Capitol Area Stormwater Management Study

A framework for more resilient, multi-beneficial stormwater management

October 2024

Image Source: CAAPB

Capitol Area Stormwater Management Study

By Capitol Region Watershed District and Capitol Area Architectural and Planning Board

Project conducted in partnership with Barr Engineering Co., Young Environmental Consulting Group, LLC

Input provided by the following organizations: Metropolitan Council, MN Department of Transportation, Ramsey County Public Works Department, City of Saint Paul, State of MN Department of Administration – Facilities Management Division, State of MN Department of Administration – Office of Enterprise Sustainability

Saint Paul, Minnesota

October 2024

CAPITOL REGION WATERSHED DISTRICT

CAAPB

Young Environmental Consulting Group, LLC

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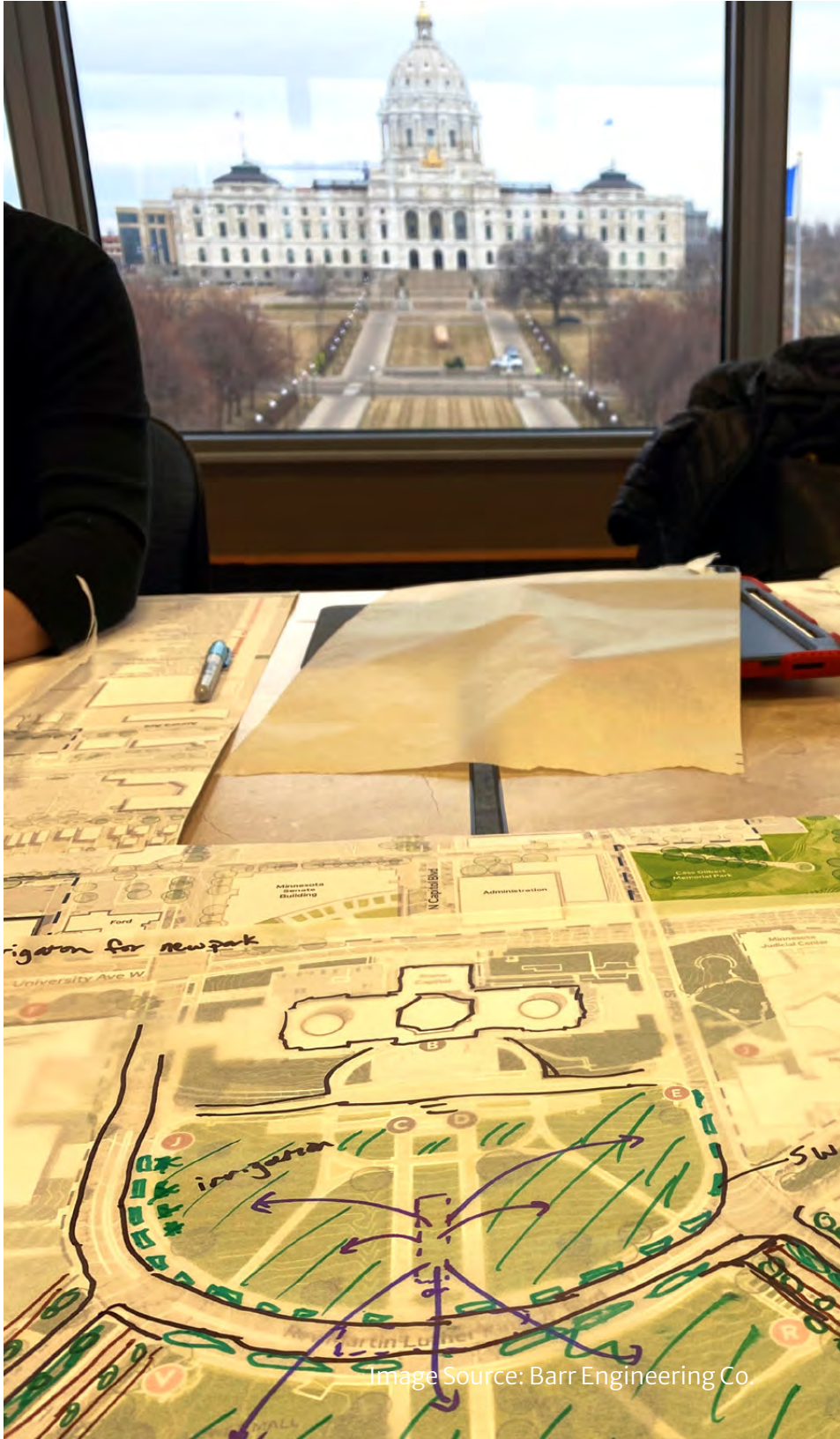


Image Source: Barr Engineering Co.

Executive Summary

The Capitol Area of Saint Paul comprises a 333-acre area centered around the Minnesota State Capitol. As Minnesota's "front door," a place of gathering for the entire state, and a location that is poised for significant public investment in capital projects and redevelopment efforts over the next several years, it is critical to ensure that investments made within the area are innovative, forward-thinking, and reflective of the values of the people of Minnesota.

To address the need for climate-resilient approaches to stormwater management and to reduce the flow of polluted stormwater into the Mississippi River, the Capitol Region Watershed District (CRWD) and Capitol Area Architectural and Planning Board (CAAPB) completed a study to plan for and guide implementation of regional green stormwater management within the Capitol Area.

The Capitol Area Stormwater Management Study (CASMS), described in this document, examined opportunities for "district" stormwater management systems (systems serving more than one public or private parcel) that employ "green infrastructure" practices within the Capitol Area. District systems offer efficiencies and can provide additional functions and community benefits beyond stormwater runoff management. Green infrastructure practices capture stormwater runoff for reuse or allow it to soak into the ground instead of running into storm sewers.

The Setting

The Capitol Area covers 60 blocks in the City of Saint Paul. It is highly urbanized, with roughly 70 percent of the area covered by hard surfaces like sidewalks and roadways.

The Opportunity

The Capitol Area is poised to experience significant change over the next several years, with large redevelopment projects, the Capitol Mall redesign, and several roadway/transit improvements in the planning stages. This change presents a tremendous opportunity to manage stormwater runoff differently and to proactively plan for district stormwater systems that use green infrastructure practices.

The Challenge

In its current condition, over 90 percent of the Capitol Area currently receives no stormwater treatment. This means that most of the rain that falls here runs into storm sewers, carrying pollutants such as fertilizer, sediment, oil, pesticides, and bacteria. The path of this polluted stormwater leads directly to the Mississippi River, which flows only a half mile away.

A Multi-Stage Approach

The CASMS began with an initial screening of stormwater conditions to identify opportunities for more resilient stormwater management practices and to prioritize areas for focus. Early ideas generated from this process were then used to inform conversations with potential partnering agencies and community organizations. Using results from the screening analyses, feedback from the agency partners, and considering anticipated timelines for redevelopment and capital improvement projects within the Capitol Area, four focus areas were identified for further evaluation of district stormwater systems:

1. *The former Sears redevelopment site*
2. *The University Avenue and Rice Street intersection*
3. *The Rice Street corridor*
4. *The Capitol Mall*

District System Focus Areas

The goal for each system was to maximize the stormwater and associated community benefits while acknowledging the unique constraints at each site.

To evaluate the costs and benefits of taking a district stormwater approach, a "triple bottom line" (TBL) analysis was used. The TBL approach goes beyond a typical cost-benefit evaluation to consider:

- **Economic factors:** *The economic viability and profitability of a project.*
- **Social factors:** *The effect on human well-being and the welfare of the community or stakeholder groups. This includes considerations related to equity, social justice, health, and quality of life.*
- **Environmental factors:** *The ecological consequences of the project, including water quality, energy consumption or savings, greenhouse gas emissions, and environmental sustainability.*

Within each focus area, the district stormwater management approach was compared with the "baseline" (i.e., status quo) approach of simply meeting minimum state, local, and CRWD stormwater management requirements.

Why District System Make Sense

The results of the TBL analysis demonstrate that adopting a district system approach for stormwater management within the Capitol Area would meet traditional stormwater management requirements while providing substantial social and environmental benefits.

These benefits include the following:

- *Increased volumes of water captured and treated (1.4 to 11 times)*
- *Enhanced user experience through the development of urban greening and the creation of three additional park spaces*
- *Greater phosphorus removal from runoff (1.3 to 3 times)*
- *Opportunities for stormwater reuse storage (up to 2.9 acre-feet)*
- *Reduced urban heat island effect and improved air quality*
- *Improved return on investment (1.2 to 6.2 times)*

Next Steps

CRWD and CAAPB are continuing conversations with potential local, state, and private project partners to further define the opportunities and constraints for district systems within the Capitol Area. This includes the potential for integrating green stormwater streetscapes and district system concepts into the reconstruction of Rice Street between Pennsylvania Avenue and John Ireland Boulevard, which is planned for reconstruction in 2025. It also includes the integration of a district-scale stormwater management reuse system into Phase I of the upcoming Capitol Mall improvements. As additional capital and redevelopment projects within the study area advance through the planning stages, the district stormwater concepts, goals, and guidelines developed through this planning effort will continue to inform the agency partners and encourage a more resilient and integrated approach to managing one of our state's most precious resources.

Benefits of District Systems in the Capitol Area

Environmental

1.4x **to 11**x more stormwater volume captured and treated

1.3x to 3x more pounds of total phosphorus removed

Up to **2.9 acre-feet** of stormwater reuse storage

Social

Enhanced user experience through urban greening and creation of up to **3 additional park spaces**

Economic

1.2 to 6.2 improved return on investment

"Many know this area as home to the Capitol and Minnesota's front yard. Fewer know this ground as a place where we have gathered, lived, and worked since native Minnesotans first called the river and hills of downtown their home. Today, there are opportunities to form new stories and to create a healthier and more unifying landscape..."

Peter Musty, Principal Planner and Zoning Administrator, CAAPB

1.0 Introduction

Saint Paul's Capitol Area is rich in history. From the start of the Capitol's construction in 1896 to today, it has been a site of energy and ideas. Tens of thousands of people call this place home; hundreds of thousands work or visit every year. Soon, it will be the site of several redevelopment projects that allow an opportunity to honor the past while also shaping a more resilient future.

As we create that new future, we need to consider how we can protect and improve water quality in one of our most prominent natural resources—the Mississippi River, which flows just a half-mile away. We also need to consider climate-resilient approaches to water management within the Capitol Area. To accomplish these goals, the Capitol Region Watershed District (CRWD) and the Capitol Area Architectural and Planning Board (CAAPB) have partnered to study water quality and quantity issues in the Capitol Area and to identify opportunities for regional green stormwater management approaches. These approaches, modeled by several local precedent projects, not only decrease pollutants flowing to the Mississippi River but provide other environmental, social, and economic benefits.

