



INDIANA OFFICE OF
Community & Rural Affairs

Welcome!

Green Infrastructure Curriculum & Training

SIP the Green Juice!

Session 2: Policies, Incentives & Funding



INDIANA OFFICE OF
Community & Rural Affairs

Today's Speakers



**CHRISTOPHER B. BURKE
ENGINEERING, LLC**

Sheila McKinley



CURRY & ASSOCIATES, INC.
CONSULTING ENGINEERS & ARCHITECTS

Sarah Hudson



JRM Environmental

Robin Feller



Three Sessions

1. Overview of Green Infrastructure
- 2. Policies, Incentives, and Funding for Green Infrastructure**
3. Implementation of Green Infrastructure



Overcoming Barriers

1. Technical & Physical Barriers
2. Legal & Regulatory Barriers
3. Community & Institutional Barriers
4. Financial Barriers



1. Technical & Physical Barriers

TRUE OR FALSE...

There is not enough data demonstrating green infrastructure performance.

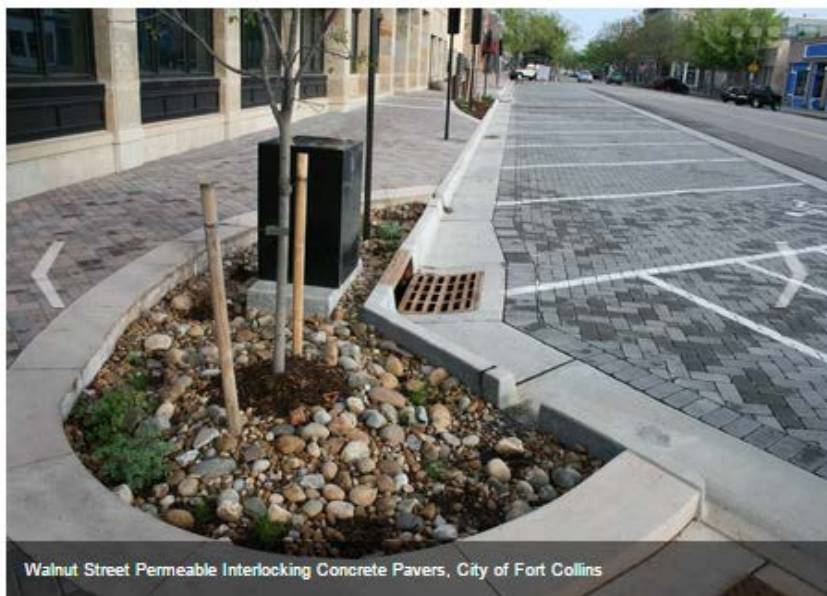


1. Technical & Physical Barriers

~~TRUE OR FALSE...~~

There is not enough data demonstrating green infrastructure performance.

<http://www.bmpdatabase.org/index.htm>



Walnut Street Permeable Interlocking Concrete Pavers, City of Fort Collins

Welcome! The International Stormwater Best Management Practices (BMP) Database project website features a database of over 530 BMP studies, performance analysis results, tools for use in BMP performance studies, monitoring guidance and other study-related publications. New to the site? [Start Here](#)

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- News**
- [2014 BMP Database Release](#)
 - [2014 BMP Performance Summaries](#)
 - [2013 Advanced Analysis](#)
 - [National Stormwater Quality Database Has A New Home](#)

- Related Databases & Research**
- [National Stormwater Quality Database](#)
 - [Agricultural BMP Database](#)
 - [Construction BMP Database](#)
 - [Chesapeake Bay Research Portal](#)

- Urban Stormwater Research Reports**
- [2014 BMP Performance Summaries](#)
 - [2014 Statistical Appendices](#)
 - [2012 Manufactured Device Performance Analysis Summary](#)
 - [2012 Volume Reduction in Bioretention](#)
 - [2012 Database Overview](#)
 - [2012 Chesapeake Bay BMP Performance Summary](#)


- Retrieve Urban Stormwater BMP Performance**
- [BMP Study Retrieval Tool](#)
 - [BMP Map Tool](#)
 - [BMP Category Reports](#)
 - [Online Statistical Analysis Tool](#)
 - [Download Access Database](#)



BMP Database - Google Chrome

BMP Database x Settings x

www.bmpdatabase.org/help.html



International Stormwater BMP Database

Home Get Data - Submit Data - Documents - Guidance - About -

What Type of User Are You?	Intended Use	Typical Users
Low-Intensity	Get Basic Performance Summary Information for BMPs	Public officials, casual users, those seeking quick/fast answers
Mid-Intensity	Get Detailed Statistical Analysis for Individual BMPs	Consultants, public works staff, designers
Researcher	Download the Master Database to Conduct Independent Analysis	University researchers
Data Provider	Obtain Data Entry Spreadsheets	Public agencies, consulting firms, university researchers
New to BMP Monitoring	Obtain Monitoring Guidance	Public agencies, consulting firms, university researchers, graduate students

BMP Fact Sheet

PLANTER BOXES

Planter boxes receive runoff from multiple impervious surfaces, which is used for irrigation of the vegetation in the planter box preventing stormwater from directly draining into nearby sewers. They also play an important role in urban areas by minimizing stormwater runoff, reducing water pollution, and creating a greener and healthier appearance of the built environment by providing space for plants and trees near buildings and along streets. There are three main types of planter boxes which can be used on sidewalks, plazas, rooftops, and other impervious areas: contained, infiltration, and flow-through.



