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## MEMORANDUM

TO: Wes Saunders-Pearce  
Water Resource Coordinator, City of Saint Paul

FROM: Joni Giese, ASLA, AICP

DATE: December 23, 2013

SUBJECT: SHARED, STACKED-FUNCTION GREEN INFRASTRUCTURE POLICY INVESTIGATION

### Purpose

The purpose of this memorandum is to document investigations performed that informed the development of shared, stacked-function green infrastructure (SSGI) implementation policy recommendations.

### Referenced Memorandums

- Technical Memorandum: Analysis and Evaluation For Shared, Stacked-Function, Green Infrastructure
- White Paper: Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure
- Technical Memorandum: Existing Stormwater Rules and Regulations
- Technical Memorandum: Advanced Design Concepts For Shared, Stacked-Function, Green Infrastructure

### Project Focus

The Strategic Stormwater Solutions for Transit-Oriented Development (TOD) project investigated whether stormwater management along the Central Corridor could more robustly achieve the community's redevelopment vision for the corridor.

The memorandum documents investigations into potential shared, stacked-function green infrastructure (SSGI) implementation from a policy perspective. SSGI is a stormwater management framework where stormwater runoff generated from multiple parcels is jointly treated in shared green infrastructure. The green infrastructure is located and designed to provide economic, environmental and social (triple bottom line) benefits to the community beyond treating stormwater (referred to as "stacked-function"). Additional information regarding barriers identification and conceptual studies related to SSGI implementation can be found in the memorandums referenced above.

### Project Context

Currently under construction, Metro Transit's Light Rail Transit Green Line (also known as the Central Corridor) will run 11 miles from Target Field in downtown Minneapolis, Minnesota, to Union Depot in downtown St. Paul, Minnesota, beginning in 2014 (see Figure 1). The corridor is host to a wide variety of land uses, such as the highly urban downtown cores of Saint Paul and Minneapolis, the Minnesota State Capitol, the University of Minnesota Twin Cities Campus, industrial and retail uses, and multi-family and

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single-family residences. A vast majority of the corridor is covered with impervious surfaces and there are few parks or green spaces along the corridor. The corridor also hosts a wide range of socio-economic conditions and is a key gathering location for, and home to, a diverse array of ethnic communities, creating a rich cultural resource for the community.

### Corridor Redevelopment Goals

As cities and neighborhoods along the corridor have planned for this new LRT line, the implementation of TOD emerged as a primary redevelopment goal for the Central Corridor. The Center for Transit-Oriented Development (CTOD) provides the following definition of TOD:

*Transit-oriented development is often defined as higher-density mixed-use development within walking distance – or a half mile – of transit stations. Transit-oriented development projects should also:*

- Increase "location efficiency" so people can walk and bike and take transit
- Boost transit ridership and minimize traffic
- Provide a rich mix of housing, shopping and transportation choices
- Generate revenue for the public and private sectors and provide value for both new and existing residents
- Create a sense of place

*TOD is really about creating attractive, walkable, sustainable communities that allow residents to have housing and transportation choices and to live convenient, affordable, pleasant lives—with places for our kids to play and for our parents to grow old comfortably.*

### Saint Paul

Traversing the corridor from east to west, the Saint Paul segment of the corridor starts in, and runs through, the heart of downtown Saint Paul, past the Minnesota State Capitol, and then follows University Avenue to the western municipal limits. Numerous parcels along University Avenue are currently underperforming and are ready for redevelopment. With 14 of the 18 new stations along the Green Line lying within the Saint Paul municipal limits, the City and partnering organizations have been actively planning for anticipated redevelopment along the line.

Previous City-led planning efforts highlight the community's desire for TOD, an increase in the number of parks and open spaces along the corridor, and the use of green infrastructure. (Note: The "Green Line" was formerly referred to as the Central Corridor before official branding of the LRT.) These previous efforts have continued to build upon each other and include the following plans and studies:

- Central Corridor Development Strategy plan (2007)
- Central Corridor station area plans (10 plans for stations along University Avenue; plus, one plan addressing all of the downtown stations) (2008)
- Mitigating the Loss of Parking in the Central Corridor study (2009)

These City adopted plans call for the evaluation and revision, if appropriate, of existing policies such as stormwater management to better support the City's vision for the corridor. Additional efforts to facilitate desired development have included:

- Creation of the Traditional Neighborhood 4 Zoning District and updates to other Traditional Neighborhood Zoning Districts to facilitate higher density development, reduce parking demand, and create a more of a pedestrian- and transit-oriented environment.

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- Rezoning of parcels along the corridor.
- Publication of a Transit-Oriented Development Guidebook.
- Establishment of a Design Center organization to facilitate early development review discussions.



In addition to the previous planning and zoning efforts, and concurrent with this plan, a park creation analysis is underway. The Minnesota Chapter of the Trust for Public Land, with participation from city partners, is spearheading the “Green Line Parks and Commons Initiative.”

#### Minneapolis

From east to west, the City of Minneapolis’ segment of the Green Line traverses University Avenue, the University of Minnesota campus and downtown. The City is experiencing significant redevelopment activity within, and adjacent to, the University. The downtown segment is also experiencing significant redevelopment as this section of the corridor is also a part of Metro Transit’s Blue Line that has been operating for approximately eight years. Similar to Saint Paul, the City of Minneapolis and stakeholder organizations have been actively planning for anticipated redevelopment along the line. Previous planning efforts highlight the community’s desire for TOD, vibrant and flexible public spaces, along with environmental sustainability through the incorporation of green infrastructure and stormwater best management practices in transit-related redevelopment projects. Representative previous efforts include the following plans and studies:

- *The Minneapolis Plan for Sustainable Growth (2009)*
- *University of Minnesota East Gateway District Master Plan (2009)*
- *University of Minnesota Twin Cities Campus Master Plan (2009)*
- *Bridal Veil Subwatershed Study (MWMO, 2011)*
- *Stadium Village University Avenue Station Area Plan (2012)*

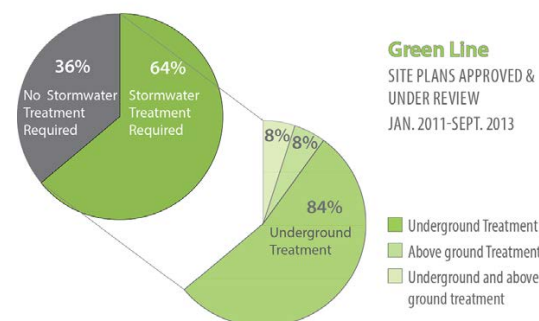
#### **Recent Development along the Green Line**

When redevelopment occurs in established urban communities, stormwater management facilities are competing with other site features for limited and valuable space, resulting in stormwater facilities being relegated underground a vast majority of the time. Since 2011, 84 percent of redevelopment sites along the Green Line requiring stormwater management placed stormwater below ground. When this happens, an opportunity to use stormwater to create a green, sustainable and vibrant community is lost.

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#### **Definition of SSGI**

Governmental agencies across the country are looking for techniques to improve environmental health and community livability. Agencies are also looking for more efficient approaches to delivering community services. This project developed the concept of shared, stacked-function green infrastructure (SSGI) as a stormwater management approach that addresses environmental health, community livability and cost efficiencies within current statutory standards.

#### **Shared**

When redevelopment occurs in older, established urban communities such as the Central Corridor, buildings, open space, surface parking, streets, alleys and stormwater facilities are all competing for limited and valuable space. In response to this situation, stormwater is typically being managed in expensive underground facilities that are quite large in order to meet water quantity and/or rate control requirements. In addition, most of the recently constructed facilities do not integrate stormwater with reuse or other features that could support corridor enhancements. This study hypothesized it would be beneficial to construct shared stormwater facilities that collect and treat runoff from multiple parcels (both smaller and larger than one acre). These shared facilities could provide cost efficiencies, enable runoff/pollutant reduction for small parcels that otherwise may not require such treatment, and provide substantial water supplies that could be reused to improve the environmental and social character of the corridor.

#### **Stacked-Function**

This study hypothesized the space used for stormwater management, along with the captured stormwater runoff itself, can be used to provide triple bottom line benefits to the corridor beyond stormwater management, thereby creating a “stacked-function.” For example, economic benefits can be achieved when space can be used to accommodate multiple functions such as stormwater facilities and parking facilities. Environmental benefits are realized when stormwater facilities mimic the natural hydrologic cycle or introduce new habitat into the urban environment. Social benefits result from the provision of new street trees and open spaces that improve corridor livability. In addition, when stormwater facilities are placed below ground, the community loses their understanding and personal experience with natural systems. Also lost is the opportunity to learn about the environmental impacts associated with increased impervious surfaces. By expressing stormwater management on the surface or using stormwater to support environmental benefits, a richer and meaningful environment is created.



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The goal of this study was to identify feasible stormwater stacking opportunities that:

- Merged triple bottom line uses with stormwater facilities to make efficient use of valuable urban land.
- Reused captured stormwater runoff to enhance the environmental health and corridor livability.
- Provided opportunities to interpret, educate and celebrate water in the corridor through the artful design of stormwater facilities.

#### **Green Infrastructure**

Both nationally and locally, there is a movement towards the use of green infrastructure to manage stormwater. Several representative definitions of green infrastructure follow:

- *Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water. (United States Environmental Protection Agency)*
- *Green infrastructure is strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations. (The Conservation Fund)*
- *Stormwater management approach that utilizes natural landscape features and hydrologic processes to treat stormwater by infiltrating, evapotranspiring, and/or reusing runoff. Green infrastructure also achieves other environmental goals such as carbon sequestration, reductions in urban heat island effect, improved air quality, improved wildlife habitat and increased opportunities for outdoor recreation. (Capitol Region Watershed District)*

While there are variations between these definitions, they all consistently state that green infrastructure uses landscape features and/or natural processes to manage and/or treat stormwater in a manner that provides environmental benefits. Green infrastructure aligns well with the vision for a revitalized central corridor that includes new green spaces along the corridor, along with environmentally sound and sustainable redevelopment.

#### **Right-of-Way Considerations**

Cities are the stewards of the right-of-way as the public right-of-way supplies a benefit to the civic community at large. The right-of-way must accommodate a variety of public needs, such as transportation facilities (e.g., streets, sidewalks, and transit), above and below ground utility services (e.g., water mains, storm and sanitary sewers, stormwater management practices to mitigate public projects, electric, gas, and cable services) and environmental enhancements (e.g., street trees and ground vegetation). Frequently, these various public uses are competing for the limited space available within the right-of-way. Therefore, the addition of any non-public use within the right-of-way involves significant risk for any governmental agency responsible for the public right-of-way.

Both Minneapolis and St. Paul have long-standing processes to evaluate and control uses proposed for the right-of-way that may have direct benefit to only a limited group. Encroachment permits are issued as a means to review, approve and track non-public features within the right-of-way. Typically an applicant is required to demonstrate that a private “need” cannot be met on private property thereby justifying the permit.

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The public right-of-way provides possible real estate for hosting shared stormwater management. However, the placement of shared stormwater facilities in the right-of-way must provide public services and value beyond simply benefiting the developer, such as installing street trees that provide habitat, stormwater management, and shade, thereby improving neighborhood livability.

#### **Preliminary Project Findings**

Over the course of four SAC meetings and a developer focus group meeting, the following issues came to light regarding the potential implementation of SSGI. Many of the SSGI findings revolved around long-term risk management and associated cost implications.

- There is competition for space on redevelopment parcels between stormwater management and other site programmatic elements.
- There is a lack of funding to purchase, develop, operate and maintain new public open spaces along the corridor.
- Cities/agencies want to ensure the long-term functionality of stormwater management facilities both on private and public land.
- Private development places value on having open space next to development parcels.
- Private-private sharing is difficult to achieve due to current financing requirements and long-term relationship risks between private land owners.
- Private-public shared stormwater facilities are desirable to developers because the stormwater treatment approach is then a known component when developing the site and perceived risk is reduced.

The investigation quickly raised a number of logistic issues that successful SSGI implementation approach must address, such as:

- Where will the SSGI be located and who will own the property?
- Who will administer, operate and maintain the SSGI?
- Can SSGI facilities be constructed in a phased manner to coincide with phased redevelopment?
- How can the initial SSGI construction be funded in a fair and equitable manner?
- How can the SSGI long-term operations and maintenance be funded in a fair and equitable manner?
- What contingency plans are needed in case redevelopment doesn’t occur, or only partially occurs?
- Will SSGI work within the existing statutory framework?

These issues were influential in the development of the potential SSGI approaches.

#### **Potential SSGI Approaches**

Six potential SSGI approaches were developed and presented to project stakeholders. Stakeholders were requested to complete a survey form indicating their level of interest in pursuing each of the approaches further. Based on survey responses (see Figures 2 – 4 for survey form and response summaries) and SAC meeting discussion, the following four were selected for additional feasibility analysis. The SSGI approaches were developed with the goal of providing mutual benefit for all affected stakeholders, or at a minimum, the approaches would not create a hardship for any of the affected stakeholders. These approaches are not mutually exclusive but were evaluated individually to simplify the analysis.

**New Public Parks/Open Spaces:** Hosting stormwater in new public parks/open spaces benefits adjacent redevelopment as it eliminates the spatial constraints of treating stormwater on site and reduces soft development costs. Developers also benefit by the adjacency of a new open space, which makes their parcel more desirable to potential tenants or purchasers. By taking stormwater into a park/open space, the city obtains capital and maintenance funding from the developer that will help finance the shared, stacked-function portion of park/open space construction and maintenance. It also

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allows other city projects to participate in the facility, such as stormwater treatment for new or reconstructed streets. By sharing a stormwater facility, economies of scale can be achieved, resulting in reduced construction costs for all parties sharing the facility.

Shared stormwater facilities in public parks/open spaces also provide a cost effective opportunity to treat stormwater from adjacent parcels currently not receiving treatment that are not anticipated to redevelop in the near future.

