CITY OF BLOOMINGTON UTILITIES

wood.

Bloomington Stormwater Master Plan

Creating a Forward Thinking and Implementable Stormwater Master Plan

INAFSM

September 15th , 2022

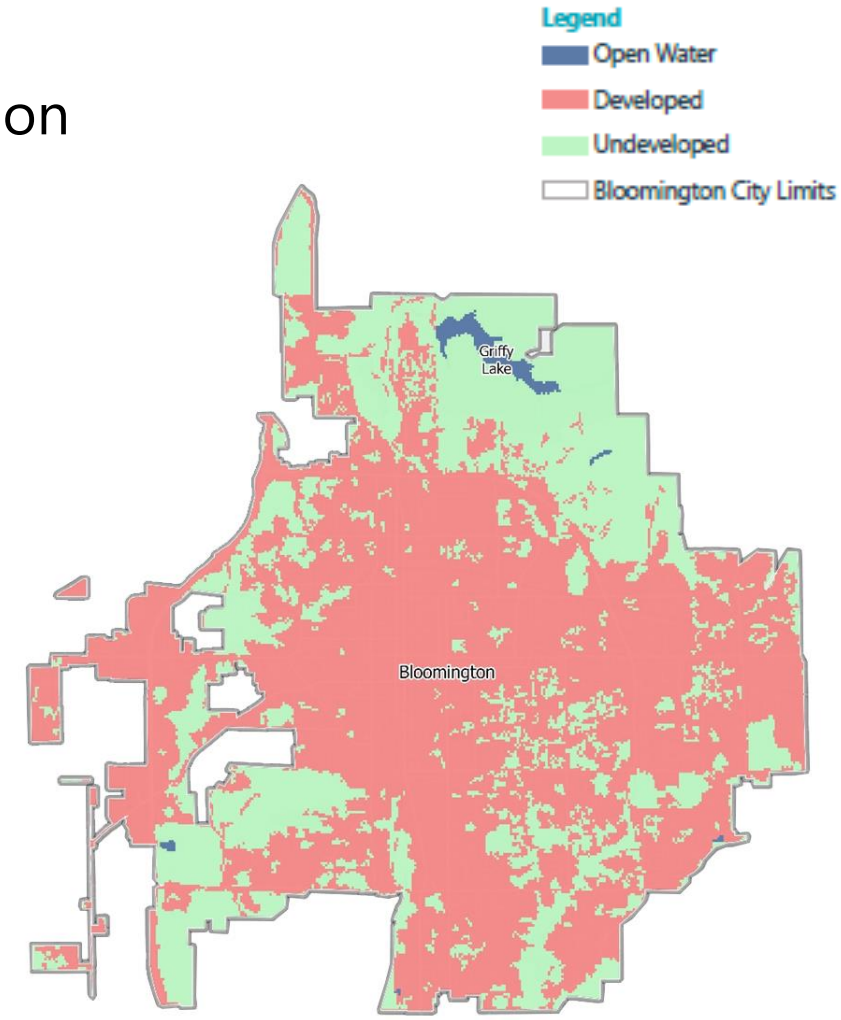
2:20 pm – 3:10 pm

Presentation Outline

- Background
- Master Plan Process
- Master Plan Outcomes
- Current Implementation Items
  - SWQMP Update
  - WQCR Creation
  - Green Infrastructure Typical Details
- Future Vision and Current Process to Implementation
- Presentation Takeaways

City of Bloomington, Indiana

- MS4 Program
  - City of Bloomington Utilities (CBU) Environmental Division
  - Within Monroe County there are four permitted MS4s:
    - City of Bloomington
    - Monroe County
    - Indiana University
    - Ivy Tech Community College
- Physical Size
  - 13,114 Acres
- Stormwater Utility Rate
  - Currently have a rate of $5.95, was $2.70
    - Goal is to do a rate case every four years.

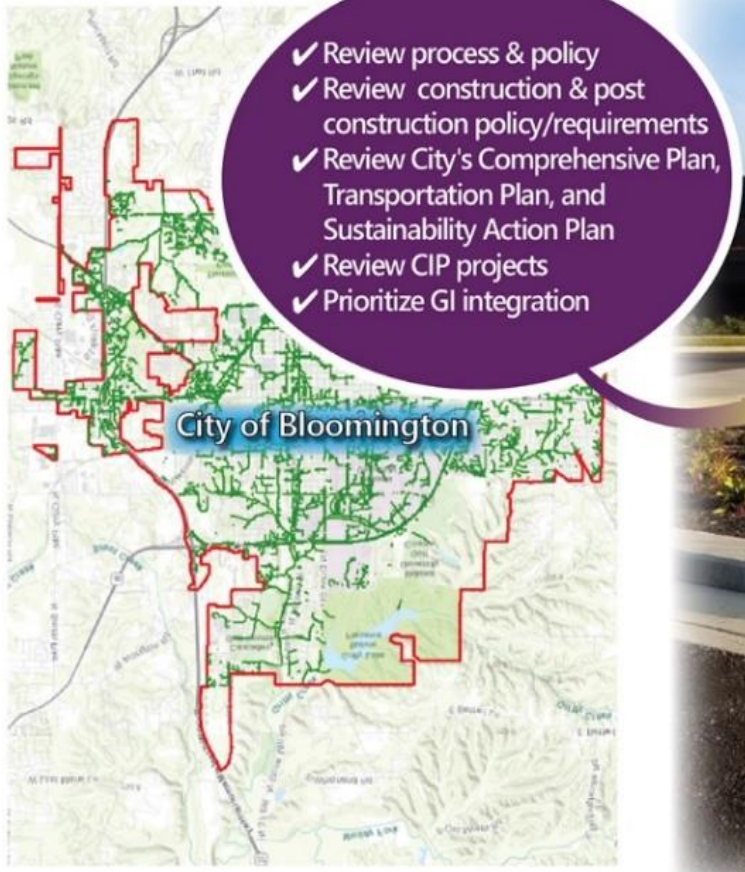


Stormwater Master Plan Goals

- Address existing water quality and quantity problems, and prevent future problems
- Help city comply with the new MS4 permit now and well into the future
- Align City's stormwater management program with the goals, objectives, and visions established in:
  - Comprehensive Plan, Transportation Plan, and Sustainability Plan

Stormwater Program Master Plan Process

Implementable Stormwater Master Plan



- ✔ Review process & policy
- ✔ Review construction & post construction policy/requirements
- ✔ Review City's Comprehensive Plan, Transportation Plan, and Sustainability Action Plan
- ✔ Review CIP projects
- ✔ Prioritize GI integration

- ✔ Plan a future stormwater program
- ✔ Outline processes to evaluate green infrastructure feasibility
- ✔ Develop design standards
- ✔ Identify green infrastructure projects
- ✔ Frame effective, long-term maintenance programs

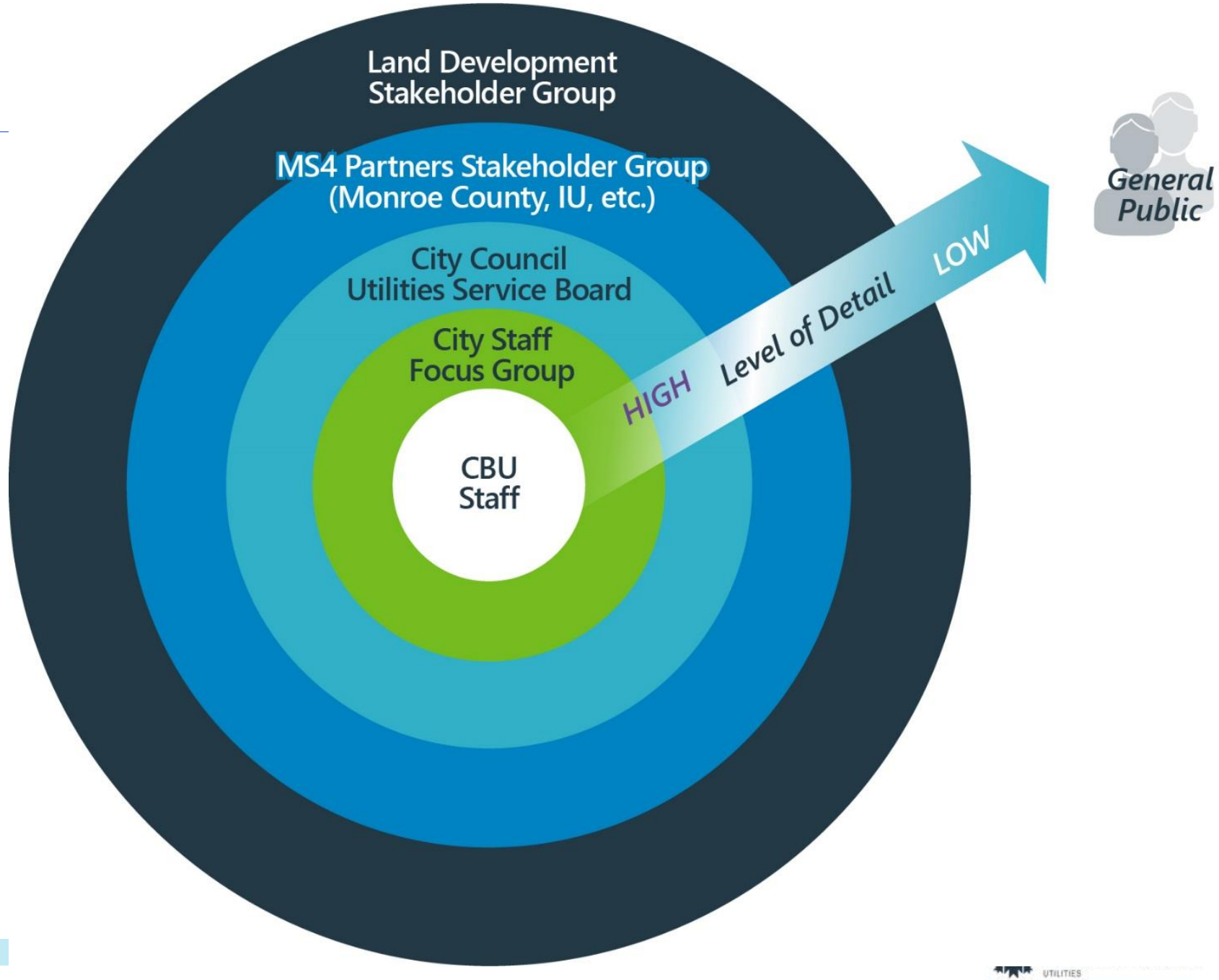
Develop recommendations for policy change, GI pilot projects, and GI promotion and incentives

Who's Involved?

