CITY OF BLOOMINGTON UTILITIES

wood.

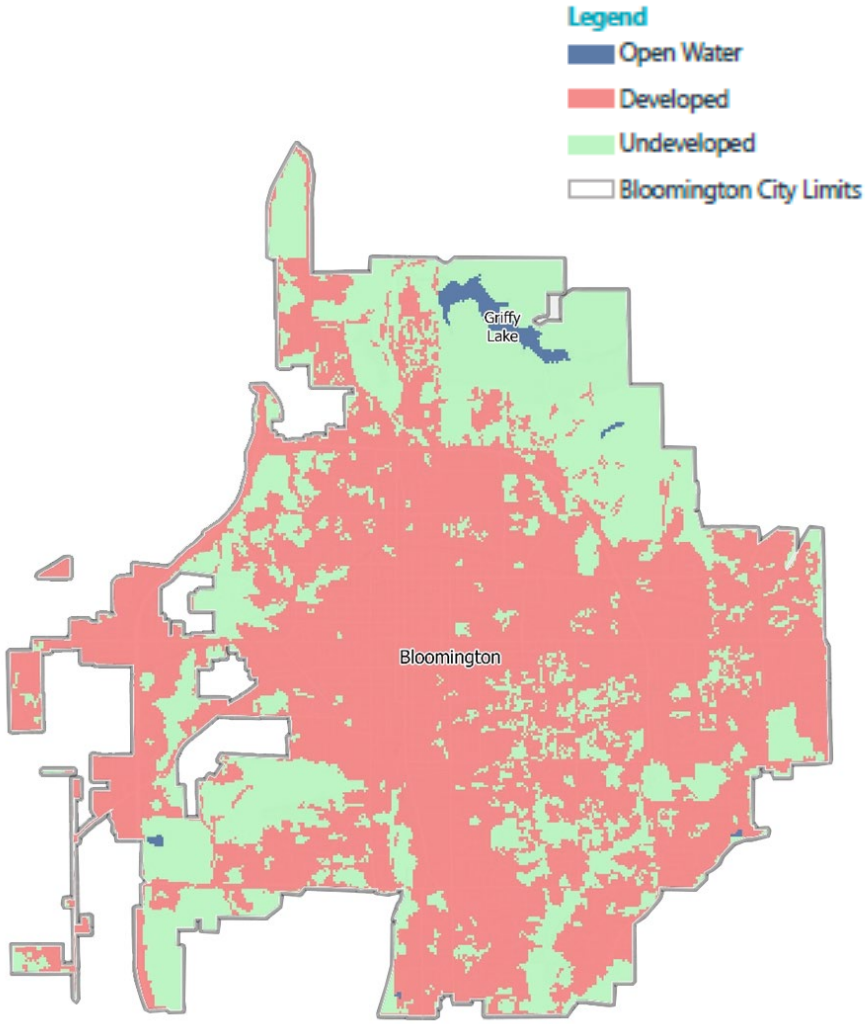
Bloomington Stormwater Master Plan

White River Alliance Water Summit

August 8th, 2021

City of Bloomington Indiana

- MS4 Program
  - Works in the Environmental Programs division at the City of Bloomington Utilities (CBU)
  - Within Monroe County we have four permitted MS4s
    - City of Bloomington
    - Monroe County
    - Indiana University
    - Ivy Tech Community College
- Physical Size
  - 13,114 Acres
- Rate
  - We currently have a rate of $5.95, was $2.70
    - Goal is to do a rate case every four years.

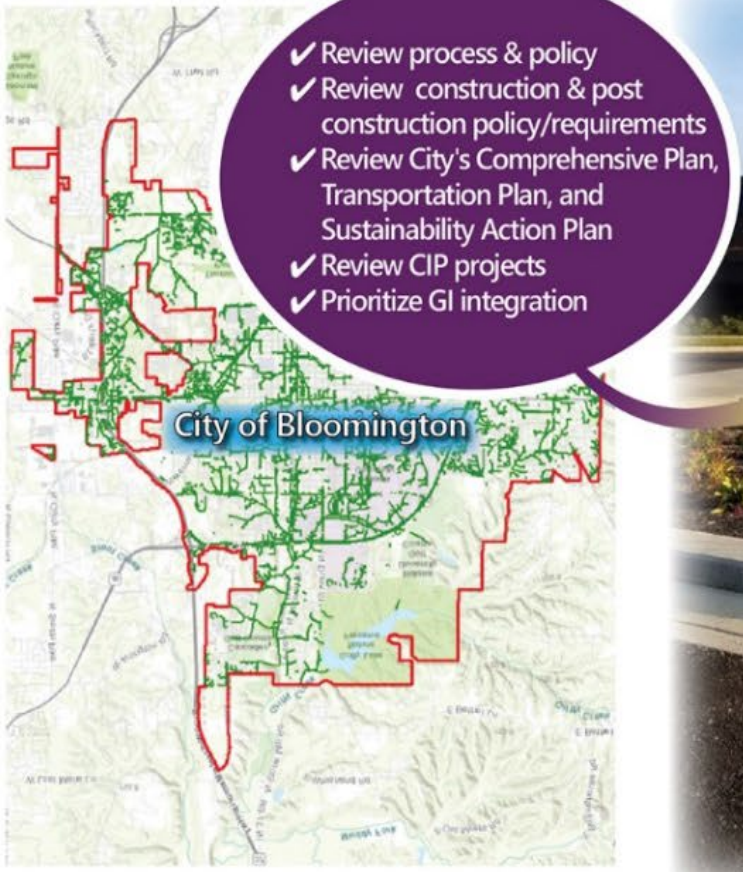


Stormwater Master Plan

- Goal
  - Cohesion between all City of Bloomington Departments
    - Gaining knowledge from them and their mission
    - Using the same language
  - Prepare the City for green infrastructure/low impact design and climate adaptation
  - Align CBU with potential new MS4 requirements
  - Create consistency in our program for both internal and external customers with designing for water quality and quantity.