**Shared Parking Facilities:** A key component of TOD is the creation of a pedestrian friendly environment and the efficient use of available space, which may result in the development of shared parking facilities. Owners of parking facilities and those using it typically develop mutually-agreeable operating and liability arrangements. It is feasible that a water treatment facility could be built into new parking structures or under shared parking lots and the legal agreement expanded to include the shared stormwater facility.

This type of shared facility also allows for the accumulation of a significant volume of water that will support reuse options, such as irrigation or building toilet flushing.

**Green Alleys:** A vast majority of blocks in Saint Paul are served by alley access. These “shared” driving facilities are strategically located to conveniently collect and store stormwater runoff. New pervious pavements allow for the infiltration of water, while still providing the structural support needed for vehicle movement. Alleys are also typically free of major underground utilities that compete for underground space with stormwater facilities. While this approach doesn’t heighten awareness of water, it does support efficient use of space in highly urbanized environments.

**Street Right-of-way:** Green infrastructure located in street boulevards (e.g., tree trenches, rain gardens, and boulevard swales) may be able to host shared stormwater treatment facilities. Runoff collected in these facilities may be able to be used to irrigate new streetscape plantings that would increase environmental health, improve streetscape aesthetics, and provide a comfortable walking environment. These facilities also heighten residents’ awareness of and connection to water and natural processes in the urban landscape. Significant engineering, regulatory and jurisdictional issues would need to be addressed to determine feasibility of any given project.

Based on review comments received from project stakeholders, the following two potential SSGI approaches were not pursued further.

**New Private Parks/Open Spaces:** Hosting stormwater in new private parks benefits adjacent redevelopment as it eliminates the spatial constraints of treating stormwater on site. Developers also benefit by the adjacency of a new open space, which makes their parcel more desirable to potential tenants or purchasers. By taking stormwater into a park facility, economies of scale can be achieved, resulting in reduced construction costs for all parties sharing the shared facility.

It was decided not to pursue this approach as the Minnesota Chapter of the Trust for Public Land, with participation from city partners, was spearheading the, “Green Line Parks and Commons Initiative,” that could potentially address this topic.

**A Special Service District:** This approach was different from the others as it was an inquiry into stakeholders’ interest in using a non-traditional stormwater funding approach. After SAC discussion, it was determined that a special service district would be difficult to establish as it requires owner approval to establish and needs to be renewed after designated periods of time.

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### SSGI Implementation

While SSGI can be used to assist with the creation of TOD, the development of effective policies and implementation tools is critical to the successful implementation of SSGI.

The study quickly concluded that a “one size fits all” may not be a realistic SSGI implementation approach. The variable ways in which SSGI can be implemented lends to a case-by-case evaluation. However, general frameworks are needed to help guide implementation feasibility discussions.

#### Draft Policy Resolution

A recommended first step to implement SSGI is the development and adoption of a SSGI policy resolution. The initial policy resolution brought forward should highlight SSGI benefits and how its use can assist with the creation of the City’s adopted TOD vision. To increase policy makers’ comfort with its use and to refine implementation protocols, it is recommended that the resolution request authorization for pilot implementation of SSGI. SSGI policy resolutions can be brought forward to those agencies that influence or direct stormwater management implementation, primarily municipalities and MWOs. A sample SSGI policy resolution template can be found in Figure 5.

#### Perform Pilot Projects

Several pilot projects should be identified and performed for the purpose of testing and refining the SSGI implementation framework developed in this study. The use of pilot projects allows agencies to further attempt the approach without making a commitment in perpetuity to its implementation. A municipal agency will likely need to initiate the identification and selection of pilot sites in partnership with other stakeholder agencies and the development community. Establishing public-private partnerships very early in the site development process will foster the most benefit to assessing suitability and interest for a pilot effort.

Engineering feasibility studies should be prepared for strategic locations along the Green Line where implementation of SSGI would achieve the City’s redevelopment vision. Pilot site locations must be evaluated more closely to thoroughly understand existing conditions and proposed improvements. A feasibility study would evaluate soil conditions, drainage patterns, infrastructure and utility locations, and would develop an approach or combination of approaches that illustrates the properties served, the level of treatment, probable cost, and other pertinent information. Pilot sites should be selected to test various SSGI:

- Development scales.
- Approaches, such as green alleys, open space or parking.
- Funding and cost recovery mechanisms.

After a designated number of pilot projects have been implemented, monitored and evaluated, agencies can make the determination whether the approach provides desired TOD benefits, and that agencies (i.e., staff) are fully capable of successfully delivering this approach. If SSGI is deemed feasible, modifications to implementation protocols identified through the pilot process should be incorporated into the SSGI framework. Another benefit of performing pilot projects is the creation of demonstration sites for others to see and learn from should SSGI be deemed feasible.

If the pilot projects indicate that SSGI provides public and private benefits, another policy resolution authorizing the use of SSGI could be brought forward for adoption.

#### Revise Regulatory Framework

While a majority of SSGI implementation recommendations address the development of an approach to define answers to logistic issues and thereby reducing risk, there are regulatory considerations as well, which differ across the cities and WMOs. If elected/appointed officials choose to move beyond

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pilot projects into a long-term implementation mode, it will likely require modification of existing stormwater rules and local ordinances.

Pertinent topics (not necessarily exhaustive) to scrutinize at a finer level of detail would include:

- *On-site management.* The current CRWD rules require an applicant to follow a regimented series of stormwater compliance steps, the first being that stormwater must be managed on-site (Rule C.3(2)i). Both municipalities reflect that stormwater must be managed on-site (e.g., Minneapolis Chapter 54.70(1)a.1.; Saint Paul Chapters 69.504b and 63.319(a)). Minneapolis does have provisions for off-site stormwater management considerations but the wording indicates that provision is not to be used to circumvent on-site requirements. Flexibility would need to be incorporated into these processes to allow shared facilities when their use provides public benefit.
- *Encroachment.* Cities of Saint Paul and Minneapolis both have requirements relating to encroachments into the right-of-way, which can potentially inform successful SSGI implementation.
- *Code consolidation.* The City of Saint Paul has multiple locations for expressing stormwater management requirements. Any revisions would need to include all locations to ensure there are no conflicts or discord.
- *Green requirements.* Cities of Saint Paul and Minneapolis have regulatory tools which, in certain circumstances, encourage the use of natural features and vegetation in stormwater management (Minneapolis Chapter 54.70(3)ii; Saint Paul Chapters 63.319(b)1 and 66.344(b)5). These could be expanded or adapted to better support stacked-function green infrastructure implementation.

Jurisdictional stormwater regulations need to be reviewed and modified to remove or clarify regulations that specifically prohibit or discourage SSGI implementation.

Additionally, the City of Saint Paul has a charter prohibiting the diversion of park uses (Saint Paul Chapter 13.01.1). Through SAC discussions, it was determined that retrofitting SSGI into existing Green Line parks (within Saint Paul) would not be a high priority. Given that SSGI can be used as tool to assist with the development of new Saint Paul parks along the Green Line, its use should be strongly considered. Before this tool can be realized, Saint Paul will need to evaluate if changes are necessary to the existing charter to allow for the incorporation of SSGI in new parks along the Green Line. To that end, the City has already developed an official interdepartmental Cooperative Agreement that has been used to retrofit existing parks for large-scale stormwater runoff reduction. The “Green Line Parks and Commons” analysis being prepared by the Trust for Public Land may provide further clarification on this issue.

#### ***Institutionalize SSGI into Agency Processes***

The institutionalization of SSGI into agency processes is critical to its implementation. The feasibility of SSGI should be discussed between implementing agencies and developers early in the development process, before significant time or funds are invested in developing a traditional site plan. Traditional review procedures, such as site plan review, is too late in the development process to introduce SSGI discussions as developers have already invested significant time and funding into the plans being brought forward for agency review. Therefore, SSGI implementation may require modifications to existing agencies processes to allow for early discussion and evaluation.

The implementation of SSGI is not limited to the redevelopment of individual parcels. There are a number of scenarios that could trigger SSGI feasibility discussions, such as:

- Street reconstruction project
- Replatting assembled land(s)

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- Construction project requiring stormwater management permits
- New public facility construction (e.g., schools, libraries, parks)
- Development of a small area master plan or stormwater retrofit analysis

Inserting SSGI feasibility discussions and evaluations to these agency processes is a key step in institutionalizing SSGI.

SSGI may provide cost-efficient stormwater management for runoff from small parcels that otherwise would not receive treatment in the near future. Therefore, the development of a retrofit program that provides a process to initiate the SSGI feasibility discussion, evaluate opportunities and to identify potential funding mechanisms may be advantageous.

#### ***Implementation Tools***

The successful implementation of SSGI entails the creation and use of multiple tools to educate Green Line development stakeholders about TOD benefits that can be achieved through the use of SSGI. The tools also serve to assist agencies with incorporating SSGI feasibility evaluations and implementation as standard practice. The following tools have been developed as base templates that agencies can modify to meet their agency’s specific needs and goals.

#### ***SSGI Assessment Tool***

Given that a number of factors must align in order to utilize SSGI, the determination whether SSGI is feasible needs to occur on a case-by-case basis. This study suggests that agency staff use an assessment tool to help evaluate whether SSGI would be appropriate. A sample SSGI assessment tool template, as shown in Figure 6, provides a series of questions that agency staff can ask early in the development process to assess whether SSGI is a tool that can be used to further the goal of TOD for the proposed project at hand. This tool is envisioned to be used by agency staff that first interact with the development community, as an early determination of feasibility is essential if SSGI is to be successfully implemented.

#### ***Decision-making Flowcharts and Matrices***

Numerous options exist for how SSGI can be implemented and funded. At times the multitude of options and complexity of funding options can appear to be overwhelming. To assist agency staff with the evaluation of funding options, a series of flow charts and matrices templates have been developed that articulate the various funding options currently available. Sample flow chart and matrices templates were developed for each of the four SSGI approaches and can be found in Figures 7 - 29:

- New Parks and Open Spaces
- Shared Parking Facilities
- Green Alleys
- Street Right-of-ways

The flowcharts are designed to lead agency staff through a series of questions on such issues as SSGI ownership and maintenance and then provide funding alternatives based on answers provided. The matrices provide more detail than the flowcharts about the opportunities and constraints associated with the various funding options.

#### ***Pilot Project Educational and Outreach Materials***

Educational and outreach materials should be utilized to inform Green Line development stakeholders about potential pilot opportunities, if a community is interested in advancing SSGI approaches. The audience primarily would involve developers, but these materials also could help inform elected/appointed officials about TOD benefits that can be achieved through SSGI pilot projects. The materials help provide a consistent message about current stormwater challenges, the intent of SSGI, and the potential opportunity, given that SSGI use is not formally

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adopted. Education and outreach materials may be useful when a developer begins initial dialogue with the city, a Green Line neighborhood group, or other early stages of property redevelopment. The materials can be complementary to existing resources such as Saint Paul's "TOD Guidebook for the Central Corridor." At a minimum, the outreach materials can help encourage and foster site designs that more creatively incorporate natural vegetation into stormwater management. A sample brochure can be found in Figures 29 - 30.

### Findings and Conclusions

In a highly urban corridor, SSGI represents a balancing of risk, roles, and responsibilities (particularly for city departments) in the context of broader triple-bottom line benefits. Leadership from elected/appointed officials will be necessary to effectively support and advance with this strategic stormwater solution initiative. This may involve adopting resolutions, sponsoring code modifications, or other similar actions.

#### **Flexibility Supports Vision**

Stormwater management is currently performed on a parcel by parcel basis and segregated between private and non-private ownership. This is done to address mandates for on-site compliance, manage risk exposure for long term maintenance demands, and simply due to the fact that urban parcels redevelop in a sporadic manner making it difficult to coordinate shared facilities. In practice, in dense urban areas, the status quo often results in development managing stormwater underground.

Yet, there are key events such as the construction of major infrastructure projects like light rail transit that trigger concentrated redevelopment where sharing of stormwater facilities may be feasible and conducive to the creation of desired TOD. This is of particular importance for small, space-constrained, urban redevelopment parcels where numerous programmatic requirements are competing for valuable space. In these situations, flexibility could be provided in the current stormwater management approach to allow for SSGI implementation, if doing so would be beneficial in achieving the community's corridor vision of a green, vibrant, sustainable neighborhood.

#### **Define a Process**

SSGI can be successfully implemented, but will likely involve a case-by-case approach. Therefore, processes – such as decision trees or screening methods – must be put in place to assess its feasibility early in the development process. Tools such as flowcharts identifying necessary incremental commitments must also be in place to assist agency staff and developers to efficiently structure a SSGI approach that creates a balanced approach for funding and risk management. These processes and tools must be general enough to work across a variety of possible development scenarios while acknowledging many stakeholders may potentially participate.

The SSGI Assessment Tool (in combination with an outreach brochure) is essential to establish a structured dialogue to identify where a potential project may be feasible, while also maintaining baseline expectations for stormwater management.

#### **Development Scale is Important**

This study identified four SSGI approaches (Parks, Parking, Alleys, and Street Right-of-way) that successfully provide triple bottom line benefits supportive of TOD. In addition, the study indicated that several of these approaches lend themselves more strongly to a particular scale of development. For example, while green alleys can be incorporated into all scales of development, this approach is a more viable option for use with small scale development projects than the parks approach. Likewise, a structured parking approach is better aligned with an urban village development scale. Figure 31 highlights the applicability of the four SSGI approaches to different development scales.

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### **Potential for Financial Balance**

Government units have broad authority and multiple options to raise revenue for SSGI costs. This will likely require significant political leadership. Yet a financially "neutral" funding source is preferable, rather than relying upon grants or general funds solely from one municipal department. A financially neutral funding source, such as a tax district, allows for greater equity and predictability by virtue of collecting funds from directly benefiting properties.

