

GREEN STORMWATER INFRASTRUCTURE OPPORTUNITIES WATERSHED SUMMARIES

KANSAS CITY SMART SEWER ADAPTIVE MANAGEMENT PLAN
VERSION 1.0 (JULY 2018)

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20TH STREET AT BALTIMORE AVE

Phronesis, 20th Street Streetscape, 2018.

The **Smart Sewer Program** is a long-term implementation plan to reduce sewer overflows and meet federal Consent Decree requirements. The program represents the **largest infrastructure investment in Kansas City's history**, outlining a city-wide plan to significantly reduce sewer overflows and improve water quality in the Blue and Missouri Rivers, to the benefit of all downstream communities.

Kansas City is the first city to incorporate “green” solutions in a Consent Decree, which will advance the City’s goal to update the City’s aging sewer system, support local workforce development, and allow citizens an opportunity to participate in community revitalization. **Green stormwater infrastructure (GSI)** is an emerging set of engineered stormwater solutions deployed in urban conditions that use vegetation, soils, and natural processes to manage water. Following successful pilot project implementation of GSI in the Marlborough neighborhood, the **Smart Sewer Program is encouraged to pursue the expansion of city-wide incorporation of GSI technologies** to reduce or remove the need for more costly solutions such as tunnels and storage tanks.

GSI OPPORTUNITIES: WATERSHED PLANS

The Watershed Plans Process Summary and the set of five Watershed Plans that collectively make up the GSI Opportunities Plan for Kansas City’s Combined Sewer System represent the next step toward successful implementation of GSI within the Smart Sewer Program. The program team developed concepts for five major watersheds within the combined sewer system: 1.) Town Fork Creek 2.) Brush Creek 3.) Gooseneck Creek 4.) Lower Blue River 5.) Turkey Creek. **Detailed recommendations for project opportunities and how those opportunities were established can be found within a separate document titled GSI Watershed Plans. Watershed Summaries provided here highlight the primary opportunity projects.**

Smart Sewer Program expansion of GSI has the opportunity to redefine infrastructure in Kansas City for future generations. Thanks to Kansas City’s position as an EPA Green Infrastructure trailblazer, it also has the opportunity to redefine urban stormwater infrastructure across the United States.



WATERSHED PLANS: IDENTIFYING GSI OPPORTUNITIES

Watershed Plans identify green stormwater infrastructure (GSI) opportunity projects that are generally categorized by GSI typology, watershed location, and implementation level. The inclusion of categorization by Implementation Level provides guidance about general scale of project impact, which may assist in long-term system-wide planning of project implementation.

IMPLEMENTATION LEVEL

LEVEL I: INCREMENTAL STORMWATER REDUCTION

LEVEL II: IMPROVE INTEGRATED INFRASTRUCTURE

LEVEL III: STIMULATE COMMUNITY INVESTMENT

LEVEL IV: STIMULATE ECONOMIC INVESTMENT

GSI TYPOLOGY

- DISTRIBUTED

- NEIGHBORHOOD

- CENTRALIZED

- TBD

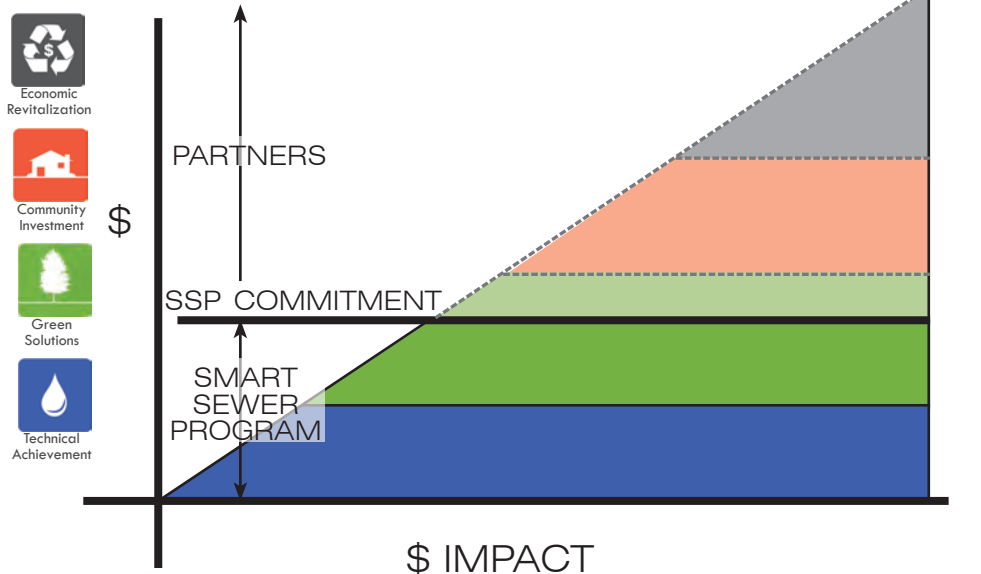
WATERSHED LOCATION

- UPPER

- MID

- LOWER

- NODAL



Level IV – STIMULATE ECONOMIC INVESTMENT in high priority areas that will be a catalyst for real change

- Create jobs and future opportunity
- Lay foundation for future economic development

Level III – STIMULATE COMMUNITY INVESTMENT in high priority areas that will be a catalyst for real change

- Integrate GSI opportunities with neighborhood amenities
- Engage community in process
- Lay foundation for future community development

Level II - IMPROVE INTEGRATED INFRASTRUCTURE solutions that increase public benefit at a lower overall cost to the City

- Integrate with other public infrastructure projects
- Do more with less: Smart Strategic Solutions