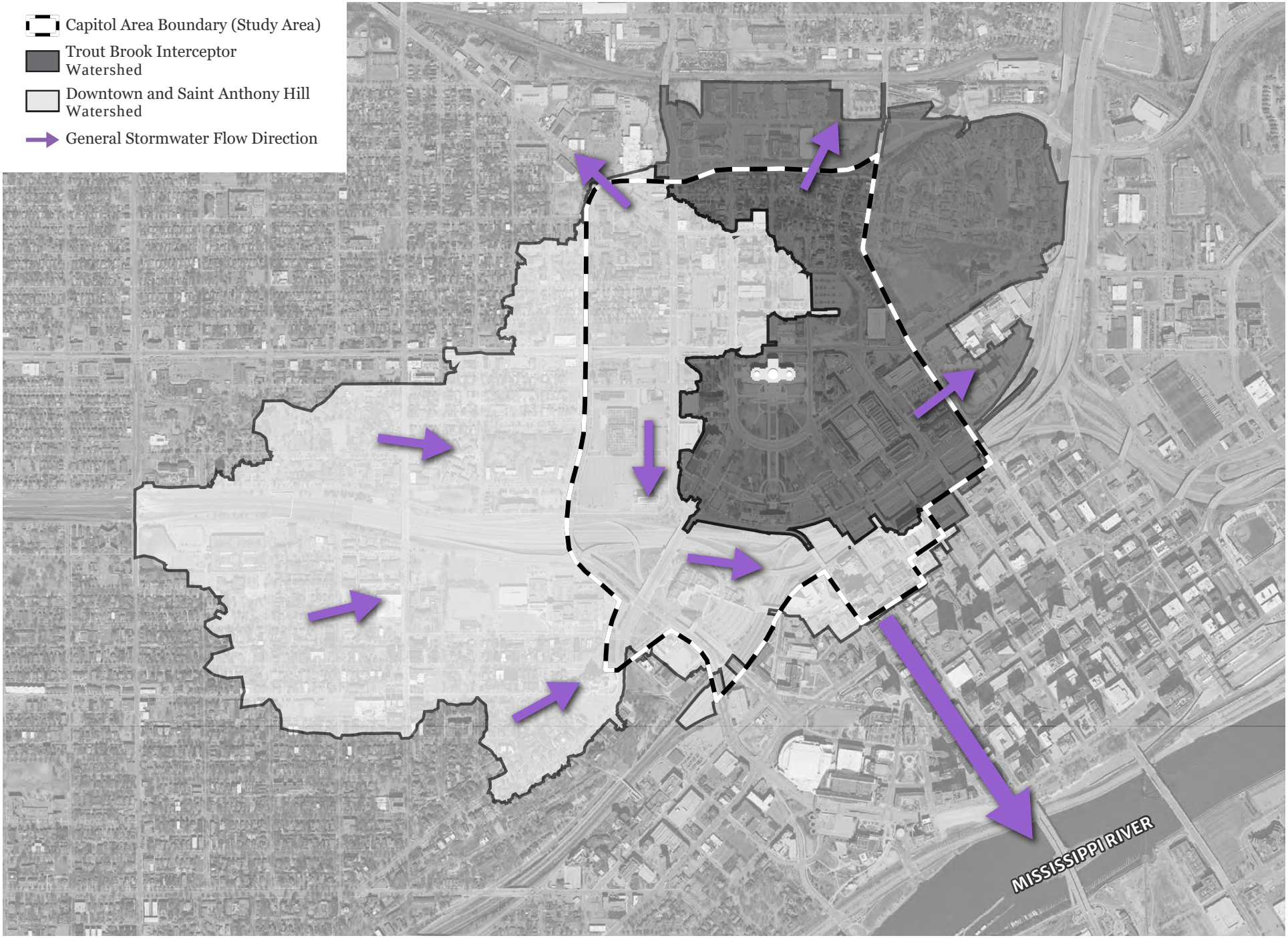
In particular, this study (the Capitol Area Stormwater Management Study or CASMS) examined "district" stormwater management systems (systems serving more than one public or private parcel) that employ "green infrastructure" practices. District systems offer efficiencies and can provide additional functions and amenities beyond the management of stormwater runoff. Green infrastructure practices capture stormwater runoff for reuse or allow it to soak into the ground instead of running into storm sewers.

The CASMS supports CRWD's goals of reducing the amount of pollution flowing to the Mississippi River and identifying area partners who can facilitate the development of stormwater systems that increase resilience and provide community benefits. The study also supports the CAAPB's goal for the Capitol Area to become a model for best practices in urban planning and development - by developing efficient urban stormwater systems that improve the community's experience.

1.1 Study Area: Present and Future

The Capitol Area comprises approximately 333 acres covering 60 blocks in the City of Saint Paul. The area is a mix of land uses and buildings associated with the Capitol Campus, the Capitol-Rice District to the west, a large redevelopment parcel at the former Sears site, and other surrounding commercial and residential areas.

The Capitol Area is highly urbanized, with approximately 70 percent of the landscape covered by impervious surfaces (hard surfaces like sidewalks and roadways). Over 90 percent of these impervious surfaces currently receive no stormwater management. This means the vast majority of rain that falls in this area runs off and into storm sewers—part going northeast to the Trout Brook Storm Sewer Interceptor and part flowing to the south/southeast into

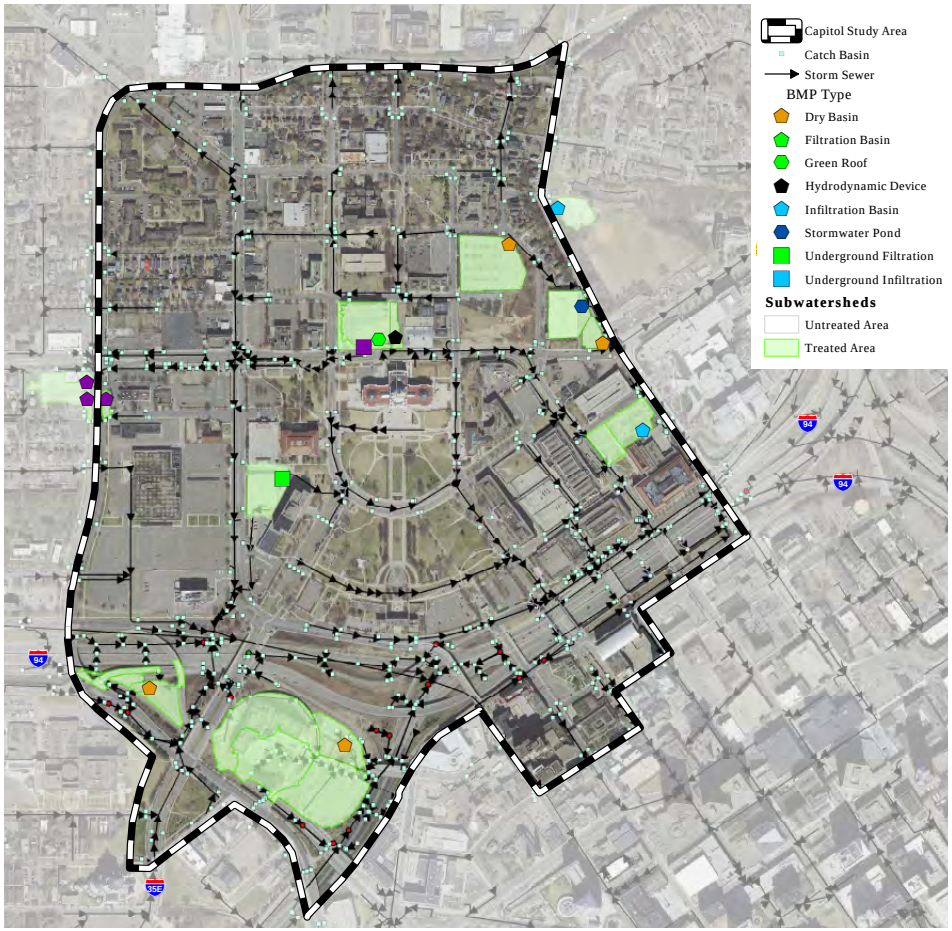


Study Area Flow Patterns

city storm sewers. Both paths lead directly to the Mississippi River, where the stormwater (carrying sediment, fertilizer, oil, pesticides, bacteria, and other pollutants) arrives primarily untreated.

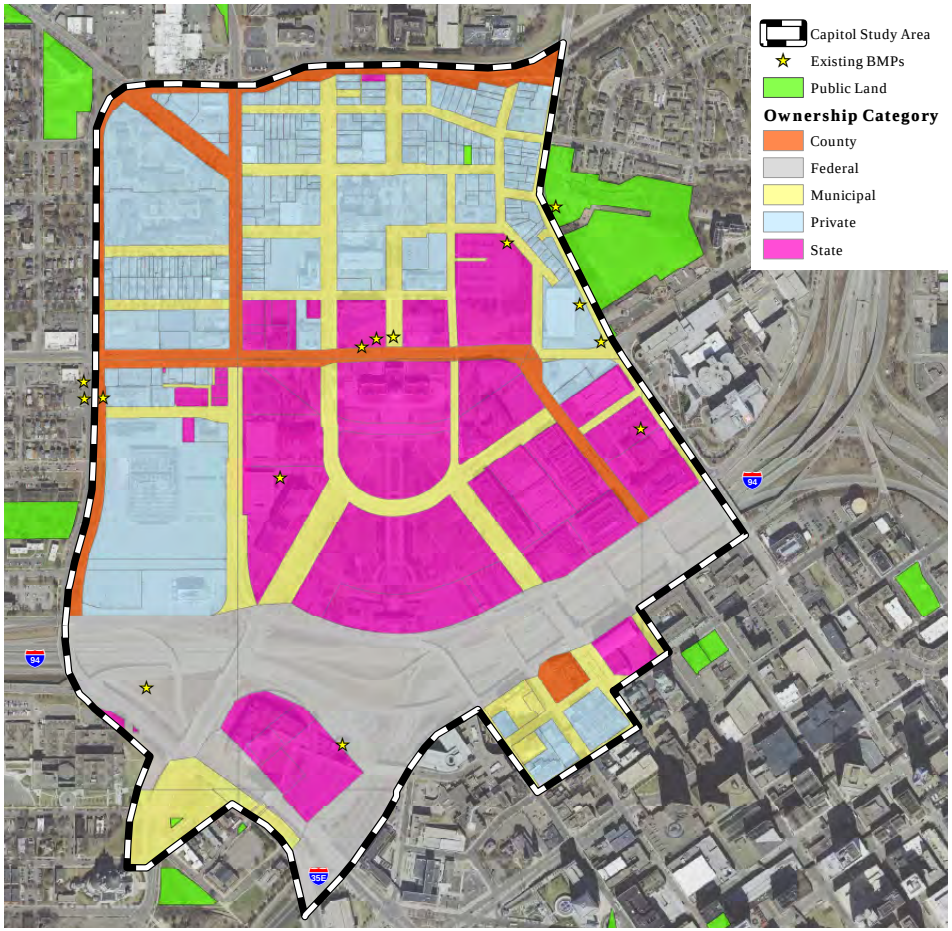
The Capitol Area is positioned to see a lot of change over the next few years, with large redevelopment projects (including at the former Sears Site) and several roadway/transit improvements being planned. This change presents a tremendous opportunity to manage stormwater runoff differently—to proactively plan for district stormwater systems that use green stormwater infrastructure practices.