Compared to estimated costs for stormwater facilities on an individual parcel basis, SSGI estimated costs result in net capital cost efficiencies overall. However, a challenge is developing a cost recovery approach that will fairly distribute the reduced costs to all parcels sharing the stormwater facility. For example, analyses herein that allocated costs based on contributing runoff volume (or impervious surface) resulted in some parcels realizing a relative cost increase compared to stormwater management being performed on an individual parcel basis. This allocation method is just one possibility; there may be other suitable allocation methods, depending on how SSGI is approached.

Therefore, careful consideration must be given when determining funding sources and developing cost recovery approaches for SSGI to ensure a balanced distribution of costs and benefits. Specifically, SSGI implementation will place a significant emphasis on the use of development agreements, license agreements or similar formal tools to address financial and obligatory arrangements. These tools will establish acceptable requirements, fees, noncompliance recourses, and other practicalities including long term responsibilities and liability. Fees, responsibilities and liability must run with the land. As a practical matter, license agreements should first be executed to formalize these arrangements, and then be incorporated as an exhibit to a development agreement.

#### **Be Opportunistic**

Runoff from untreated, small parcels that otherwise would not redevelop (i.e., employ stormwater management) in the near future can be effectively included in SSGI projects. SSGI provides an approach to opportunistically realize "excess capacity" in stormwater treatment in a cost effective manner, which may be utilized as a banked or brokered commodity depending on regulatory frameworks. By casting a wide net on how much drainage area is potentially included in a SSGI project, larger gains in water quality can be attained with minimal additional cost. This is very useful in a corridor where overall redevelopment is very incremental (especially small sites) and public land control is very limited. This may warrant the discussion or development of a retrofit program to capitalize on these opportunities when they arise.

#### **Triple Bottom Line Benefits**

The concepts developed illustrated that triple bottom line (economic, environmental, and social) benefits resulted from the use of SSGI, the strongest benefit derived from SSGI implementation may be community enhancements and associated improved livability (environmental and social), which are key redevelopment outcomes desired by the community.

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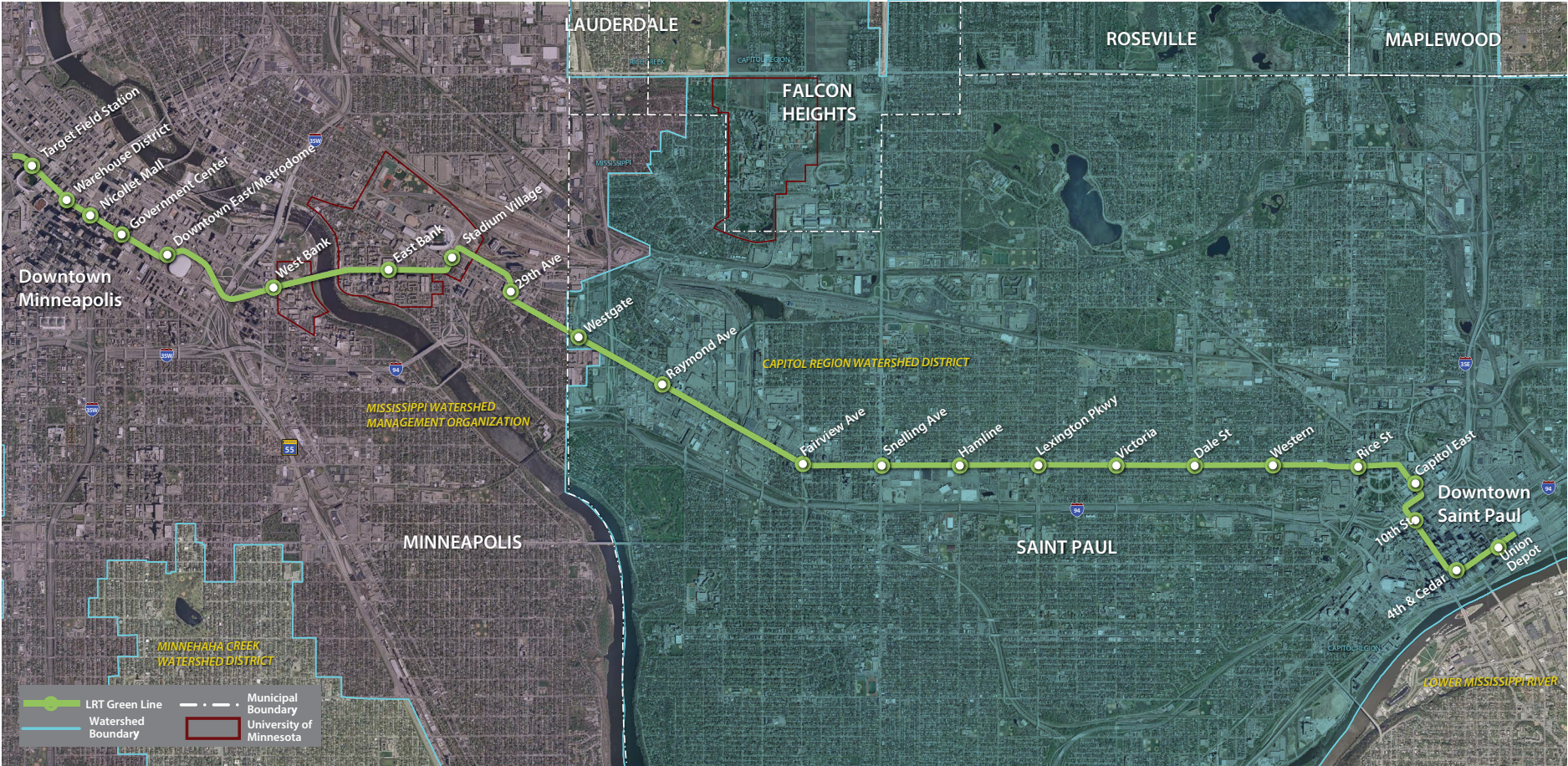


FIGURE 1 Central Corridor Context



**Central Corridor Stormwater and Green Infrastructure Plan  
SAC Feedback Form**

The Central Corridor Stormwater and Green Infrastructure study is investigating the feasibility of implementing shared, stacked-function green infrastructure along the Central Corridor to meet stormwater requirements while also facilitating corridor redevelopment.

Please complete this form and bring it to the August 28 SAC Meeting. If your department has more than one representative on the SAC, please work together to complete the feedback form.

Department/Agency/City \_\_\_\_\_

1. From your department/agency's perspective, would shared, stacked- function green infrastructure be a valuable tool for achieving the following along the Central Corridor? Please rank on a scale from 1 (low) to 5 (high).
 

	Low Value				High Value
A. Transit-oriented Development	1	2	3	4	5
B. New Open Space	1	2	3	4	5
C. Innovative parking strategies	1	2	3	4	5
  
2. What is your department/agency's level of interest in further investigating the feasibility of implementing the following policy approaches? Please rank on a scale from 1 (low) to 5 (high).
 

	Low				High
A. A special service district could be established to construct and manage facilities owned by the city or other agency. *	1	2	3	4	5
B. New publically owned parks/open spaces could provide stacked-function benefits while hosting a public-private shared stormwater treatment facility.	1	2	3	4	5
C. New privately owned open spaces could provide stacked-function benefits while hosting privately owned shared stormwater treatment facilities.	1	2	3	4	5
D. Permanent shared parking facilities (either publicly or privately owned) could also host either public-private or private-private shared stormwater treatment facilities.	1	2	3	4	5
E. Green Alleys could host public-private shared stormwater treatment facilities.	1	2	3	4	5
F. Green Infrastructure located in street boulevards on parallel or side streets to the Central Corridor could host public-private shared stormwater treatment facilities.	1	2	3	4	5
  
3. If your department/agency has additional thoughts or suggestions that you want to share with the project team, please feel free to write them on the back of this form.

\* There are a number of potential funding sources available to implement shared green infrastructure, such as ad valorem, fees, and special assessments. It is assumed that Policy Approaches B – F will identify a funding source. Policy approach A is specifically looking at one particular funding source (special service districts) to see if there is interest in using it, as it requires approval by those who will be taxed.

