



**Neighborhood
Drainage
Infrastructure
Improvements Using
Green Initiatives**

Village of Hinsdale, IL

Presentation Agenda



- Project Overview
- Goals and Objectives
- Design Approach
- Public Coordination
- Recap
- Questions

Project Location



Project Location





Previous Studies

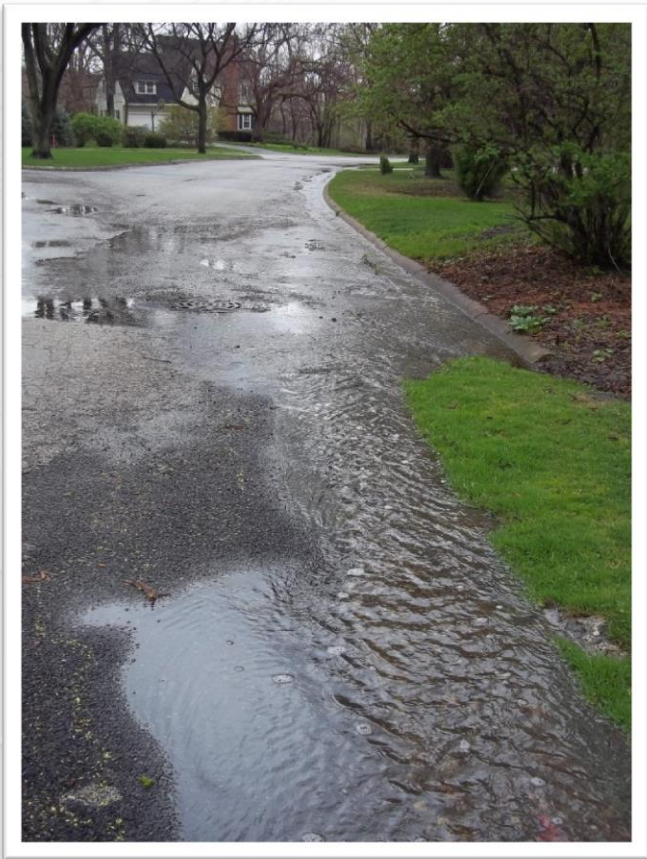
- September 2008 Drainage Study
 - Reconstruct roadways with curb and gutter
 - Traditional storm sewer conveyance
 - Large storm sewers with underground detention were required
 - Design provided collection and conveyance of 100-year, 24-hour duration storm
 - 2008 Cost estimate for drainage improvements - \$24.4 Million

- December 2009 Feasibility Study
 - Focused on “green initiatives”
 - Combination of rain gardens, permeable pavers, and underground storage was utilized to model 100-year, 24-hour duration storm
 - Projected costs for drainage improvements - \$15.0 Million

Existing Conditions



Existing Conditions



Existing Conditions



Existing Conditions



Existing Conditions



Existing Conditions



Existing Conditions



Goals and Objectives



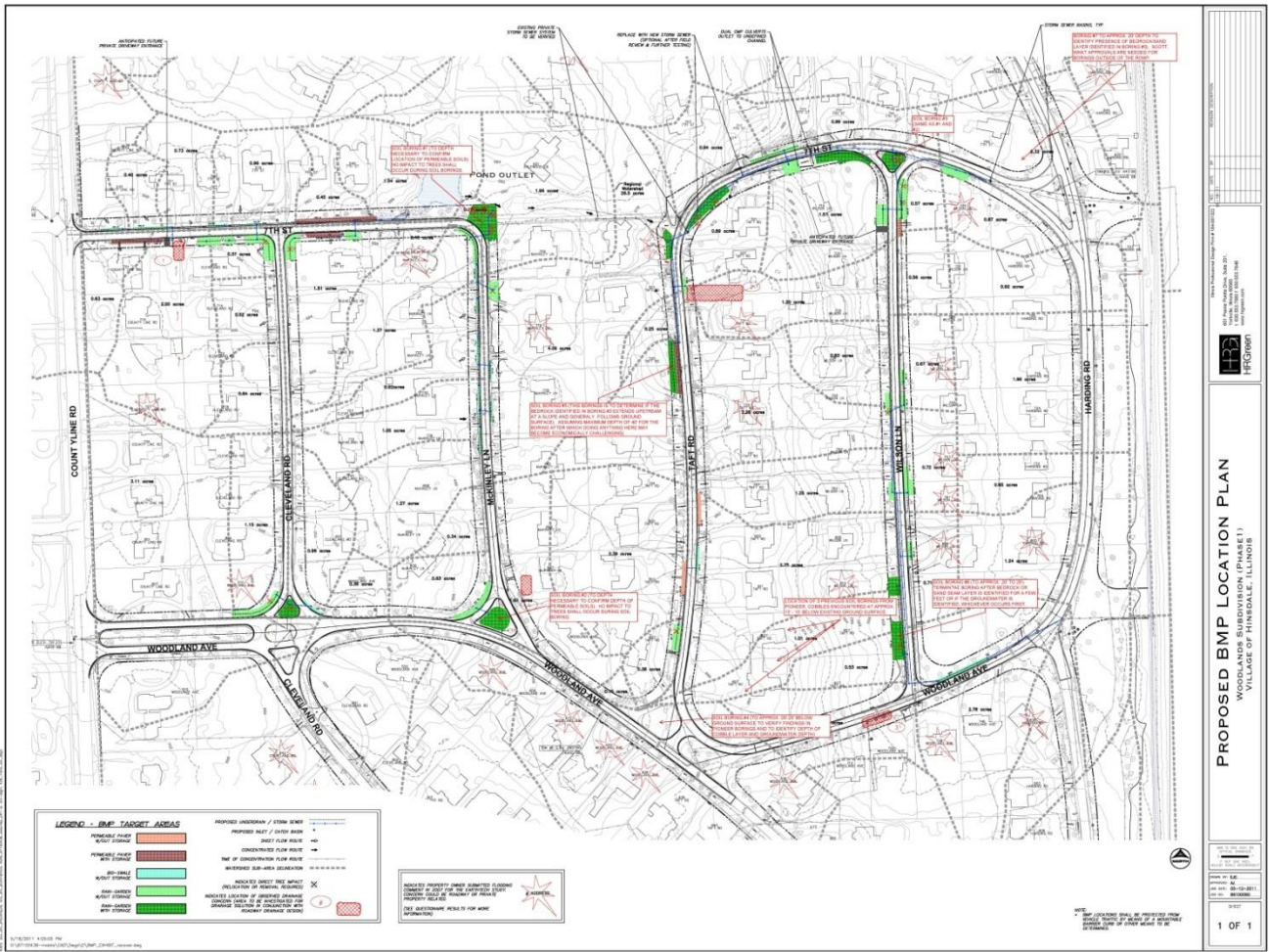
- Maintain Subdivision Characteristics
- Minimize increase in impervious area
- Stay within ROW
- Minimize Storm Sewers
- Maximize BMP's for infiltration and storage
- Minimize Tree impacts
- Minimum 10-year storm with no surcharge