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

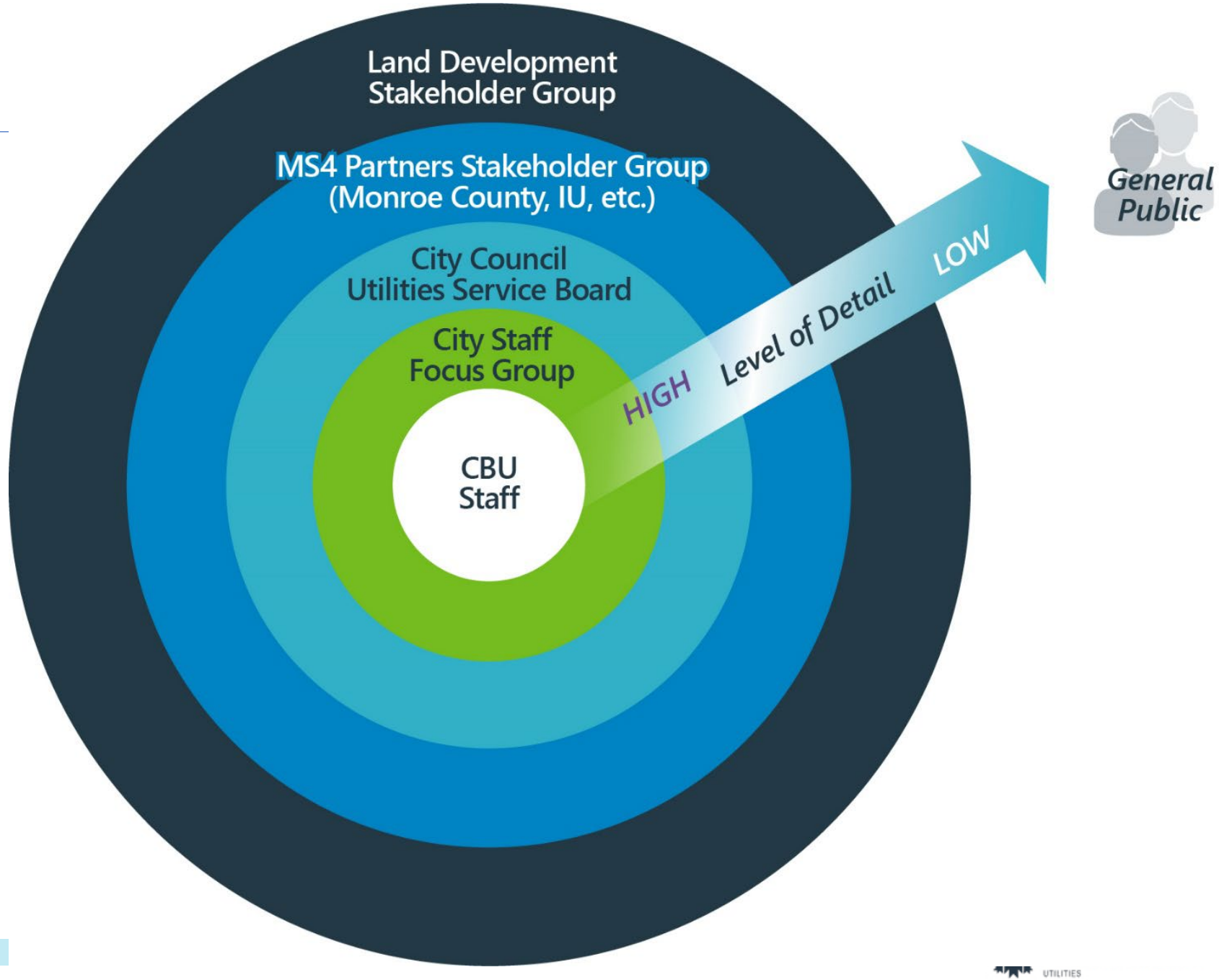
Develop recommendations for policy change, GI pilot projects, and GI promotion and incentives

Who's Involved?

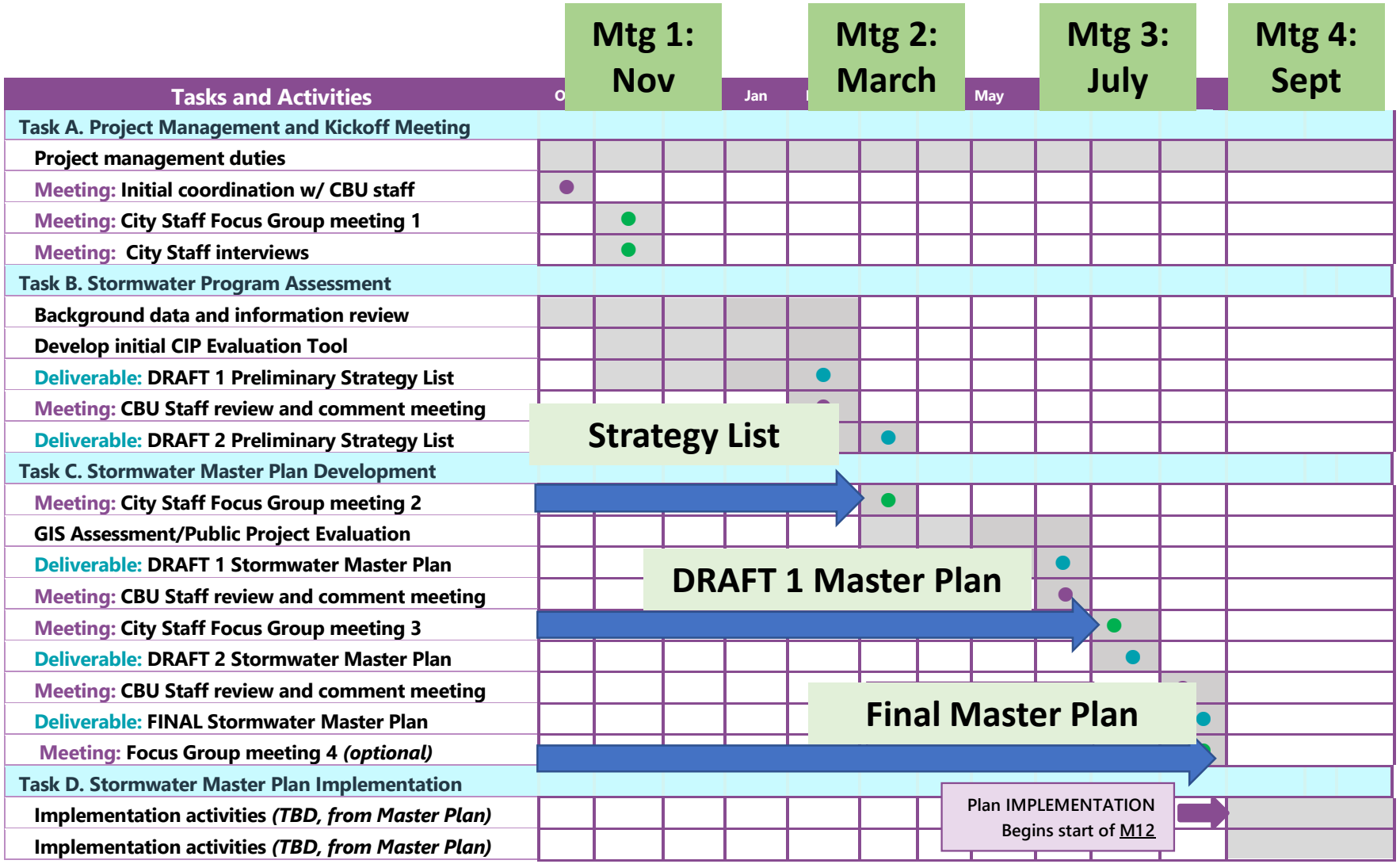
Who's Involved?