FIGURE 2 SAC Feedback Survey Form

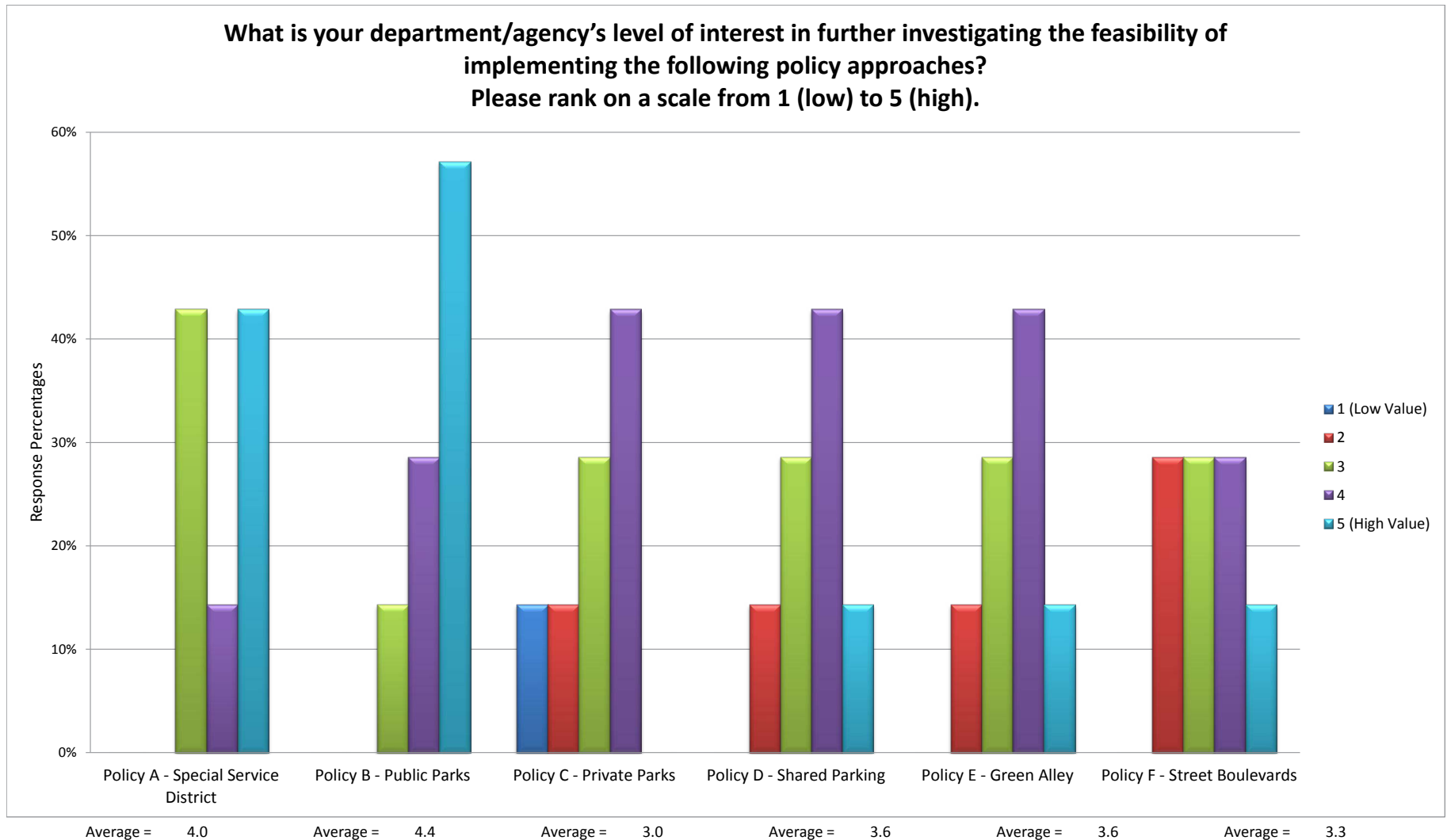


FIGURE 3 SAC Feedback Form Results August 28, 2012

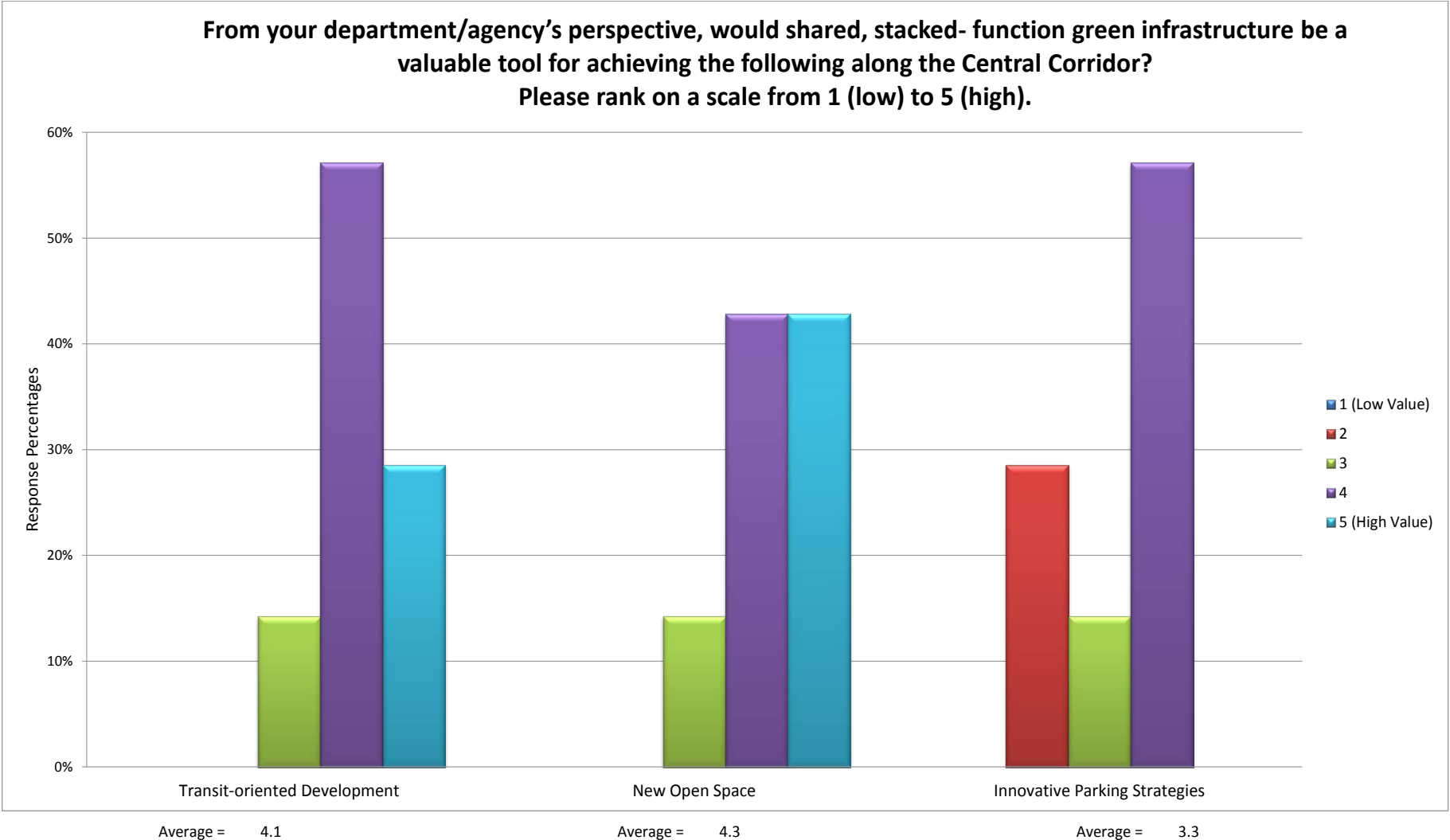


FIGURE 4 SAC Feedback Form Results August 28, 2012

### Shared, Stacked-function Green Infrastructure Resolution Template

WHEREAS, the (agency name) recognizes the Light Rail Transit Green Line will spur redevelopment along the Central Corridor, providing an opportunity to construct new parks and open space, transit-oriented development (TOD), and sustainable design, thereby creating healthy and vibrant neighborhoods; and

WHEREAS, the (agency name) recognizes that stormwater runoff is a major cause of water pollution in urban areas and that redevelopment within (agency jurisdiction), must comply with all applicable federal, state, watershed management organization, and municipal stormwater management regulations; and

WHEREAS, the (agency name) recognizes that green infrastructure, which uses vegetation, soils, and stormwater management approaches that mimic natural processes, results in the creation of healthier urban environments by reducing water-based pollutants reaching area lakes and rivers, reducing the urban heat island effect, and creation of pedestrian friendly environments that promote active living; and

WHEREAS, the (agency name) recognizes when redevelopment occurs in established urban communities, stormwater management facilities are competing with other site features for limited and valuable space, resulting in stormwater facilities being relegated underground a vast majority of the time; and

WHEREAS, the (agency name) recognizes since 2011, 92 percent of Saint Paul redevelopment sites along the Green Line requiring stormwater management placed stormwater below ground, resulting in a lost opportunity to use stormwater to create a green, sustainable and vibrant community; and

WHEREAS, the (agency name) recognizes stacking stormwater management with other complementary land uses, such as parks, plazas, parking, streets and alleys, supports TOD through the efficient use of space in urban environments, and thereby, supporting community livability; and

WHEREAS, the (agency name) recognizes that sharing of stormwater management facilities between property owners may result in reduced capital, operations and maintenance expenditures and efficient use of space in urban environments.

NOW, THEREFORE, BE IS RESOLVED, that the (agency name) supports the incorporation of shared, stacked-function green infrastructure into redevelopment projects when doing so would result in economic, environmental or social benefits to the community.

FIGURE 5 Sample SSGI Policy Resolution Template

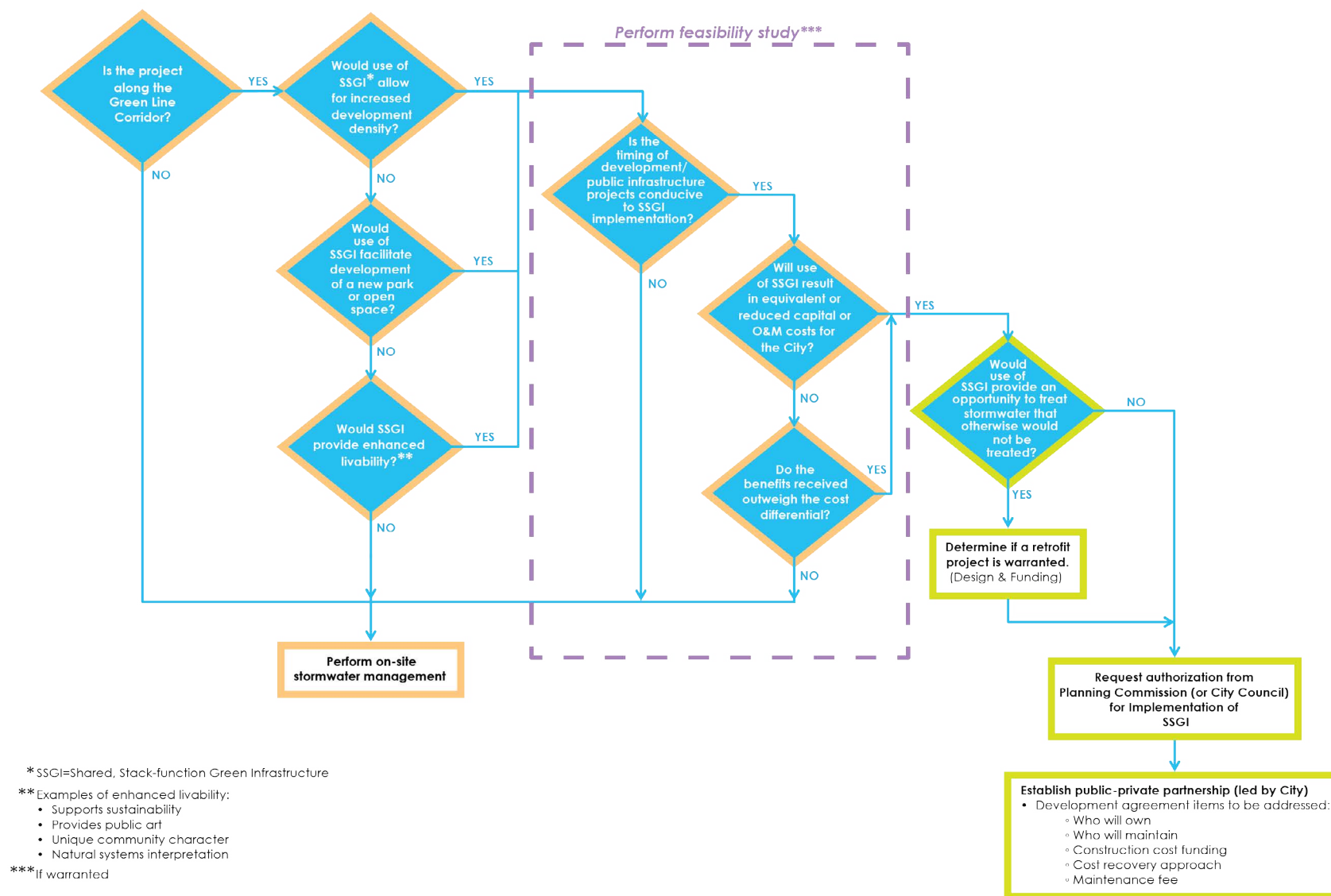


FIGURE 6 Sample SSGI Assessment Tool Template



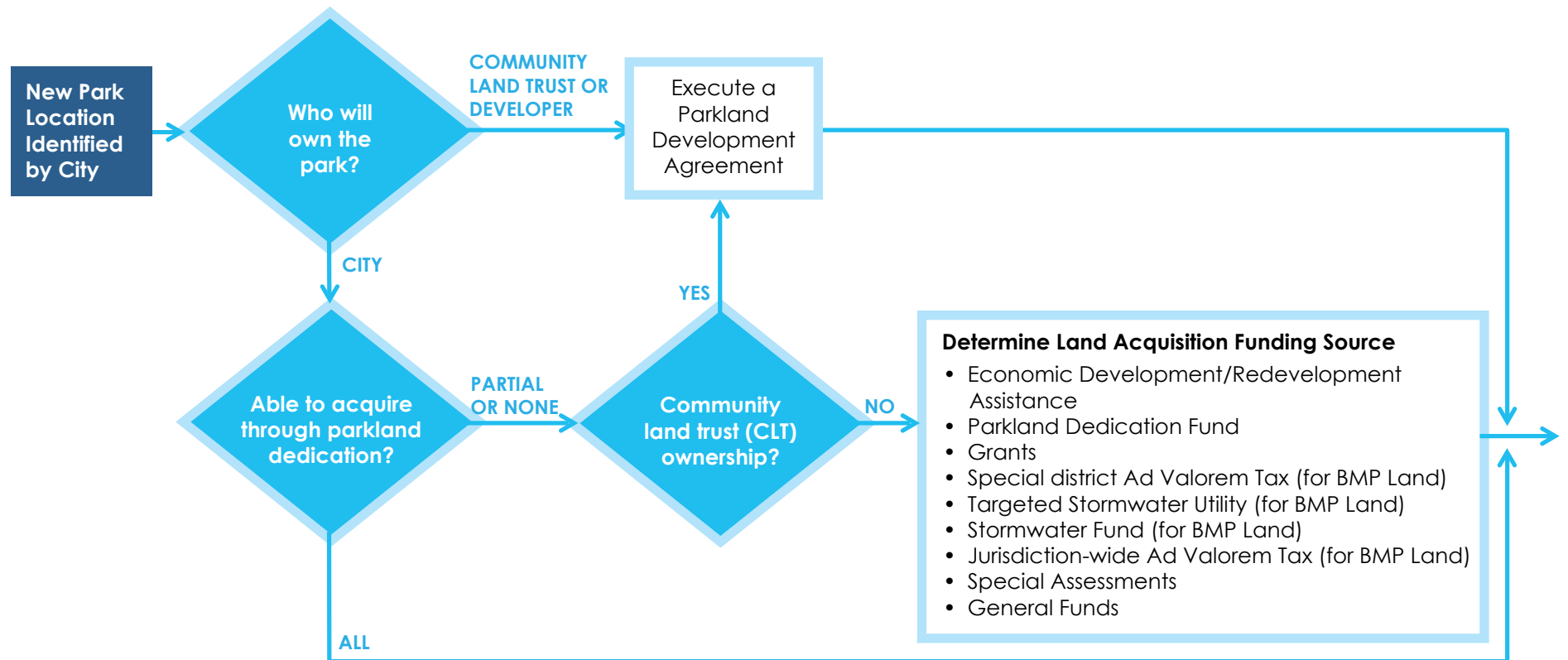


FIGURE 7 New Parks and Open Spaces Sample Flowchart and Matrices

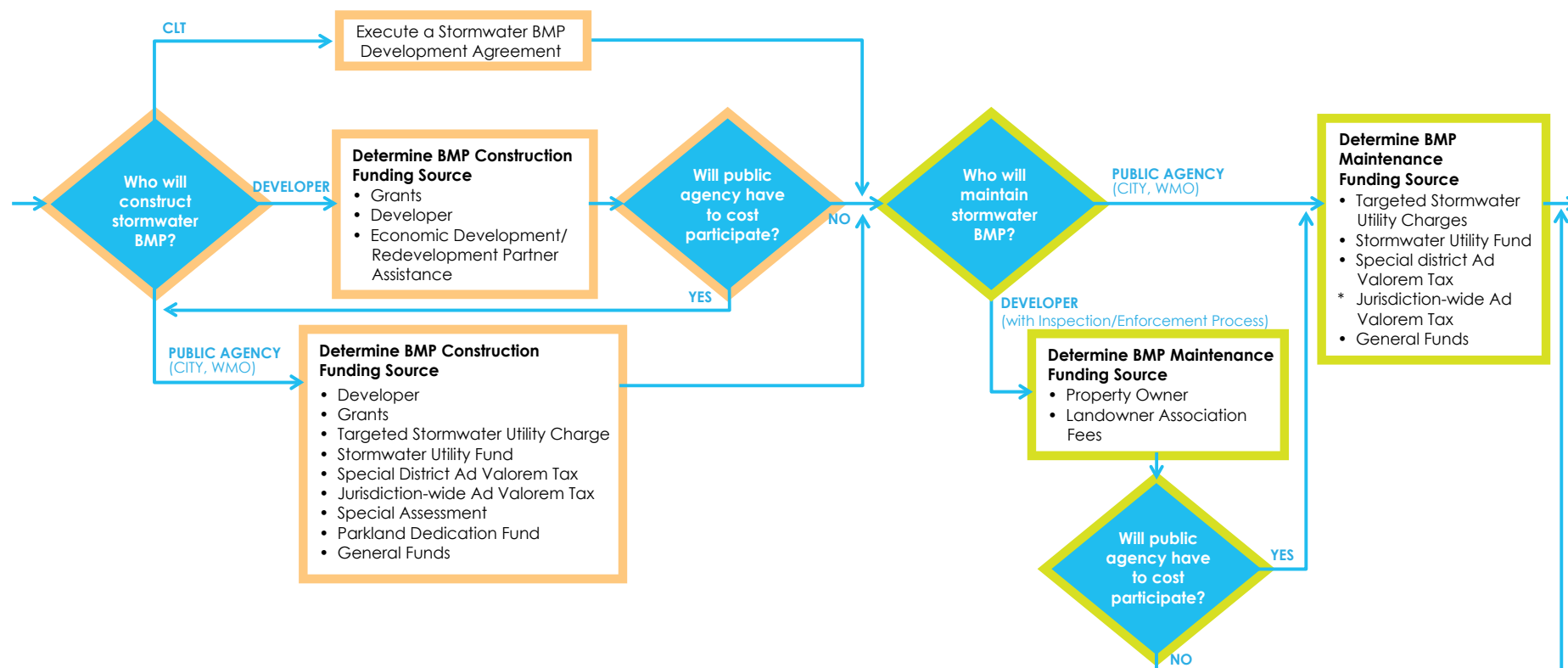


FIGURE 8 New Parks and Open Spaces Sample Flowchart and Matrices, cont.