Figure 1 Streetside planter, Portland, OR (city of Portland, Bureau of Environmental Services)

Potential Applications		Stormwater Quantity Functions	
Residential	Yes	Volume	Low/Med
Commercial	Yes	Groundwater Recharge	Low/Med
Ultra Urban	Yes	Peak Rate	Low
Industrial	Limited	Stormwater Quality Functions	
Retrofit	Yes	TSS	Medium
Highway/Road	No	TP	Medium
Recreational	Yes	TN	Low/Med
		Temperature	Low/Med

Additional Considerations	
Cost	High
Maintenance	Medium
Winter Performance	Medium

Variations

- Contained
- Infiltration
- Flow-through

Key Design Features

- May be designed as pretreatment
- May be designed to infiltrate
- Captures runoff to drain out in three to four hours after a storm event
- Receives less than 15,000 ft² of impervious area runoff
- Planters should be made of stone, concrete, brick, or pressure-treated wood

Benefits

- Enhances the area where they are placed
- Potential air quality and climate benefits
- Can be used in a wide range of areas, including ultra-urban

Limitations


- Limited stormwater quantity/quality benefits
- Relatively high cost due to structural components

Stormwater Technical Standards should include BMP Fact Sheets that include information on:

- APPLICATION
- STORMWATER FUNCTION
- VARIATIONS
- KEY DESIGN FEATURES
- SITE FACTORS
- BENEFITS
- LIMITATION
- DESCRIPTION & FUNCTION
- CALCULATIONS
- CONSTRUCTION
- MAINTENANCE
- COST
- AESTHETICS/HABITAT
- COLD CLIMATE
- DESIGN/REVIEWER CHECKLIST

CT NEMO Program - Google Chrome
 nemo.uconn.edu/tools/app/raingarden.htm



- CT LID Atlas
- CT LID Regulations
- Impervious Cover TMDL
- LID/GI Photo Gallery



Rain Garden App

A Mobile App for designing, installing, and maintaining a Rain Garden

Download the Rain Garden App first. "Rain Garden" is a **FREE app** designed to help you properly install a rain garden at your home, office, or job site. Through video tutorials, diagrams, text, and tools, the App guides you through determining the size and placement of your garden, selecting plants, digging and planting your garden, and maintaining your garden. It also includes tools for determining your soil type, measuring the size of the area that will drain to your garden, and managing multiple rain garden projects.

Download on the  **App Store** | Download for  **Android**

Help Promote the App! [Click here](#) to request App promo cards to display in your town hall or business.

To learn more about Rain Gardens visit the [NEMO Rain Garden Website](#).

For more information about the App, if you are interested in expanding the App's tools to your area, to make suggestions or to simply heap praise upon the heads of your humble App designers, please [contact us](#).

Links Contact

Google™ Custom Search Search x

Download the Rain Garden App first. "Rain Garden" is a **FREE app** designed to help you properly install a rain garden at your home, office, or job site. Through video tutorials, diagrams, text, and tools, the App guides you through determining the size and placement of your garden, selecting plants, digging and planting your garden, and maintaining your garden. It also includes tools for determining your soil type, measuring the size of the area that will drain to your garden, and managing multiple rain garden projects.



Available in 13 states (so far) including Ohio, hopefully soon in Indiana...

<http://nemo.uconn.edu/tools/app/raingarden.htm>



2. Legal & Regulatory Barriers

TRUE OR FALSE...

Local development codes don't allow for green infrastructure



2. Legal & Regulatory Barriers

TRUE ~~OR FALSE~~...

Local development codes don't allow for green infrastructure.



Review Development Codes

155.44 Design of Streets & Alleys

“Portland cement concrete or permeable pavement shall be of comparable design.”

155.47 Curbs and Gutters

“The Plan Commission shall require curb and gutter to be installed on each side of the street in every subdivision. As an alternate to continuous curb, strategic breaks in the barrier curb shall be provided in order to allow for drainage into stormwater management BMPs.”

Review Development Codes

1. Street Width

What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 daily trips (ADT)?

_____ feet

*If your answer is between **18-22 feet**, give yourself **4 points***

At higher densities are parking lanes allowed to also serve as traffic lanes (i.e., queuing streets)?

YES/ NO

*If your answer is **YES**, give yourself **3 points***

Notes on Street Width (include source documentation such as name of document, section and page #):

2. Street Length

Do street standards promote the most efficient street layouts that reduce overall street length?

YES/ NO

*If your answer is **YES**, give yourself **1 point***

Notes on Street Length (include source documentation such as name of document, section and page #):

3. Right-of-Way Width

What is the minimum right of way (ROW) width for a residential street?

_____ feet

*If your answer is **less than 45 feet**, give yourself **3 points***

Does the code allow utilities to be placed under the paved section of the ROW?

YES/ NO



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Technical Review Committee





3. Community & Institutional Barriers

TRUE OR FALSE...

Nobody gets it. I'm the only one who understands green infrastructure.



3. Community & Institutional Barriers

TRUE OR FALSE...

Nobody gets it. I'm the only one who understands green infrastructure.