Design Approach

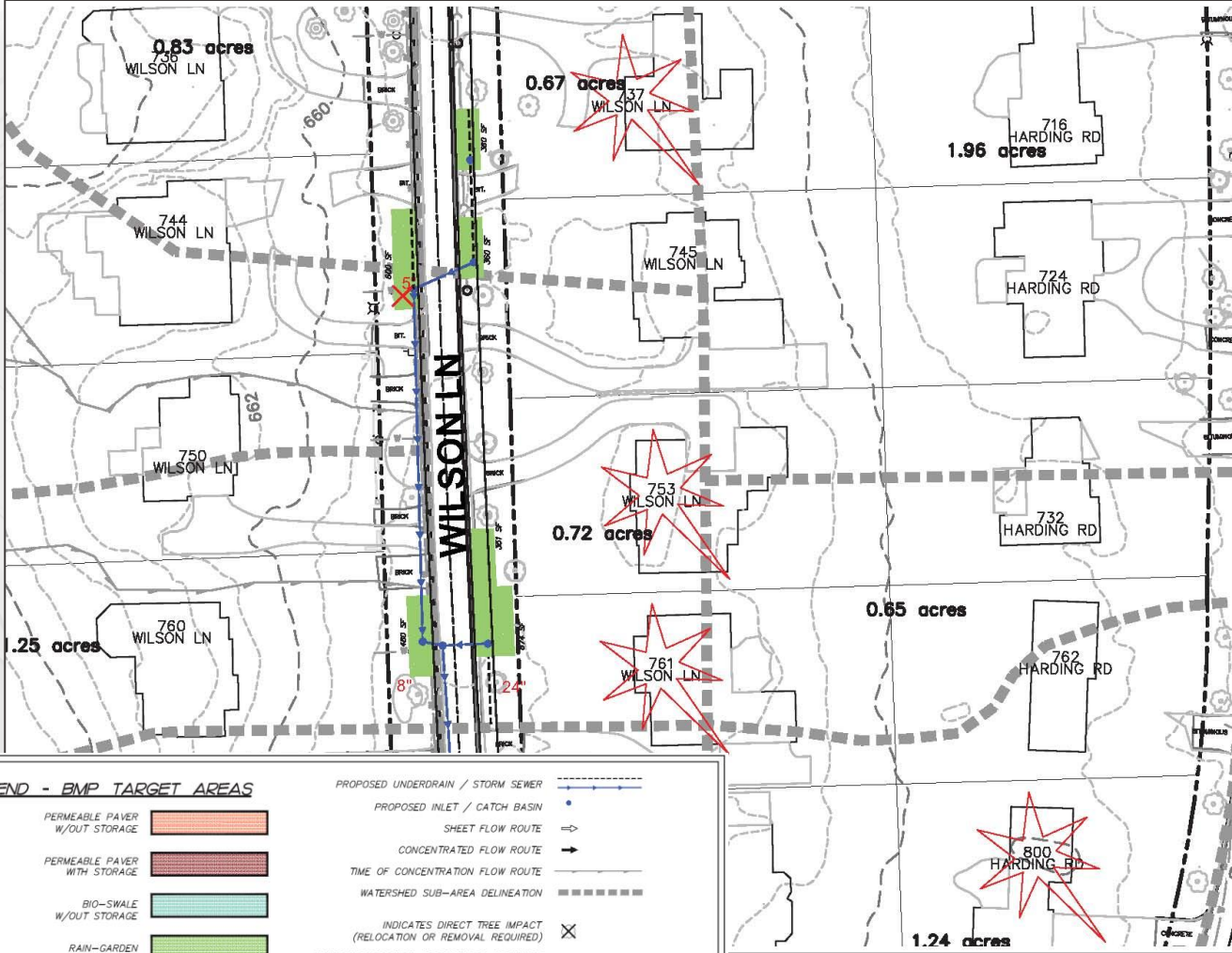


- Identify flooding locations
- Delineate sub-watershed areas (approx. 1 – 2 acres max.)
- Develop flow path and correlate to flooding locations
- Develop concept BMP's (type and location)
- Verify suitability for infiltration using soil borings
- Review conveyance path
- Series of staff meetings and public meetings
- Finalize concept BMP's
- Develop a XP-SWMM model
- Finalize stormwater management plan and design