This vision for cooperative, multi-party, and innovative stormwater management is both exciting and challenging. The Capitol Area is governed by various state, local, regional, and county entities, with overlapping jurisdictions and often different (and sometimes competing) goals and priorities. In addition, space is at a premium in this dense, urban environment. Adding to the complexity are the limitations posed by the presence of I-94, which limits stormwater management options across the full study area.



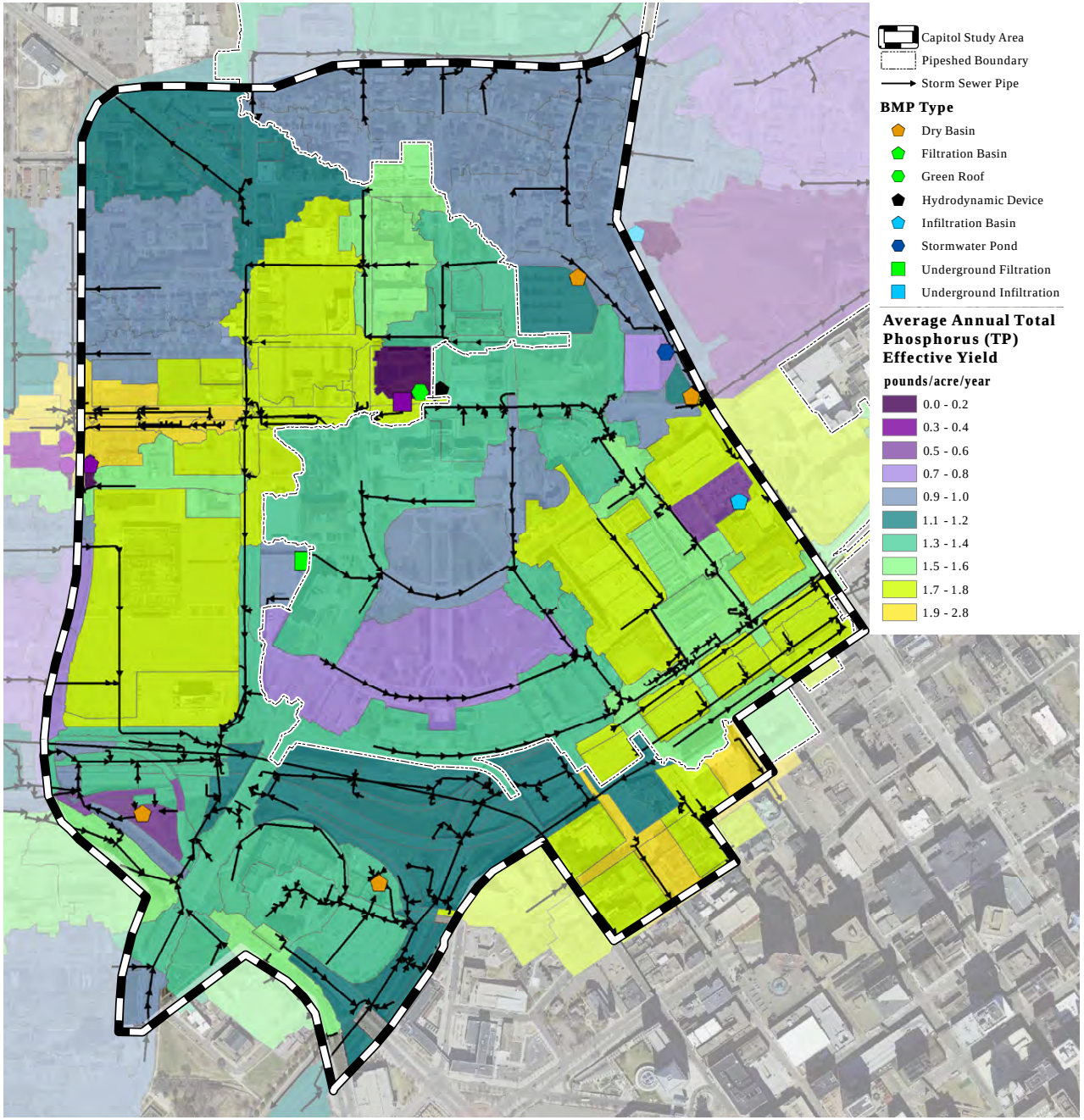
Existing Stormwater Best Management Practices (BMPs)

Over 90 percent of impervious surfaces in the Capitol Area receive no stormwater treatment.



Capitol Area Ownership

The Capitol Area is a complex mix of jurisdictions and ownership.



Average Annual Total Phosphorus (TP) Loading

Results of the stormwater screening show that water quality and not localized flooding is the primary stormwater challenge currently facing the Capitol Area.

1.2 Setting the Stage

The CASMS began with an initial screening of stormwater conditions within the 333-acre project area to identify opportunities for more resilient stormwater management practices and priority areas for focus. During this stage, CRWD, CAAPB, and their consultants developed maps showing information related to the area's existing stormwater management challenges and considered opportunities to address them through increased greening, district systems, and other resiliency-type measures (e.g., stormwater reuse, green roofs, etc.).

This screening revealed that a lack of stormwater treatment (i.e., stormwater best management practices [BMPs]) across the Capitol Area results in elevated levels of pollutants such as total phosphorus. Screening also showed that urban water quality, and not localized flooding, is the primary stormwater challenge currently faced within the Capitol Area.

The early ideas generated from this process were used to inform conversations with the project's agency stakeholders.

2.0 Workshop & Project Goals

2.1 Stormwater Workshop

Creating a vision and framework for sustainable and resilient district stormwater management requires stakeholder input. An in-person introductory workshop for the CASMS took place on October 26, 2022. The workshop focused on identifying water quality and quantity issues, exploring opportunities for sustainable stormwater management, and setting a vision for innovative solutions. Representatives with expertise in stormwater engineering, planning, and design attended the workshop. Their objectives were to:

- *Gather input and collaborate to identify water quality and quantity issues.*
- *Understand neighborhood goals and constraints.*
- *Identify the stakeholders most affected.*
- *Refine opportunities.*
- *Identify challenges to implementing district stormwater management.*
- *Set the vision for innovative stormwater management.*

The workshop achieved these objectives through presentations, small-group discussions, interactive feedback-gathering stations, and a panel discussion. It successfully engaged stakeholders in meaningful dialogue, laying the groundwork for future stormwater management initiatives in the Capitol Area. The insights gained informed the development of district stormwater solutions aligned with the community's environmental, social, and economic goals.

The small group discussions identified the challenges and benefits of district stormwater systems and the prerequisites for their successful implementation within the Capitol Area. The following are some key takeaways.

Challenges: The Capitol Area's population, density, and neighborhood character are diverse, and the challenges of stormwater management are equally diverse. The themes of the discussions included aging infrastructure, maintenance overlapping jurisdictional authority, stormwater pollutants, a lack of space for stormwater management features, and the potential for utility conflicts.

Barriers: The primary barriers identified for district stormwater systems included funding, balancing multiple players with multiple visions and jurisdictions, and ensuring proper maintenance. The need for projects to align in sequence and timing also emerged as a barrier.

Benefits: District stormwater systems achieve economies of scale and become more efficient with time, energy, and pollutant-removal capabilities. In addition, district stormwater systems offer the opportunity to create a shared community asset (e.g., water features, rain gardens, tree trenches).

Needs: Developing systems that can be reasonably maintained was a primary

necessity for the successful implementation of a district stormwater system. Other needs included identifying ownership, developing operating procedures, and tracking parcels for redevelopment (timing).

2.2 Project Goals

Combining the input received from the agency stakeholder group with outcomes from the stormwater and landscape resiliency screening efforts, a set of CASMS project goals was developed. These goals present a shared strategic vision for actions to increase resiliency and advance innovative stormwater management within the Capitol Area and reflect the perspectives of the project's agency stakeholders. To guide the development and implementation of the CASMS, these goals were divided into four overarching themes: water quality, resiliency, community benefits, and partnerships. Each theme consists of several specific objectives.