Green Street Research & Demonstration Project

A NATIONAL SHOWCASE FOR URBAN GREENING

- Plant trees
- Save water
- Improve air quality
- Reduce GHGs
- Reclaim our streets
- Build community
- Create jobs
- Restore lives

31ST STREET, OAKLAND

TREE CANOPY

HOUSEHOLD INCOME

West Oakland Census Tract	Median Household Income (1995)	(Source: US Census 2001)
4014	18,824	
4016	25,913	
4018	27,258	
4017	24,542	
4019	19,053	
4019	50,226	
4021	51,944	
4022	28,313	
4023	42,063	
4024	16,771	
4025	16,824	
4026	13,256	
4027	30,329	

PREVENTING URBAN RUNOFF POLLUTION

PROJECT SITE

CITY'S WATERSHED

Urban Releaf
Building Healthy Communities,
One Tree at a Time!
We are a 501(c)(3) nonprofit.

CONTACT US!
Kemba Shakur, Executive Director
Dr. Qingfu Xiao, Scientist
Jane Wardani, Project Manager
(510) 601-9062
info@urbanreleaf.org



GREEN AWARDS 2015
Green Business & Sustainability



Be the kind
of leader
that you
would
follow.



4. Financial Barriers

TRUE OR FALSE...

Green infrastructure is more expensive than grey infrastructure



4. Financial Barriers

~~TRUE OR FALSE...~~

Green infrastructure is more expensive than grey infrastructure

http://water.epa.gov/infrastructure/greeninfrastructure/gi_costbenefits.cfm

EPA Case Study Example

- 70 lot residential development
- Using green reduced cost from \$2.4 M to \$1.6 M
- 56% overall savings in stormwater

ITEM	COST SAVINGS (Green vs Grey)	PERCENT SAVINGS (Green vs Grey)
Site Preparation	\$166,000	24%
Stormwater Management	\$422,779	64%
Site Paving & Sidewalks	\$187,617	24%
Landscaping	-\$15,000	-7%





Indiana Case Studies

- 12 selected case studies for this training
- Examples for CSO, street flooding, localized flooding, and sustainable site design
- Cost savings using green infrastructure





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What are the options to fund green infrastructure projects?





Program List

- Stormwater Improvements Program (SIP)
- Wastewater and Drinking Water Program (WDW)
- Public Facilities Program (PFP)
- Main Street Revitalization Program (MSRP)
- Downtown Enhancement Grant (DEG)
- Place Based Investment Fund (PBIF)
- (Disaster Recovery Appropriation 2 (DR2))



Case Study: West Elementary School Drainage Improvements Project

- Located in Mount Vernon, IN
- Owned by City of Mount Vernon
- Construction completed December 2012



West Elementary School- Description

- Flooding at school and surrounding neighborhood
- Safety hazard for children walking to school
- Negative impacts to homeowners
- Shallow pipes caused limitations
- Basins caused liability concerns