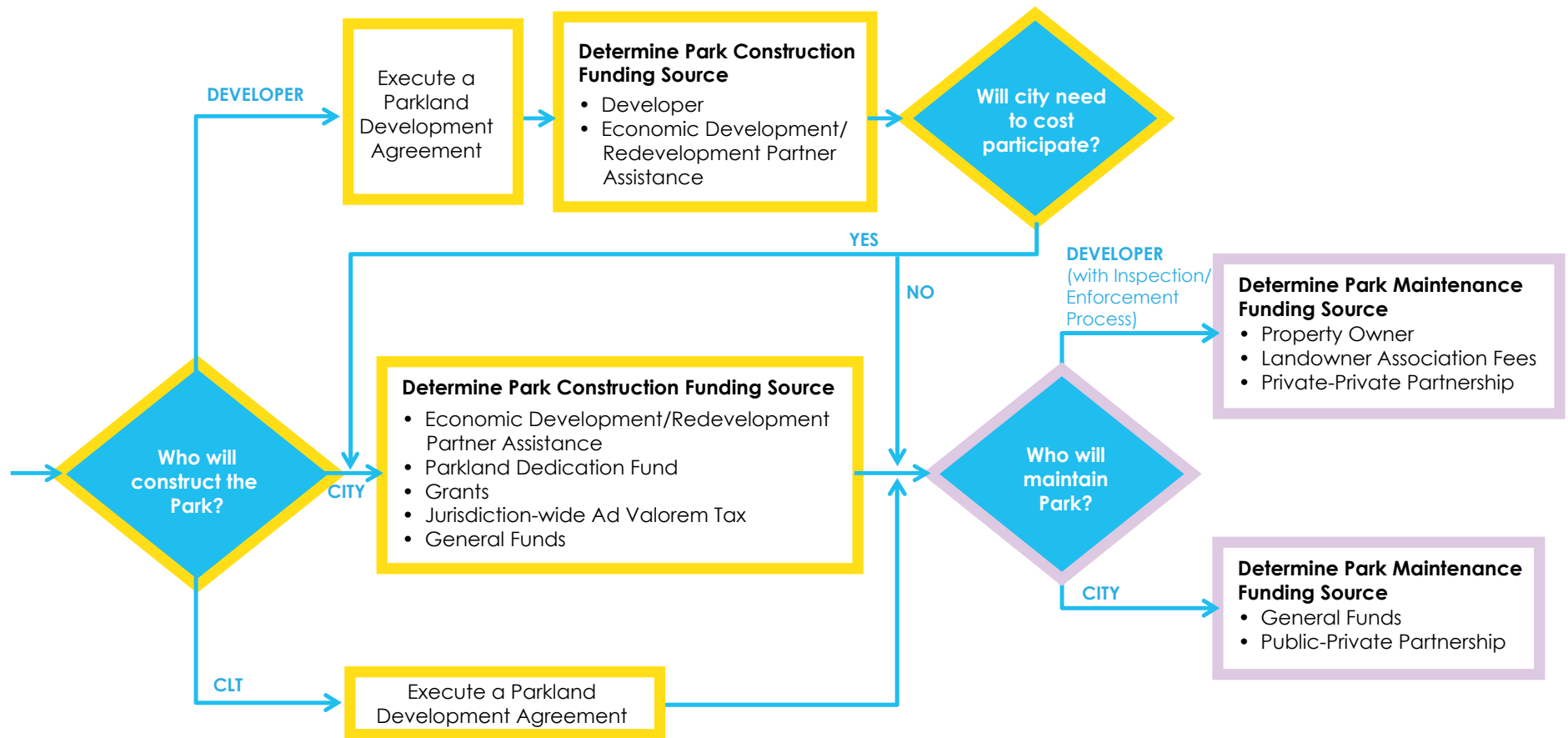


FIGURE 9 New Parks and Open Spaces Sample Flowchart and Matrices, cont.

## Parks and Open Space

Table 1: BMP Construction

Shared Facility	Property & BMP Ownership	Parkland Acquisition Funding Source	Who is Responsible for BMP Construction	BMP Construction Funding Source	BMP Construction Cost Allocation Approach	Issues
Parkland	City	1. Economic development/ redevelopment partner assistance <sup>1</sup> <i>a. May not occur frequently as project must meet economic development/ redevelopment goals and criteria</i> 2. Parkland dedication fund 3. Grants 4. Special district ad valorem tax <sup>4</sup> (for BMP land) 5. Targeted stormwater utility charge <sup>2</sup> (for BMP land) 6. Stormwater utility fund <sup>2</sup> (for BMP land) 7. Jurisdiction-wide ad valorem tax <sup>3</sup> (for BMP land) 8. Special Assessment <sup>8</sup> 9. General funds	Developer	1. Developer 2. Economic development/ redevelopment partner assistance <sup>1</sup>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using parkland for private stormwater treatment, the developer will size and construct the treatment facility to treat runoff from adjacent parcels and public r/w directed to the park. The developer could be required to cover developer's portion of the treatment facility and a pro rata portion of the treatment facility for public r/w generated runoff that is directed to the park</li> </ul>	<ul style="list-style-type: none"> <li>Is there an opportunity to modify the parkland dedication ordinance to increase required parkland development special fund contributions?</li> </ul>
			Public Works or Parks	1. Developer 2. Grant(s) <i>a. May not occur frequently as grants are generally awarded through a competitive process</i> 3. Targeted stormwater utility charge <sup>2</sup> 4. Stormwater utility fund <sup>2</sup> 5. Special district ad valorem tax <sup>4</sup> <i>a. Special assessments - to assist developer with project financing</i> 6. Jurisdiction-wide ad valorem tax <sup>3</sup> 7. Special Assessment <sup>8</sup> 8. Parkland Dedication Fund 9. General funds	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using parkland for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from developer's parcel and a pro rata portion of the treatment facility for public r/w generated runoff that is directed to the park</li> </ul>	
			Watershed District/WMO	1. Developer 2. Targeted stormwater utility charge <sup>5</sup> 3. Stormwater utility fund <sup>5</sup> 4. Special district ad valorem tax <sup>7</sup> <i>a. Special assessments - to assist developer with project financing</i> 5. Jurisdiction-wide ad valorem tax <sup>6</sup> 6. Special Assessment <sup>9</sup> 7. General funds	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> <li>As a condition of using parkland for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from developer's parcel and a pro rata portion of the public r/w generated runoff that is directed to the park.</li> </ul>	

FIGURE 10 New Parks and Open Spaces Sample Flowchart and Matrices, cont.

## Parks and Open Space

Shared Facility	Property & BMP Ownership	Parkland Acquisition Funding Source	Who is Responsible for BMP Construction	BMP Construction Funding Source	BMP Construction Cost Allocation Approach	Issues
Parkland	Community Land Trust (CLT)	<ul style="list-style-type: none"> <li>Grants</li> <li>Charitable Contributions</li> <li>Endowment earnings</li> </ul>	Community Land Trust	<ul style="list-style-type: none"> <li>Grants</li> <li>Charitable Contributions</li> <li>Endowment earnings</li> </ul>	<ul style="list-style-type: none"> <li>Contractual agreement needed between CLT and developer for payment of that portion of the treatment facility that treats runoff from developer's parcel.</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater development agreement needed between City and CLT</li> </ul>
	Developer	1. Developer	Developer	<ol style="list-style-type: none"> <li>Grants</li> <li>Developer</li> <li>Economic development/ redevelopment partner assistance<sup>1</sup> <ol style="list-style-type: none"> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement or parkland development agreement</li> <li>As a condition of using parkland for private stormwater treatment, the developer will size and construct the treatment facility to treat runoff from adjacent parcels and public r/w directed to park. The developer will be required to cover developer's portion of the treatment facility and a pro rata portion of the treatment facility for public r/w generated runoff</li> </ul>	

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>1</sup> See Section III.A.5

<sup>2</sup> See Section III.A.1.a

<sup>3</sup> See Section III.A.2.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>8</sup> See Section III.A.3.a.i

<sup>9</sup> See Section III.A.3.a.ii

FIGURE 11 New Parks and Open Spaces Sample Flowchart and Matrices, cont.



## Parks and Open Space

**Table 2: BMP Maintenance**

Shared Facility	Property & BMP Ownership	Who Maintains BMP	BMP Maintenance Funding Source	BMP Maintenance Cost Allocation Approach	Issues
Parkland	City	Public Works	<ol style="list-style-type: none"> <li>1. Targeted stormwater utility charge<sup>2</sup></li> <li>2. Stormwater utility fund<sup>2</sup></li> <li>3. Special district ad valorem tax<sup>4</sup> <ol style="list-style-type: none"> <li>a. <i>Can be met with opposition if all properties in sub area do not perceive a direct benefit</i></li> </ol> </li> <li>4. Jurisdiction-wide ad valorem tax<sup>3</sup></li> <li>5. General Fund</li> </ol>	<ul style="list-style-type: none"> <li>As a condition of using parkland for private stormwater treatment, the developer could be charged to treat runoff from developer's parcel and a pro rata portion of the public r/w generated runoff that is directed to the park</li> </ul>	
		Watershed District/WMO	<ol style="list-style-type: none"> <li>1. Targeted stormwater utility charge<sup>5</sup></li> <li>2. Stormwater utility fund<sup>5</sup></li> <li>3. Special district ad valorem tax<sup>7</sup> <ol style="list-style-type: none"> <li>a. <i>Can be met with opposition if all properties in sub area do not perceive a direct benefit</i></li> </ol> </li> <li>4. Jurisdiction-wide ad valorem tax<sup>6</sup></li> <li>5. General Fund</li> </ol>	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> <li>As a condition of using parkland for private stormwater treatment, the developer could be charged to treat runoff from developer's parcel and a pro rata portion of the public r/w generated runoff that is directed to the parking ramp</li> </ul>	<ul style="list-style-type: none"> <li>WMO needs joint powers agreement from city to operate a utility<sup>10</sup></li> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
	Developer	Developer	<ol style="list-style-type: none"> <li>1. Property owners</li> <li>2. Landowner association fees</li> </ol>	<ul style="list-style-type: none"> <li>Contract between City and Developer</li> </ul>	<ul style="list-style-type: none"> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
		Watershed District/WMO	<ol style="list-style-type: none"> <li>1. Contracted work</li> </ol>		
		Public Works	<ol style="list-style-type: none"> <li>1. Contracted work</li> </ol>		

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>2</sup> See Section III.A.1.a

<sup>3</sup> See Section III.A.2.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>10</sup> See Section III.A.1.b

FIGURE 12 New Parks and Open Spaces Sample Flowchart and Matrices, cont.