Concept Exhibit



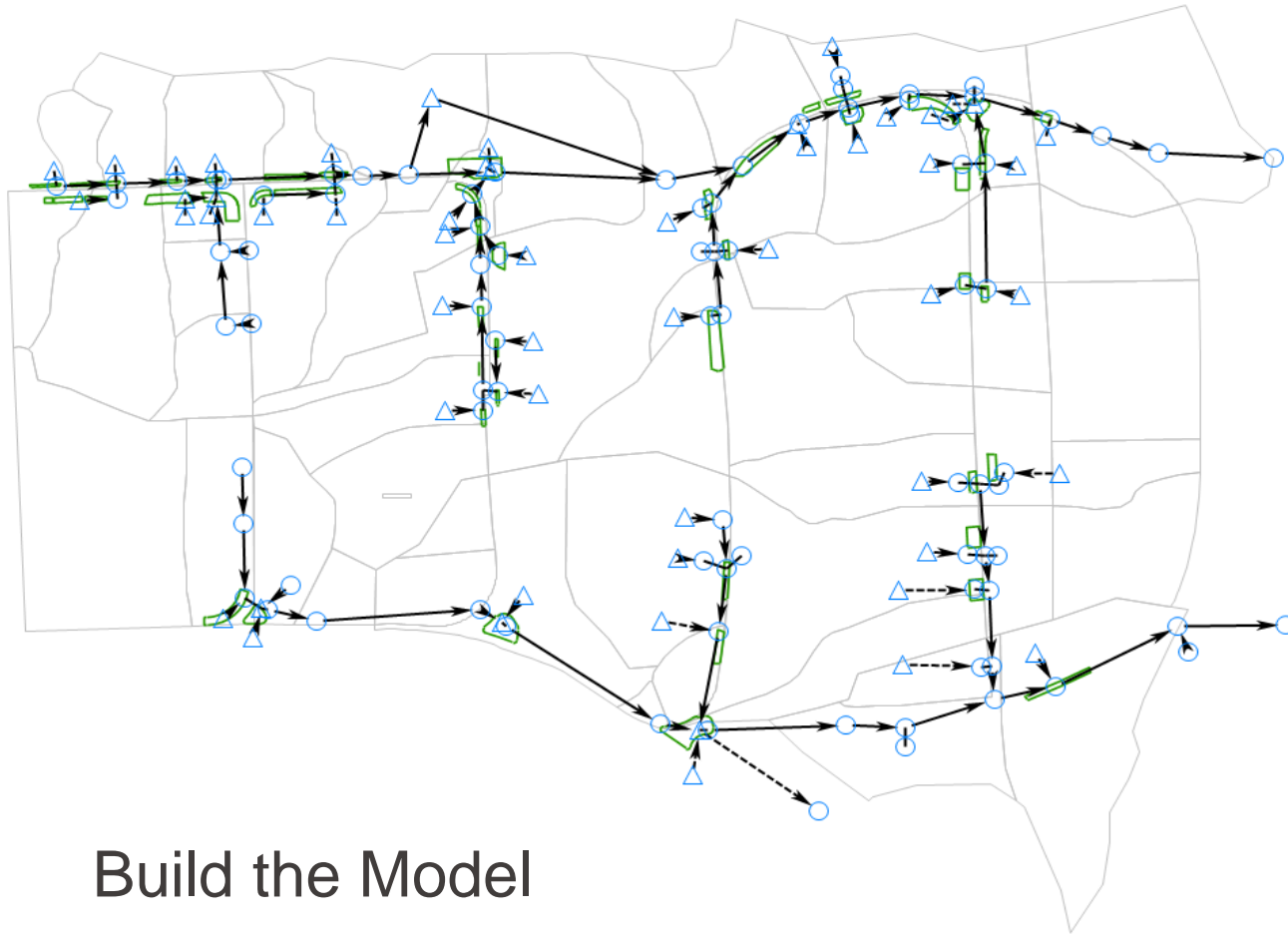
Concept Exhibit



LEGEND - BMP TARGET AREAS

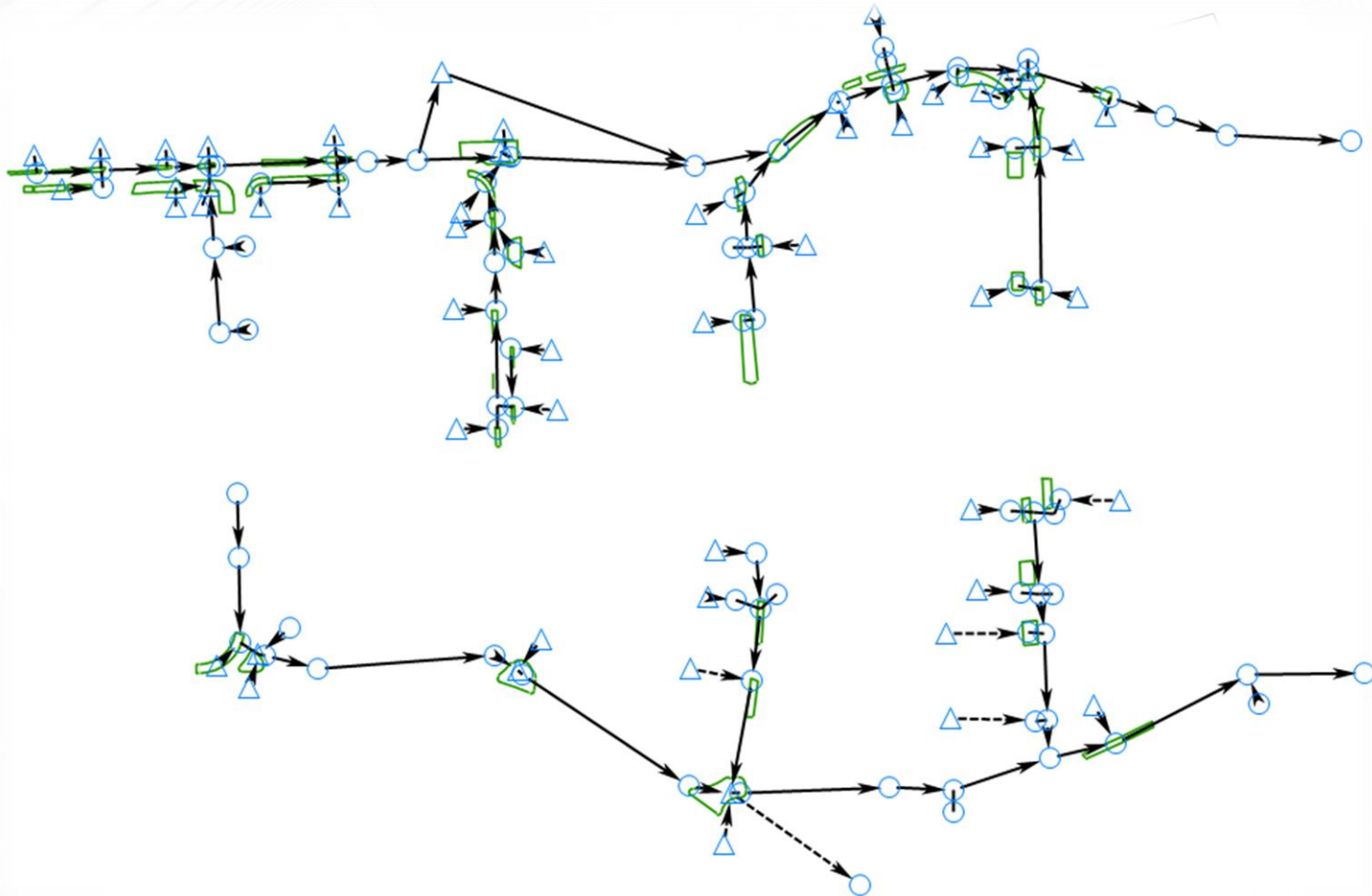
PERMEABLE PAVEMENT W/OUT STORAGE		PROPOSED UNDERDRAIN / STORM SEWER	
PERMEABLE PAVEMENT WITH STORAGE		PROPOSED INLET / CATCH BASIN	
BIO-SWALE W/OUT STORAGE		SHEET FLOW ROUTE	
RAIN-GARDEN W/OUT STORAGE		CONCENTRATED FLOW ROUTE	
RAIN-GARDEN WITH STORAGE		TIME OF CONCENTRATION FLOW ROUTE	
		WATERSHED SUB-AREA DELINEATION	
		INDICATES DIRECT TREE IMPACT (RELOCATION OR REMOVAL REQUIRED)	
		INDICATES LOCATION OF OBSERVED DRAINAGE CONCERN (AREA TO BE INVESTIGATED FOR DRAINAGE SOLUTION IN CONJUNCTION WITH ROADWAY DRAINAGE DESIGN)	