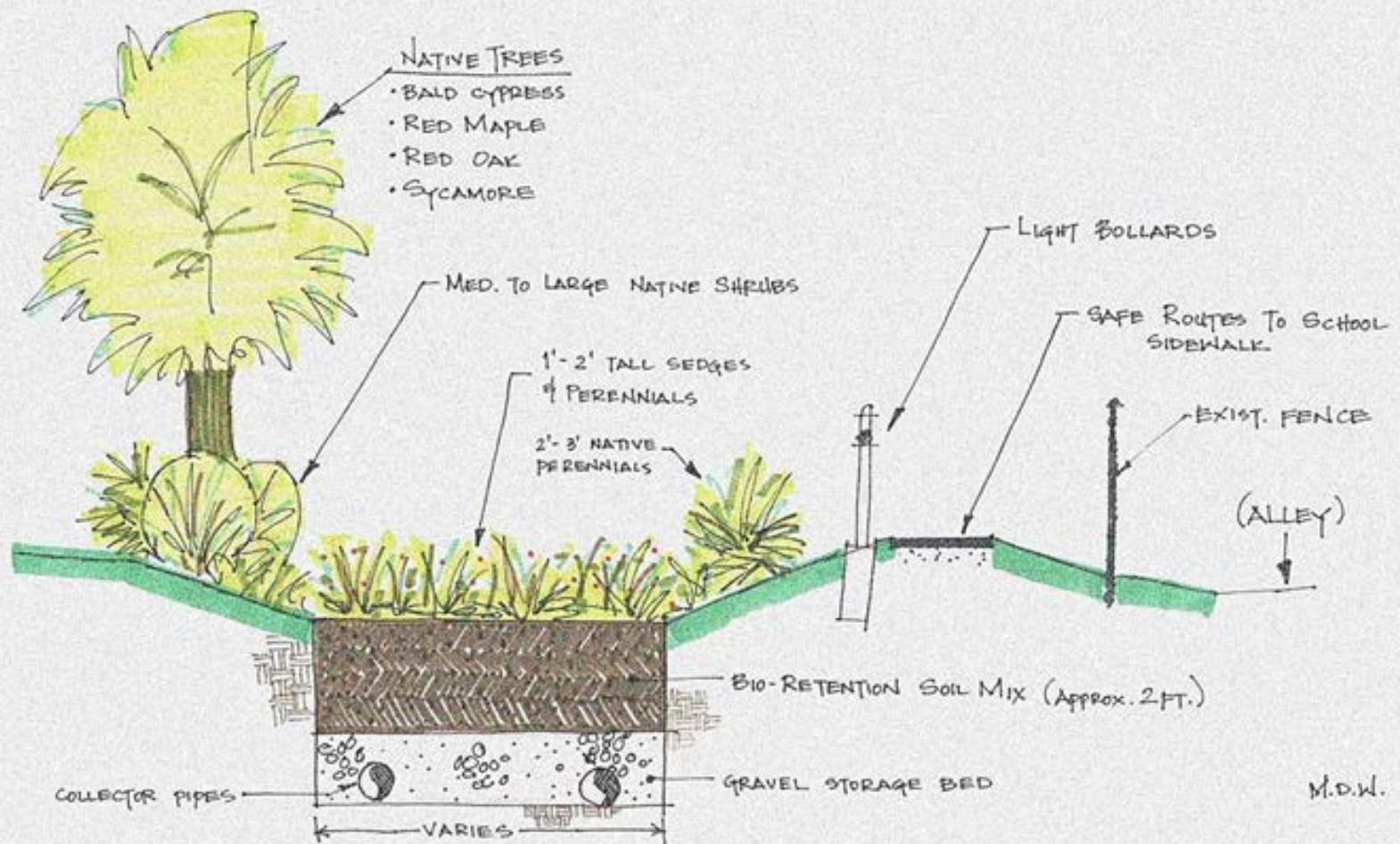




West Elementary School - Solution

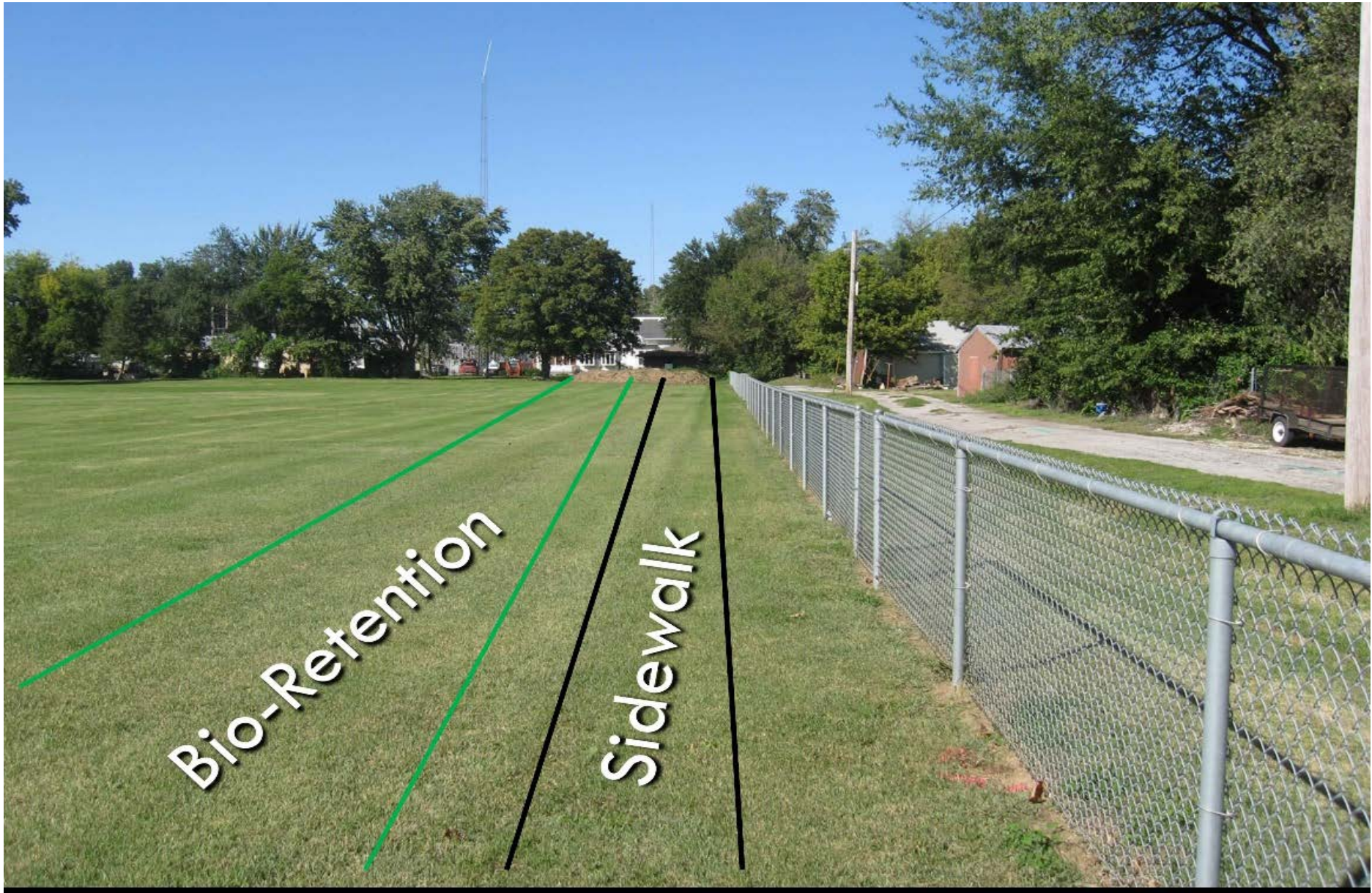
- Bioretention areas and berms
- \$524,287 OCRA grant from the Stormwater Improvements Program (“SIP”)
- Local Match from the City Sewer Fund and Mount Vernon School Corporation





TYPICAL BIO-RETENTION CROSS-SECTION - EAST LINE

NOT TO SCALE



Bio-Retention

Sidewalk





West Elementary School-Benefits

- Safe Routes to School
- Solved flooding problems
- Most cost-effective
- Only viable option