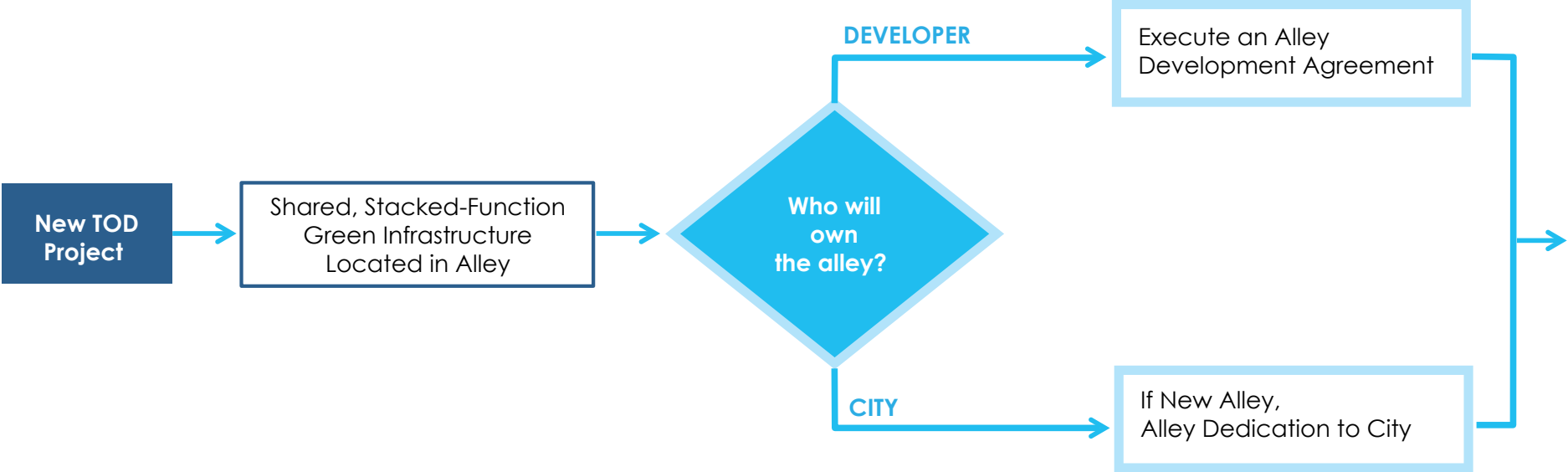


FIGURE 13 Green Alleys Sample Flowchart and Matrices

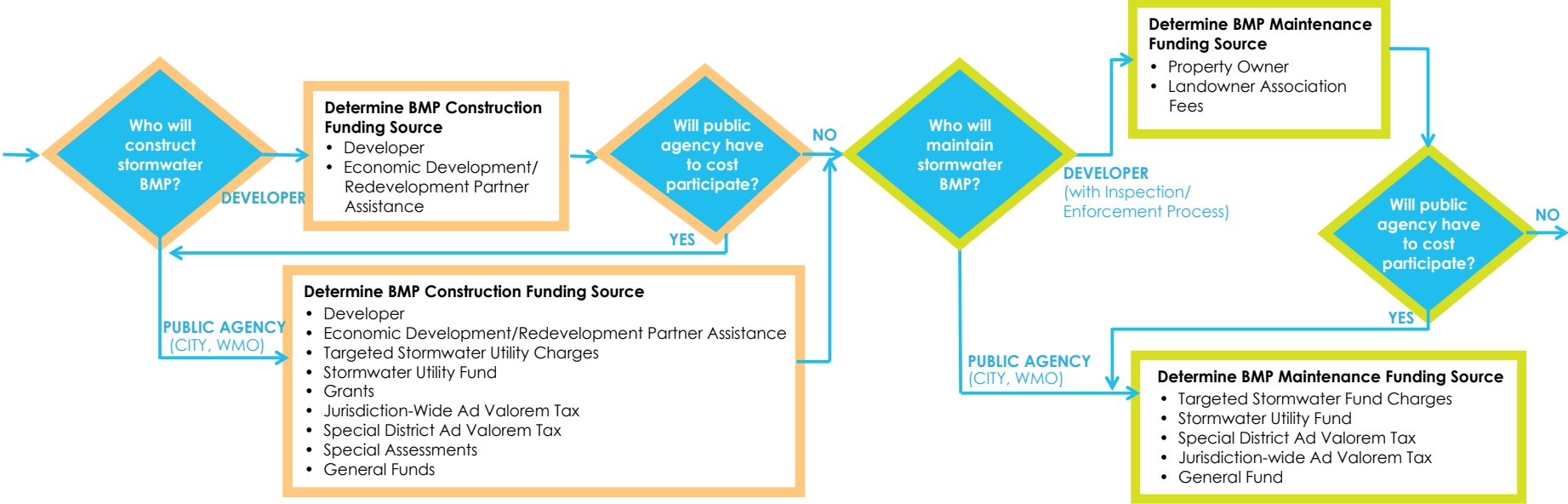


FIGURE 14 Green Alleys Sample Flowchart and Matrices, cont.

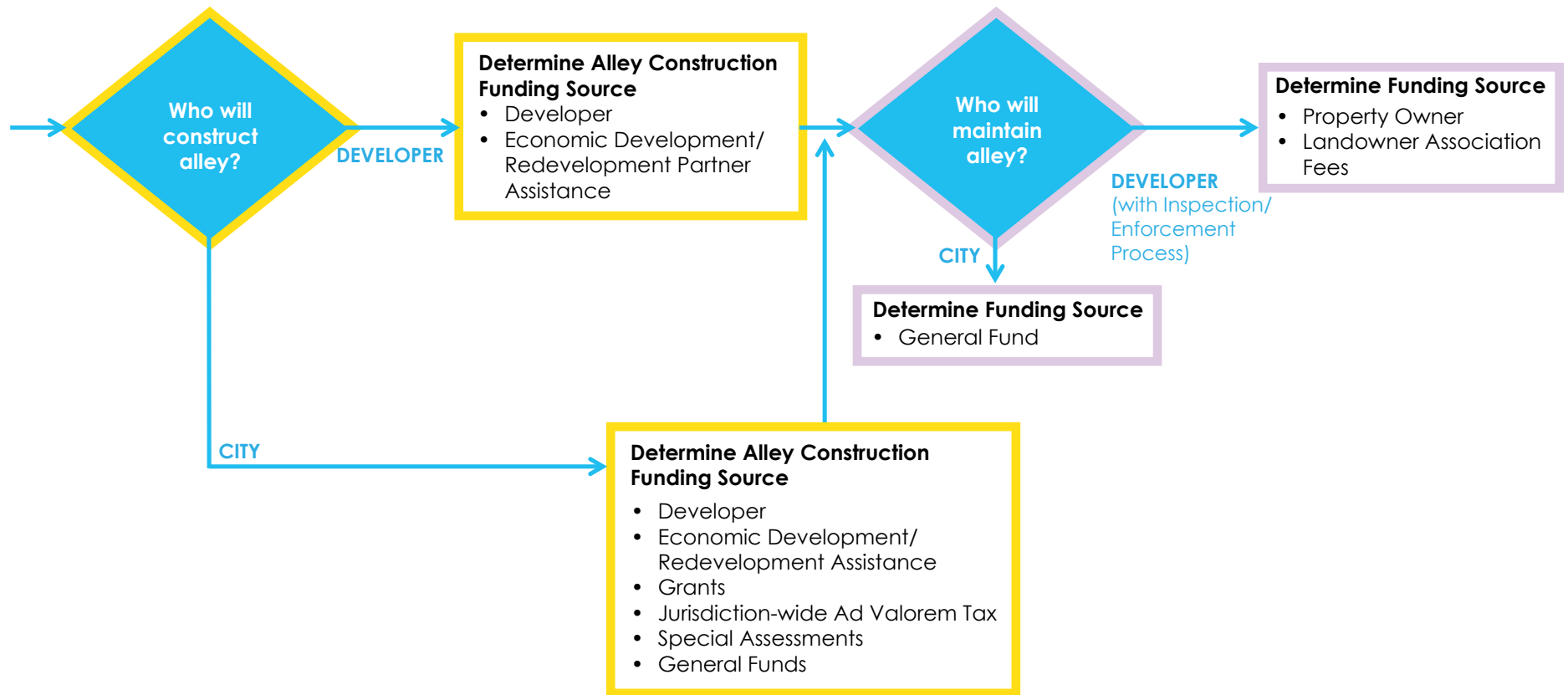


FIGURE 15 Green Alleys Sample Flowchart and Matrices, cont.

## Alleys

Table 1: Shared Stormwater Facility Best Management Practice (BMP) Construction

Shared Facility	Property & BMP Ownership	Who is Responsible for BMP Construction	BMP Construction Funding Source	BMP Construction Cost Allocation Approach	Potential Issues
Alley	City	Developer	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup></li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using alley for private stormwater treatment, the developer could be required to size and construct the treatment facility to treat runoff from adjacent parcels and from the public r/w (alley and/or adjacent streets) draining to the alley. The developer could be required to cover the cost of these portions of the treatment facility</li> </ul>	<ul style="list-style-type: none"> <li>Will developer be required to reconstruct the full alley or just that portion of the alley needed to meet stormwater treatment needs and to maintain positive drainage.</li> </ul>
		Public Works	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup> <ol style="list-style-type: none"> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> <li>Targeted stormwater utility charge (connection fee)<sup>2</sup></li> <li>Stormwater utility fund<sup>2</sup></li> <li>Grant(s)               <ol style="list-style-type: none"> <li>May not occur frequently as grants are generally awarded through a competitive process</li> </ol> </li> <li>Jurisdiction-wide ad valorem tax<sup>3</sup></li> <li>Special district ad valorem tax<sup>4</sup> <ol style="list-style-type: none"> <li>Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>Special assessments<sup>8</sup> <ol style="list-style-type: none"> <li>May be requested by developer to assist with project financing</li> </ol> </li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using alley for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from adjacent parcels and from public r/w (alley and/or adjacent streets) draining to the alley</li> </ul>	
		Watershed District/WMO	<ol style="list-style-type: none"> <li>Targeted stormwater utility charge (connection fee)<sup>5</sup></li> <li>Stormwater utility fund<sup>5</sup></li> <li>Jurisdiction-wide ad valorem tax<sup>6</sup></li> <li>Special district ad valorem tax<sup>7</sup> <ol style="list-style-type: none"> <li>Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>Special assessments<sup>9</sup> <ol style="list-style-type: none"> <li>May be requested by developer to assist with project financing</li> </ol> </li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> <li>As a condition of using alley for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from adjacent parcels and from public r/w (alley and/or adjacent streets) draining to the alley</li> </ul>	

FIGURE 16 Green Alleys Sample Flowchart and Matrices, cont.



Alleys

Shared Facility	Property & BMP Ownership	Who is Responsible for BMP Construction	BMP Construction Funding Source	BMP Construction Cost Allocation Approach	Potential Issues
Alley	Developer	Developer	<div>1. Developer</div> <div>2. Economic development/ redevelopment partner assistance/incentive<sup>1</sup><div>a. <i>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</i></div></div>	<div>• Per development agreement</div> <div>• As a condition of using alley for private stormwater treatment, the developer could be required to size and construct the treatment facility to treat runoff from adjacent parcels and from the public r/w (alley and/or adjacent streets) draining to the alley. The developer may be required to cover the cost of these portions of the treatment facility</div>	<div>• Will developer be required to reconstruct the full alley or just that portion of the alley needed to meet stormwater treatment needs and to maintain positive drainage.</div>

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>1</sup> See Section III.A.5

<sup>2</sup> See Section III.A.1.a

<sup>3</sup> See Section III.A.2.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>8</sup> See Section III.A.3.a.i

<sup>9</sup> See Section III.A.3.a.ii

FIGURE 17 Green Alleys Sample Flowchart and Matrices, cont.

## Alleys

**Table 2: Shared Stormwater Facility Best Management Practice (BMP) Maintenance**

Shared Facility	Property & BMP Ownership	Who Maintains BMP	BMP Maintenance Funding Source	BMP Maintenance Cost Allocation Approach	Issues
Alley	City	Public Works	<ul style="list-style-type: none"> <li>Targeted stormwater utility charge (use fee)<sup>2</sup></li> <li>Stormwater utility fund<sup>2</sup></li> <li>Special district ad valorem tax<sup>4</sup> <ul style="list-style-type: none"> <li><i>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</i></li> </ul> </li> <li>General Fund</li> </ul>	<ul style="list-style-type: none"> <li>As a condition of using alley for private stormwater treatment, the developer could be charged to treat runoff from developer's parcel draining to the alley</li> </ul>	
		Watershed District/WMO	<ol style="list-style-type: none"> <li>Targeted stormwater utility charge (use fee)<sup>5</sup></li> <li>Stormwater utility fund<sup>5</sup></li> <li>Special district ad valorem tax<sup>7</sup> <ul style="list-style-type: none"> <li><i>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</i></li> </ul> </li> <li>General Fund</li> </ol>	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> </ul>	<ul style="list-style-type: none"> <li>WMO needs joint powers agreement from city to operate a utility<sup>10</sup></li> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
	Developer	<ul style="list-style-type: none"> <li>Property owner</li> <li>Landowner association</li> </ul>	<ol style="list-style-type: none"> <li>Property owner</li> <li>Landowner association fees</li> </ol>	<ul style="list-style-type: none"> <li>Contract between City and Developer</li> </ul>	<ul style="list-style-type: none"> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
		Watershed District/WMO	<ol style="list-style-type: none"> <li>Contracted work</li> </ol>		
		Public Works	<ol style="list-style-type: none"> <li>Contracted work</li> </ol>		

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>2</sup> See Section III.A.1.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>10</sup> See Section III.A.1.b

FIGURE 18 Green Alleys Sample Flowchart and Matrices, cont.

## Alleys

Table 3: Alley Construction

Shared Facility	Property & BMP Ownership	Who is Responsible for Alley Construction	Alley Construction Funding Source	Alley Construction Cost Allocation Approach	Potential Issues
Alley	City	Developer	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup></li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using alley for private stormwater treatment, the developer could be required to cover the entire cost of the alley</li> </ul>	<ul style="list-style-type: none"> <li>Will developer be required to reconstruct the full alley or just that portion of the alley needed to meet stormwater treatment needs and to maintain positive drainage.</li> </ul>
		Public Works	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup> <ol style="list-style-type: none"> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> <li>Grant(s)               <ol style="list-style-type: none"> <li>May not occur frequently as grants are generally awarded through a competitive process</li> </ol> </li> <li>Jurisdiction-wide ad valorem tax<sup>3</sup></li> <li>Special Assessments<sup>8</sup></li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using alley for private stormwater treatment, the developer could be required to cover the entire cost of the alley</li> </ul>	
	Developer	Developer	<ol style="list-style-type: none"> <li>Developer               <ol style="list-style-type: none"> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup></li> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using alley for private stormwater treatment, the developer could be required to cover the entire cost of the alley</li> </ul>	<ul style="list-style-type: none"> <li>Will developer be required to reconstruct the full alley or just that portion of the alley needed to meet stormwater treatment needs and to maintain positive drainage.</li> </ul>

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>1</sup> See Section III.A.5

<sup>3</sup> See Sections III.A.2.a

<sup>8</sup> See Section III.A.3.a.i

Table 4: Alley Maintenance

Shared Facility	Property & BMP Ownership	Who Maintains Alley	Alley Maintenance Funding Source	Alley Maintenance Cost Allocation Approach	Issues
Alley	City	Public Works	<ul style="list-style-type: none"> <li>Special Assessments<sup>8</sup></li> <li>General Fund</li> </ul>		
	Developer	<ul style="list-style-type: none"> <li>Property owner</li> <li>Landowner association</li> </ul>	<ul style="list-style-type: none"> <li>Property owners</li> <li>Landowner association fees</li> </ul>		

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>8</sup> See Section III.A.3.a.i

FIGURE 19 Green Alleys Sample Flowchart and Matrices, cont.