Stakeholder Groups

- CBU Staff:
  - James Hall
  - Phil Peden
  - Brad Schroeder



Project Schedule and Process



CITY OF BLOOMINGTON UTILITIES

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

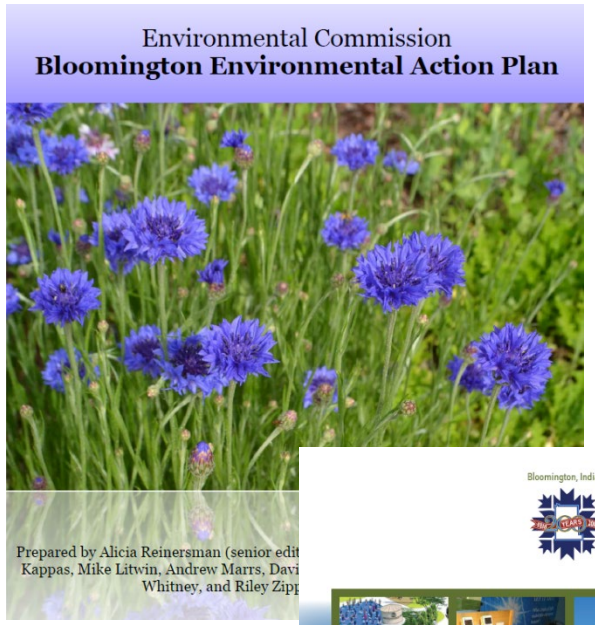
2. Outline **processes** to evaluate green infrastructure feasibility for public and private projects

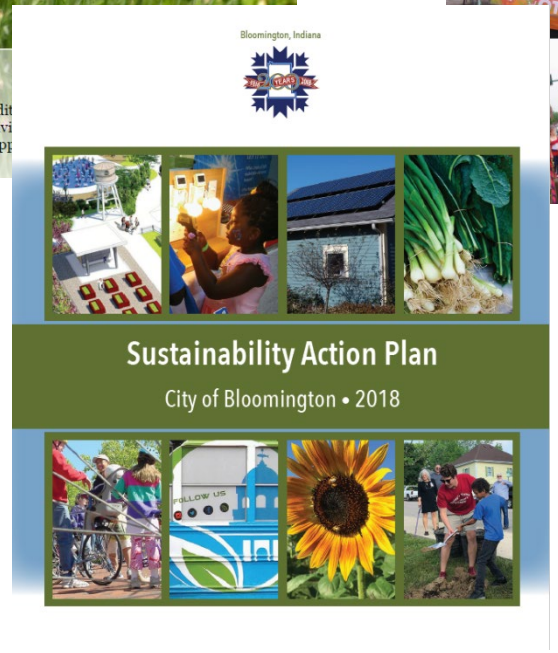
3. Develop **design standards, guidance, and specifications** for green infrastructure practices

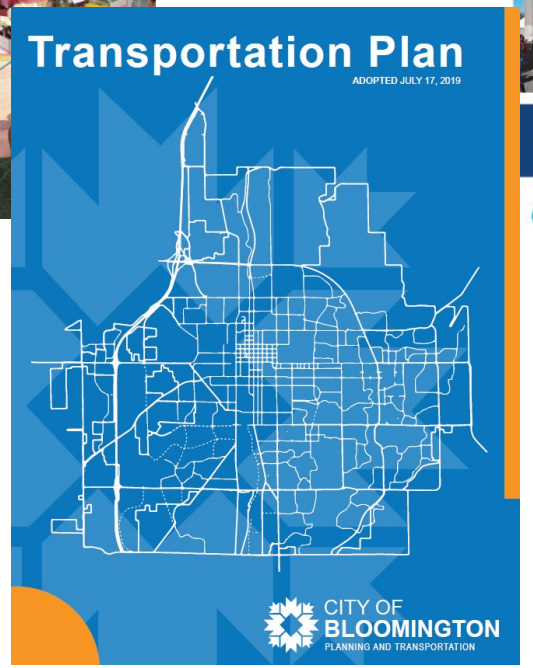
4. Identify and plan for green infrastructure integration into Capital Improvement Projects (CIPs)

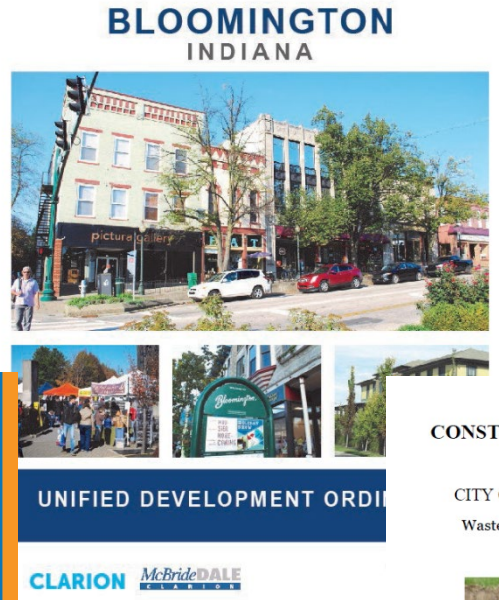
5. Frame an effective **long-term maintenance** program for stormwater practices on public and private land.

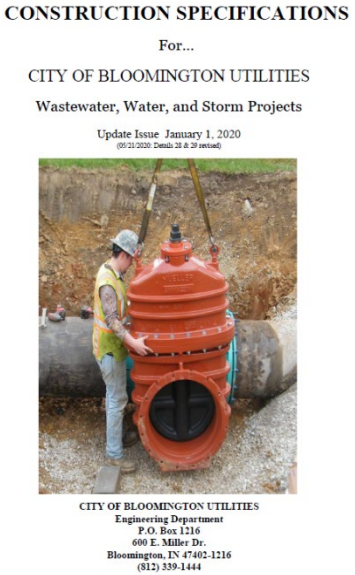
Goals, Objectives, and Outcomes: **Alignment w/ City Plans**











CITY OF BLOOMINGTON UTILITIES

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

3.2

3.3.

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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

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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