Indiana State Revolving Fund (SRF) Loan Program

- Green Project Reserve Sustainability Incentive
 - Higher ranking on Project Priority List
 - Interest rate break up to 0.5% (applied to entire loan amount) or cost of “green” component



Case Study: Washington (CSO) Wetland System Project

- Located in Washington, IN
- Owned by City of Washington
- Construction completed July 2012



CSO Wetland System- Description

- City operated a combined sewer and stormwater system
- “Grey” cost to fix separate >\$50 Million
- City’s main waterway that received CSO discharge supported no aquatic life





Washington CSO Wetland System

- “Grey” infrastructure to separate systems and store CSO effluent
- “Green” infrastructure (27 acre constructed wetland) to treat and store effluent from large rain events







Washington CSO Wetland System

Table 1. Green Infrastructure Benefits- Cost Comparison

Description	Capital Cost	Annual O&M	Total Present Worth Value
Grey Only Solution	\$52.8	\$1.6	\$80.0
Grey and Green Solution (includes Constructed Wetland)	\$25.9	\$0.03	\$26.2
<i>Wetland Construction Only</i>	<i>\$3.9 M</i>		



Washington CSO Wetland System

- Reduced CSO discharges
- Above average effluent
- Aquatic life has returned to Hawkins Creek
- Less energy and chemicals
- Cost effective solution



Washington CSO Wetland System

Funded by:

- \$9 M grant from OCRA DR2
- \$16.9 M loan from Indiana State Revolving Fund Loan Program (2.81% interest rate)
- \$1 M savings from 0.5% interest rate break



Local Funds

- Stormwater Utility fees
- Wastewater Utility fees
- Transportation funds
- General Revenue
- Taxes: COIT, CAGIT, CEDIT, TIF



Stormwater Utility Formation

- Develop feasibility and rate study
- Create a billing system, policy and procedures
- Stakeholder engagement
- Adopt ordinances
- Implementation and public outreach



Case Study: North Street Reconstruction

- Located in Lafayette, IN
- Owned by City of Lafayette
- Construction completed October 2013



North Street Reconstruction- Description

- City operated a combined sewer and stormwater system
- City needed to reduce stormwater
- Deteriorated roads in historic downtown not ADA compliant



North Street Reconstruction- Solution

- Porous pavers
- Rain gardens
- Reused historic brick
- Project cost \$1.68 M and was paid from city transportation and stormwater funds









North Street Reconstruction-Benefits

- Removal of ~6.6 MG from combined sewer
- Eliminates \$44,000 in WW treatment costs
- Street reconstructed
- Neighborhood revitalization
- Meets ADA accessibility needs



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Case Study: Mackey Athletic Facility

- Located in West Lafayette, IN
- Owned by Purdue University
- Construction completed March 2009