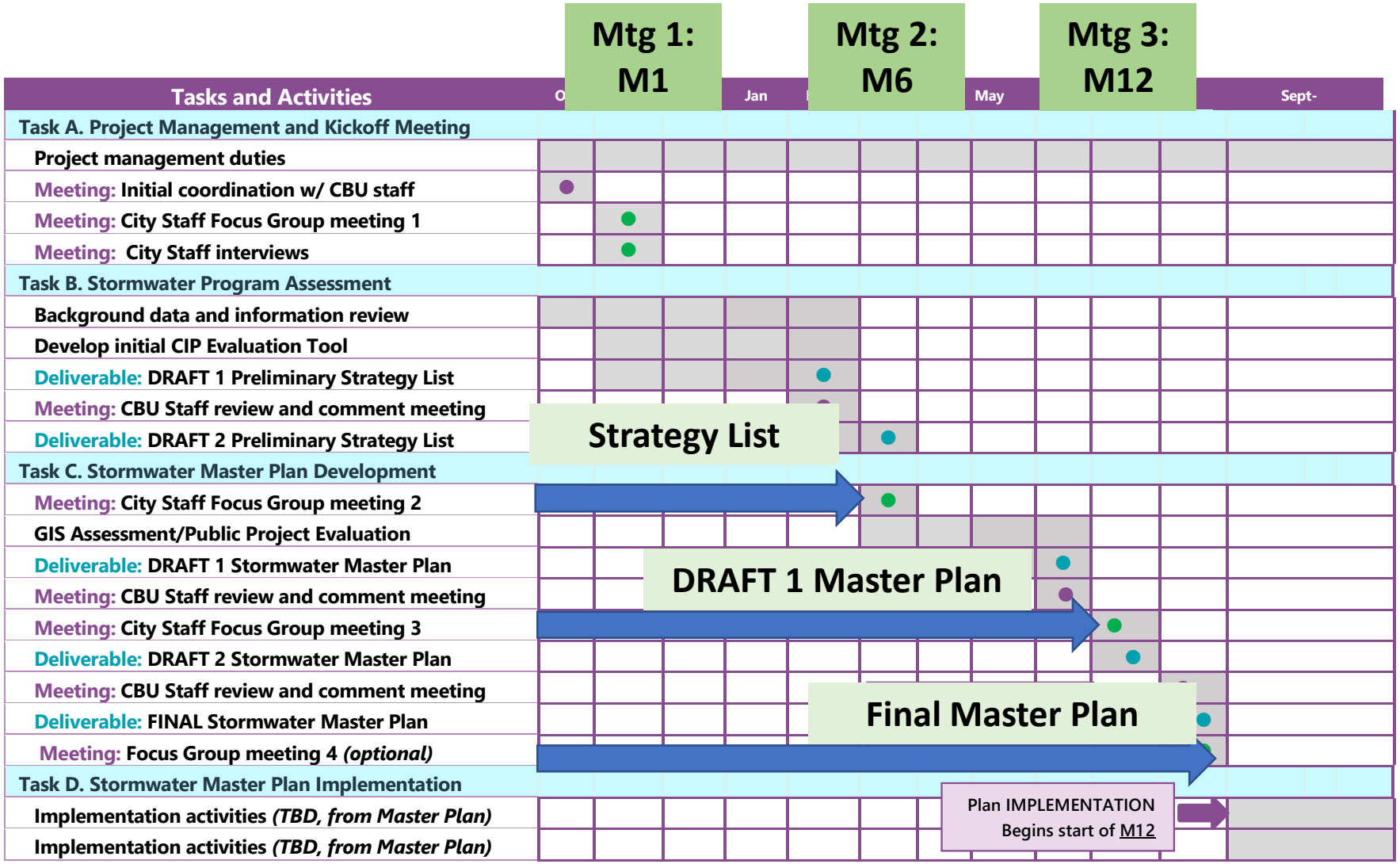
Who's Involved?

Stakeholder Groups

- CBU Staff:
  - James Hall
  - Phil Peden
  - Katherine Zaiger



Project Schedule and Process



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Goals, Objectives, and Outcomes

1. Frame a future **stormwater program** that:

    1.1 Aligns and supports Bloomington's economic, sustainability and planning goals

    1.2 Prepares for future NPDES-MS4 permit requirements

    1.3 Supported and understood by City staff

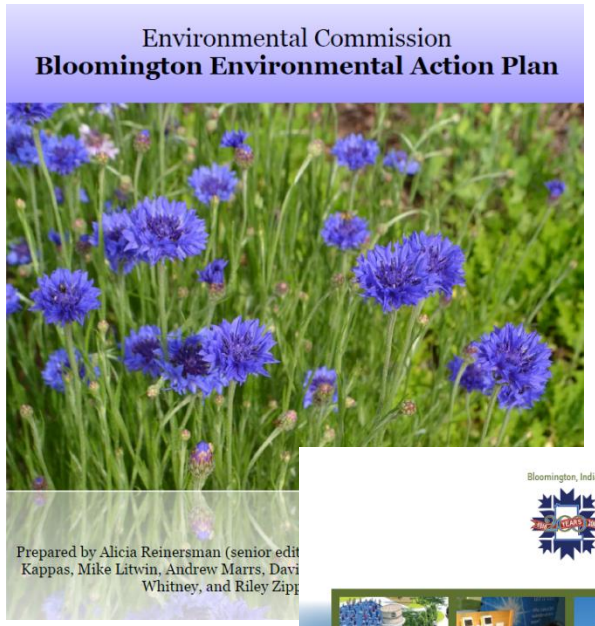
2. Outline **processes** to evaluate green infrastructure feasibility for public and private projects

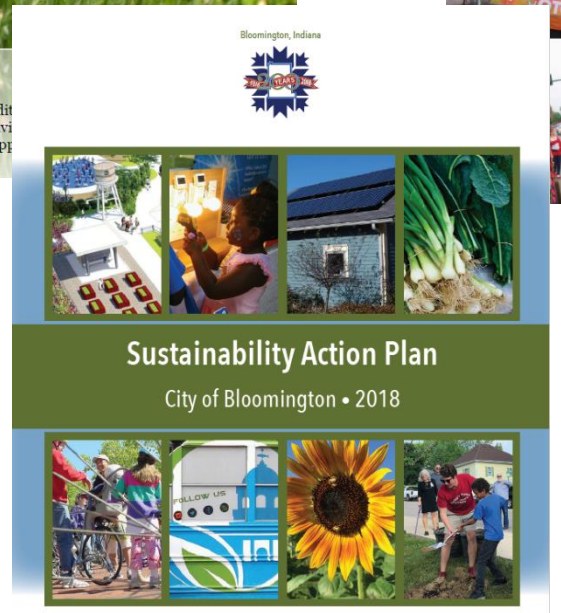
3. Develop **design standards, guidance, and specifications** for green infrastructure practices

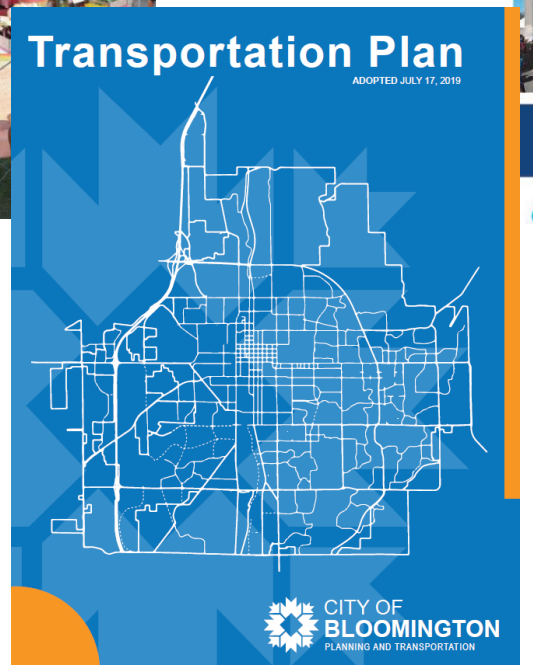
4. Identify and plan for green infrastructure integration into Capital Improvement Projects (CIPs)

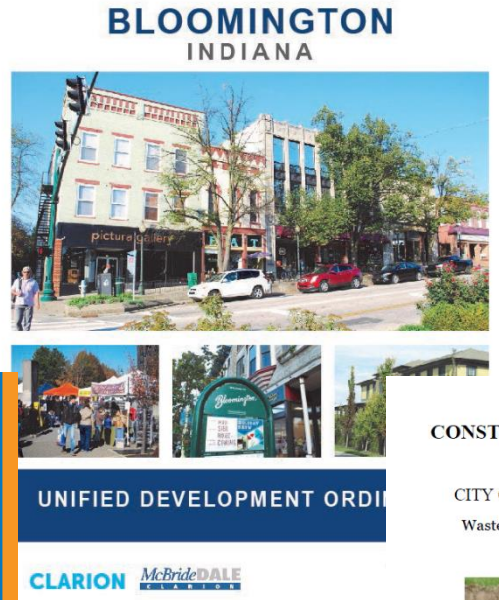
5. Frame an effective **long-term maintenance** program for stormwater practices on public and private land.