ıre

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***

CITY OF BLOOMINGTON UTILITIES

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

CITY OF BLOOMINGTON UTILITIES

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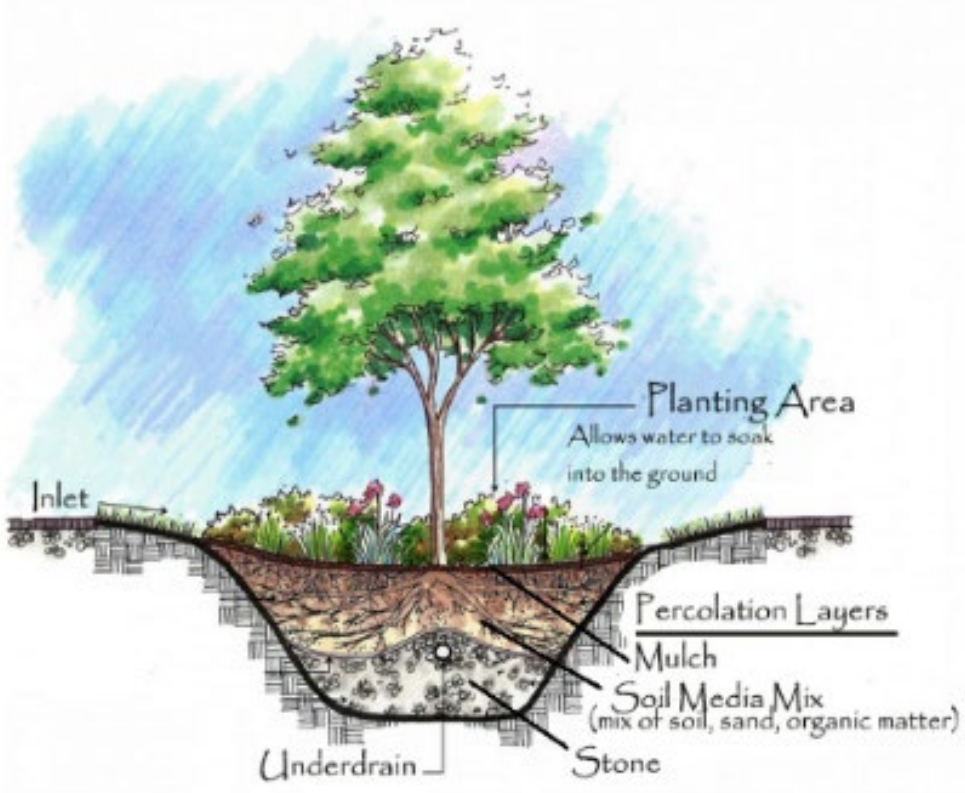
Green Infrastructure: **The Paradigm Shift for Land Development**

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)

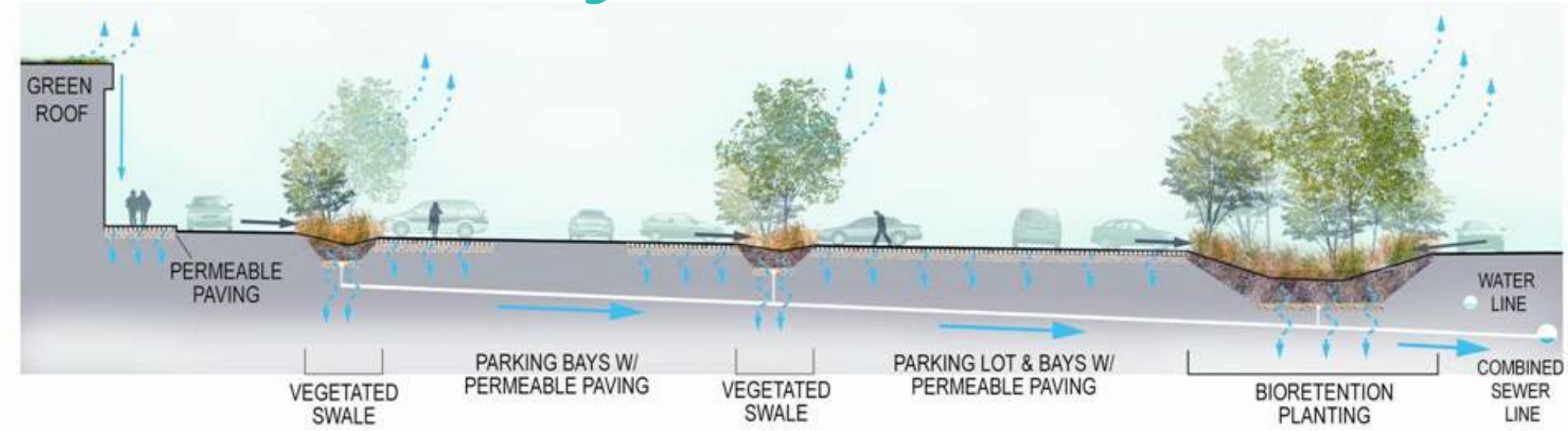
After construction:
BMP Maintenance Elements

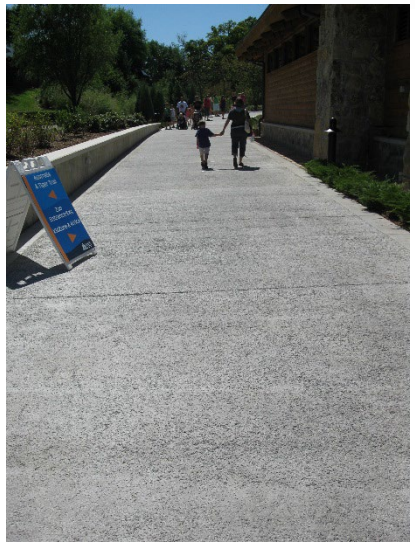


CITY OF BLOOMINGTON UTILITIES

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)

Goals, Objectives, and Outcomes

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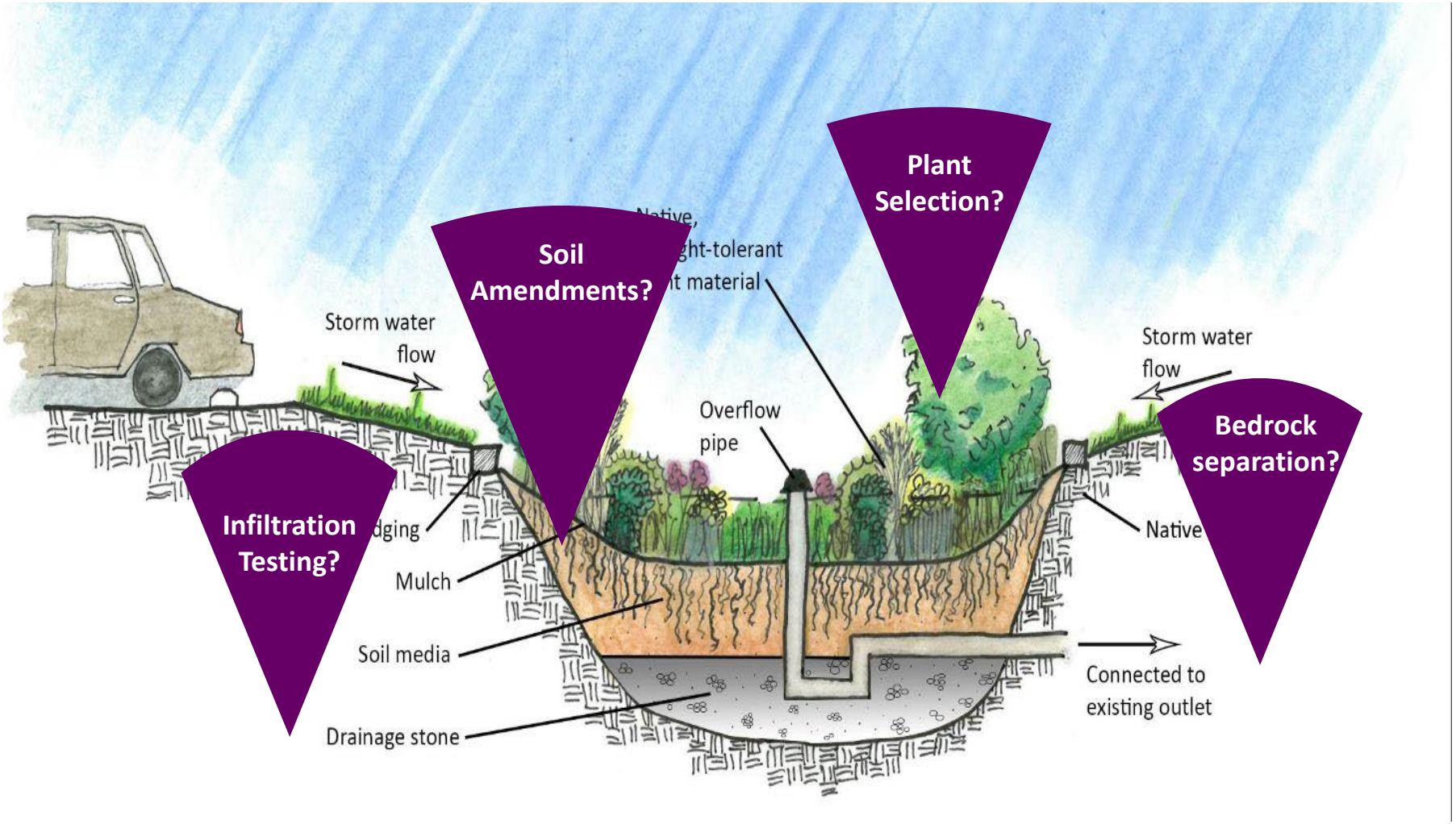
Goals, Objectives, and Outcomes: **Design Standards**