Water Quality

- *Improve the quality of stormwater runoff from the Capitol Area and reduce the amount of urban pollution reaching the Mississippi River.*
- *Meet or exceed the more restrictive of CRWD or Minnesota Buildings, Benchmarks, and Beyond (B3) stormwater standards as projects are implemented.*

Resiliency

- *Lead, educate, engage, and demonstrate through learning from past mistakes and early projects how district stormwater systems (integrated green stormwater infrastructure) improve and can help restore the land where people live, visit, and work.*
- *Implement improvements to address underlying climate vulnerabilities, such as*
  - *1) holding stormwater and treating it within the landscape,*
  - *2) increasing tree canopy, and*
  - *3) using climatically appropriate and pollinator-friendly vegetation and minimizing turf grass.*

Community Benefits

- *Help build and strengthen connections within and through the Capitol Area and surrounding areas (neighborhoods, businesses, downtown, etc.) by improving the pedestrian experience within the public realm.*
- *Maximize the triple bottom line (return on investment) and provide multiple individual and shared benefits over the life cycle of the improvements, from the time of construction through operation and maintenance.*

Partnerships

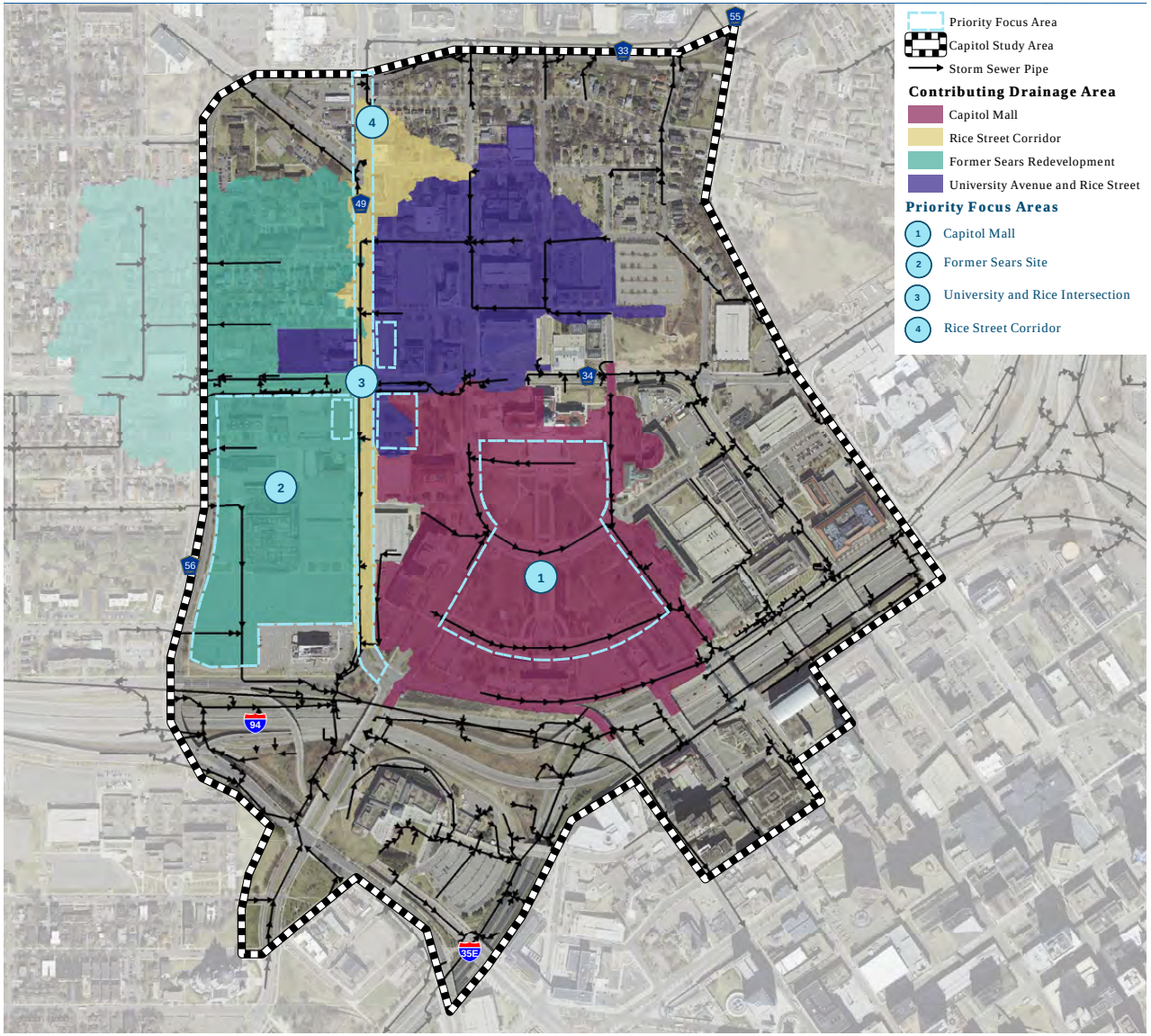
- *Create a design framework to advance a multi-beneficial district stormwater management approach within the Capitol Area's landscape, streetscape, neighborhoods, and subwatersheds.*
- *Collaborate and harness enthusiasm for innovative stormwater solutions to create partnerships and use consensus-based decision-making to navigate competing authorities, goals, and objectives.*

Image Source: Barr Engineering Co.

3.0 District System Focus Areas

3.1 Project Focus Areas

Using results from the existing conditions and stormwater BMP screening analyses, feedback received from the project partners, and considering anticipated timelines for redevelopment and capital improvement projects within the Capitol Area, CRWD and CAAPB identified four priority focus areas for further consideration of district stormwater systems.



District System Focus Areas

Former Sears Redevelopment Site: This 18.6-acre future redevelopment site is bordered by regional storm sewer systems on both the east and west, making it a prime location for a district stormwater solution. A district system at this location would have the potential to capture and treat stormwater runoff from up to 103 acres: 17 acres from the former Sears site itself and 86 acres of additional drainage area to the north, west, and east.

University/Rice Intersection: Upcoming land use changes at three of the four corners surrounding this intersection could provide an opportunity for a district stormwater system. These areas, owned by the State of Minnesota, are being considered for redevelopment as future park space. A district system in this location would have the potential to treat up to 35 acres of drainage area to the north and east—77 percent of which is impervious surface. The southeast corner appears to be particularly well-situated for consideration.

Rice Street Corridor: Upcoming reconstruction along this wide urban corridor provides an opportunity for incorporating green stormwater infrastructure into the reimagined streetscape. Here, green stormwater infrastructure (tree trenches, bioswales, planters, bioretention basins) would be used to infiltrate stormwater runoff from Rice Street and portions of Como Avenue. The system would have the potential to treat stormwater runoff from the surrounding 10 acres, with 74 percent being impervious.

Capitol Mall: Capital improvements are also being planned for the 36-acre Capitol Mall area, owned by the State of Minnesota. A district stormwater system at this location could capture and treat stormwater runoff from up to 63 acres of the surrounding area, improving water quality and advancing state sustainability initiatives.

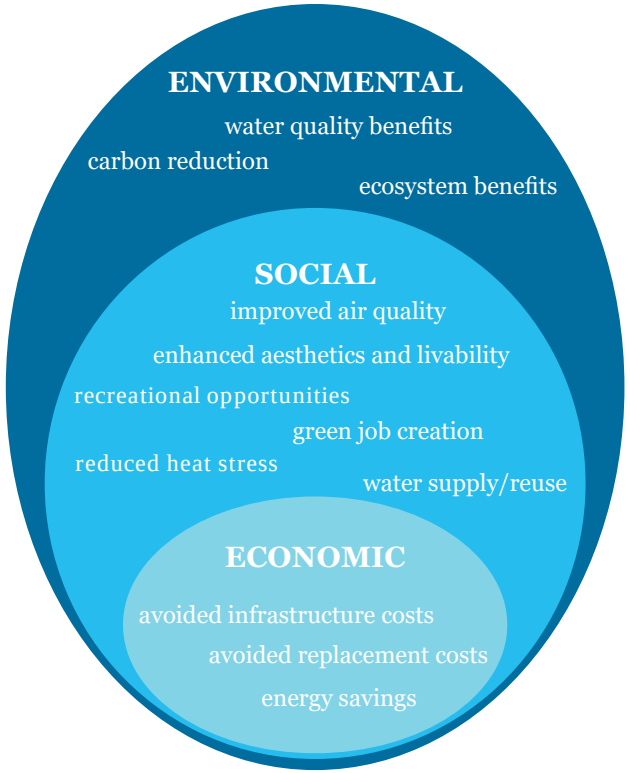
3.2 Sustainable Stormwater Management

Considering available information on constraints at each site, integrated, district-level, green stormwater management systems were conceptualized for the four locations. The goal for each system was to maximize stormwater benefits while also meeting project stakeholder objectives.

The next step was to evaluate the benefits of a district stormwater management approach beyond just meeting stormwater management regulations. This was accomplished using a triple bottom line (TBL) analysis. Specifically, the TBL analysis considers:

- **Economic factors:** *The economic viability and profitability of a project.*
- **Social factors:** *The effect on human well-being and the welfare of the community or stakeholder groups. Included are considerations related to equity, social justice, health, and quality of life.*
- **Environmental factors:** *The ecological consequences of the project, including water quality, energy consumption or savings, greenhouse gas emissions, and environmental sustainability.*

At each focus site, the district stormwater management approach was compared with a "baseline" (i.e., status quo) approach. The baseline scenario was defined as the level of treatment the contributing drainage area would receive if redeveloped parcels and capital projects met CRWD stormwater regulations using the conventional approach of managing stormwater at an individual project level (instead of a larger district system) and through conventional primarily grey infrastructure best-management practices with little to no additional community benefits.