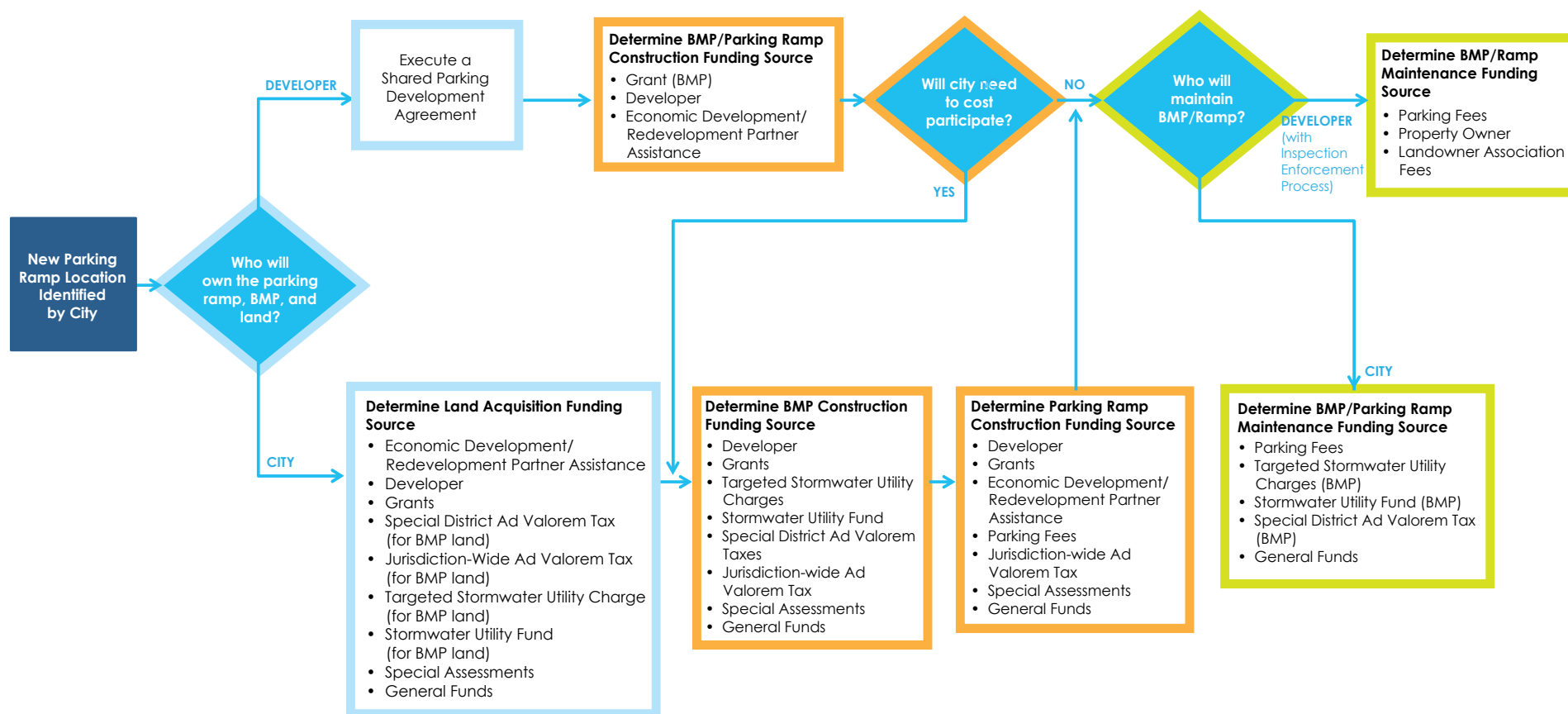


FIGURE 20 Shared Parking Facilities Sample Flowchart and Matrices

## Shared Parking

Table 1: BMP &amp; Ramp Construction

Shared Facility	Property, BMP & Ramp Ownership	Land Acquisition Funding Source	BMP & Ramp Construction Responsibility	BMP Construction Funding Source	Ramp Construction Funding Source	BMP & Ramp Construction Cost Allocation Approach	Issues
<b>Parking Ramp</b>	City	1. Economic development/redevelopment partner assistance <sup>1</sup> <i>a. May not occur frequently as project must meet economic development/redevelopment goals and criteria</i> 2. Developer 3. Grant(s) <i>a. May not occur frequently as grants are generally awarded through a competitive process</i> 4. Special district ad valorem tax <sup>4</sup> (for BMP land) 5. Jurisdiction-wide ad valorem tax <sup>3</sup> (for BMP land) 6. Targeted stormwater utility charge <sup>2</sup> (for BMP land) 7. Stormwater utility fund <sup>2</sup> (for BMP land) 8. Special Assessments <sup>8</sup> 9. General funds	Public Works	1. Developer 2. Grant(s) <i>a. May not occur frequently as grants are generally awarded through a competitive process</i> 3. Targeted stormwater utility charge <sup>2</sup> 4. Stormwater utility fund <sup>2</sup> 5. Special district ad valorem tax <sup>4</sup> 6. Jurisdiction-wide ad valorem tax <sup>3</sup> 7. Special Assessment <sup>8</sup> 8. General funds	1. Developer 2. Grant(s) <i>a. May not occur frequently as grants are generally awarded through a competitive process</i> 3. Economic development/redevelopment partner assistance <sup>1</sup> <i>a. May not occur frequently as project must meet economic development/redevelopment goals and criteria</i> 4. Parking fees 5. Jurisdiction-wide ad valorem tax <sup>3</sup> 6. Special Assessments <sup>8</sup> 7. General funds	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using parking ramp for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from developer's parcel and a pro-rata portion of the public r/w that is directed to the parking ramp.</li> <li>As a condition of using parking ramp for private parking, developer will be required to pay the construction cost for that portion of the parking ramp that accommodates minimum (or more?) private parking stalls required per zoning code.</li> </ul>	<ul style="list-style-type: none"> <li>Investigate the feasibility of establishing a parking dedication fee or parking development special fund through economic development/redevelopment partners</li> </ul>
			Watershed District/WMO (BMP only)	1. Developer 2. Targeted stormwater utility charge <sup>5</sup> 3. Stormwater utility fund <sup>5</sup> 4. Special district ad valorem tax <sup>7</sup> 5. Jurisdiction-wide ad valorem tax (to repay bonds) <sup>6</sup> 6. Special Assessment <sup>8</sup> 7. General funds	n/a	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> <li>As a condition of using parking ramp for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from developer's parcel and a pro-rata portion of the public r/w that is directed to the parking ramp.</li> </ul>	

FIGURE 21 Shared Parking Facilities Sample Flowchart and Matrices, cont.

## Shared Parking

Shared Facility	Property, BMP & Ramp Ownership	Land Acquisition Funding Source	BMP & Ramp Construction Responsibility	BMP Construction Funding Source	Ramp Construction Funding Source	BMP & Ramp Construction Cost Allocation Approach	Issues
<b>Parking Ramp</b>	Developer	Developer	Developer	1. Grants (for BMP land) 2. Developer 3. Economic development/redevelopment partner assistance <sup>1</sup> a. <i>May not occur frequently as project must meet economic development/redevelopment goals and criteria</i>	1. Developer 2. Economic development/redevelopment partner assistance a. <i>May not occur frequently as project must meet economic development/redevelopment goals and criteria</i>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>The developer will size and construct the treatment facility to treat runoff from contributing parcels and from the public r/w directed to the parking ramp. The developer could be required to cover developer's portion of the treatment facility and a pro-rata portion of the treatment facility for the public r/w.</li> </ul>	

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>1</sup> See Section III.A.5

<sup>2</sup> See Section III.A.1.a

<sup>3</sup> See Section III.A.2.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>8</sup> See Section III.A.3.a.i

FIGURE 22 Shared Parking Facilities Sample Flowchart and Matrices, cont.

## Shared Parking

Table 2: BMP &amp; Ramp Maintenance

Shared Facility	Property, BMP & Ramp Ownership	BMP & Ramp Maintenance Responsibility	BMP Maintenance Funding Source	Parking Ramp Maintenance Funding Source	BMP & Ramp Maintenance Cost Allocation Approach	Issues
Parking Ramp	City	Public Works	1. Parking Fees 2. Targeted stormwater utility charge <sup>2</sup> 3. Stormwater utility fund <sup>2</sup> 4. Special district ad valorem tax <sup>4</sup> <i>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</i> 5. General Fund	1. Parking Fees 2. General Fund	<ul style="list-style-type: none"> <li>As a condition of using parking ramp for private stormwater treatment, the developer could be charged for BMP maintenance for that portion of the treatment resulting from runoff generated from developer's parcel.</li> <li>As a condition of using parking ramp for private parking, developer could be required to pay parking ramp maintenance for that portion of the parking ramp that accommodates minimum (or more?) private parking stalls required per zoning code.</li> </ul>	<ul style="list-style-type: none"> <li>Assumes any fees generated by reuse of harvested stormwater would not generate meaningful revenue</li> </ul>
		Watershed District/WMO (BMP only)	1. Targeted stormwater utility charge <sup>5</sup> 2. Stormwater utility fund <sup>5</sup> 3. Special district ad valorem tax <sup>7</sup> <i>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</i> 4. General Fund		<ul style="list-style-type: none"> <li>As a condition of using parking ramp for private stormwater treatment, the developer could be charged for BMP maintenance for that portion of the treatment resulting from runoff generated from developer's parcel.</li> </ul>	
	Developer	Developer	1. Parking Fees 2. Property owner 3. Landowner association fees	1. Parking Fees 2. Property owner 3. Landowner association fees		<ul style="list-style-type: none"> <li>Assumes any fees generated by reuse of harvested stormwater would not generate meaningful revenue</li> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
		Watershed District/WMO (BMP only)	1. Contracted work			
		Public Works	1. Contracted work			

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>2</sup> See Section III.A.1.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

FIGURE 23 Shared Parking Facilities Sample Flowchart and Matrices, cont.