Model Set-up

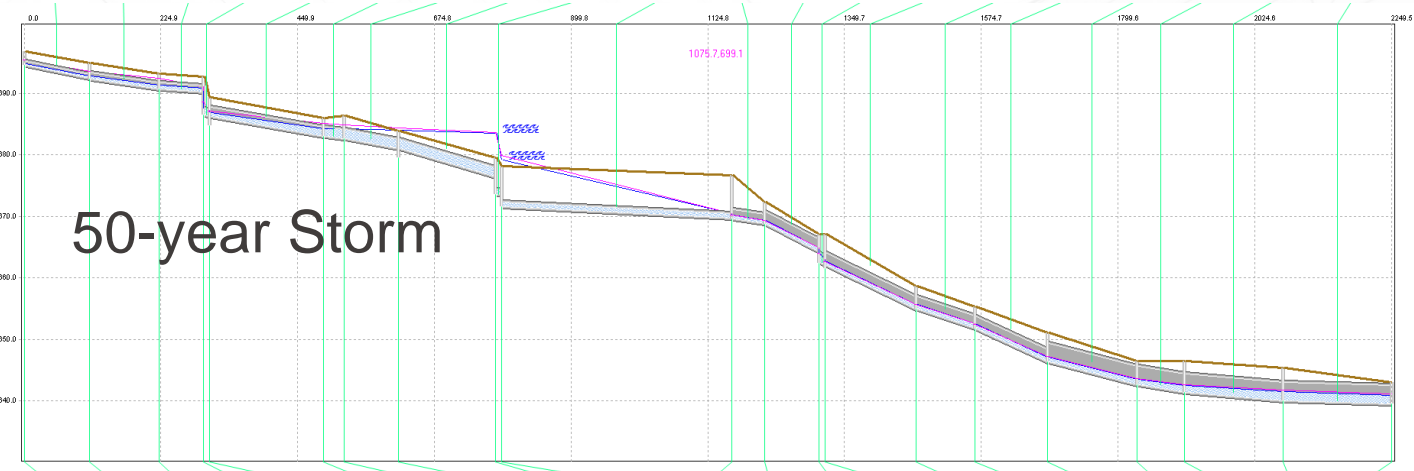
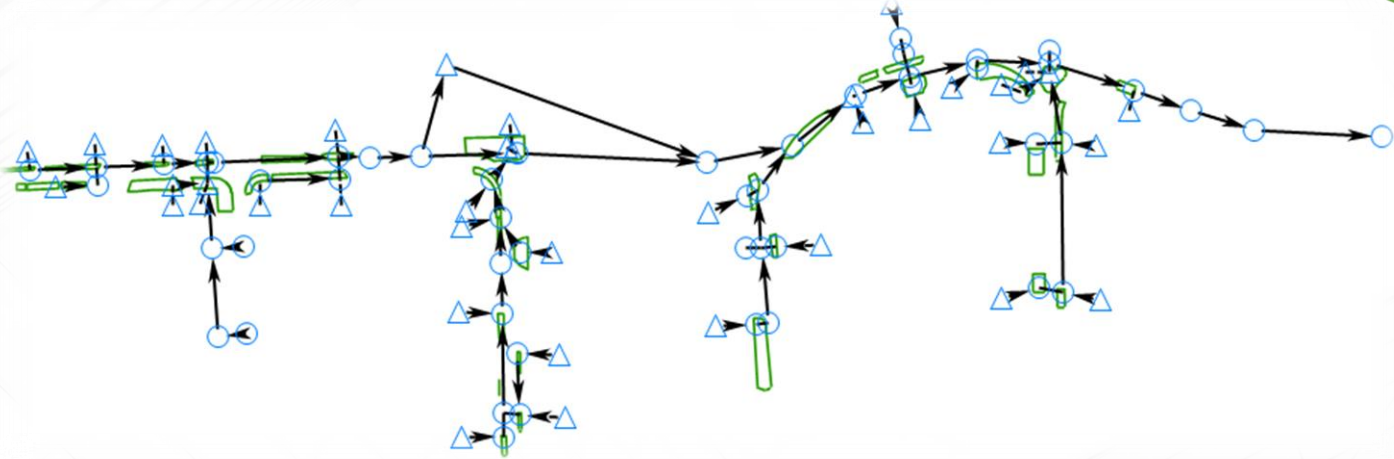


Build the Model

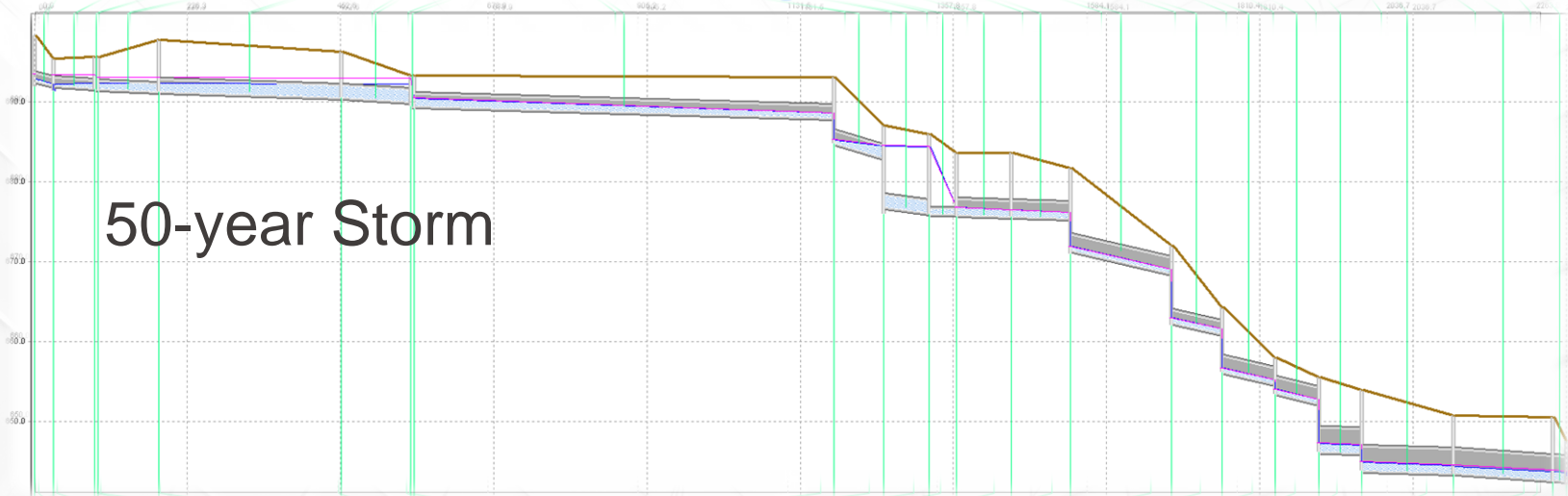
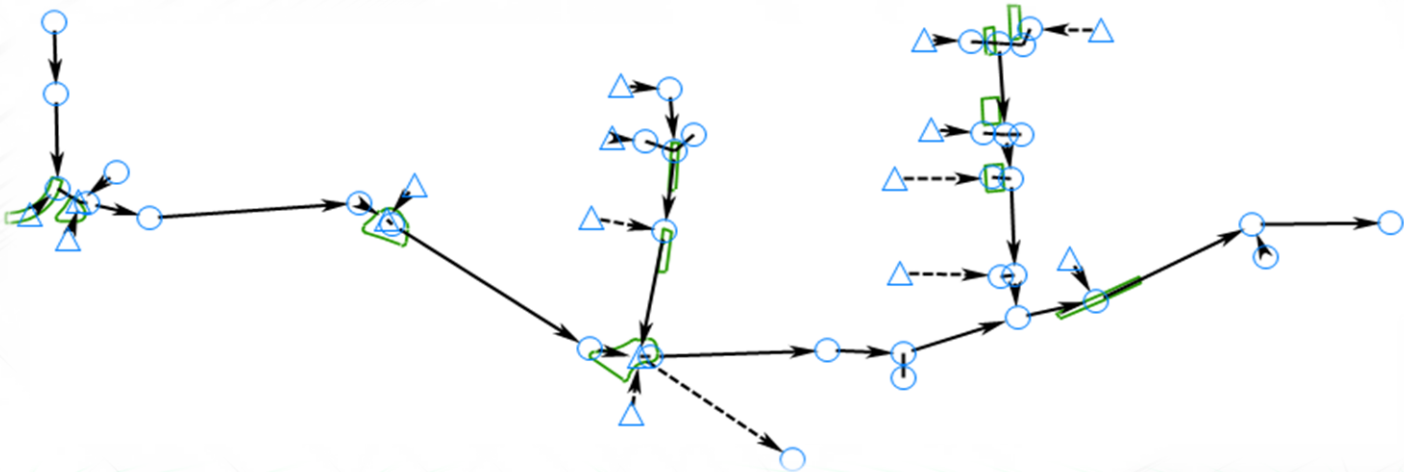
XP SWMM model of Phase 1