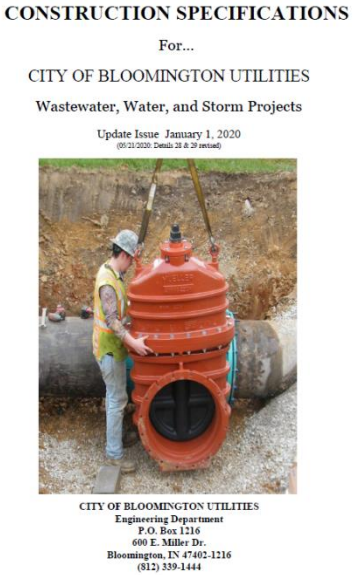
Goals, Objectives, and Outcomes: **Alignment w/ City Plans**











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Comprehensive Plan:

Develop a city-wide GI plan pg 47

3.2.1 – Continue to limit the amount of impervious surface in new development or public improvement projects and increase GI

3.2.2 Increase green space and protect environmentally sensitive area

3.2.3

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Transportation Improvement Program DRAFT 2045:

-Aim to reduce or mitigate stormwater impacts of surface transportation. New or updated corridors include SW runoff control as a mandatory design. (pg 64)

-Setting aside funds for transportation alternatives that help

Reviewed Document	Summary	Owning Department	Overlapping/Potential Stormwater Inclusion/Goals	What can be supported by the SW Master Plan?
Comprehensive Plan 2018	A seven-chapter document guiding growth into 2040, focused on sustainability and resilience. Policy surrounding land use highlighted in Ch 7. The plan calls out specific goals for green infrastructure & low-impact development practices and utilization of green space to improve quality of life for residents and tourism.	P&T	• Overlap in the Vision Statement regarding protection and enhancement of the natural environment, smart-growth supply strategies, call for green space and parks for healthy lifestyles • Call for limiting negative footprint in areas of combined sewer • Protection for natural resources, specifically water and air • Develop a city-wide GI plan pg 47 • 3.2.1 – Continue to limit the amount of impervious surface in new development or public improvement projects and increase GI	• The "how to" of GI implementation, Complete Streets, limiting sewer footprint

permeable pavement requirements

-Incentives for LID/GI and green roofs

Habitat Connectivity Plan:

Focus on buffers, installing GI, planting natives, expansion on naturally occurring corridors

Goals to enhance and conserve existing greenspace during rapid development

Parks Master Plan:

Switchyard park utilizing green infrastructure BMPs

*Expanding **trail systems w/ sustainable material***

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Goals, Objectives, and Outcomes

1. Frame a future **stormwater program** that:

1.1 Aligns and supports Bloomington's economic, sustainability & planning goals

1.2 Prepares for future NPDES-MS4 Permit requirements

1.3 Is understood and supported by City staff

- *Some departments influence stormwater*
- *Some are influenced by stormwater*

NPDES-MS4 Permit Compliance: **Links to Land Development Codes**

1: Public Education and Outreach

2: Public Participation and Involvement

3: Illicit Discharge Detection and Elimination

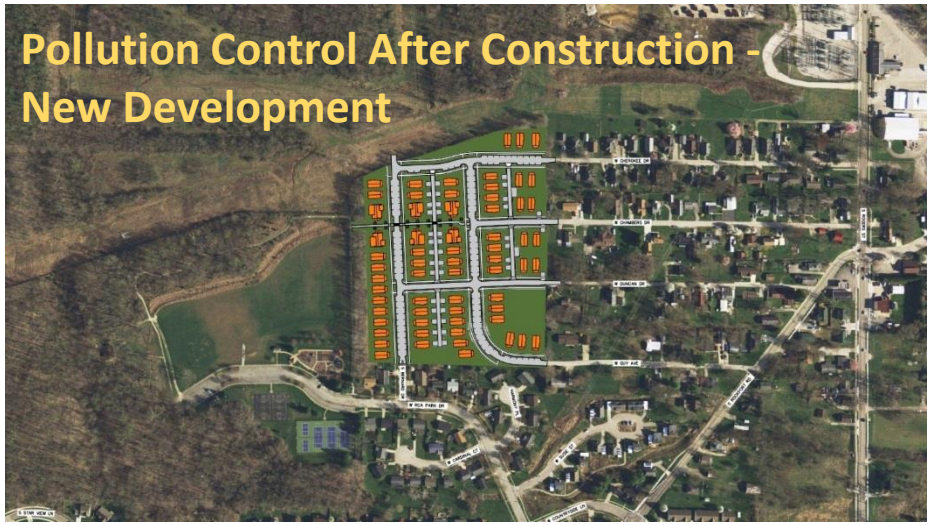
4: Construction Site Runoff Control

5: Post-Construction Stormwater Runoff Control

6: Municipal Ops Pollution Prevention & Good Housekeeping

Bloomington Muni Code
Title 10 Chapter 10.21 and
CBU Rules and Regulations
26.6.6.2.1

Source: Schenectady County, NY



Habitat for Humanity Osage Place, Bloomington IN; Source: B Square Beacon

Source: Indiana Universities Library

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Stormwater Management Today

EPA says **pollutant removal** isn't enough!

They now want

~~**Pollution Prevention**~~

~~**Runoff Reduction**~~

Low Impact Development
&
Green Infrastructure

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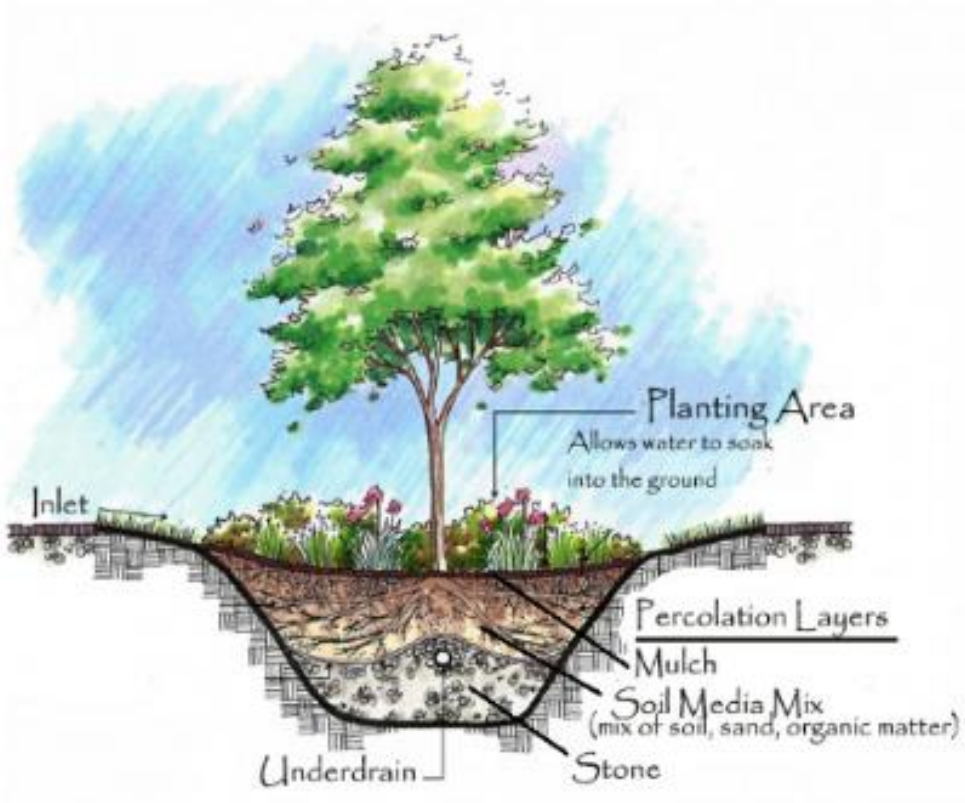
Green Infrastructure: **The Paradigm Shift for Land Development**

Plants & **Soil** are now **Infrastructure** and therefore **Regulated**

In community & site planning:
LID Opportunities
(considered in land use plans & site layouts)

During site design & construction:
BMP Design Elements
(have design criteria & shown on plans)
Const. Protection Areas
(clearly marked & avoided)