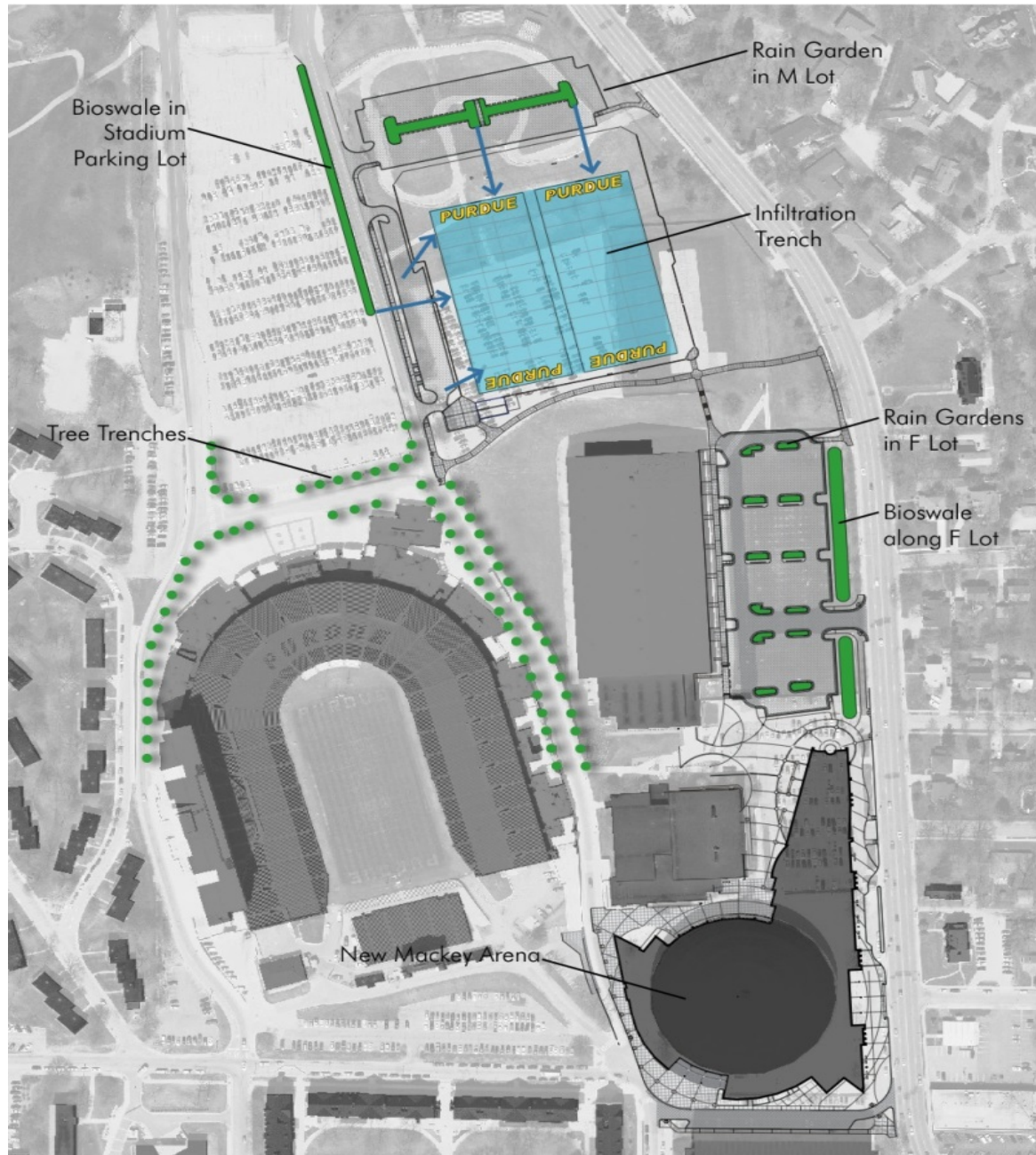
Mackey Athletic Facility- Description

- Large parking lot generated a significant volume of stormwater, which went to traditional stormwater system
- Area was subject to frequent, localized flooding



Mackey Athletic Facility- Solution

- Bioswales throughout the parking lots
- Large stone infiltration beds below practice fields
- During very high flow events, the infiltration beds discharge back to stormwater system
- Project cost \$1.78 M and was paid for by the university











Mackey Athletic Facility- Benefits

- Reduces campus flooding
- Meets parking needs
- Promotes campus greening
- Eliminates the need and cost to construct a large expensive detention basin



Green Infrastructure Incentives

- Homeowners
- Rate payers
- Developers



Case Study: “Catching Rain Fort Wayne”

- Fort Wayne City Utilities
- Residential Rain Garden Incentive Program
- Application, workshop, agreement, register
- Cash incentive \$2.00 per sq. ft. of rain garden installed, up to \$250.00 (125 sq. ft.)



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Case Study: “Catching Rain Fort Wayne”

<http://www.catchingrainfw.org/>



Home

Rain Garden 101

Frequently Asked Questions (FAQ)

Incentive Program

Register Your Rain Garden

Resources

Demonstration Rain Gardens

Rain Gardens as a Teaching Tool

Rain Gardens for Businesses

Event Calendar

August 2015

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Incentive Program

Fort Wayne City Utilities has developed a program to help you build and maintain a rain garden at home. A direct cash payment is available to help you with some of the costs of plants or other rain garden needs. Incentives are only available to residential properties inside the City of Fort Wayne.

There are four general requirements for the incentive program. Home owners must:

1. Complete an [Application](#) and submit it to the City
2. Attend a free instructional workshop-- [click here for dates](#). Following the workshops, technical assistance will be provided by City staff members and the Allen County Master Gardeners if requested.
3. Sign an [Agreement](#) to install and maintain a rain garden -- these will be available at the workshops and may be signed then. Plant match certificates will be given at the workshop. Cash payments will be mailed following the workshops.
4. [Register the garden](#)



[Home](#)

[Rain Garden 101](#)

[Frequently Asked Questions \(FAQ\)](#)

[Incentive Program](#)

[Register Your Rain Garden](#)

[Resources](#)

[Demonstration Rain Gardens](#)

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4206 Arlington Avenue

4206 Arlington Avenue
46807 - Fort Wayne

Partial Sun

Chuck had originally planned a rain garden of about 315 sq ft, but is expanding it to just over 460. He is directing water from all 5 downspouts into rain gardens and other gardens around the property and plans to eliminate all turf grass. Chuck's property drains extremely well with a 12 inch column of water soaking into the ground in 15 minutes. He has tilled the topsoil into 14 inches of sandy loam and simply raked the loose grass away. He plans to plant hostas and ornamental grasses in the front of his property.



2806 Meadows Park Way

2806 Meadows Park Way
46825 - Fort Wayne

134 square foot garden with full sun exposure. Located in the SW corner of backyard 10.5 feet from the downspout feeding it.





2820 Pittsburgh St.

2820 Puttsburgh St.
46803 - Fort Wayne

Kidney shaped garden with 215 square feet. Receives water from 3 down spouts. Full sun exposure. Garden contains 7 Blue Flag Iris, 14 Crested Sedge, 11 Fox Sedge, 38 Wild Bergamont, 38 Swamp Rose Mallow, 4 spirea bushes, and 2 Forsythia bushes.





10/18/2009



Case Study: Stormwater User Fee Credits

- City of Seymour, IN
- Stormwater Utility Policy and Procedures Manual
- Adopted February 2014



Stormwater User Fee Credits

- Low-Impact Development Credit
- Education Credit
- Open Space Credit
- Conservation Area Credit
- Over-Detention Credit
- One-Time Credit



Case Study: Expedited Permit Reviews

- City of Indianapolis, IN
- Developers who are applying for permits for projects that contain green infrastructure components are afforded an expedited permit review





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Incorporating Green Infrastructure into your SIP Application



SIP Overview





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SIP Application

**Applicant
Eligibility**

- Incorporated towns, small cities, and counties that are Non Entitlement areas



SIP Application

Program/
Project
Eligibility

- Meet National objective of the federal Community Development Block Grant Program
 - Benefit low to moderate income persons (at least 51% of beneficiaries)
- Be an eligible activity
 - Specifically, must include storm drainage infrastructure improvements only