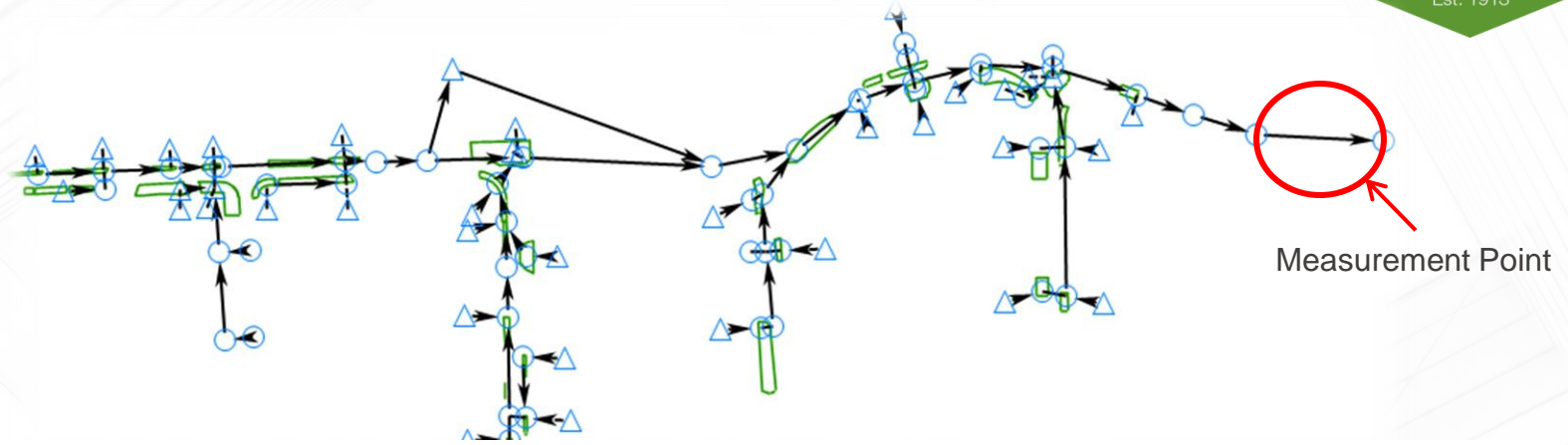
North System



South System

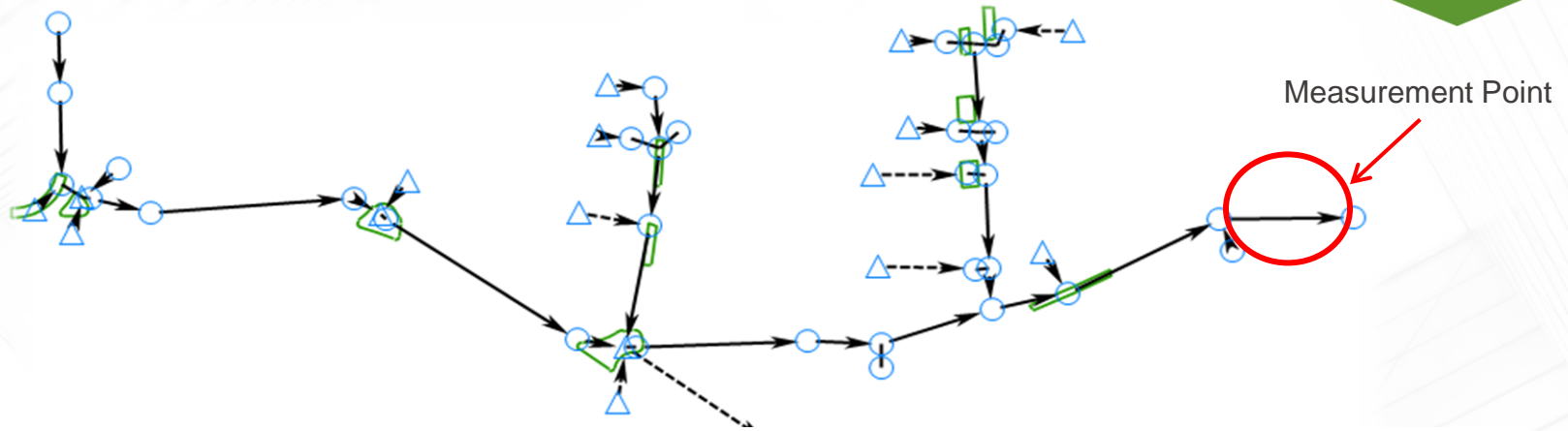


North System



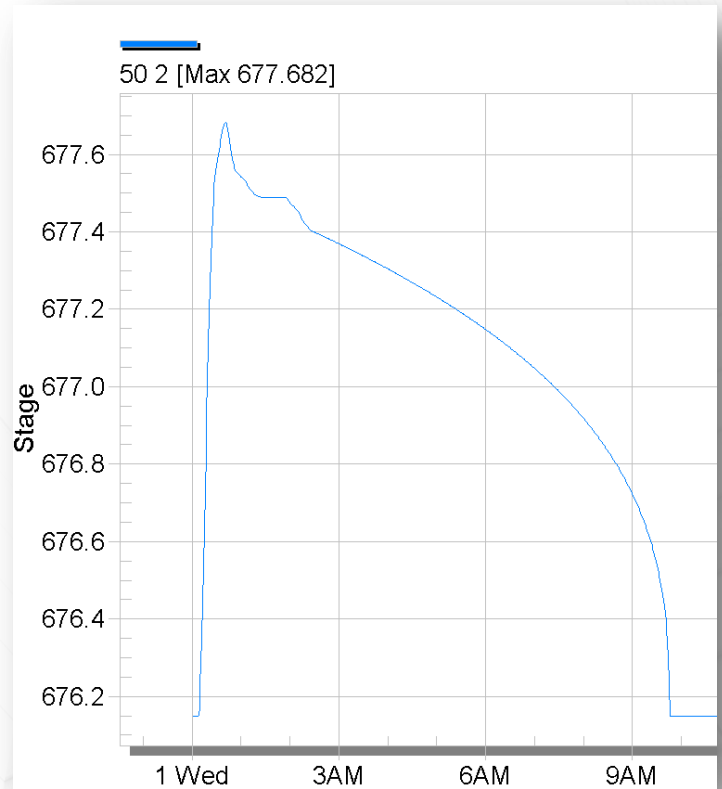
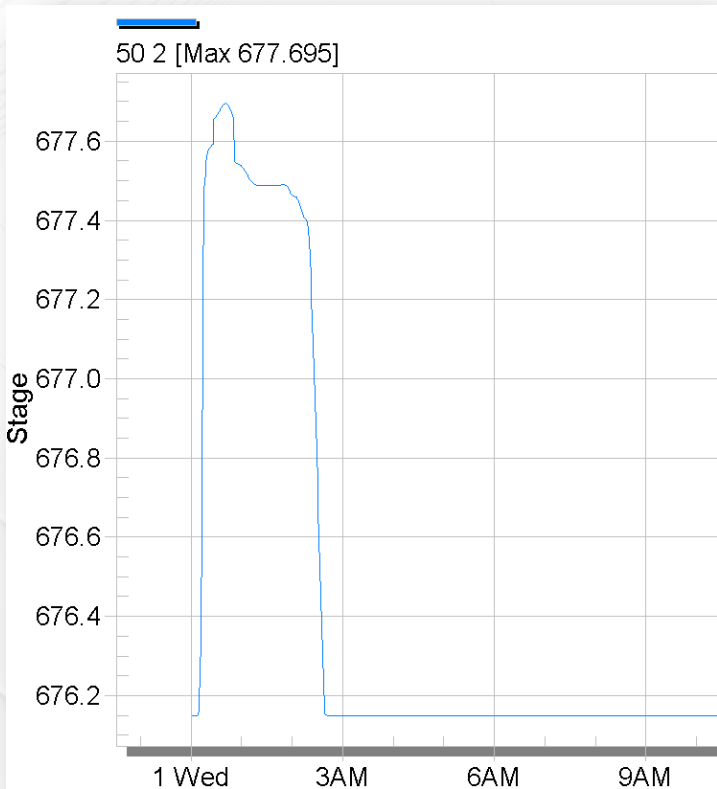
Event	Peak Flow Without BMPs	Peak Flow With BMPs	% Reduction
50-year 2-hour	69.85 cfs	23.45 cfs	66%
10-year 2-hour	35.25 cfs	15.87 cfs	55%

South System