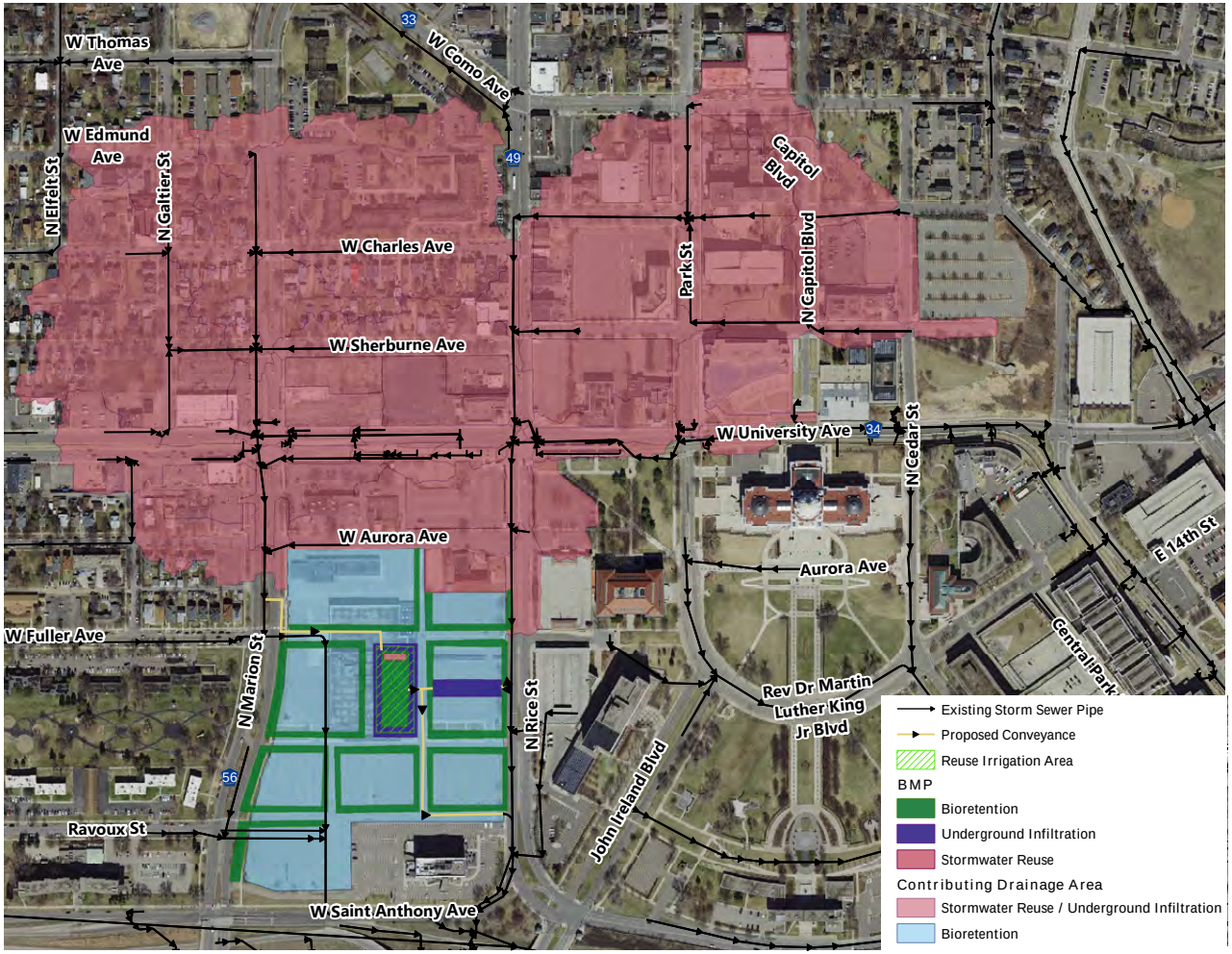


Within the TBL framework the largest sphere represents environmental factors upon which all economic and social factors depends. The environment sustains the human community which then sustains the economy.
Figure adapted from Scott Cato, Green Economics (2009)

3.3 Former Sears Site

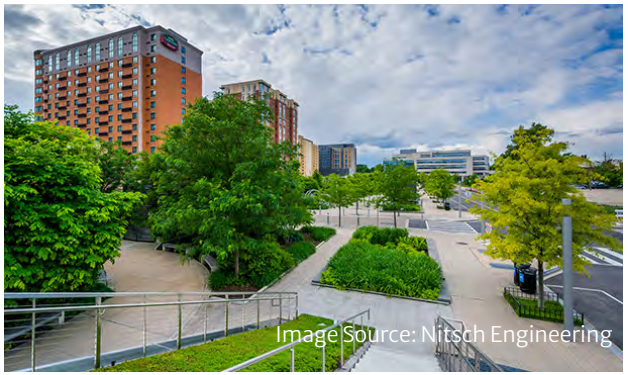
System description:

- A district stormwater system at this location would capture and treat stormwater runoff from up to 103 acres.
- Green stormwater infrastructure will be integrated into the site's redevelopment. **Surface bioretention features** would be used to capture and treat stormwater runoff from the Sears redevelopment site itself.
- An **underground treatment stormwater reuse system** would be placed underneath the planned public park area within the site. Stormwater runoff from the areas upstream of the Sears redevelopment site would be directed into these systems for treatment. A portion of the filtered stormwater would be used for irrigation of green space at the site.
- The district stormwater treatment and reuse systems at the site would be designed to incorporate stormwater and greening into the public realm, resulting in **publicly accessible stormwater features and pocket parks** that allow for interpretation and sharing of the story of the innovative water management techniques being used at the site. **Interpretive elements** would be included within the design and may include signage, art pieces, and/or interactive features.



Concepts: District System Former Sears Site

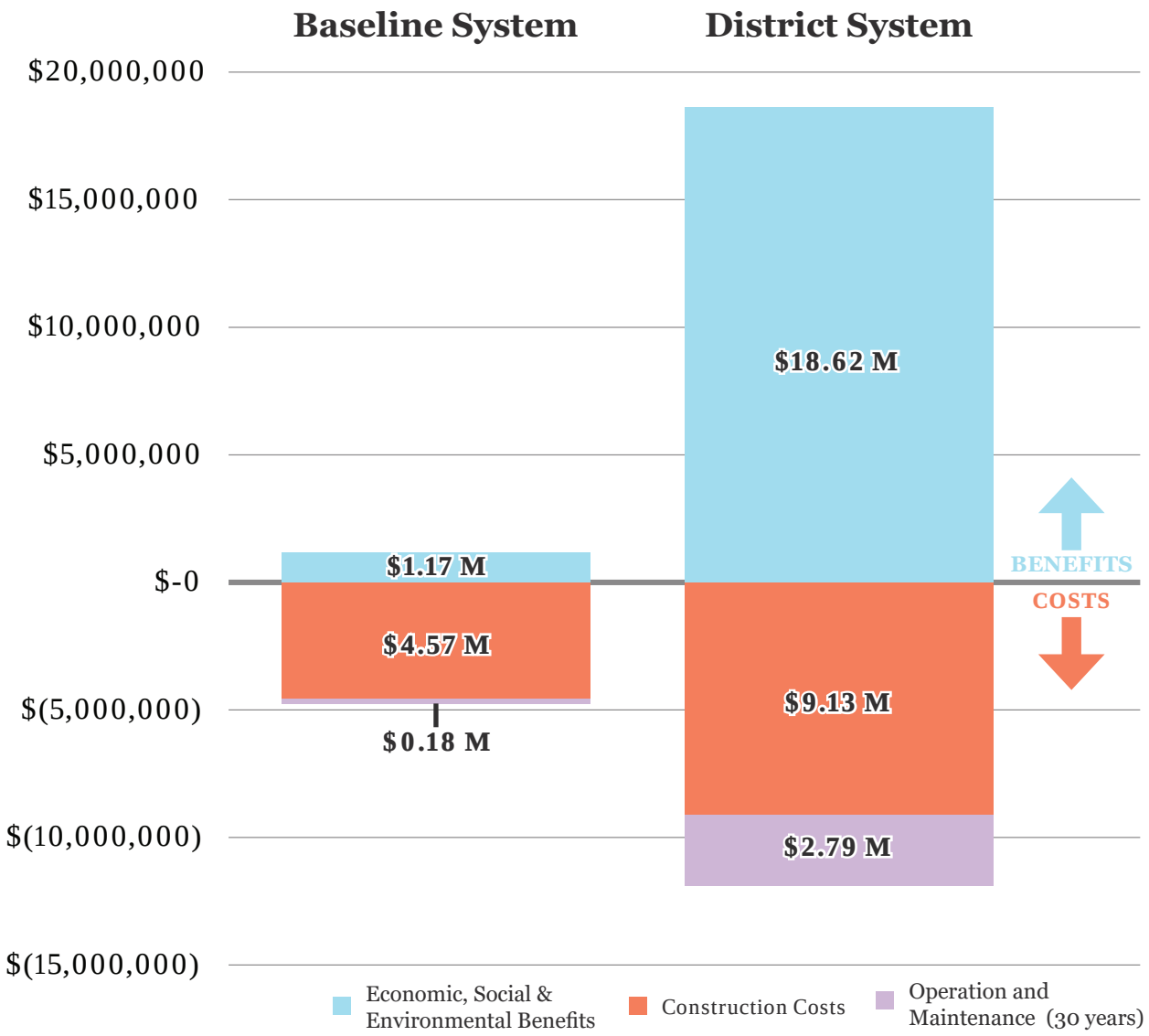
Towerside district stormwater system - Minneapolis, MN



Canal Park district stormwater system - Washington DC

Benefits of a district system approach:

- **1.4 times more volume captured and treated.** Improved stormwater management could facilitate the development of stormwater credits for application to future projects (i.e., stormwater banking).
- The district system would provide an **enhanced user experience** through the development of a stormwater park and two pocket parks.
- Opportunities to showcase **innovation and climate resiliency** in water management.
- **1.3 times more phosphorus removed.** An average of 135 pounds of total phosphorus would be removed per year, compared to 106 pounds using a baseline approach.
- An estimated **2.6 acre-feet of stormwater available for reuse** in irrigating green spaces at the site, conserving potable water supply.
- Avoids costs of constructing other or larger infrastructure to handle the additional stormwater being captured and treated, as compared to the baseline approach.
- Offers a **6.2 times better return on investment** when considering community benefits as compared to the baseline approach.



Cost-Benefit Comparison of District System Approach at Former Sears Site

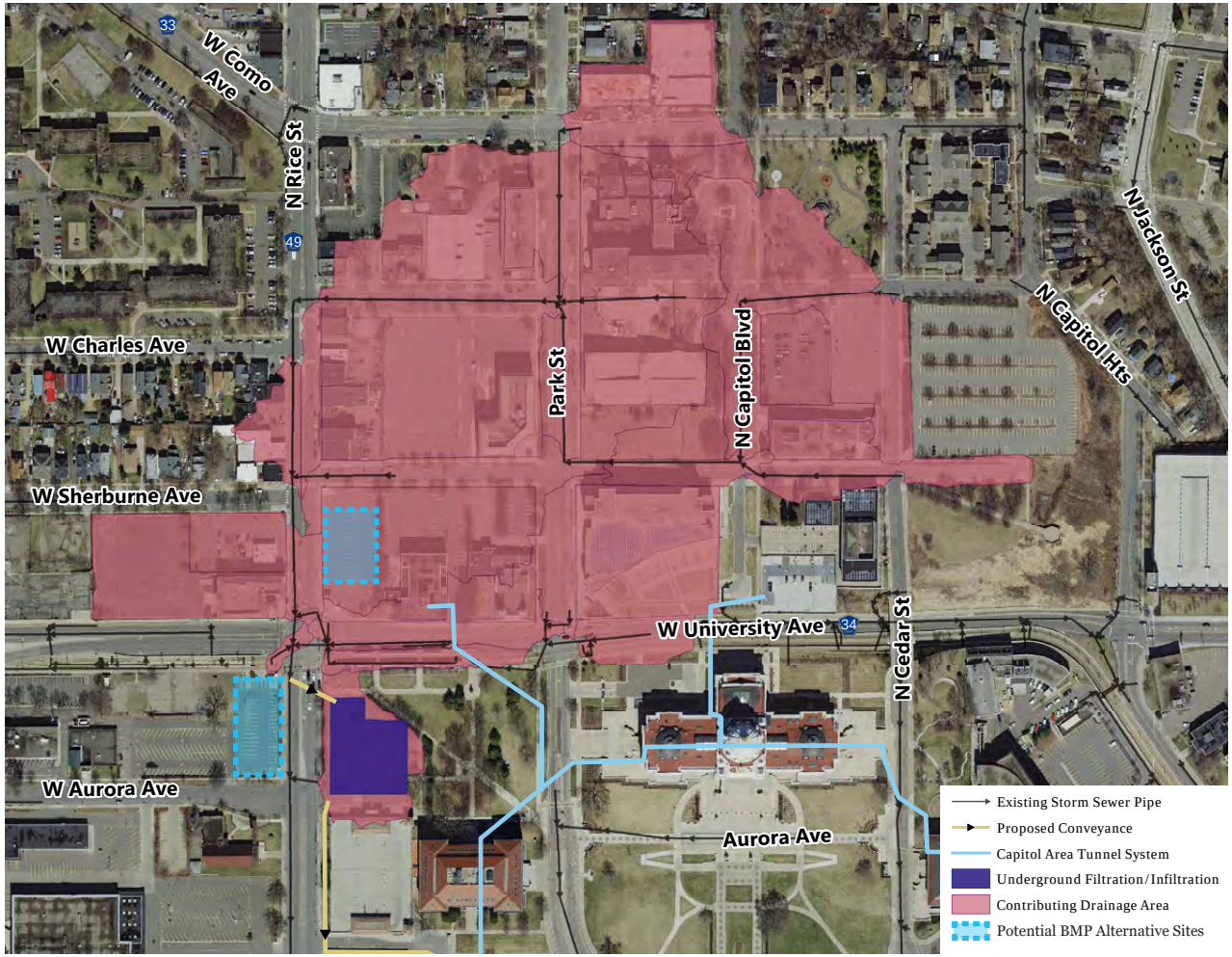
Potential partners:

- CRWD (convener & regulator); CAAPB (convenor & zoning); private entities (landowners); and the City of Saint Paul (right-of-way/landowner & regulator). Other partners could include granting agencies or the County should stormwater from Rice Street be directed into the system.

3.4 University/Rice Intersection

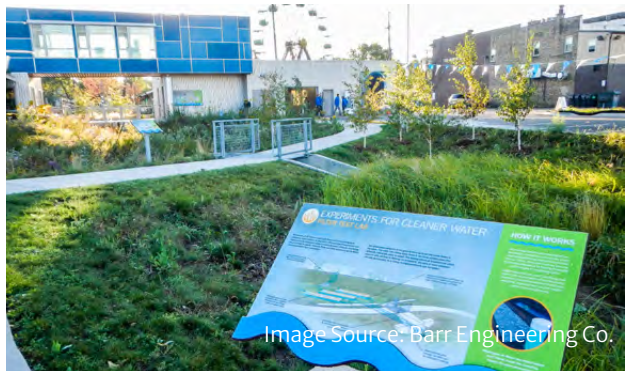
System description:

- A district stormwater system at this location would capture and treat approximately 35 acres of drainage area.
- An **underground treatment system** would be sited below planned park space on one of three corners at this intersection. As of this report, the southeast corner of the intersection is currently under construction; opportunities remain at the other locations.
- **Green stormwater infrastructure** (e.g., native plantings and/or biofiltration basins) would be integrated as part of the park development.
- **Interpretative signage** could be incorporated into the park areas to highlight the district and climate-resilient practices being used. Given the nearby transit station and proximity of this future park space to the State Capitol, the visibility of any educational elements at this location is expected to be high. Signage at this location could also be coordinated with any interpretative signage that was planned for installation at the Capitol Mall.



Concepts: District System University/Rice Intersection

Highland Bridge underground stormwater system - St. Paul, MN



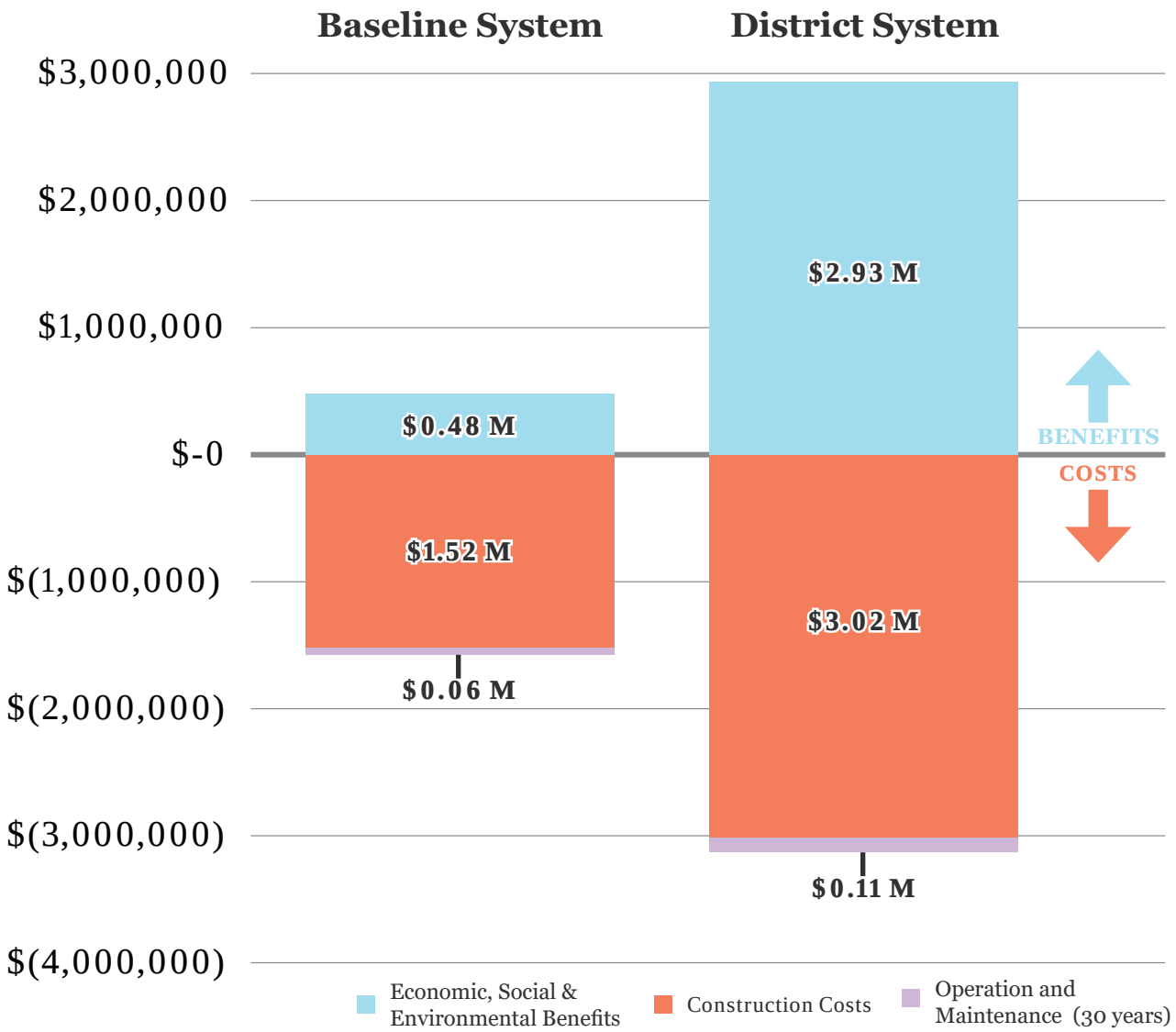
Green infrastructure and interpretive signage - Minneapolis, MN

Benefits of a district system approach:

- **3 times more stormwater volume captured and treated** than with the baseline condition. Provides the potential to consider partnerships with upstream public or private landowners to develop stormwater credits with this additional volume.
- **1.4 times more phosphorus removed.** An average of 46 pounds of total phosphorus would be removed per year compared to 34 pounds with the baseline approach.
- A pocket park is proposed, providing **additional habitat and climate-resilient plantings that enhance users' experiences.**
- Avoids costs of constructing other solutions to handle the additional stormwater being captured and treated, as compared to the baseline approach.
- Offers a **3 times better return on investment** as compared to the baseline approach.

Potential partners:

- CRWD (convener & regulator); CAAPB (convenor & zoning); MN Department of Administration (landowner); Metropolitan Council (right-of-way/landowner); Ramsey County (right-of-way/landowner); private entities (landowners); and the City of Saint Paul (right-of-way/landowner & regulator). Other partners could include granting agencies.



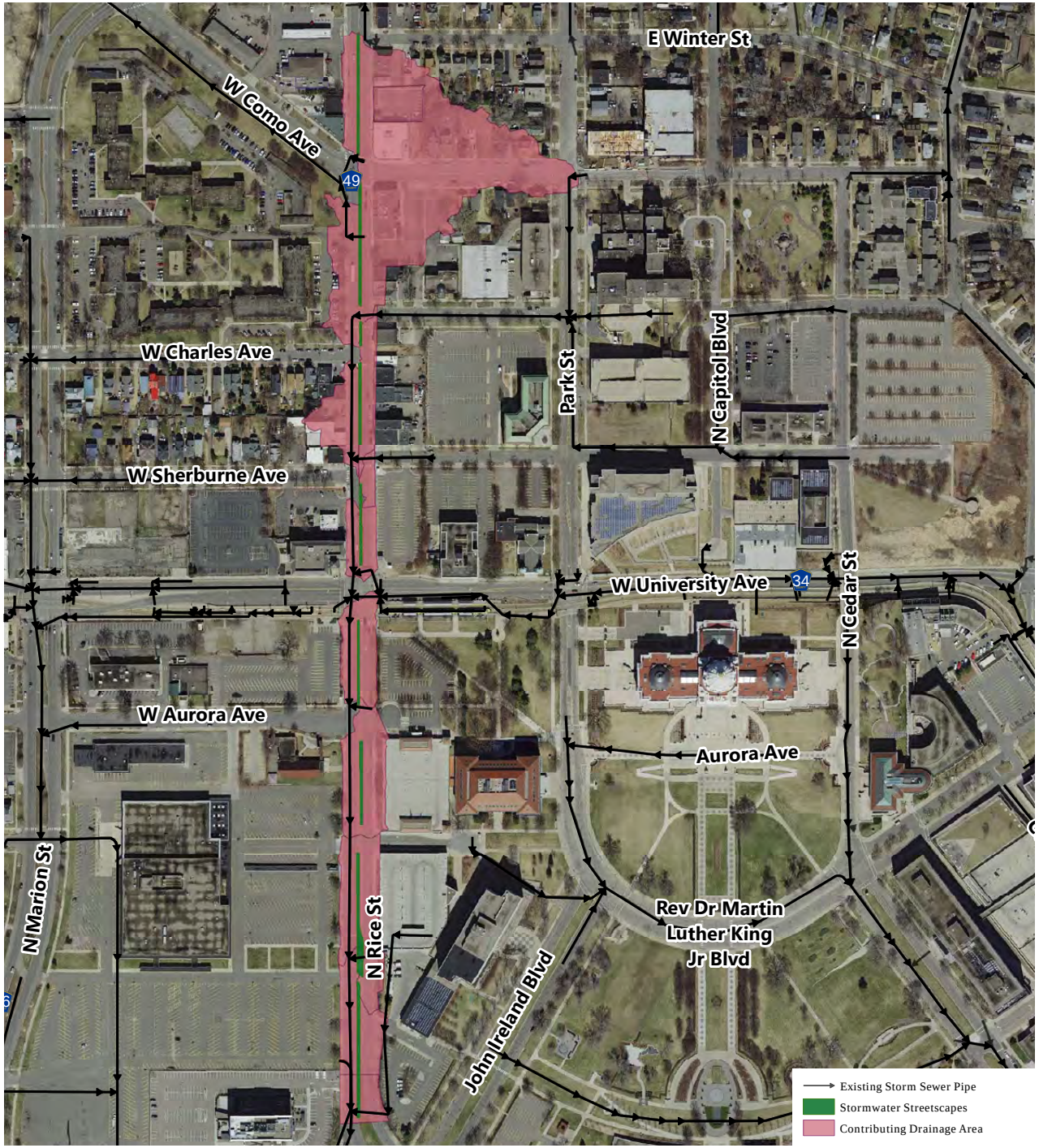
Cost-Benefit Comparison of District System Approach at University/Rice Intersection