After construction:
BMP Maintenance Elements



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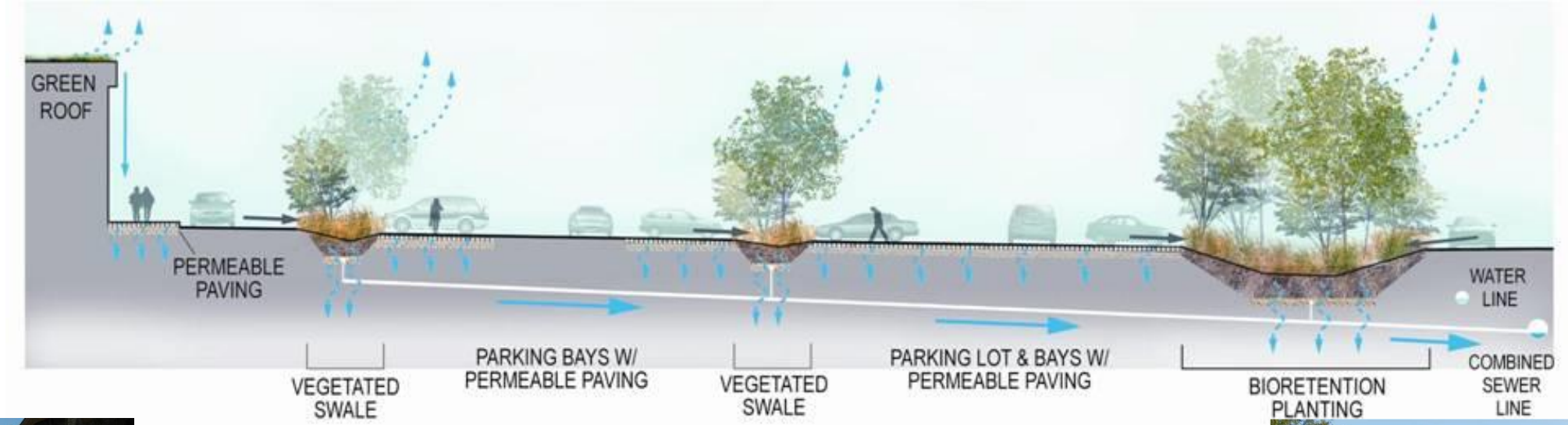
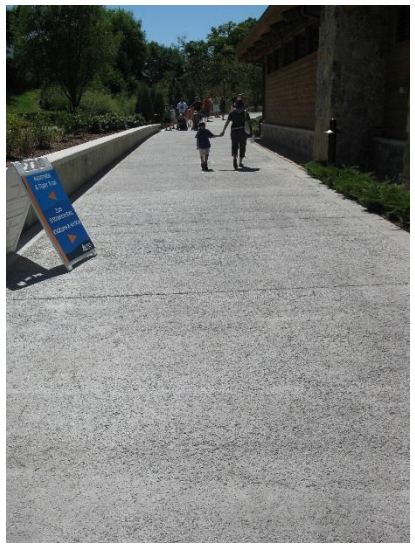
Goals, Objectives, and Outcomes: **NPDES-MS4 Permit Compliance**

Stormwater code changes can better facilitate use of LID & GI





Goals, Objectives, and Outcomes: **GI Feasibility**

2.0 Outline **processes** to evaluate green infrastructure feasibility for **public and private projects**

- Green Infrastructure Constraints (Code and Policy Conflicts)

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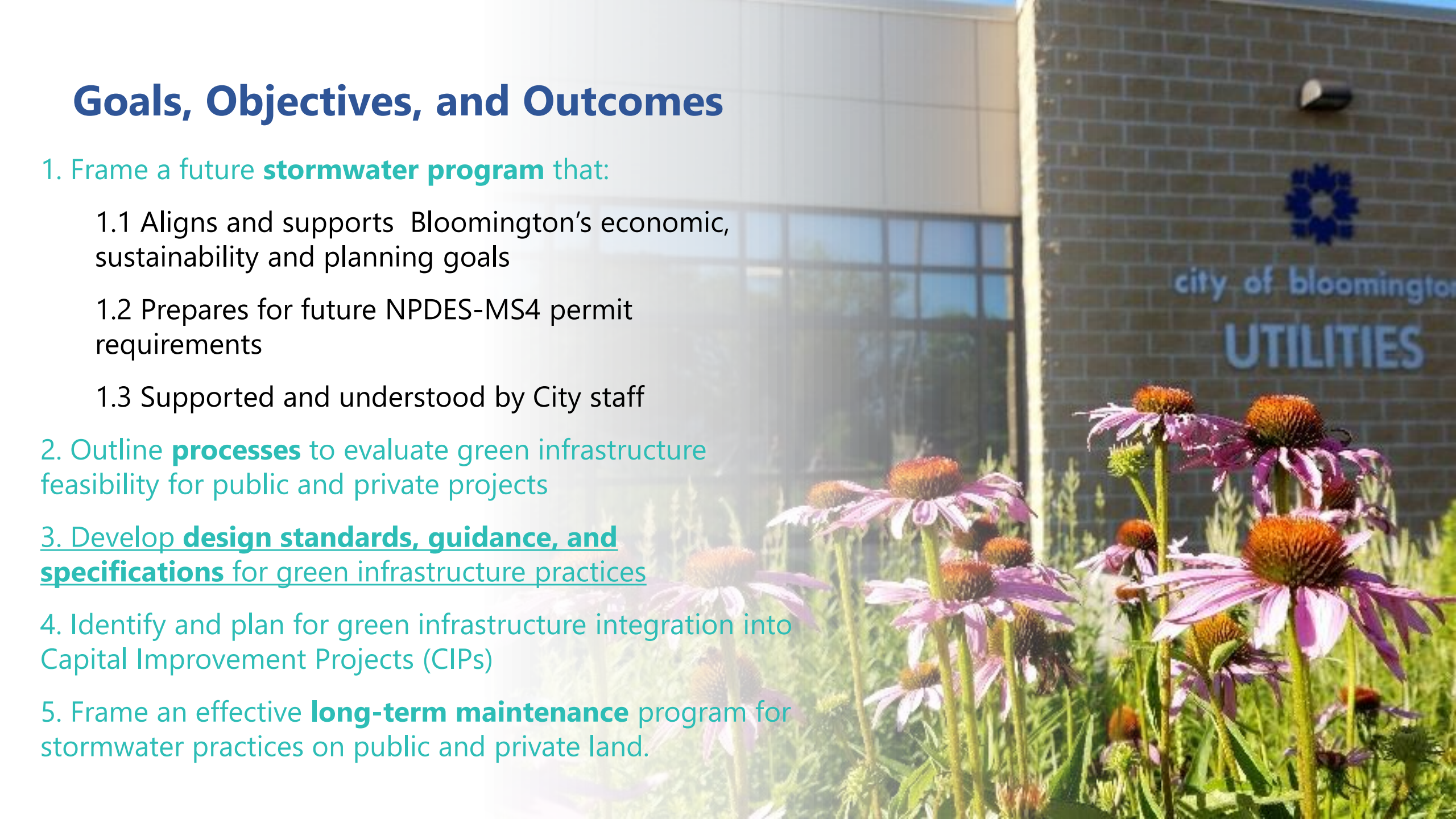
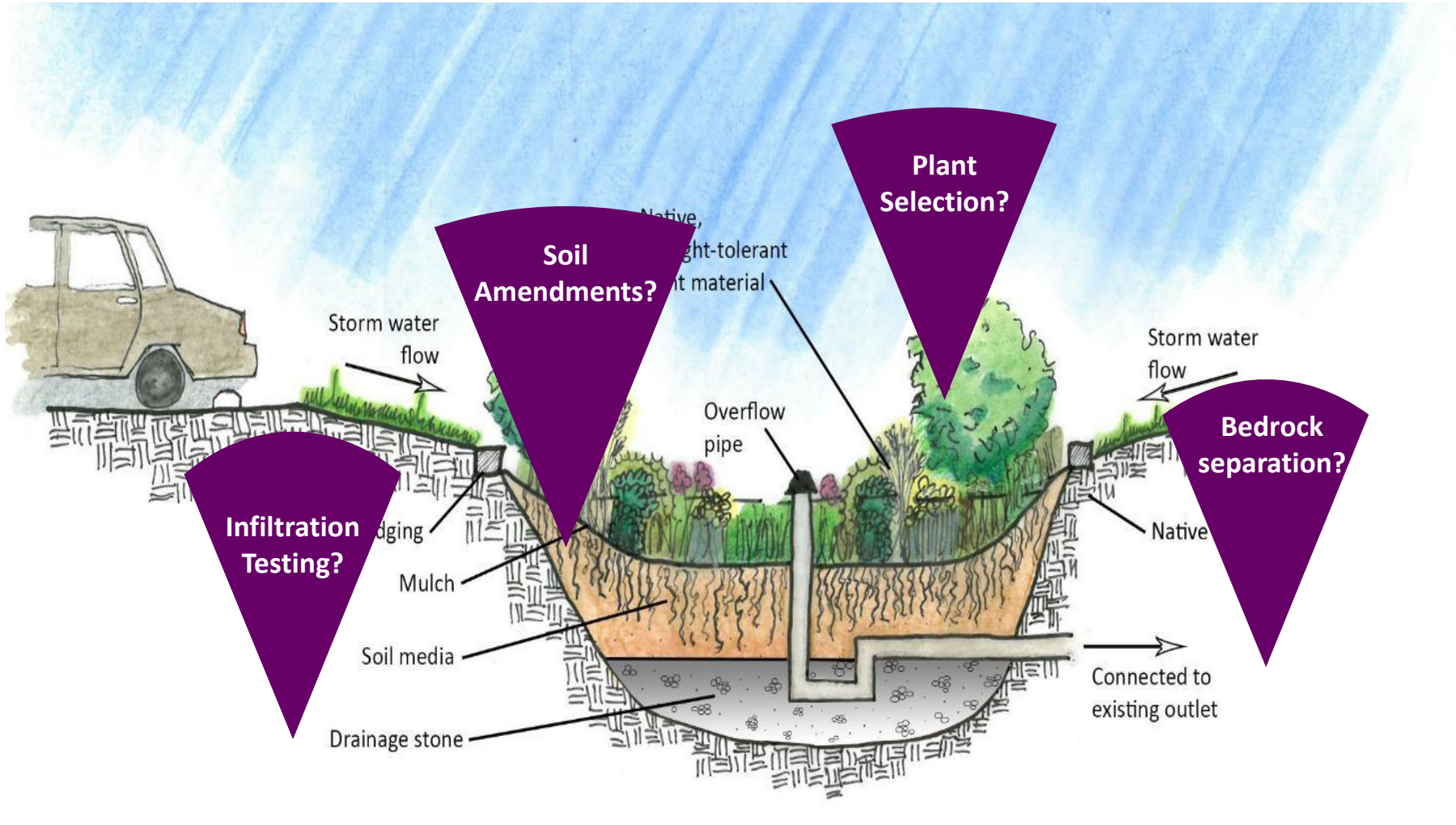