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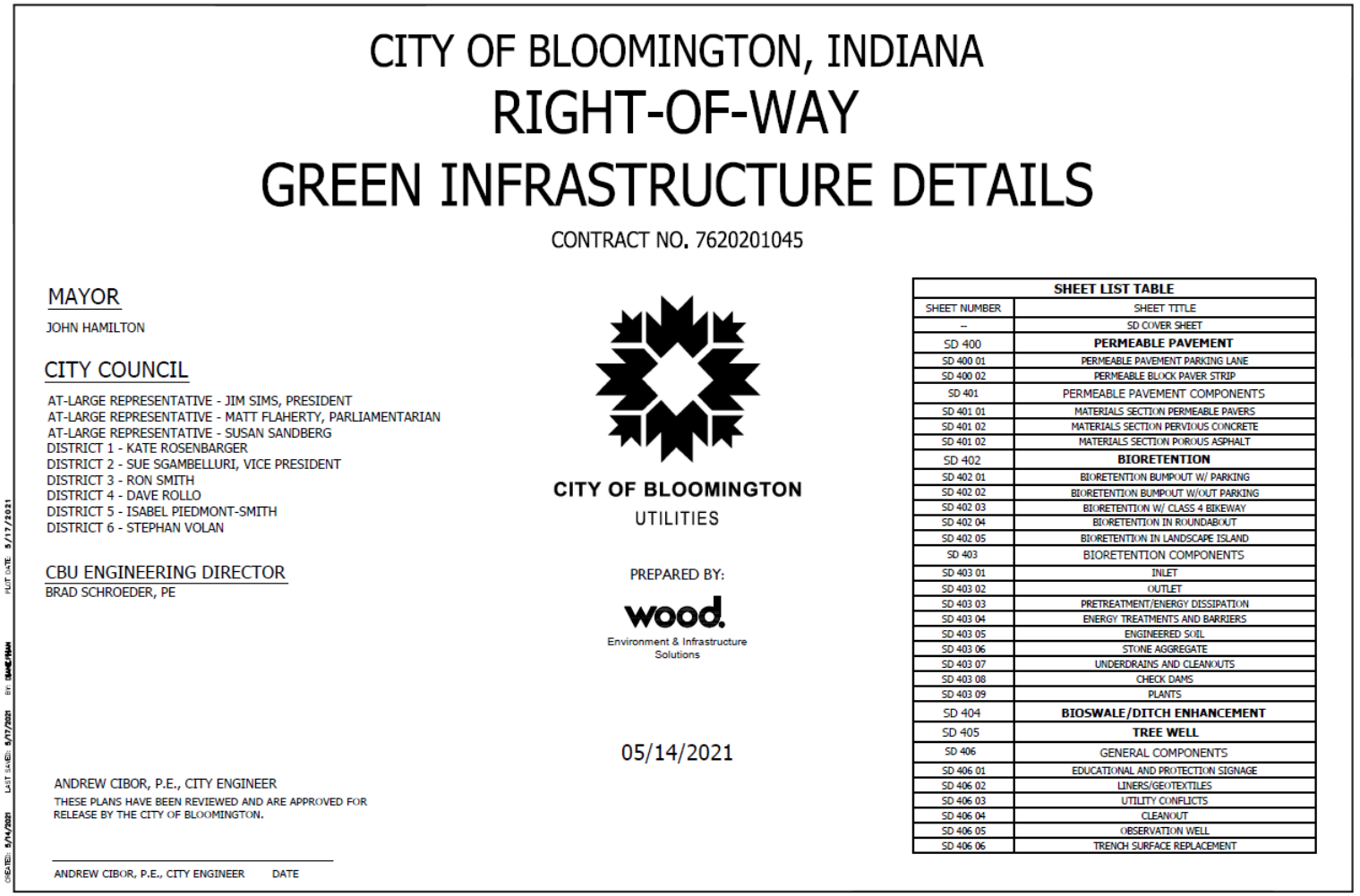
Goals, Objectives, and Outcomes: **GI Integration Public Projects**

CITY OF BLOOMINGTON UTILITIES

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

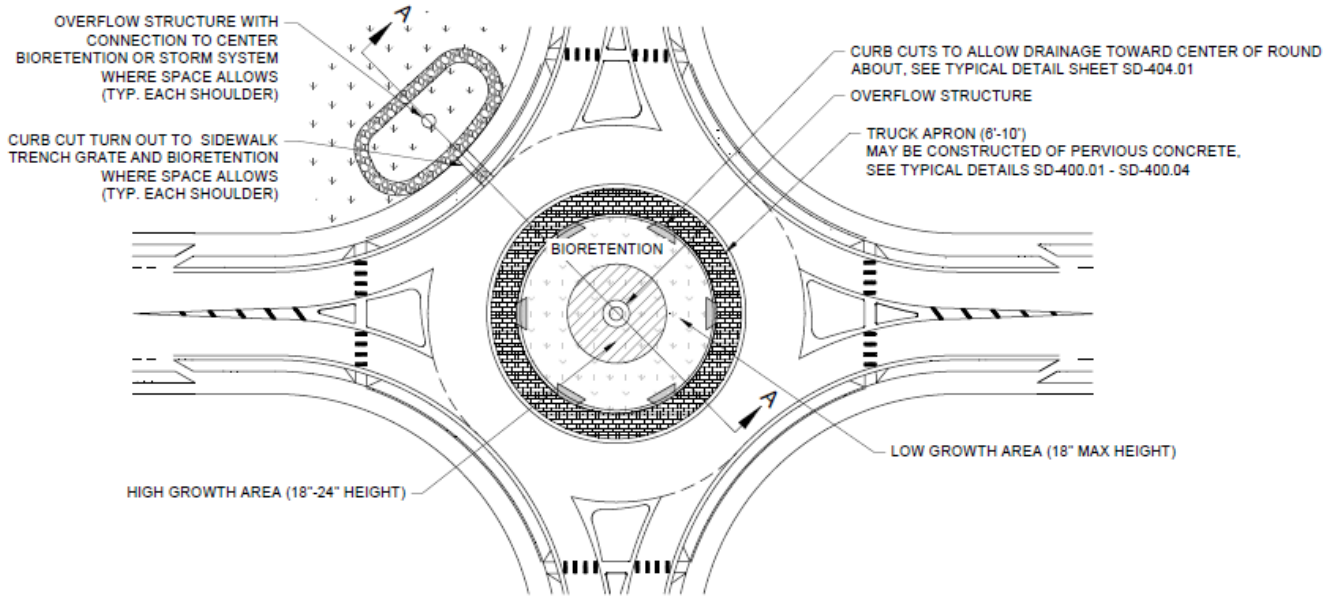
THESE PLANS HAVE BEEN REVIEWED AND ARE APPROVED FOR RELEASE BY THE CITY OF BLOOMINGTON.