3.5 Rice Street Corridor

System description:

- The stormwater system at this location would have the capacity to capture and treat 10 acres of drainage area along and bordering Rice Street.
- **Green stormwater infrastructure** (tree trenches, bioswales, planters, and/or bioretention basins) would be integrated into the road reconstruction project planned for this corridor.
- **Public signage** could be incorporated along the corridor to highlight the environmental and community benefits of green stormwater infrastructure and the climate-resilient practices being used.

Green Line light-rail transit stormwater planters - St Paul, MN



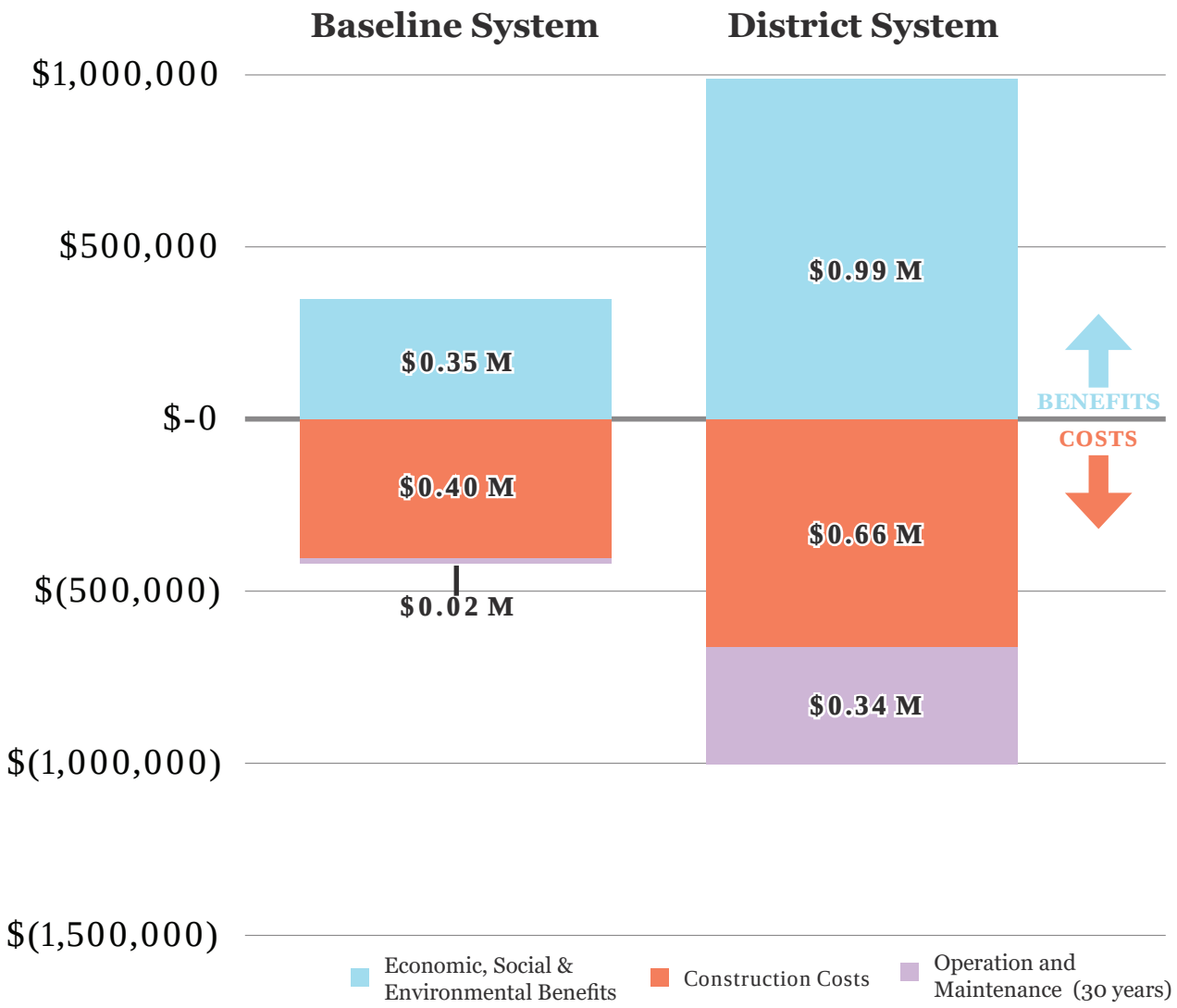
Concepts: District System Rice Street Corridor

Benefits of a district system approach:

- **2 times the amount of stormwater managed.** The volume of water captured and treated would be twice as much as with the baseline approach.
- **1.3 times more phosphorus removed.** An average of 15 pounds of total phosphorus would be removed per year, compared to 13 pounds with the baseline condition.
- A green corridor and enhanced recreational opportunities for multi-modal transportation are expected to **increase both the corridor's use and the profitability** of local businesses.
- **Increased street greening** would benefit habitats, reduce the urban heat island effect, and improve air quality.
- Offers a **1.2 times better return on investment** as compared to the baseline approach.

Potential partners:

- CRWD (convener & regulator); CAAPB (convenor & zoning); private entities (landowners); Ramsey County (right-of-way/landowner); and the City of Saint Paul (right-of-way/landowner & regulator). Other partners could include granting agencies.

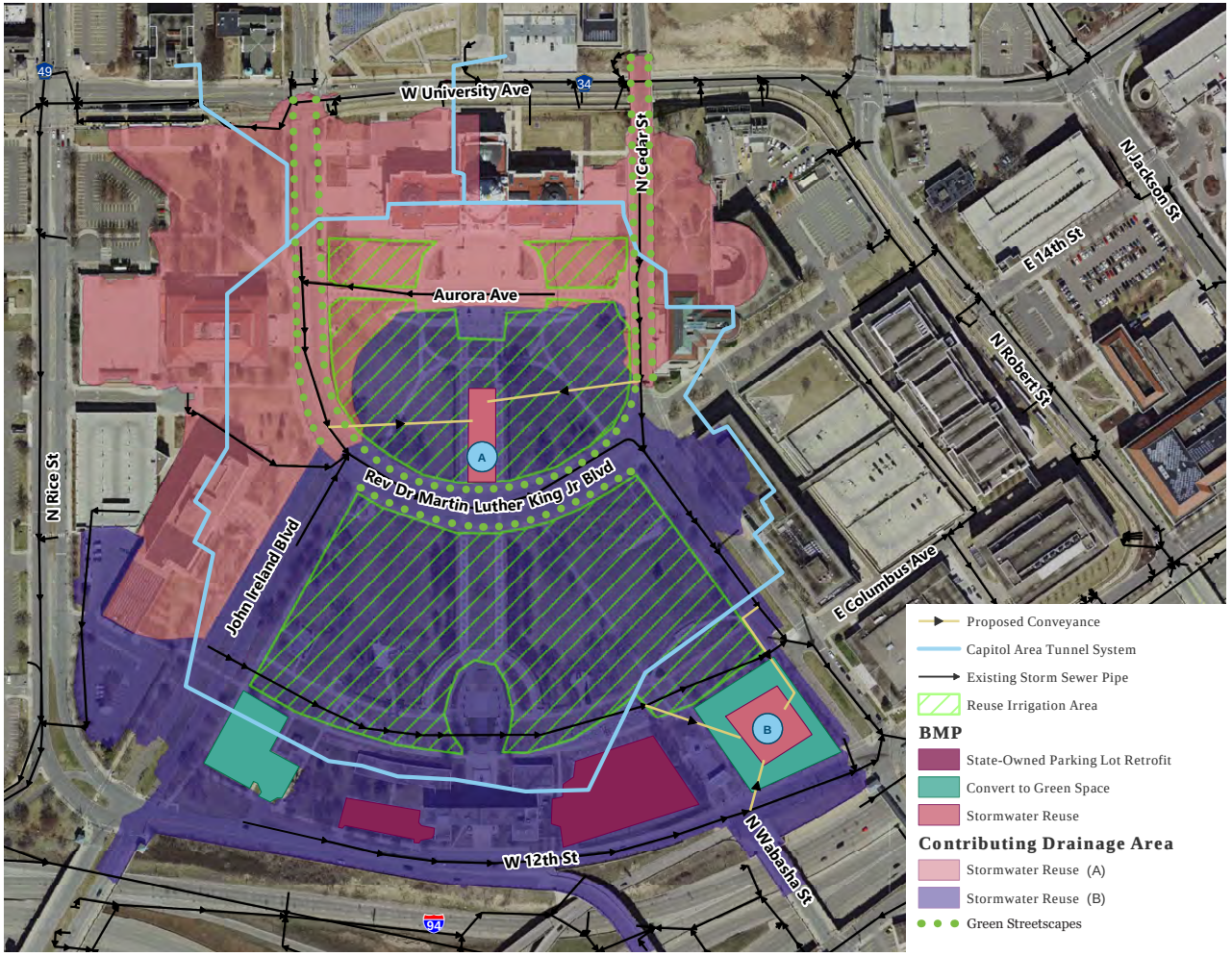


Cost-Benefit Comparison of District System Approach along Rice Street

3.6 Capitol Mall Area

System description:

- A district stormwater system at this location would capture and treat stormwater runoff from up to 63 acres of the Mall and the immediate surrounding area.
- This system would consist of **two underground stormwater treatment and reuse** facilities at the Capitol Mall, replacing potable water for irrigation of the large lawn area, surrounding gardens, and green spaces.
- **Green stormwater infrastructure** (tree trenches, bioswales, planters, and/or bioretention basins) would be integrated into the street rights-of-ways that border and surround the Mall area as part of upcoming road reconstruction projects.
- **Green stormwater retrofits and a stormwater pocket park** would be incorporated into the redevelopment of the southern Mall.
- **Interpretative signage** and/or other elements would be incorporated into the district and green stormwater management areas to highlight the innovation of the district approach and the climate-resilient practices being used. The high traffic and notoriety of this site provide an exciting opportunity to showcase leadership in innovative water management at the State's Capitol.