Goals, Objectives, and Outcomes: **Design Standards**



Develop a Bloomington Stormwater Design Manual

- Supports Chapter 10.21 and the UDO
- Policies, technical guidance, and support tools
- Locally-specific BMP design specifications

Goals, Objectives, and Outcomes

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Goals, Objectives, and Outcomes: **GI Integration Public Projects**

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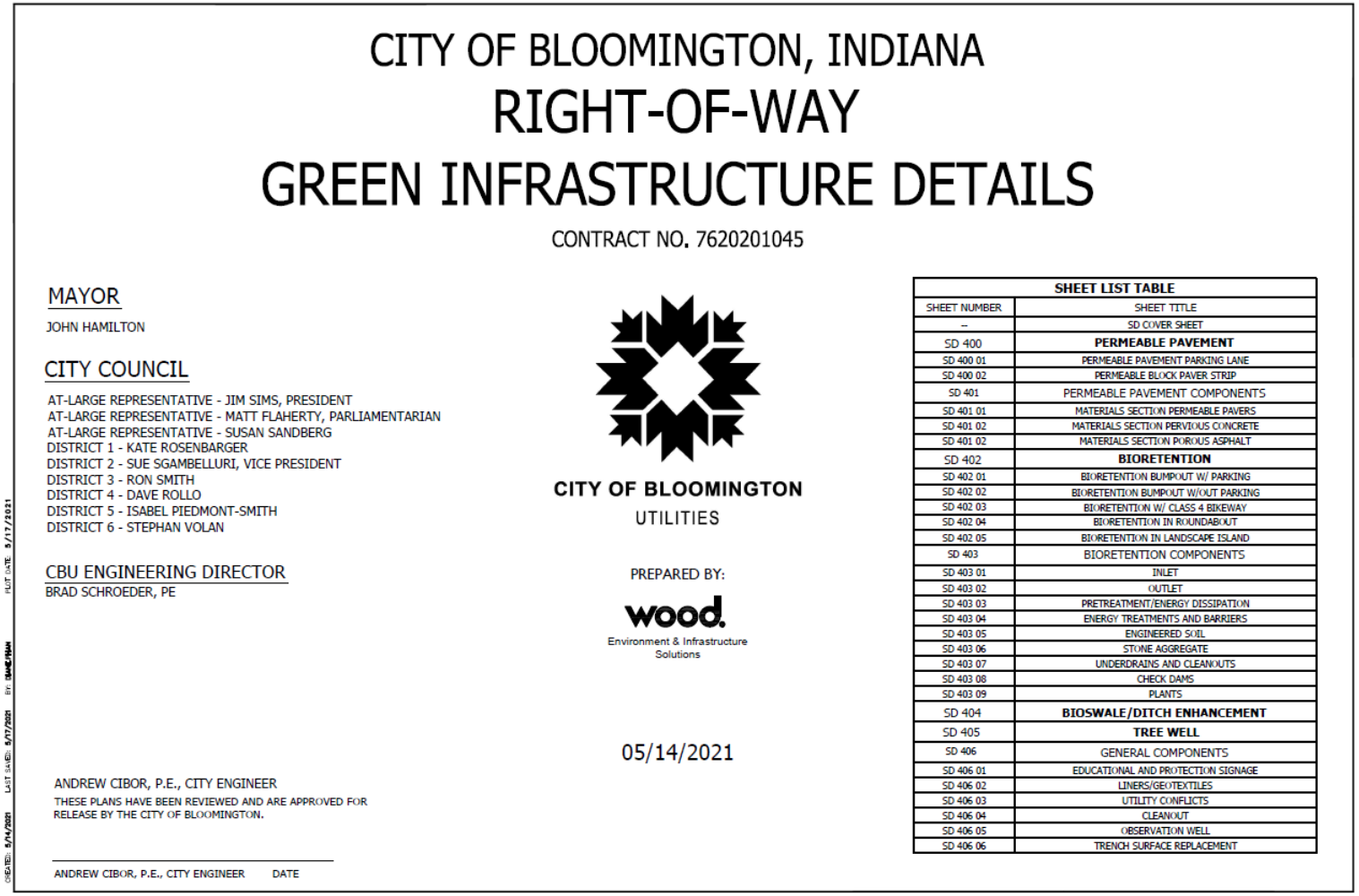
Develop GI Typical Details for Public R/W Projects



CITY OF BLOOMINGTON, INDIANA

RIGHT-OF-WAY

GREEN INFRASTRUCTURE DETAILS

CONTRACT NO. 7620201045

MAYOR

JOHN HAMILTON

CITY COUNCIL

AT-LARGE REPRESENTATIVE - JIM SIMS, PRESIDENT
AT-LARGE REPRESENTATIVE - MATT FLAHERTY, PARLIAMENTARIAN
AT-LARGE REPRESENTATIVE - SUSAN SANDBERG
DISTRICT 1 - KATE ROSENBARGER
DISTRICT 2 - SUE SGAMBELLURI, VICE PRESIDENT
DISTRICT 3 - RON SMITH
DISTRICT 4 - DAVE ROLLO
DISTRICT 5 - ISABEL PIEDMONT-SMITH
DISTRICT 6 - STEPHAN VOLAN

CBU ENGINEERING DIRECTOR

BRAD SCHROEDER, PE

CITY OF BLOOMINGTON
UTILITIES

PREPARED BY:

wood.
Environment & Infrastructure Solutions

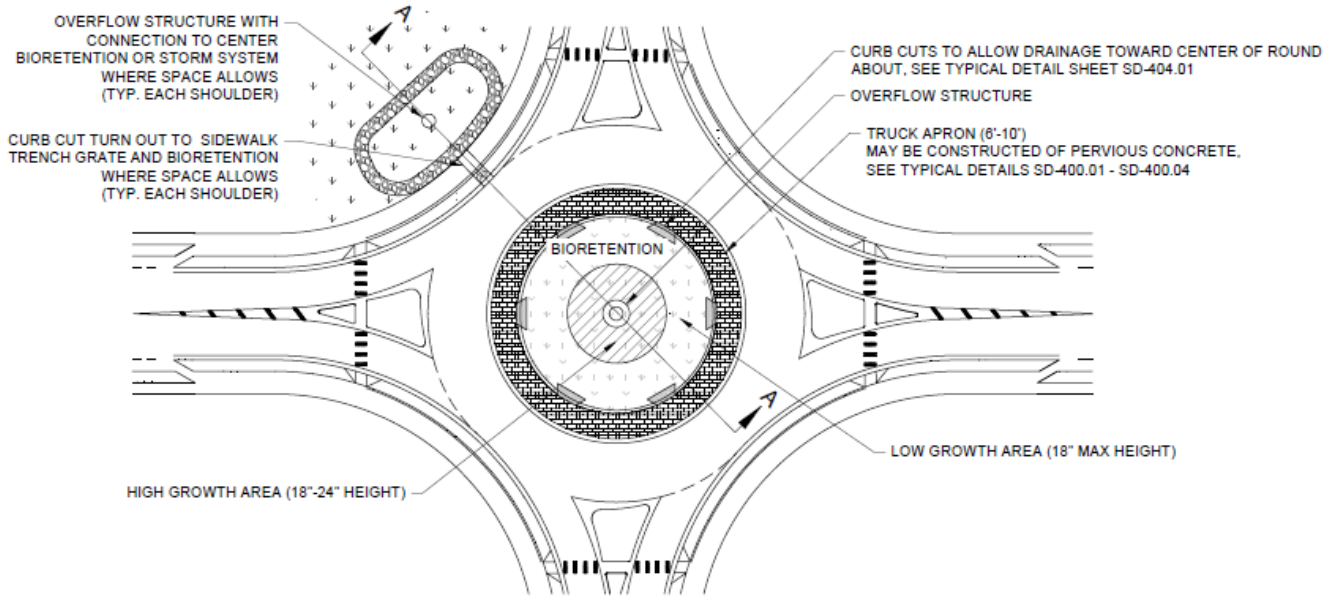
05/14/2021

ANDREW CIBOR, P.E., CITY ENGINEER
THESE PLANS HAVE BEEN REVIEWED AND ARE APPROVED FOR RELEASE BY THE CITY OF BLOOMINGTON.

ANDREW CIBOR, P.E., CITY ENGINEER DATE

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
--	SD COVER SHEET
SD 400	**PERMEABLE PAVEMENT**
SD 400 01	PERMEABLE PAVEMENT PARKING LANE
SD 400 02	PERMEABLE BLOCK PAVER STRIP
SD 401	PERMEABLE PAVEMENT COMPONENTS
SD 401 01	MATERIALS SECTION PERMEABLE PAVERS
SD 401 02	MATERIALS SECTION PERVIOUS CONCRETE
SD 401 02	MATERIALS SECTION POROUS ASPHALT
SD 402	**BIORETENTION**
SD 402 01	BIORETENTION BUMPOUT W/ PARKING
SD 402 02	BIORETENTION BUMPOUT W/OUT PARKING
SD 402 03	BIORETENTION W/ CLASS 4 BIKEWAY
SD 402 04	BIORETENTION IN ROUNDABOUT
SD 402 05	BIORETENTION IN LANDSCAPE ISLAND
SD 403	BIORETENTION COMPONENTS
SD 403 01	INLET
SD 403 02	OUTLET
SD 403 03	PRETREATMENT/ENERGY DISSIPATION
SD 403 04	ENERGY TREATMENTS AND BARRIERS
SD 403 05	ENGINEERED SOIL
SD 403 06	STONE AGGREGATE
SD 403 07	UNDERDRAINS AND CLEANOUTS
SD 403 08	CHECK DAMS
SD 403 09	PLANTS
SD 404	**BIOSWALE/DITCH ENHANCEMENT**
SD 405	**TREE WELL**
SD 406	GENERAL COMPONENTS
SD 406 01	EDUCATIONAL AND PROTECTION SIGNAGE
SD 406 02	LINERS/GEOTEXTILES
SD 406 03	UTILITY CONFLICTS
SD 406 04	CLEANOUT
SD 406 05	OBSERVATION WELL
SD 406 06	TRENCH SURFACE REPLACEMENT