Event	Peak Flow Without BMPs	Peak Flow With BMPs	% Reduction
50-year 2-hour	44.04 cfs	15.67 cfs	65%
10-year 2-hour	22.98 cfs	9.47 cfs	58%

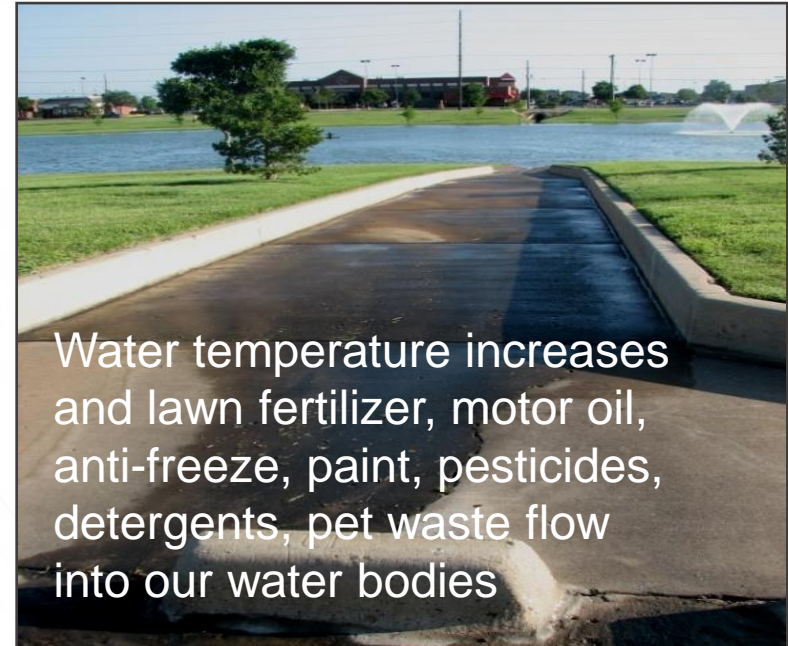
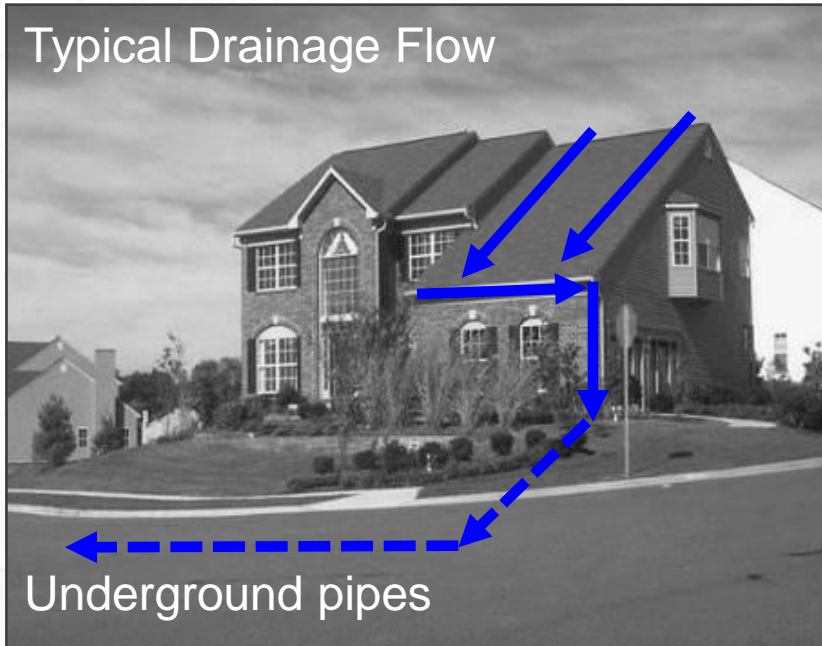
Hydrographs



Landscape Approach and Concept



Conventional methods - Collect, concentrate and convey polluted runoff directly to our lakes, streams and groundwater.