SIP Application

Funding Overview

- Generally, \$2 million available each year
- Maximum award is \$500,000
- 2015 awarded ~\$3.5 million or 7 grants at ~\$500,000
- Required Local Match of 10%



SIP Application

Application Process

- One competitive round per year
- Process:
 1. Proposal
 2. Site visit with OCRA liaison
 3. Final application



OCRA SIP Green Incentives

Today

April 2016
Consolidated
Plan issued

July 2016
Changes to SIP
go into effect
(e.g. addition of
specific green
incentives)

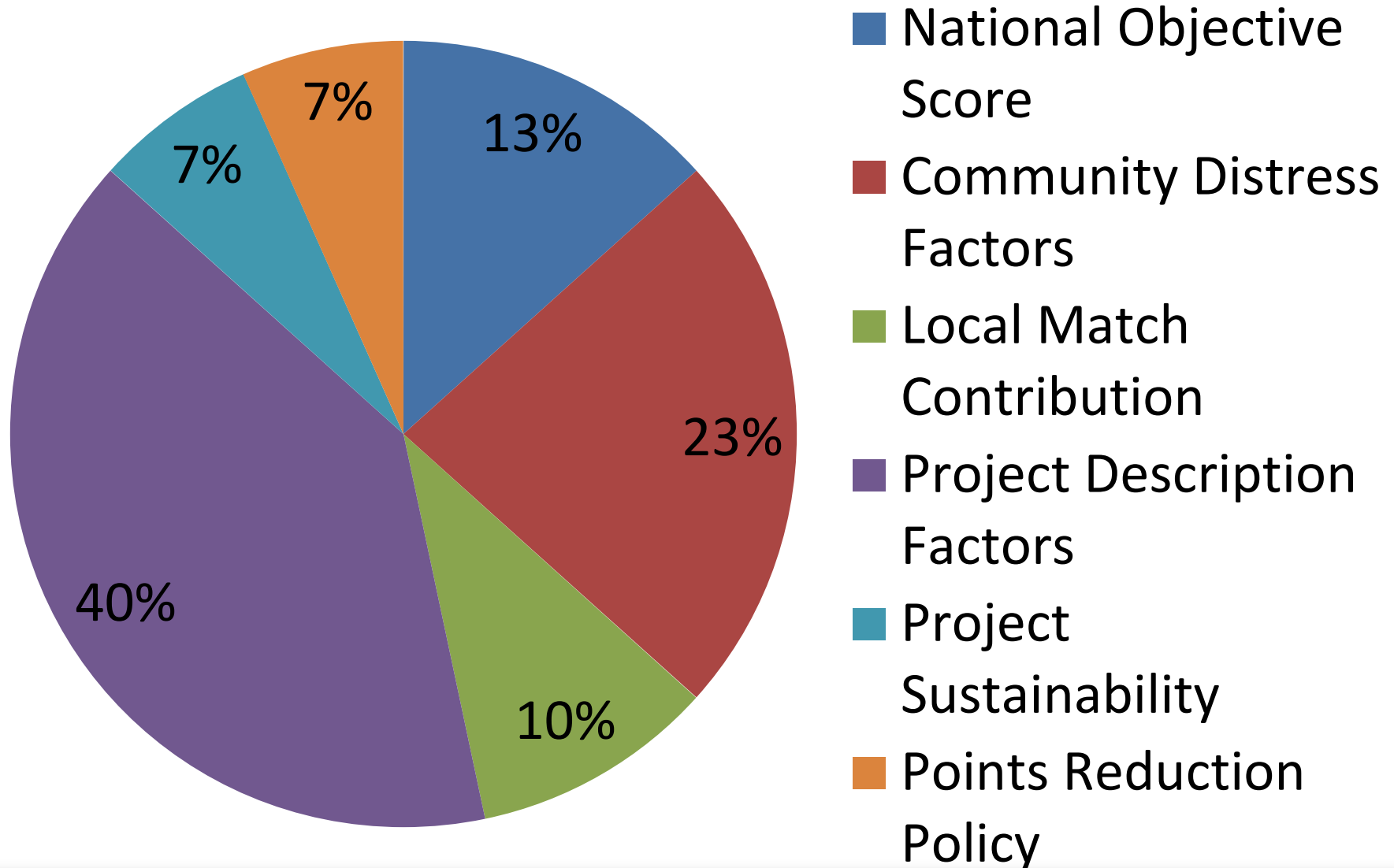


Tips from Successful Grant Administrators

- Meet deadlines
- Coordinate with OCRA Liaison
- Don't assume – ask questions
- Tell your story in a thorough and clear way
- Describe all your efforts
- Understand and maximize points