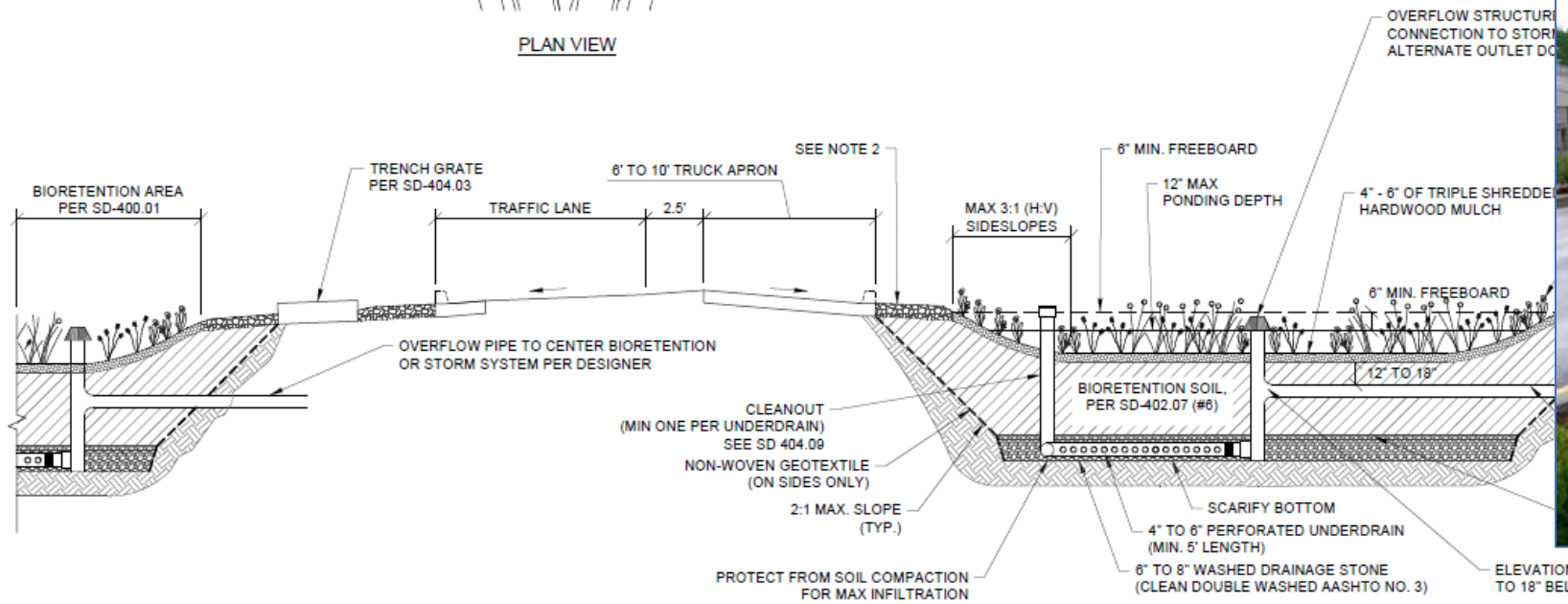
- ✓ Site Suitability/Applicability
- ✓ Design & Construction Notes
- ✓ Layout & Siting Requirements
- ✓ Permeable Pavement Parking Lane
- ✓ Bioretention Bumpout
  - ✓ W/ parking
  - ✓ w/ out parking
  - ✓ Round about
- ✓ Bioswale/Ditch Enhancement
- ✓ Tree Wells
- ✓ Educational and Protection Signage



PLAN VIEW

NOTES:

1. PROJECT SPECIFIC ROADWAY GEOMETRY AND DESIGN TO BE PROVIDED BY TRANSPORTATION ENGINEER.
2. REFER TO TYPICAL DETAIL SD-402.07 "BIORETENTION NOTES" FOR BIORETENTION CONSTRUCTION REQUIREMENTS.
3. REFER TO TYPICAL DETAIL SD-404.10 "GRAVEL TRENCH LEVEL SPREADER" FOR ENERGY DISSIPATION AT CURB INLET. IF SIDES OF BIORETENTION ARE SLOPED, REFER TO TYPICAL DETAIL SD-404.01 "CURB CUT WITH SPLASH PAD."
4. DETAILS OF PIPE CONNECTIONS TO PROPOSED/EXISTING STORM SYSTEM SHALL BE AS DESIGNED BY THE PROJECT DESIGNER.
5. ENSURE THAT SIGHT TRIANGLES ARE NOT COMPROMISED WITH PROPOSED LANDSCAPING.
6. BIORETENTION PLANTING PLANS MUST BE STAMPED BY A LANDSCAPE ARCHITECT IN THE STATE OF TENNESSEE.
7. PIPE MATERIALS INSTALLED IN RIGHT OF WAY MUST COMPLY WITH CITY STANDARDS.