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

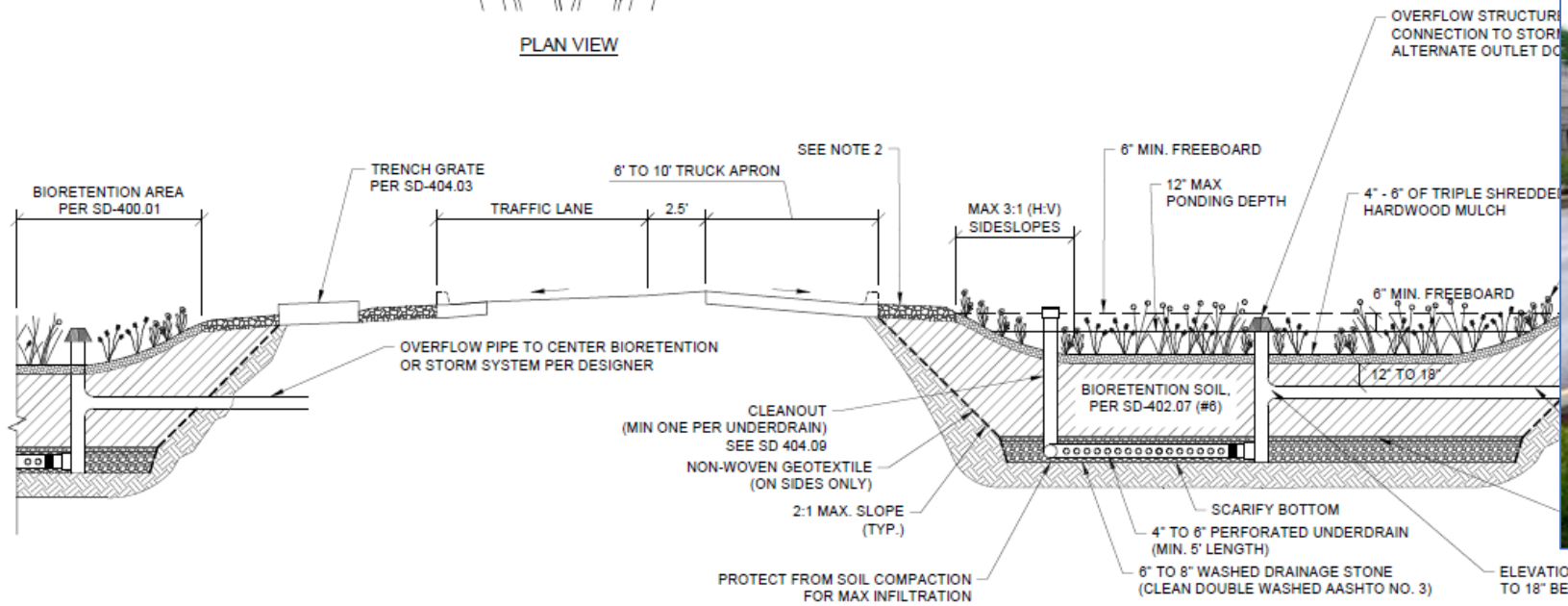
CITY OF BLOOMINGTON UTILITIES



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

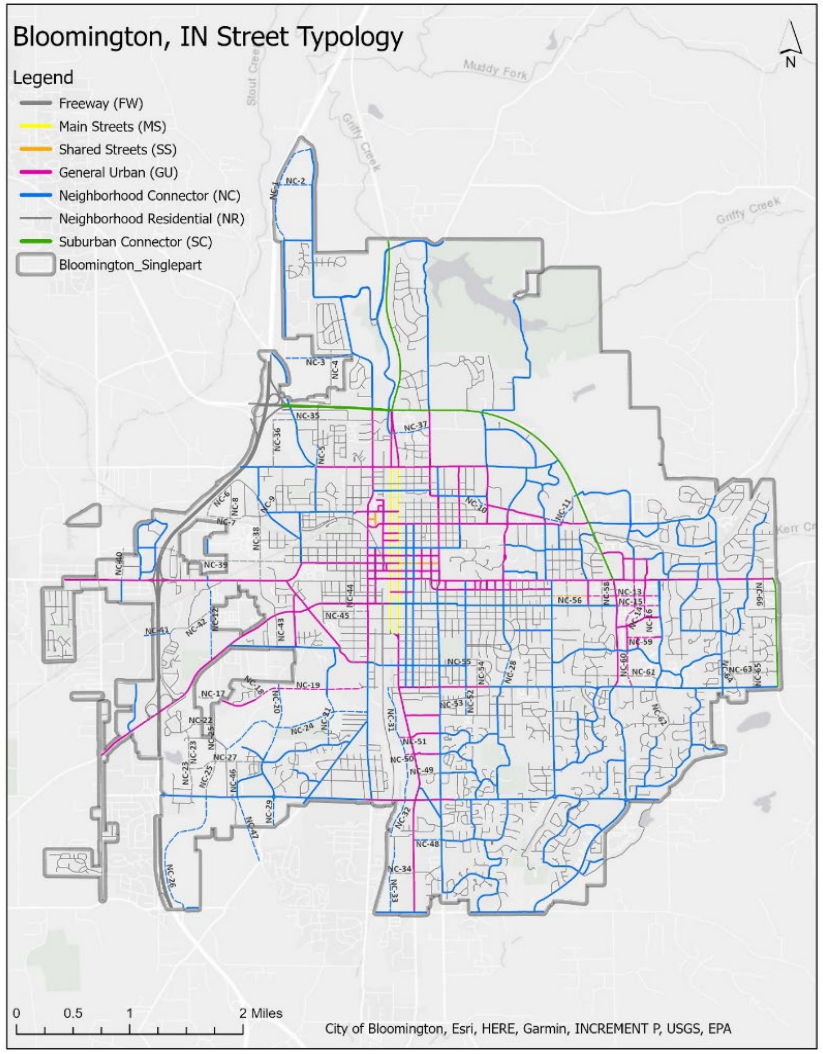
NO.	REVISION	DATE

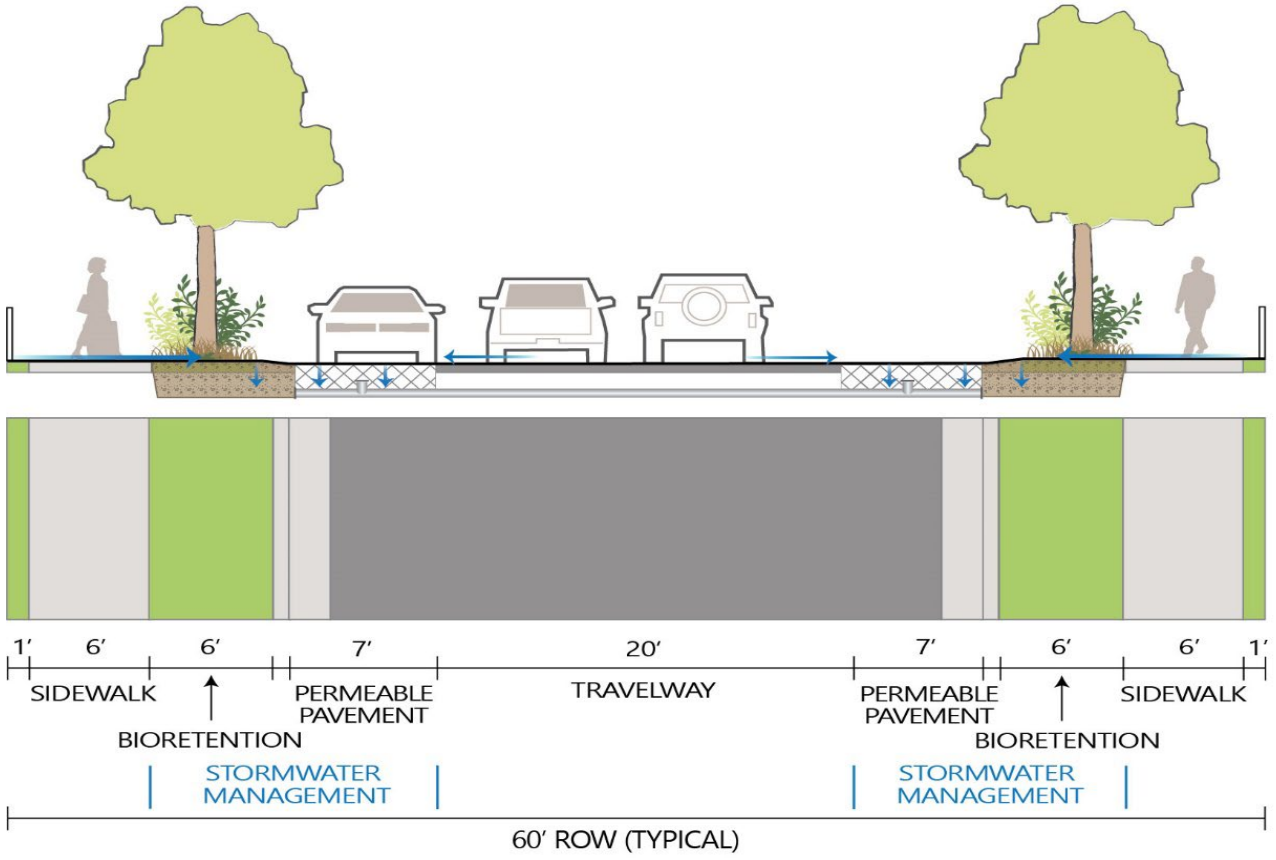
CITY OF CHATTANOOGA AND HAMILTON COUNTY

BIORETENTION - ROUND ABOUT

CITY OF BLOOMINGTON UTILITIES

Stormwater and Transportation Planning





CITY OF BLOOMINGTON UTILITIES