NEW WAY – Rain gardens and bio-swales

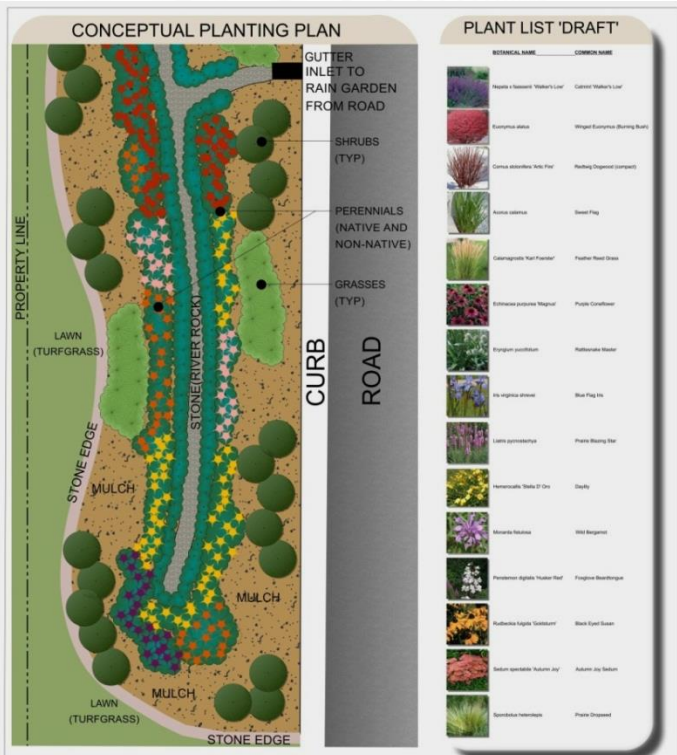
- filter the pollutants
- cool the water down
- infiltrate into the sub-surface

Native landscape plants are often used in these stormwater features.

Landscape Approach and Concept



Mix of Non-Native Plants....



...and Illinois Native Plants



RAIN GARDEN FACTS

What is a rain garden?
A rain garden is a garden depression that allows rainwater runoff from impervious areas (i.e., roofs, driveways, walkways, streets) and porous areas (i.e., lawns) to be collected and filtered through natural processes. Utilizing rain gardens reduces storm water runoff by allowing rain water to soak into the ground as opposed to flowing into storm drains which causes erosion, water pollution, flooding, and diminished groundwater. Native plants are typically installed in rain gardens because they don't require fertilizer and are more tolerant of local climate, soil, and water conditions. However, non-native plants can also be utilized. A variety of natural edge vegetation, such as shrubs, single, native, ferns, shrubs and small trees soak up or absorb the water flowing into the rain garden. Water flows through the plants and soil layers before entering the groundwater system or man-made storm drainage system.

REPRESENTATIVE RAIN GARDEN PHOTOS



DESIGN INTENT

The design intent is to create a rain garden that is a mix of native and non-native plants. Design elements will include:

- Use of native plants, grasses & perennial plants of similar heights and colors.
- Use of native shrubs, ferns and grasses.
- Use of native trees to provide shade and structure.
- Use of native plants to provide structure and shade.
- Use of native plants to provide shade and structure.

CURB TREATMENT

All high-traffic curb areas will be treated with a curb treatment. The curb treatment will include:

- Use of native plants to provide shade and structure.
- Use of native plants to provide shade and structure.
- Use of native plants to provide shade and structure.

STONE TREATMENT

Stone will be used to provide structure and shade. The stone treatment will include:

- Use of native plants to provide shade and structure.
- Use of native plants to provide shade and structure.
- Use of native plants to provide shade and structure.

RAIN GARDEN/BIO-SWALE DESIGN INTENT

THE WOODLANDS
HINSDALE, IL

DECEMBER 9, 2011
NET TO SCALE



Landscape Approach and Concept



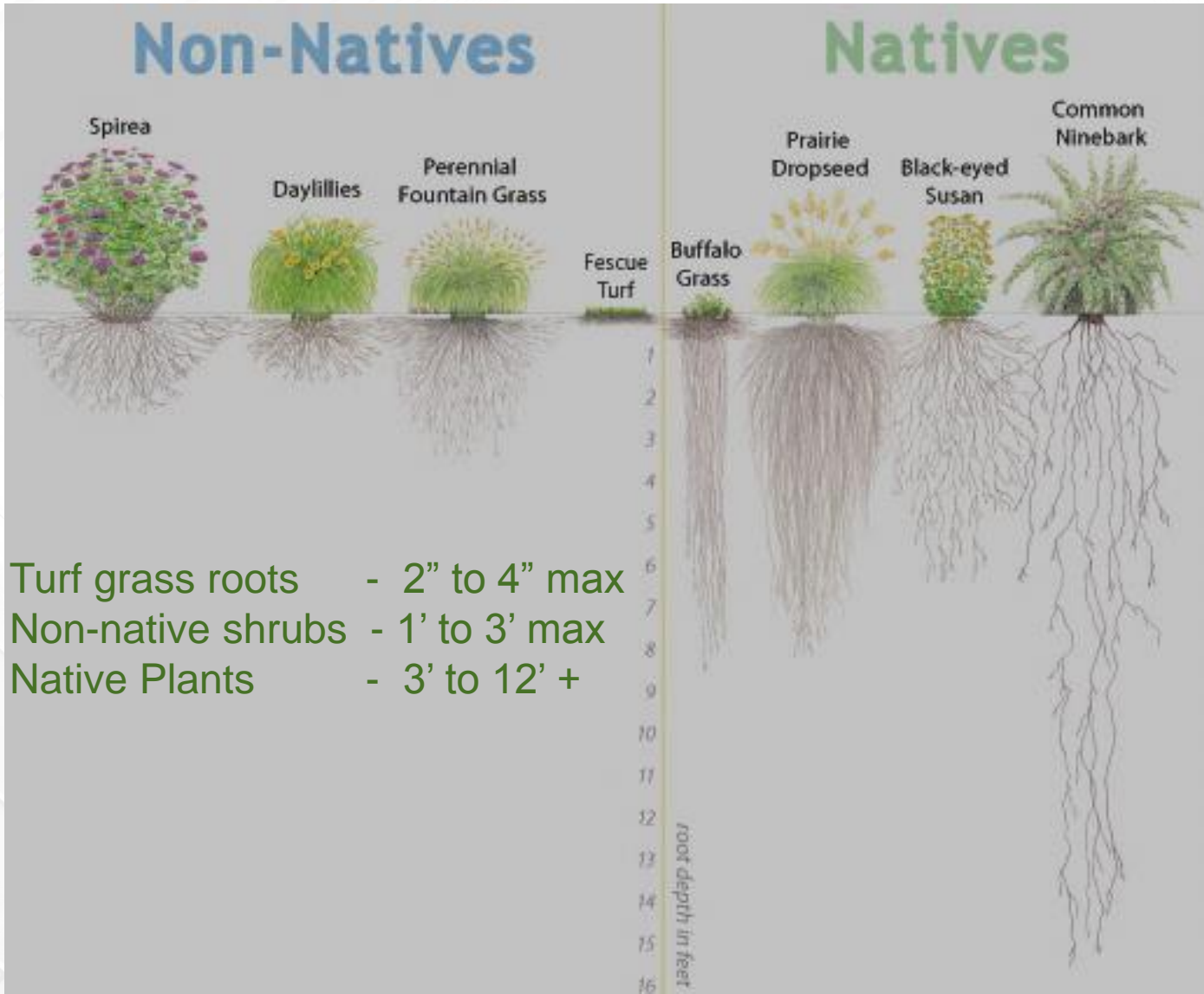
The landscape palette needed to blend in with this manicured neighborhood...