SECTION A-A

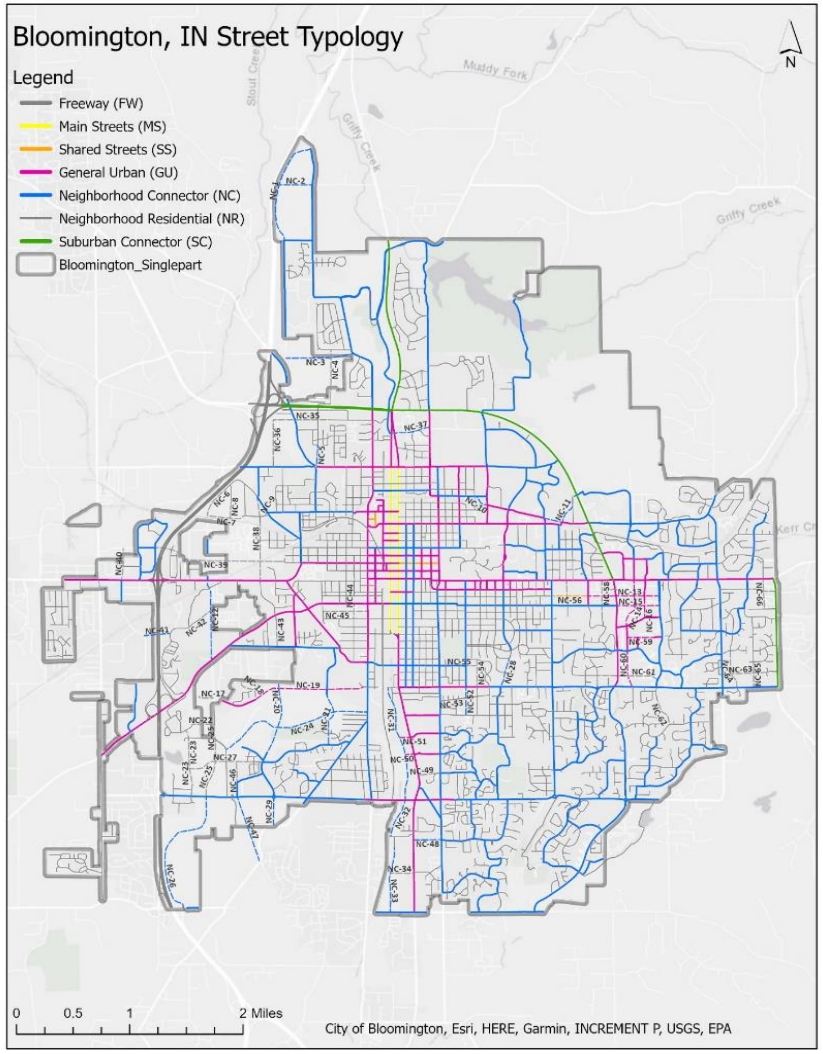
NO.	REVISION	DATE

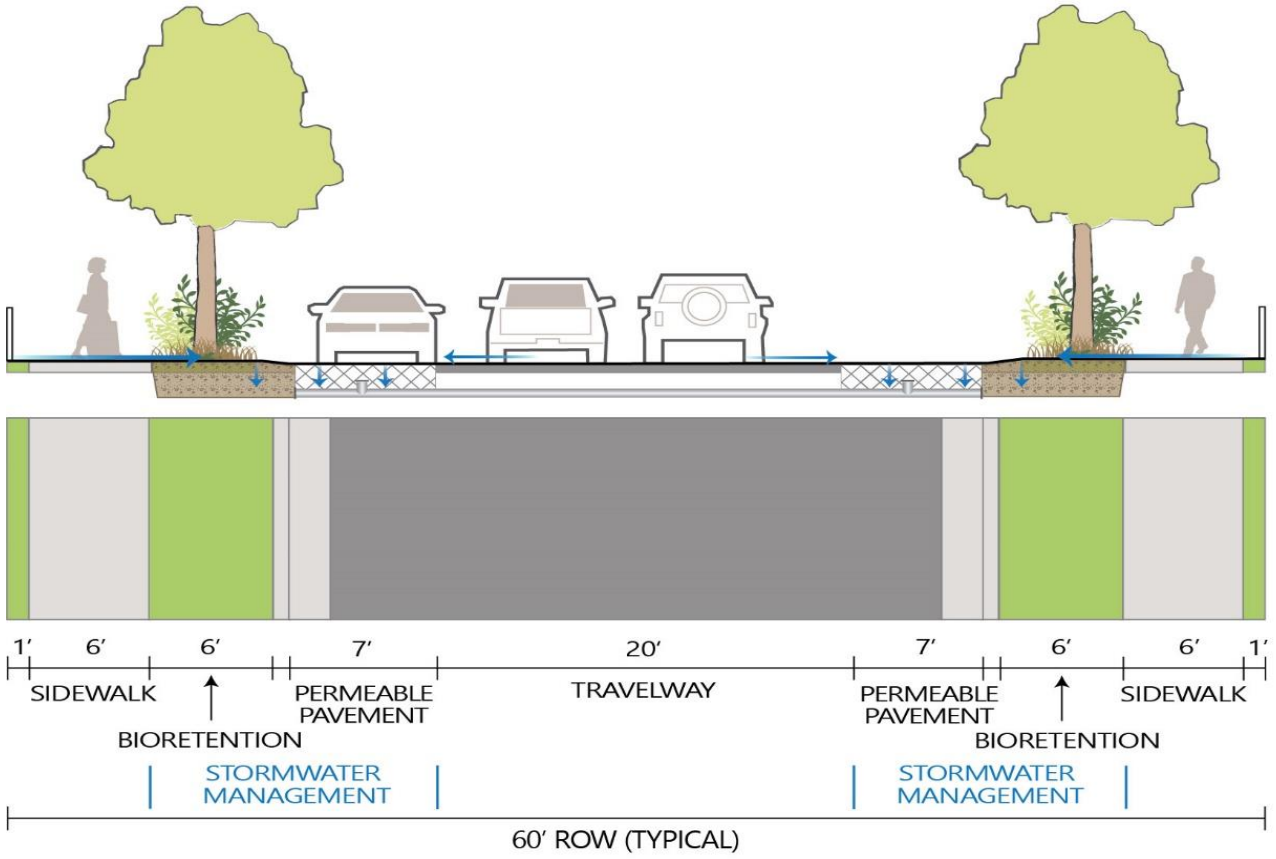
CITY OF CHATTANOOGA AND HAMILTON COUNTY

BIORETENTION - ROUND ABOUT

CITY OF BLOOMINGTON UTILITIES

Stormwater and Transportation Planning





CITY OF BLOOMINGTON UTILITIES

R/W Typical Detail Educational Material

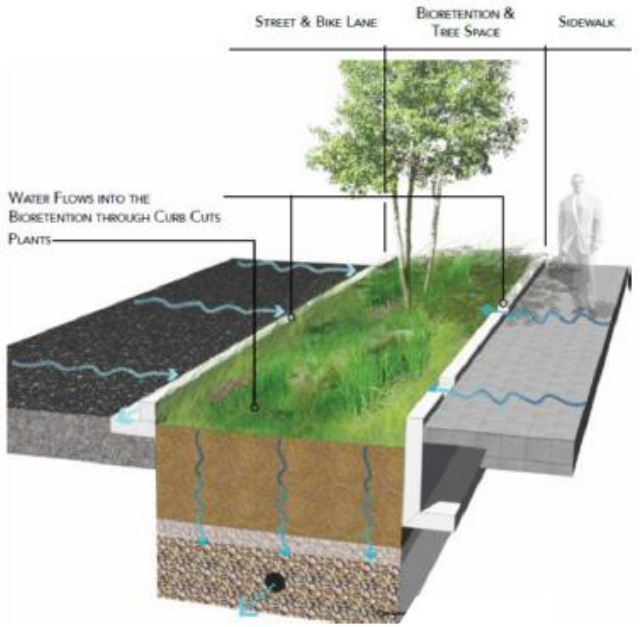
3.2 Bioretention

Bioretention is landscaping with a purpose for stormwater management. Trees, shrubs, grasses, and perennials are used to create a diverse landscape with varied benefits. Plants should be chosen based on the site needs like level of care expected at the facility, and water intake. Right of way areas provide a harsh environment for plants to thrive due to high instances of salt loads, urban fill, sediment build up, trash and continuous car exhaust. It is critical that the proper soil media is provided to keep tough plants healthy in this environment. Plants should be chosen to ensure sight lines are preserved for pedestrians and vehicles on the street and that like to be inundated with water. See Appendix 1 for Plant Guidance and a Plant list.

GI Typical Detail Series:

- SD 402 – Bioretention
- SD 402 – Bumpout w/ Parking
- SD 402 – Bumpout w/ out Parking
- SD 402 – Bioretention w/ Bikeway
- SD 402 – Bioretention in Round About
- SD 402 – Bioretention in Landscape Island

Where to Use It? Bioretention is very versatile and can fit into many land use types and right of way spaces. With a few design modifications bioretention areas can thrive on slopes as well.



Bioretention w/ Bikeway

Greening Bloomington Streets: A guide to green infrastructure stormwater practices CITY OF BLOOMINGTON

Design Considerations:

- ✔ Bioretention bumpouts can be used as traffic calming
- ✔ Existing mature trees & root systems should be protected
- ✔ Existing utilities shall be considered and evaluated. Should be avoided where possible, and allowed to coexist where possible
- ✔ Site lines and turning radi shall be considered and evaluated
- ✔ When plantings are placed between on-street parking stalls and sidewalk, adequate distance should be provided from the curt to ensure trees are not damaged by car doors
- ✔ Pretreatment and energy dissipation shall be considered
- ✔ Urban soil conditions provide a harsh environment, engineered soil is critical to infiltration and plant health.
- ✔ Check dams can be designed in steep slope areas
- ✔ Soil infiltration testing shall be completed to determine how fast water will soak into the subgrade, underdrains are commonly used due to existing soil conditions
- ✔ Long term maintenance plan and agreement shall be completed

Green Infrastructure Vegetation Educational Material

General Planting Technique Examples

Massings/Clumping: Creating massings help to form more aesthetic groupings that are more recognizable to people who may pass by the system. It will also make maintenance of the system easier.

Define the Edge: Edging techniques consider how the GI-BMP will be distinguished from the surrounding landscape such that it is easily identified by pedestrians and vehicles. A clearly marked edge treatment is preferred for consideration of long-term maintenance responsibilities. Some GI-BMPs, such as this one, will have a defined edge made from physical barriers such as fences, boulders, or paving/curbs. Other GI-BMPs will use a soft edge created by planting structural vegetation around the perimeter.

Sight Lines Maintained: It may be necessary to keep vegetation low in areas, keeping the area visible through the GI-BMP and maintaining sight lines. A general guideline for a clear zone is between 4' and 7'. **This is especially critical at street intersections, where dense vegetation should be no greater than 3' above top of curb.** Sight lines may also be important in areas where perception of crime is high or child supervision is a priority.

Appropriate Number of Species: The number of species will be determined by the desired design impact and range of environmental conditions within the GI-BMP. **While supporting these goals, the number of species should be limited by the reality of maintenance crews and budgets.** GI-BMPs with a large number of species may be more challenging to maintain.

Green Infrastructure Vegetation Educational Material

Long Range Stormwater Program Master Plan

- Draft Stormwater Master Plan
- Strategies
  - $$$
  - Timeframe
  - Affected Departments
- Current Implementation Items:
  - WQCR
  - SWQMP
  - GI Typical Details

#	Strategy	Frequency	Year						
			2022	2023	2024	2025	2026	2027	2028
1	Update the Construction Stormwater Management provisions in Chapter 10.21	One time	-	$ 16,000	-	-	-	-	-
2	Update and expand the Post-Construction Stormwater Management provisions in Chapter 10.21	-	-	$ 25,000	-	-	$ 15,000	-	-
3	Develop a comprehensive Stormwater Design Manual using a stakeholder guided process	One time	-	-	$ 80,000	$ 110,000	$ 110,000	-	-
4	Review and update the CBU Construction Specifications	One time	-	-	-	-	$ 5,000	-	-
5	Align the UDO with updated Chapter 10.21 and the new Stormwater Design Manual	One time	-	-	$ 30,000	-	-	-	-
6	Develop and implement a maintenance program for privately owned stormwater BMPs and detention basins	On-going	-	-	-	$ 50,000	$ 25,000	$ 25,000	*Ongoing* →
7	Review and update the CBU Stormwater Utility Credit Manual	One time	-	-	-	-	-	$ 35,000	-
8	Facilitate and support the design and implementation of Low Impact Development and Green Infrastructure for public projects	One time	-	-	-	$ 64,000	$ 60,000	$ 60,000	*Ongoing* →
9	Eliminate conflicting activities between the City & CBU depts in regards to the private land development process	One time	-	$ 10,000	-	-	-	-	-
10	Develop a jurisdiction-wide Stormwater System Management and Maintenance plan	-	-	-	-	-	-	-	-
	10a. System condition assessment and prioritization	One time	-	$ 100,000	$ 75,000	$ 75,000	$ 75,000	-	-
	10b. Watershed master plans & climate adaptation analysis *(leads to CIP projects & system maint. upgrades)*	Ongoing	-	-	-	$ 110,000	$ 110,000	$ 110,000	-
	10c. System maintenance upgrades	Ongoing	-	-	-	-	$ 50,000	$ 200,000	*Ongoing* →
11	Develop guidance for control of invasive plant species	One time	-	-	$ 50,000	-	-	-	-
12	Implement a Green Ditch Enhancement initiative	One time	-	$ 20,000	-	-	-	-	-
13	Evaluate and update the SWQMP	One time	$ 20,000	-	-	-	-	-	-
14	Develop a Water Quality Characterization Report	One time	$ 50,000	-	-	-	-	-	-
15	Develop an Education & Outreach Program for stakeholders and the public	Ongoing	-	-		$ 15,000	$ 50,000	$ 50,000	*Ongoing* →
16	Update CBU's stormwater cost-of-service & perform rate study	Ongoing	*Already in CBU's existing budget*		-	-	-	-	-