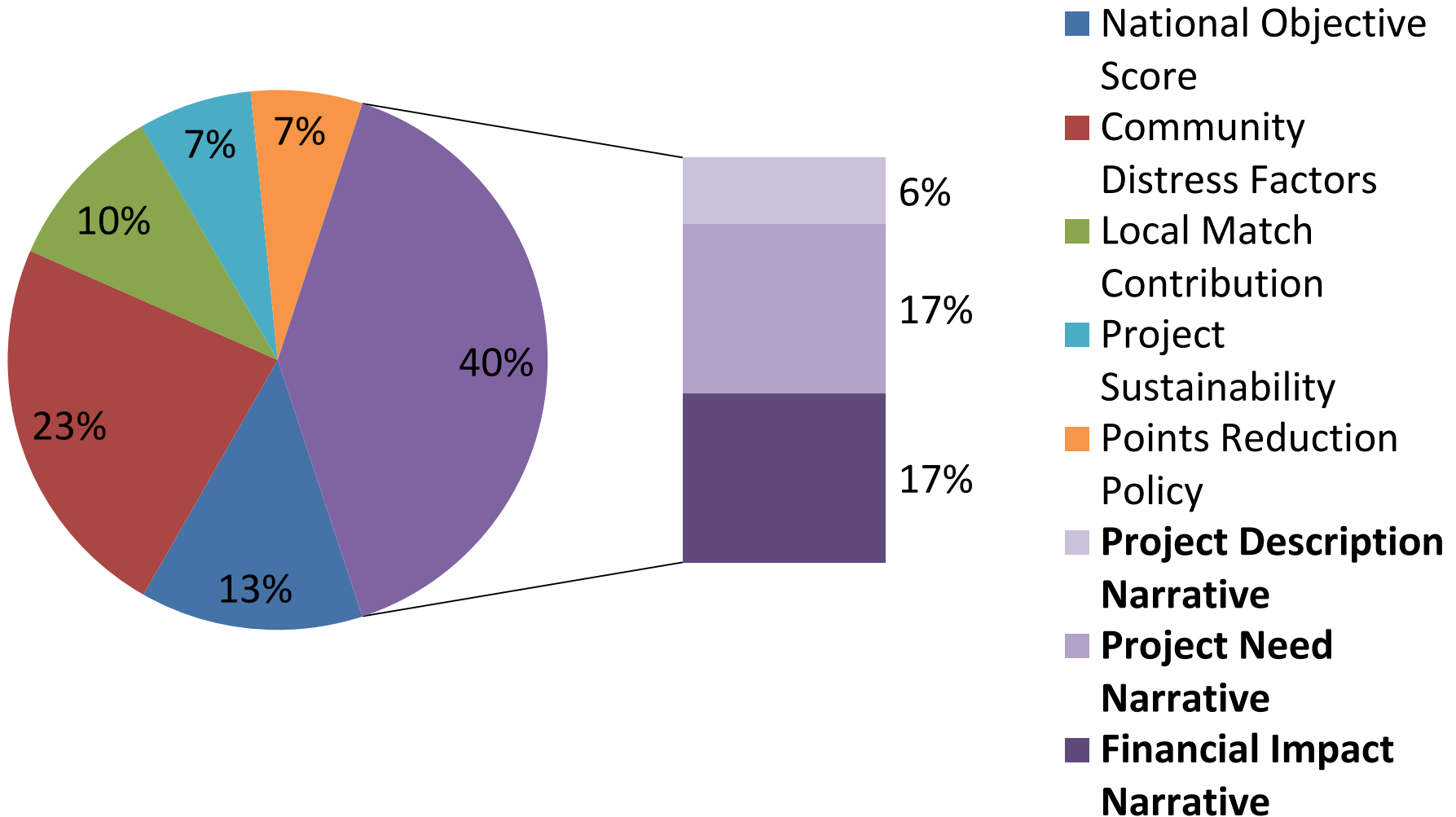
SIP Application

Current Grant Evaluation Criteria (750 points)



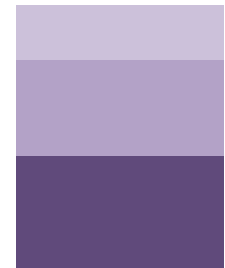
SIP Application

Current Project Description Factors (300 Points Total)





6%



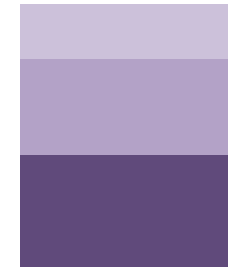
SIP Application

Current Project Description Narrative (50 Points)

- Describe the proposed green infrastructure project
- Previous Planning Efforts
 - Rate study
 - Stormwater utility, instituting a stormwater fee
 - Revised existing manual to give green infrastructure credits/expedited permit review



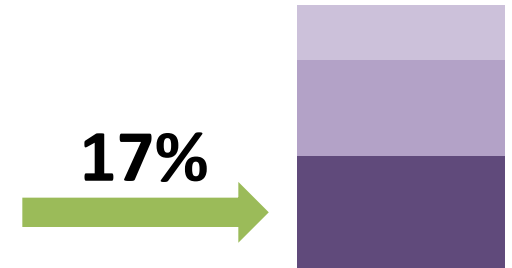
17%



SIP Application

Current Project Need Narrative (125 Points)

- Describe the problem
- Pictures
- Letters of support from residents, agencies, and organizations
- Violation letters or enforcement actions



SIP Application

Current Financial Impact Narrative (125 Points)

- Financial options investigated
- Local match package
- Previous efforts (including funds and man hours)
- “Explain the sustainability and maintenance for the project”



7%



SIP Application

Current Project Sustainability (50 points)

Establishment of, or documentation of, existing sustainability plan for the ongoing O&M of the stormwater utility

- 0 points- under \$3 monthly stormwater utility user rate
- 25 points - \$3-\$5 monthly stormwater utility user rate
- 50 points - \$5 or higher monthly stormwater utility user rate



Call To Action

- Allow Green Infrastructure
- Promote Green Infrastructure
- Implement Green Infrastructure