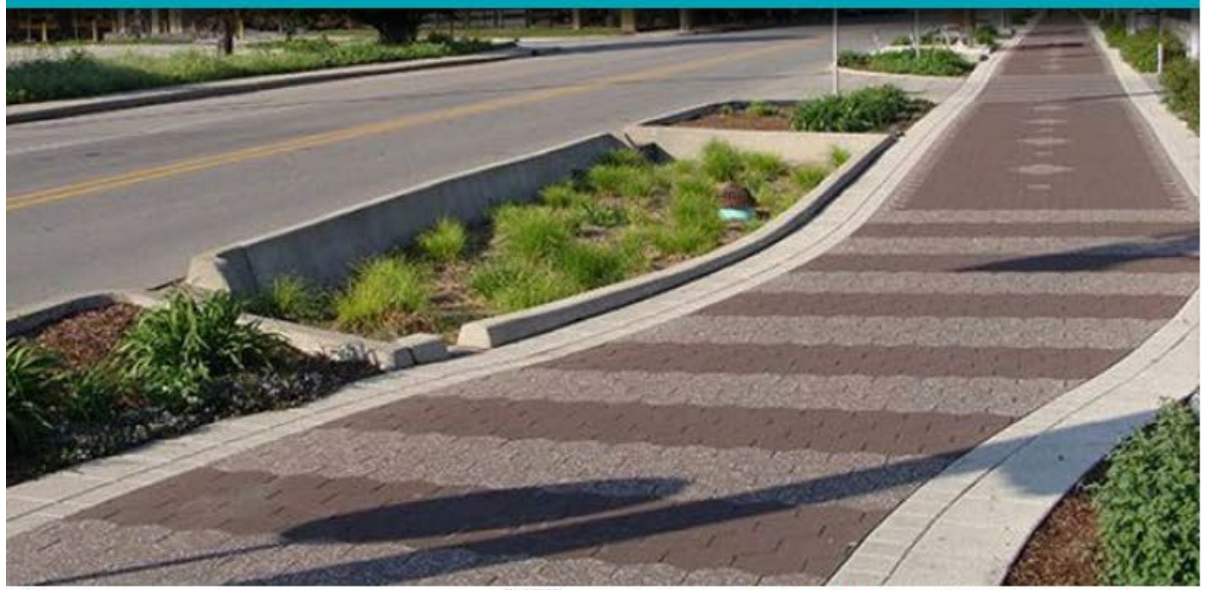
R/W Typical Detail Educational Material

3.2 Bioretention

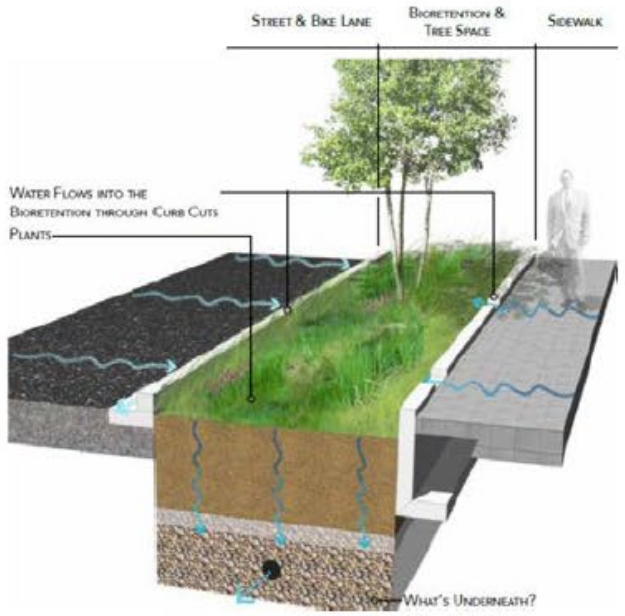
Bioretention bump outs and planters capture and treat stormwater runoff via surface and subsurface storage, filtration through native plant material, mulch, engineered soil, and infiltration into the native soil where feasible. The stormwater is held in the planting bed until it infiltrates into the subsurface or evaporates.