CITY OF BLOOMINGTON UTILITIES

The Road to Implementation

- Translating the Plan into Action
  - Adapting items to accommodate actual budget vs. anticipated budget
    - Existing projects over budget
    - Prioritizing permit compliance
  - Expansion of the implementation time frame
    - 4 year plan expanded to 6
  - Fitting implementation item cost and timing with other projects

The Road to Implementation

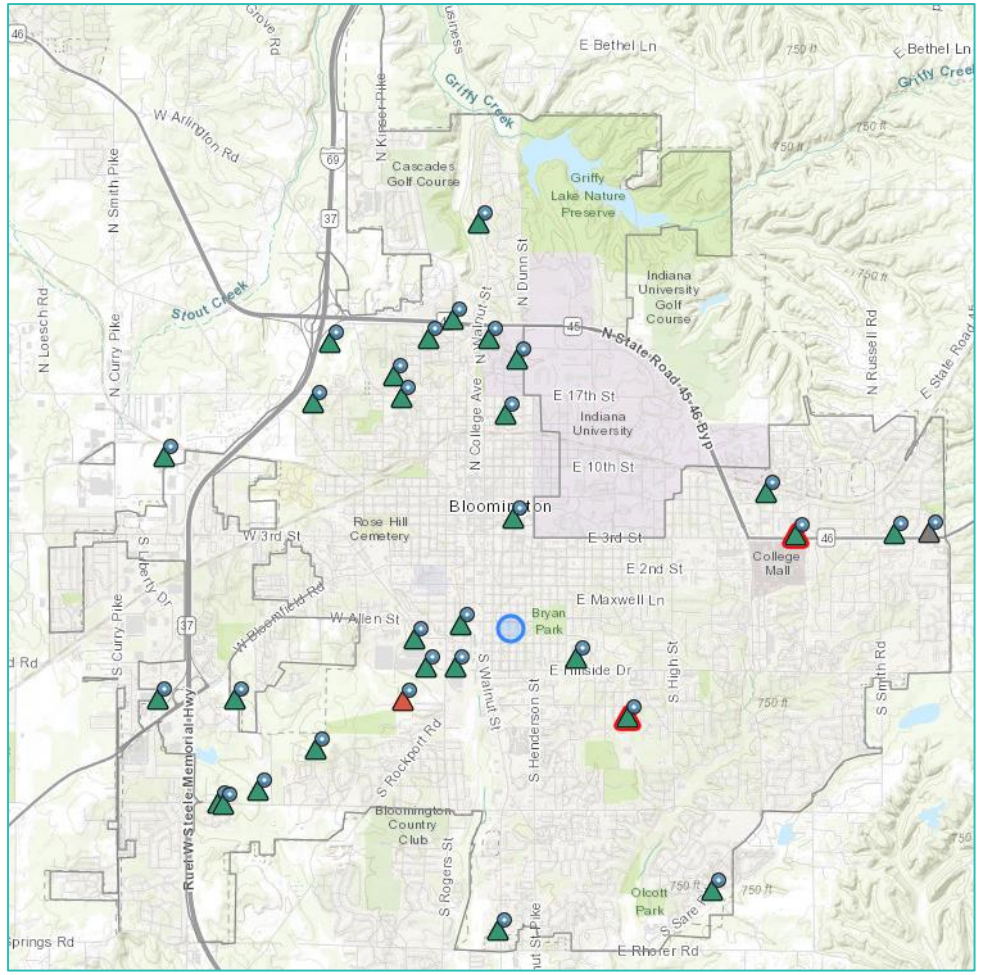
- Communication and Continuity
  - Sticking to the implementation items
  - Earmarking implementation money for specific items
    - "One big pot" issue
    - Scope each implementation item out
  - Ensuring all impacted and interested parties have input on policy changes and design standards
    - Working with Planning, Legal, and Engineering departments

#	Strategy	Frequency	Year						
			2022	2023	2024	2025	2026	2027	2028
1	Update the Construction Stormwater Management provisions in Chapter 10.21	One time	-	$ 16,000	-	-	-	-	-
2	Update and expand the Post-Construction Stormwater Management provisions in Chapter 10.21	-	-	$ 25,000	-	-	$ 15,000	-	-
3	Develop a comprehensive Stormwater Design Manual using a stakeholder guided process	One time	-	-	$ 80,000	$ 110,000	$ 110,000	-	-
4	Review and update the CBU Construction Specifications	One time	-	-	-	-	$ 5,000	-	-
5	Align the UDO with updated Chapter 10.21 and the new Stormwater Design Manual	One time	-	-	$ 30,000	-	-	-	-
6	Develop and implement a maintenance program for privately owned stormwater BMPs and detention basins	On-going	-	-	-	$ 50,000	$ 25,000	$ 25,000	*Ongoing* →
7	Review and update the CBU Stormwater Utility Credit Manual	One time	-	-	-	-	-	$ 35,000	-
8	Facilitate and support the design and implementation of Low Impact Development and Green Infrastructure for public projects	One time	-	-	-	$ 64,000	$ 60,000	$ 60,000	*Ongoing* →
9	Eliminate conflicting activities between the City & CBU depts in regards to the private land development process	One time	-	$ 10,000	-	-	-	-	-
10	Develop a jurisdiction-wide Stormwater System Management and Maintenance plan	-	-	-	-	-	-	-	-
	10a. System condition assessment and prioritization	One time	-	$ 100,000	$ 75,000	$ 75,000	$ 75,000	-	-
	10b. Watershed master plans & climate adaptation analysis *(leads to CIP projects & system maint. upgrades)*	Ongoing	-	-	-	$ 110,000	$ 110,000	$ 110,000	-
	10c. System maintenance upgrades	Ongoing	-	-	-	-	$ 50,000	$ 200,000	*Ongoing* →
11	Develop guidance for control of invasive plant species	One time	-	-	$ 50,000	-	-	-	-
12	Implement a Green Ditch Enhancement initiative	One time	-	$ 20,000	-	-	-	-	-
13	Evaluate and update the SWQMP	One time	$ 20,000	-	-	-	-	-	-
14	Develop a Water Quality Characterization Report	One time	$ 50,000	-	-	-	-	-	-
15	Develop an Education & Outreach Program for stakeholders and the public	Ongoing	-	-		$ 15,000	$ 50,000	$ 50,000	*Ongoing* →
16	Update CBU's stormwater cost-of-service & perform rate study	Ongoing	*Already in CBU's existing budget*		-	-	-	-	-

CITY OF BLOOMINGTON UTILITIES

The Road to Implementation

- Knowing our Resources and Limitations
  - Knowing when objectives can be done in house vs. when to contract out
    - The cost of what isn't being done
  - Efficiently using the resources we do have
    - MS4 software with analytics
    - Avoiding two entities working on the same things

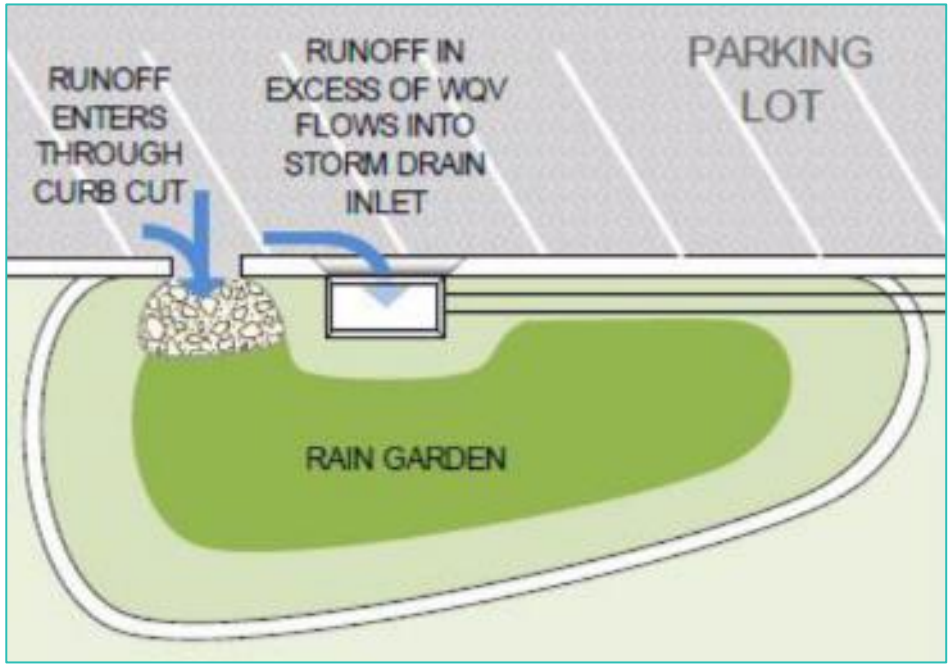


The Road to Implementation: Looking Forward

- Implementation items inform each other
  - Need to keep the big picture in mind when implementing specific items
    - Creation of typical details brings up questions to be addressed by ordinance and policy changes
    - Policy and ordinance changes impact the strength of new programs
- Putting the cart before the horse
  - GI Typical Details and Guidance Document done ahead of Design Manual
    - Need for Typical Details was urgent with City's GI initiatives
    - Might be more difficult to draft without updated Design Manual
    - Problems that arise will inform the Design Manual

The Road to Implementation: Looking Forward

- Value of an "on-call" contract
  - Expert advice for unforeseen issues
  - Keep the program on the rails
    - Minimizes issues from turnover
  - Guidance for taking advantage of green infrastructure opportunities as they arise
  - Help bring new and innovative ideas to fruition



Take Aways

- Coordination and Communication are KEY!
- Taking time to LISTEN and COLLABORATE
  - Focus Group process
  - Staff interviews
- Aligning vision and mission of multiple city departments
  - Unified Development Ordinance and Stormwater Regulations
- Evaluating through the lens of climate change
  - Design storm evaluation based on future models
- Long TERM Operation & Maintenance Planning

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