Landscape Approach and Concept



BE CAREFUL WITH THE LANDSCAPE!
Native landscape plants look like weeds to most people...

Landscape Approach and Concept



Turf grass roots - 2" to 4" max
Non-native shrubs - 1' to 3' max
Native Plants - 3' to 12' +

Landscape Approach and Concept



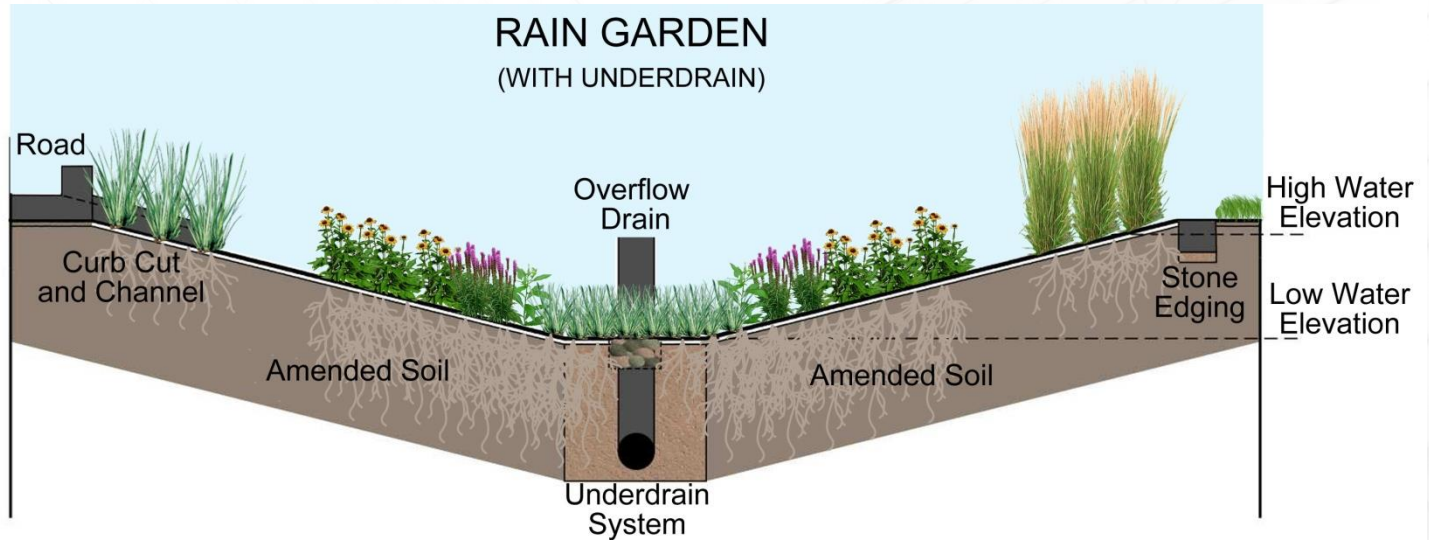
KEY ELEMENTS OF THE RAIN GARDENS AND BIO-SWALES

SOIL MIXTURE

30% sand, 30% compost and 40% topsoil

NATIVE PLANT MIX (low areas only)

COMMON NAME	BOTANICAL	PERCENTAGE
Nodding Wild Onion	(<i>Allium cernuum</i>)	25%
Blue Flag Iris	(<i>Iris virginica</i>)	25%
Common Fox Sedge	(<i>Carex stipata</i>)	25%
Foxglove Beardtongue	(<i>Penstemon digitalis</i>)	25%





During construction – under drains are critical with poor sub-surface soils (i.e. clay).



Landscape plant palette was modified above large underground storage units.





Under construction.

Landscape Approach and Concept



- The goal was to have a more “clean look” than all native plants that may appear “weedy” in a more urban environment.
- Maintenance is key for long term success.

Public Coordination

- 2005 – Drainage and Woodlands Improvement Task Force (DWIT)
- 2007 – Woodlands-Highlands Drainage Study (Traditional Study)
 - Questionnaires – 217 residences (82 responses)
- 2009 – Woodlands Green Initiatives for Stormwater Management Study
 - Neighborhood Meeting (s) – support for Green Initiative



Public Coordination



- 2011 - The Woodlands Phase 1 Design -
 - May 2011 - Concept Plan Review w/ Arborist, Village Engineer, Village Manager, Public Works Director
 - June 2011 – Neighborhood Meeting
 - Improvements Concept Plan
 - Roadway Typical Section
 - Rain Garden/Bio-swale Details
 - Planting Species & Details
 - Special Service Area



Public Coordination



- Summer 2011 – Neighborhood Survey
 - Proposed Concept Improvements
 - Special Service Area (SSA)
- Winter 2011 - Project Concept/SSA Concurrence
- Feb. 2012 – Neighborhood Meeting
 - 60% Plans & Specifications
 - Planting Plans & Details
- Summer 2012 – Phase 1 Construction
 - Field Stake Rain Gardens/Bio-swales
 - Field Meetings - Individual Residences
 - Field Adjustment of Design Elements



Recap



- Green Initiatives, a viable cost effective tool for stormwater management
- Potential 20% to 40% cost savings over traditional stormwater management
- Start public coordination early and make it an ongoing process during the design and implementation of your project
- Make your BMP details and specifications as clear as possible including effective erosion control management during construction



QUESTIONS?