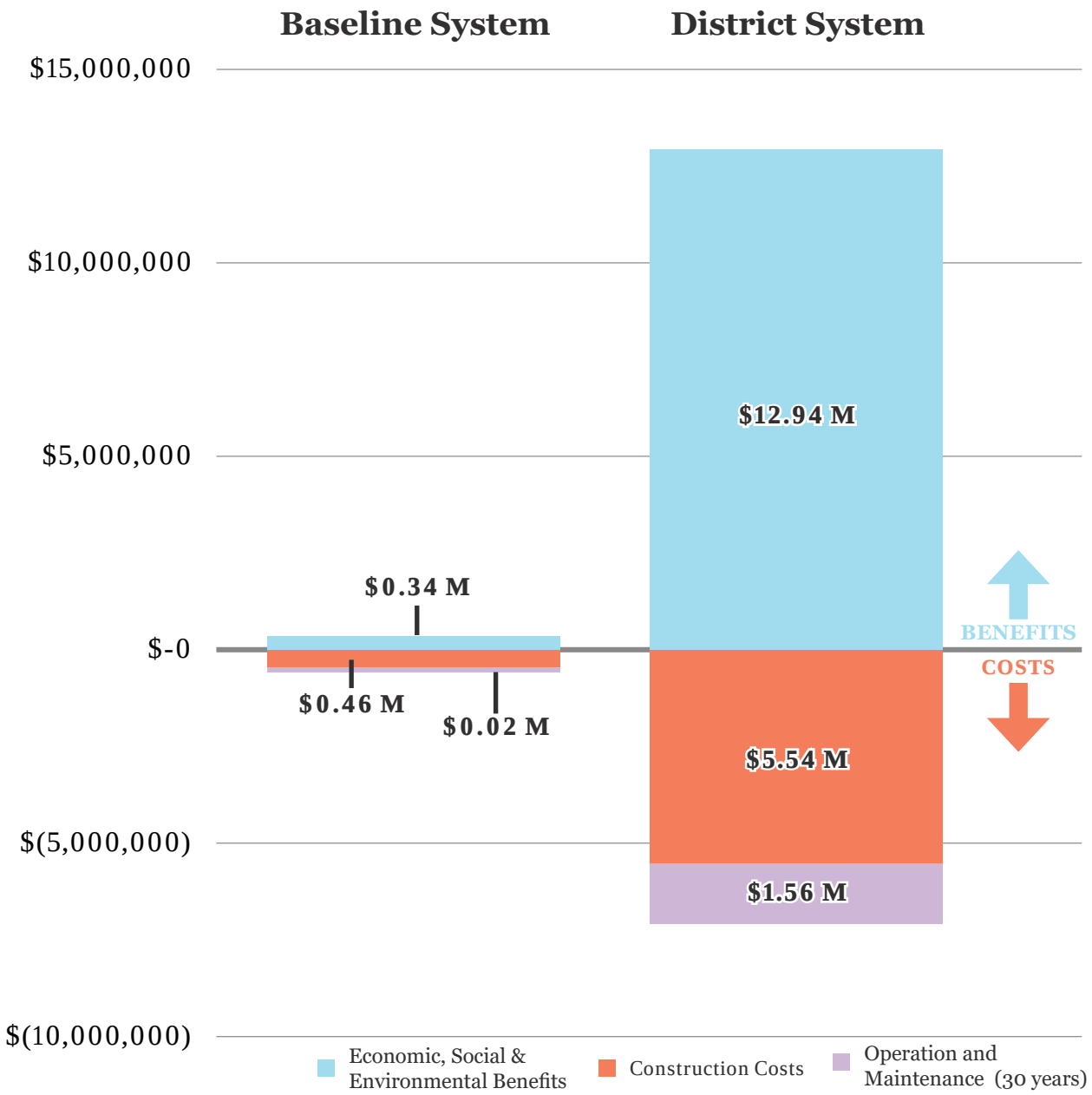
Concepts: District System Capitol Mall Area

Allianz Field underground stormwater system - St. Paul, MN

Ridgedale Commons green infrastructure - Minnetonka, MN

Benefits of a district system approach:

- **Eleven times more stormwater captured and treated** than with the baseline approach.
- The "above-and-beyond" stormwater treatment volume could facilitate partnerships for stormwater credits.
- **3.1 times more phosphorus removed.** An average of 42 pounds of total phosphorus would be removed per year compared to 14 with the baseline condition.
- Lends to an **enhanced user experience** through increased street greening, native plantings, habitat improvements, and educational elements.
- Opportunities to **showcase innovation and climate resiliency** in water management.
- An estimated **2.9 acre-feet of stormwater is available for reuse** to irrigate the Capitol lawn and surrounding green spaces at the site.
- **Avoids costs** of constructing other stormwater infrastructure to handle the additional volume being captured and treated, as compared to the baseline approach.
- Offers a **2.5 times better return on investment** as compared to the baseline approach.



Cost-Benefit Comparison of District System Approach at the Capitol Mall

Potential partners:

- CRWD (convener & regulator); CAAPB (convenor & zoning); MN Department of Administration (landowner); MN Department of Transportation (right-of-way/landowner); and the City of Saint Paul (right-of-way/landowner & regulator). Other partners could include granting agencies.

4.0 Conclusion

4.1 Study Findings

The results of the TBL analysis demonstrate that adopting a district system approach for stormwater management within the Capitol Area would meet traditional stormwater management requirements while providing substantial social and environmental benefits—increasing the projected return on investment for each dollar spent.

The range of additional benefits realized from adopting a district approach as compared to the baseline approach varies by location, with the following results:

The development of district stormwater management systems within the Capitol Area will require collaboration and the development and/or continuation of partnerships among local, state, and private stakeholders within the study area. Results from the TBL analysis can help CRWD and its partners make decisions about stormwater management opportunities and prioritize options in this important Saint Paul area.

Benefits	Potential District Stormwater System Locations			
	Former Sears Redevelopment Site	University & Rice	Rice Street Corridor	Capitol Mall
Additional stormwater treatment provided by district system.	✓ 1.4x more volume captured & treated 29 more pounds TP removed	✓ 3x more volume captured & treated 12 more pounds TP removed	✓ 2x more volume captured & treated 2 more pounds TP removed	✓ 11x more volume captured & treated 28 more pounds TP removed
Promote sustainability and climate resiliency through water conservation (stormwater reuse).	✓ 2.6 ac-ft of reuse storage			✓ 2.9 ac-ft of reuse storage
Investment in district system results in more public benefits than baseline scenario.	✓ 2.5x more capital cost ROI = 1.6 6.2x more benefit realized	✓ 2x more capital cost ROI = 1 3x more benefit realized	✓ 2.4x more capital cost ROI = 1 1.2x more benefit realized	✓ 15x more capital cost ROI = 1.8 2.5x more benefit realized
Potential to consider partnerships with upstream landowners to develop stormwater credits for use in future projects.	✓	✓		✓
Improved habitat with more pollinator friendly plants and climate resilient vegetation being included.	✓	✓	✓	✓
Enhanced user experience through greening of recreational spaces.	✓	✓	✓	✓
Additional parks provided for users.	✓ 1 stormwater park 2 pocket parks	✓ 1 pocket park		✓ 1 pocket park
Opportunities to showcase, educate, and lead on resiliency and innovation in water management.	✓			✓

4.2 Next Steps

The CASMS provides insights into the needs, opportunities, potential benefits, and projected return on investment from pursuing a district stormwater management approach within the Capitol Area. It also provides a framework for the planning, design, and integration of green, district-scale stormwater management systems into ongoing Capitol Area projects.

As part of the next steps, the CRWD and CAAPB are continuing conversations with potential project partners to further define the opportunities and constraints for district systems at the site and project scale. This includes the potential for integrating green stormwater streetscapes and district system concepts into the reconstruction of Rice Street between Pennsylvania Avenue and John Ireland Boulevard, which is planned for reconstruction in 2025. This also includes the integration of a district-scale stormwater management reuse system into Phase I of the upcoming Capitol Mall improvements.

CRWD and the CAAPB are also considering partnership opportunities and needs for each of the district system concepts. This includes identifying the potentially benefiting and interested parties at each of the locations, in addition to considering potential roles for each of the benefiting parties. An initial list of potential partnering agencies and roles is noted in the site summary for each district system focus area. Other partners may also exist and will be revealed and included as the planning process proceeds.

Next steps include:

- *Developing an approach for stormwater crediting or banking,*
- *Identifying which agencies/partners may serve in the lead versus acting as a support role in the various stages of project planning, design and implementation, and operations, and*
- *Considering the various legal and partnership frameworks available for addressing project needs throughout the entire life cycle of the system, from planning through operations and maintenance.*

As opportunities arise to consider district stormwater in project design, the concepts presented in this study should be refined to reflect more detailed site-scale information. This should include any infiltration restrictions. It may also include analysis to optimize BMP sizing and treatment at each site to further align with the CRWD's pollutant loading goals.

In addition to the four focus areas highlighted within this final report, the project goals and guidelines developed as part of the CASMS effort can also be used to help inform and influence stormwater management strategies at future, additional redevelopment projects within the Capitol Area as they move into and through the project planning stages.

Capitol Area Stormwater Management Study