials
 - Educational component
 - Progress on test site and new test sites
 - Plan for future
 - Financial Statements

Maintenance

- Water plants once a week if there has been no rain
 - For first growing season (through September)
- After one year if trees have established well enough to survive without protection, remove Tree Pro Miracle Tubes

Follow Up

□ EPICS

- Leave documentation for future teams on SharePoint
- Give park plant totals for each hill
- Remind park about follow up and maintenance once a month for the first year

□ West Lafayette Parks and Recreation Department

- Count plant survival rate
 - Survival rate on a per hill basis (not overall)
 - If less than 70% consider replanting

Neighborhood Best Management Practices Tour

- Over the Summer
- Andrew will be there to explain the problem
- Continue to educate community members about the project

Questions and Feedback?



Taken at Happy Hollow Park, October 2013