GI Typical Detail Series:

- SD 402 Bioretention
- SD 402-01 Bumpout w/ Parking
- SD 402-02 Bumpout w/ out Parking
- SD 402-03 Bioretention w/ Bikeway
- SD 402-04 Bioretention in Round About
- SD 402-05 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. The entire system can fit into small spaces making it adaptable to curb extensions, green and tree spaces along the road, medians, and parking lots. It can be designed w/ check dams for steep sloped areas.



Bioretention w/ Bikeway

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

CITY OF BLOOMINGTON UTILITIES

GI Vegetation

Description: Vegetation plays a critical role in the function of GI BMPs. Plants provide volume reduction through water uptake and their roots keep soil loosened, providing deeper infiltration pathways. Additionally, vegetation can help mitigate urban heat island effects, improve air quality, and reduce atmospheric carbon levels. Plants that are appropriate for soil, available water, light, and other site conditions should be selected. The intent is to establish a diverse, dense plant cover to reduce pollutants in stormwater runoff and withstand urban stresses from insect and disease infestations, drought, temperature, salt, wind, and sun exposure. The proper selection and installation of plant materials is the key to a successful GI BMP.

GI Typical Detail Series:
- Tree protection
- Planting Plan Requirements
- Planting Plan templates
- Planting guidelines

3.4.4 Green Infrastructure Vegetation

Existing Trees: Existing trees represent an important asset in the urban areas and should be protected wherever possible. When properly applied, protection measures minimize the negative effect of construction on trees. Tree protection measures should be used around trees that are desired to remain in place after construction.

Trees: Trees are a valuable asset that help to collect and store stormwater runoff and improve the quality of the air, soil, and public health. The use of trees in encourage if space allows. Tree canopies intercept rainfall before it reaches the ground while roots absorb water improve soil health. (check street trees that are allowed in Bloomington -Forester & Parks)

Shrubs: Shrubs are a key foundation planting for many GI BMPs. They offer structure, screening and organizing points. Successful use of shrubs in planting plans is dependent on selecting the correct plant for its location and purpose. (check shrubs-work with Parks to develop list and planting plan templates)

Perennials and grasses: Native grasses, perennial, and ground covers play a significant role in GI BMPs vegetation cover. Their fibrous root systems anchor soil, slow down water, and increase infiltration capacity of the soil. In a planting plan, grasses and perennials offer opportunities for diversity, color, and texture. Integrating these with shrubs and tree species creates a balanced landscape. (check shrubs-work with Parks to develop list and planting plan templates)

Planting Plans: Planting plans accompanied with the appropriate specifications provide the detail needed to install the vegetation for a GI BMP. The intent of the planting plan is to provide clear and consistent direction to the contractor. Template planting plans are provided in these details, and detailed planting plan requirements are included in the Bloomington Stormwater Manual.

CITY OF BLOOMINGTON UTILITIES

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

- ✓ What are Bloomington's **Values**?
- ✓ How to create **PROCESS** for Green Infrastructure Prioritization

ID		Evaluation Criteria
1		**Policy and Regulation**
	1a.	Project aligns with City's goals for green infrastructure
	1b.	Project furthers water quality goals identifed in the stormwater master plan and CIP
	1c.	Project site falls under MS4 permitting requirement
2		**Public Impact**
	2a.	Project is located in a visible area or public space
	2b.	Project addresses resident complaints and about stormwater management or flooding
	2c.	Project improves and/or enhances nature-based recreation
	2d.	Project improves/enhances mobility systems, safe connections, public spaces, recreational opportunities that support physical and mental well-being
3		**Resiliency**
	3a.	Project has the potential to mitigate stormwater management or local flooding issues
	3b.	Project has the potential to mitigate recurring maintenance issue
	3c.	Project will improve or enhance habitat quality for native landscapes and species
	3d.	Project has the potential to reduce Boulder's carbon footprint (heat island reduction, water reuse, reduced maintenance or treatement demands, alternative energy generation)
4		**Economic Impact**
	4a.	Project will improve local aesthetic quality or character
	4b.	Project implementation has potential to increase surrounding land values
5		**Administration**
	5a.	Project does not conflict with other department plans or goals
	5b.	Project installation requires permitting (USACE 401/404; Floodplain, other)
	5c.	Project requires costly ongoing or specialty skilled maintenance
6		**Cost and Construction Efficiency**
	6a.	Project is eligible for ongoing funding and/or has grant potential
	6b.	GI costs will be incrimental addition or offset to overall currect CIP budgeted project cost
	6c.	Cost of project is commensurate with the benefits achieved
	6d	Site is well suited for and/or plans are easily retrofitted to include GI

Long Range Plan

- Draft Stormwater Master Plan
- Strategies
  - $$$
  - Timeframe
  - Affected Departments

Stormwater Regulation - Design & Construction Stages	Page
1. Clarify Department responsibilities for stormwater regulation	3
2. Revise Chapter 10.21 – Construction Site Stormwater Management	3
3. Revise Chapter 10.21 – Post-Construction Stormwater Management	3
4. Develop a Bloomington Stormwater Design Manual	3
5. Revise the Unified Development Ordinance	3
Stormwater Regulation – Long-Term BMP Maintenance Stage	
6. Develop a Stormwater BMP Maintenance Program	4
LID & Green Infrastructure Public Project Integration	
7. Develop GI Typical Details & Specs for Public R/W Projects	4
8. Public Project GI Planning and Integration	4
9. Develop Project Criteria for Use of the GI Fund	4
System Maintenance	
10. Work Toward Proactive Maintenance of the Stormwater System	5
11. Implement a Green Ditch Enhancement Initiative	5
NPDES-MS4 Permit	
12. Evaluate & Update the SWQMP	5
13. Develop a Water Quality Characterization Report	5
Education, Training, & Outreach	
14. Develop an Education & Outreach Program for Stakeholders and the Public	6
15. Develop an Educational Tool for Invasive Plant Species Control	6
Funding	
16. Perform a Stormwater Finance Review	6
Communication /Organization	
17. Improve interdepartmental protocols for resource access and communication	6

Conclusion

- 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

Contact

James Hall
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