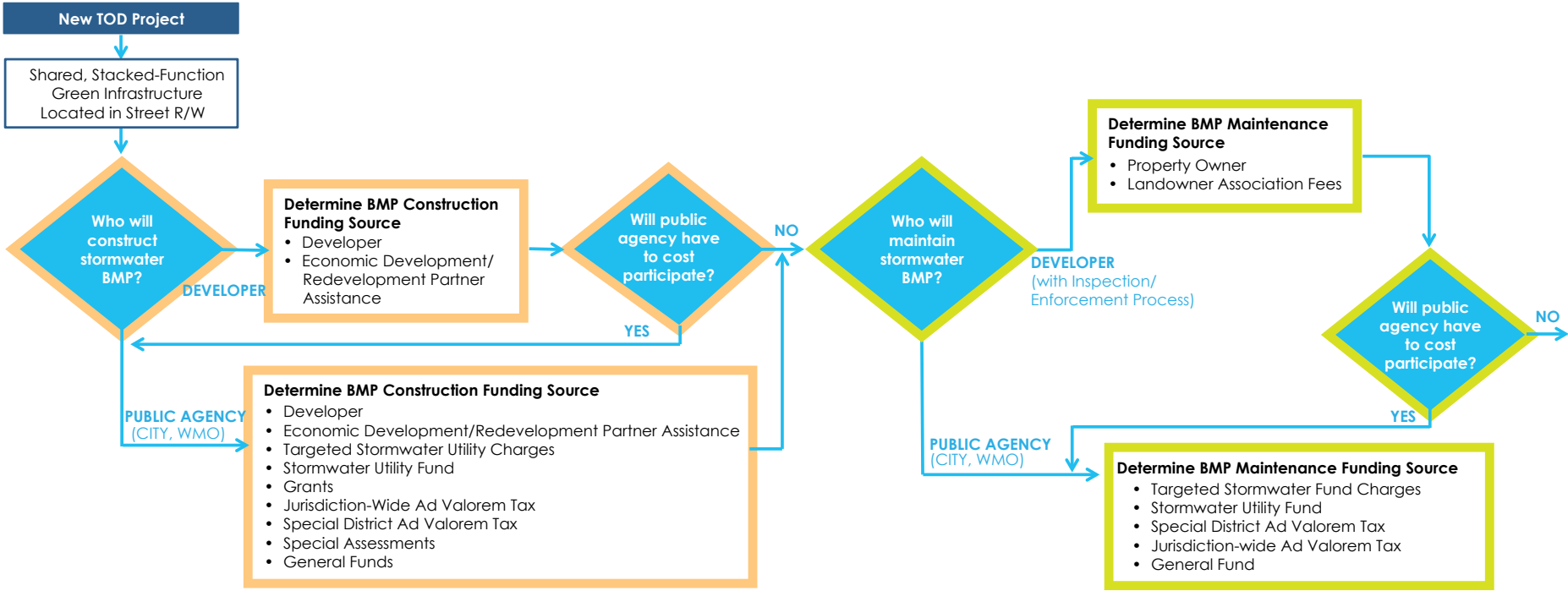


FIGURE 24 Street Right-of-Way Sample Flowchart and Matrices



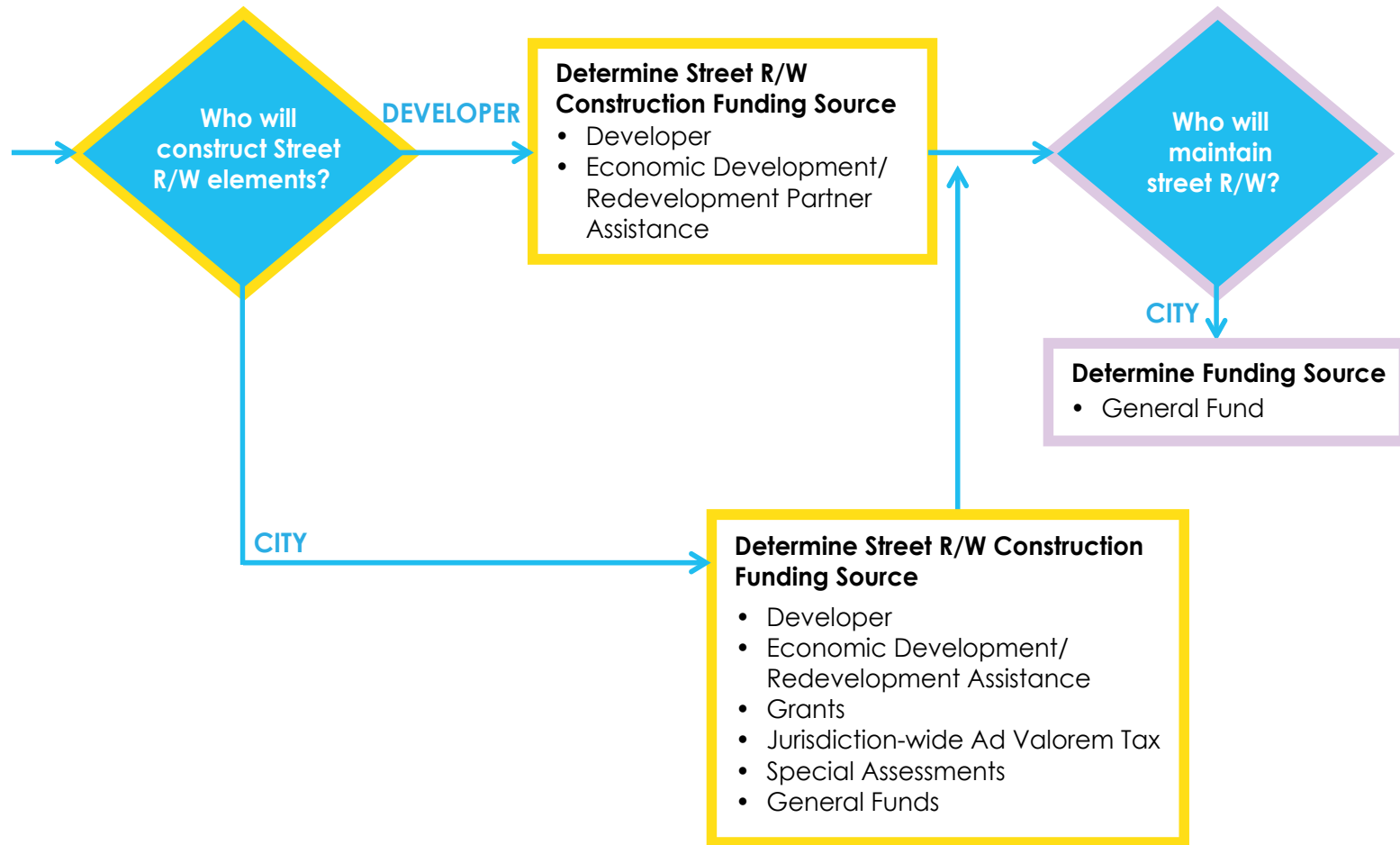


FIGURE 25 Street Right-of-Way Sample Flowchart and Matrices, cont.

## Street Right-of-Way

Table 1: Shared Stormwater Facility Best Management Practice (BMP) Construction

Shared Facility	Property & BMP Ownership	Who is Responsible for BMP Construction	BMP Construction Funding Source	BMP Construction Cost Allocation Approach	Potential Issues	
Street R/W	City	Developer	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup></li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using street r/w for private stormwater treatment, the developer could be required to size and construct the treatment facility to treat runoff from the public r/w. The developer could be required to cover the cost of these portions of the treatment facility.</li> </ul>	<ul style="list-style-type: none"> <li>Will developer be required to reconstruct the full street or just that portion of the street needed to meet stormwater treatment needs and to maintain positive drainage.</li> <li>Street will need to meet City specifications and testing, and will need to be acceptable to City upon completion.</li> </ul>	<p>The following notes reference Attachment B, <i>Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure</i> memorandum:</p> <p><sup>1</sup> See Section III.A.5</p> <p><sup>2</sup> See Section III.A.1.a</p> <p><sup>3</sup> See Section III.A.2.a</p> <p><sup>4</sup> See Section III.A.3.c.v</p> <p><sup>5</sup> See Sections III.A.1.b/c</p> <p><sup>6</sup> See Sections III.A.2.b/c</p> <p><sup>7</sup> See Sections III.A.3.c.iv/vii</p> <p><sup>8</sup> See Section III.A.3.a.i</p> <p><sup>9</sup> See Section III.A.3.a.ii</p>
		Public Works	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup> <ol style="list-style-type: none"> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> <li>Targeted stormwater utility charge (connection fee)<sup>2</sup></li> <li>Stormwater utility fund<sup>2</sup></li> <li>Grant(s)               <ol style="list-style-type: none"> <li>May not occur frequently as grants are generally awarded through a competitive process</li> </ol> </li> <li>Jurisdiction-wide ad valorem tax<sup>3</sup></li> <li>Special district ad valorem tax<sup>4</sup> <ol style="list-style-type: none"> <li>Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>Special assessments<sup>8</sup> <ol style="list-style-type: none"> <li>May be requested by developer to assist with project financing</li> </ol> </li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using street r/w for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from public r/w.</li> </ul>		
		Watershed District/WMO	<ol style="list-style-type: none"> <li>Developer</li> <li>Targeted stormwater utility charge (connection fee)<sup>5</sup></li> <li>Stormwater utility fund<sup>5</sup></li> <li>Jurisdiction-wide ad valorem tax<sup>6</sup> <ol style="list-style-type: none"> <li>Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>Special district ad valorem tax<sup>7</sup> <ol style="list-style-type: none"> <li>May be requested by developer to assist with project financing</li> </ol> </li> <li>Special assessments<sup>9</sup> <ol style="list-style-type: none"> <li>May be requested by developer to assist with project financing</li> </ol> </li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/WMO</li> <li>As a condition of using street r/w for private stormwater treatment, developer could be required to pay the construction cost for that portion of the treatment facility that treats runoff from public r/w.</li> </ul>	<ul style="list-style-type: none"> <li>Will developer be required to reconstruct the full street or just that portion of the street needed to meet stormwater treatment needs and to maintain positive drainage.</li> <li>Street will need to meet City specifications and testing, and will need to be acceptable to City upon completion.</li> </ul>	

FIGURE 26 Street Right-of-Way Sample Flowchart and Matrices, cont.

## Street Right-of-Way

Table 2: Shared Stormwater Facility Best Management Practice (BMP) Maintenance

Shared Facility	Property & BMP Ownership	Who Maintains BMP	BMP Maintenance Funding Source	BMP Maintenance Cost Allocation Approach	Issues
Street R/W	City	Public Works	<ol style="list-style-type: none"> <li>1. Targeted stormwater utility charge (use fee)<sup>2</sup></li> <li>2. Stormwater utility fund<sup>2</sup></li> <li>3. Special district ad valorem tax<sup>4</sup> <ol style="list-style-type: none"> <li>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>4. General Fund</li> </ol>	<ul style="list-style-type: none"> <li>As a condition of using street r/w for private stormwater treatment, the developer could be charged to treat runoff from developer's parcel draining to the street r/w.</li> </ul>	
		Watershed District/WMO	<ol style="list-style-type: none"> <li>1. Targeted stormwater utility charge (use fee)<sup>5</sup></li> <li>2. Stormwater utility fund<sup>5</sup></li> <li>3. Special district ad valorem tax<sup>7</sup> <ol style="list-style-type: none"> <li>a. Can be met with opposition if all properties in sub area do not perceive a direct benefit</li> </ol> </li> <li>4. General Fund</li> </ol>	<ul style="list-style-type: none"> <li>Per agreement between City and Watershed District/MWO</li> <li>As a condition of using street r/w for private stormwater treatment, the developer could be charged to treat runoff from developer's parcel draining to the street r/w.</li> </ul>	<ul style="list-style-type: none"> <li>WMO needs joint powers agreement from city to operate a utility<sup>10</sup></li> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>
		Developer	<ol style="list-style-type: none"> <li>1. Property owner</li> <li>2. Landowner association fees</li> </ol>	<ul style="list-style-type: none"> <li>Contract between City and Developer</li> </ul>	<ul style="list-style-type: none"> <li>An inspection/enforcement process is needed to ensure maintenance compliance</li> </ul>

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>2</sup> See Section III.A.1.a

<sup>4</sup> See Section III.A.3.c.v

<sup>5</sup> See Sections III.A.1.b/c

<sup>6</sup> See Sections III.A.2.b/c

<sup>7</sup> See Sections III.A.3.c.iv/vii

<sup>10</sup> See Section III.A.1.b

FIGURE 27 Street Right-of-Way Sample Flowchart and Matrices, cont.

## Street Right-of-Way

**Table 3: Street Right-of-Way Construction**

Shared Facility	Property & BMP Ownership	Who is Responsible for Street R/W Construction	Street R/W Construction Funding Source	Street R/W Construction Cost Allocation Approach	Potential Issues
Street R/W	City	Developer	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup></li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using street r/w for private stormwater treatment, the developer could be required to cover the entire cost of the street construction</li> </ul>	
		Public Works	<ol style="list-style-type: none"> <li>Developer</li> <li>Economic development/ redevelopment partner assistance/incentive<sup>1</sup> <ol style="list-style-type: none"> <li>May not occur frequently as project must meet economic development/ redevelopment goals and criteria</li> </ol> </li> <li>Grant(s)               <ol style="list-style-type: none"> <li>May not occur frequently as grants are generally awarded through a competitive process</li> </ol> </li> <li>Jurisdiction-wide ad valorem tax<sup>3</sup></li> <li>Special Assessments<sup>8</sup></li> <li>General funds</li> </ol>	<ul style="list-style-type: none"> <li>Per development agreement</li> <li>As a condition of using street r/w for private stormwater treatment, the developer could be required to cover the entire cost of the street construction</li> </ul>	

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

<sup>1</sup> See Section III.A.5

<sup>3</sup> See Sections III.A.2.a

<sup>8</sup> See Section III.A.3.a.i

**Table 4: Street Right-of-Way Maintenance**

Shared Facility	Property & BMP Ownership	Who Maintains Street	Street Maintenance Funding Source	Street Maintenance Cost Allocation Approach	Issues
Street R/W	City	Public Works	<ul style="list-style-type: none"> <li>Special Assessments<sup>8</sup></li> <li>General Fund</li> </ul>		
	Developer	<ul style="list-style-type: none"> <li>Property owner</li> <li>Landowner association</li> </ul>	<ul style="list-style-type: none"> <li>Property owners</li> <li>Landowner association fees</li> </ul>		

The following notes reference Attachment B, *Central Corridor Stormwater and Green Infrastructure Plan: Governmental Authority Relating to Stormwater Infrastructure* memorandum:

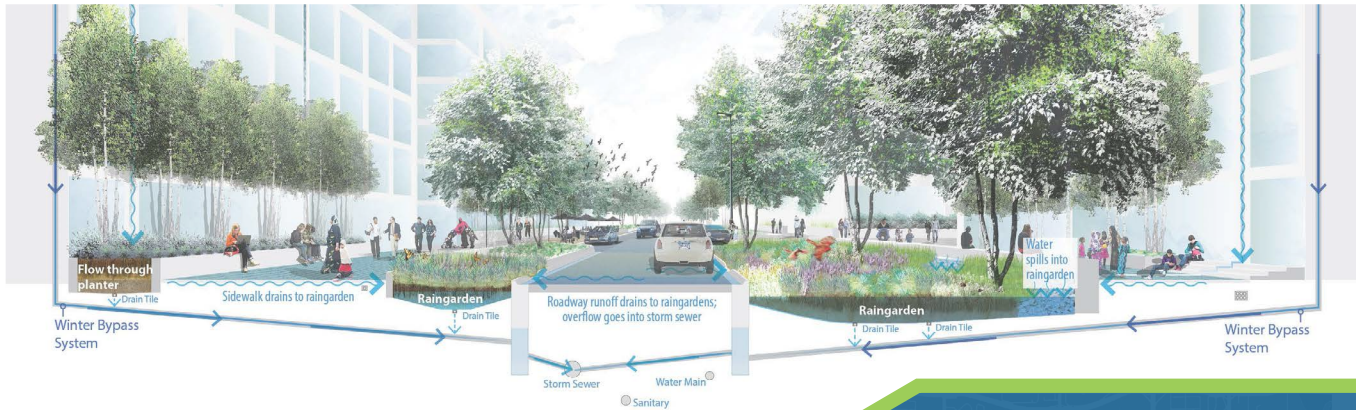
<sup>8</sup> See Section III.A.3.a.i

FIGURE 28 Street Right-of-Way Sample Flowchart and Matrices, cont.



FIGURE 29 Sample Brochure (Z-fold) Side A





A system where stormwater from multiple parcels is directed to shared, stacked-function green infrastructure (SSGI) supports economic, environmental, and social benefits. With SSGI we can "Think Blue" on the Green Line.

### Case Studies

SSGI and the 'Think Blue' approach are not new or specific to the Green line. Here are three local examples of shared stacked stormwater facilities that create community features and amenities.

THINK BLUE

### What is the Value of SSGI?

- Shared green infrastructure systems can result in reduced capital costs for both public and private sectors.
- Green infrastructure can be integrated (stacked) with other land uses including parks, plazas, gardens or boulevards to attain multiple community functions, including public art.
- Stacked green infrastructure provides a "triple bottom line" benefit of economic, environmental and social improvements that support community livability and increase sustainability.
- Enhanced community livability attracts new development and economic growth.



**Biofiltration Basin, Tartan Crossing Development**  
City of Oakdale, MN & Wellington Management, Inc.

**Benefits:** Volume control and water quality treatment for 15-acre drainage area • education • interpretation • public art integration • development gateway feature • recreation • wildlife habitat



**Trout Brook Nature Sanctuary**  
City of Saint Paul, MN & Capitol Region Watershed District

**Benefits:** Harvests and cleanses runoff from adjacent parcels • education • interpretation • public art integration • ecosystem restoration • recreation • wildlife habitat



**Hamline Library Green Alley**  
Saint Paul Public Library & City of Saint Paul, MN

**Benefits:** Provides stacked-function of circulation and stormwater management for multiple public and private parcels

*Last Revised: January 28, 2014*

FIGURE 30 Sample Brochure (Z-fold) Side B



FIGURE 31 Applicable SSGI Implementation Approaches

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