Level I – Incremental STORMWATER REDUCTION to the Combined Sewer System

- Top of the watershed
- Distributed solutions
- Public/Private partnership

CSO GSI OPPORTUNITY PROJECTS

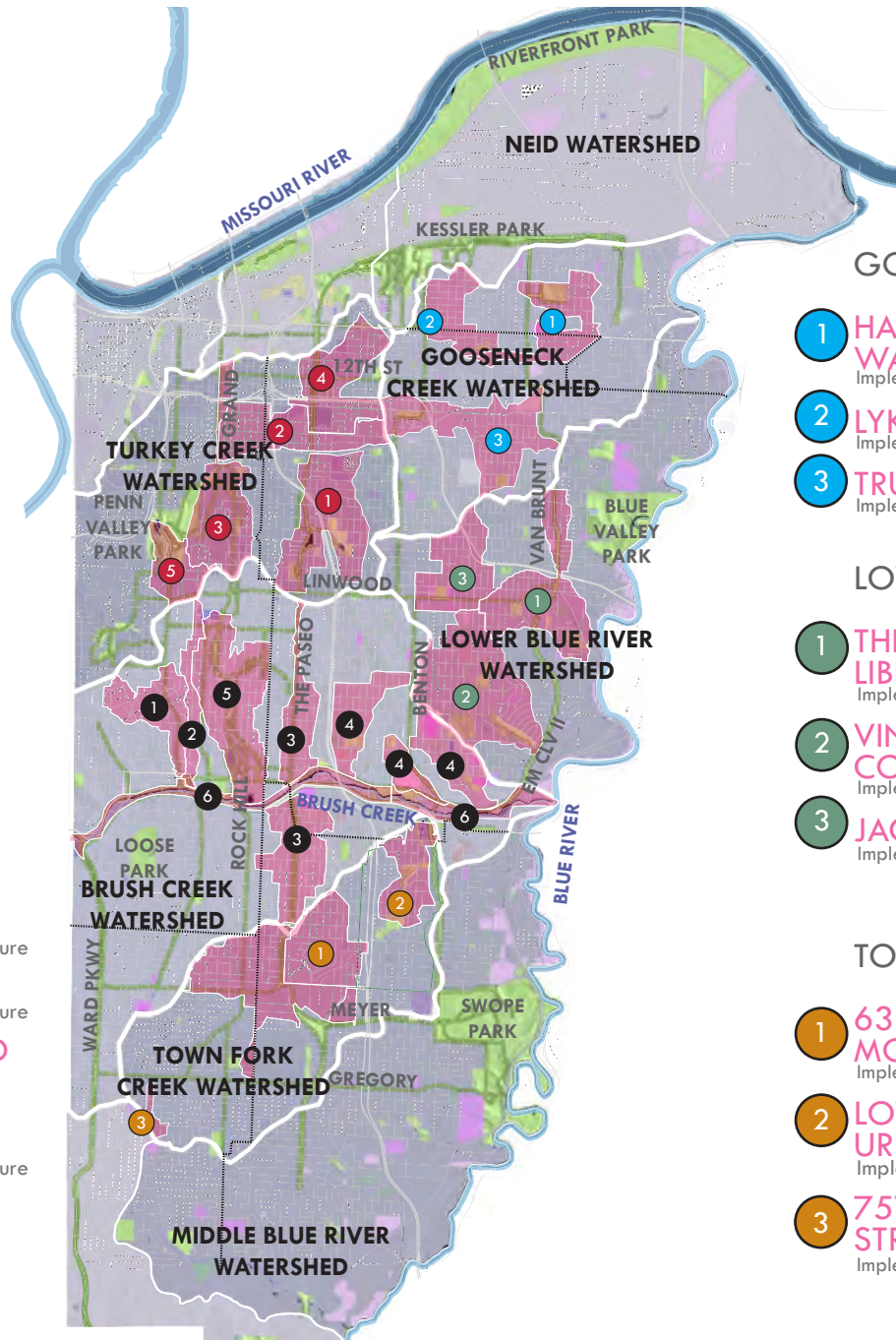
CITY-WIDE EXECUTIVE SUMMARY

TURKEY CREEK WATERSHED

- 1 **VINE STREET CORRIDOR**
Implementation Level III: Stimulate Investment
- 2 **18TH STREET CORRIDOR**
Implementation Level III: Stimulate Investment
- 3 **MAIN/GRAND/GILLHAM CORRIDORS**
Implementation Level III: Stimulate Investment
- 4 **FORGOTTEN HOMES & THE PASEO**
Implementation Level III: Stimulate Investment
- 5 **PENN VALLEY PARK**
Implementation Level II: Improve Integrated Infrastructure

BRUSH CREEK WATERSHED

- 1 **WESTPORT / MILL CREEK PARK**
Implementation Level III: Stimulate Investment
- 2 **MAIN STREET CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure
- 3 **THE PASEO CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure
- 4 **IVANHOE, OAK, AND CLEVELAND PARKS**
Implementation Level III: Stimulate Investment
- 5 **GILLHAM PARK**
Implementation Level II: Improve Integrated Infrastructure
- 6 **BRUSH CREEK WATER QUALITY INNOVATION CORRIDOR**
Implementation Level III: Stimulate Investment



GOOSENECK CREEK WATERSHED

- 1 **HARDESTY / GOOSENECK WATER PARK**
Implementation Level III: Stimulate Investment
- 2 **LYKINS SQUARE**
Implementation Level III: Stimulate Investment
- 3 **TRUMAN RD CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure

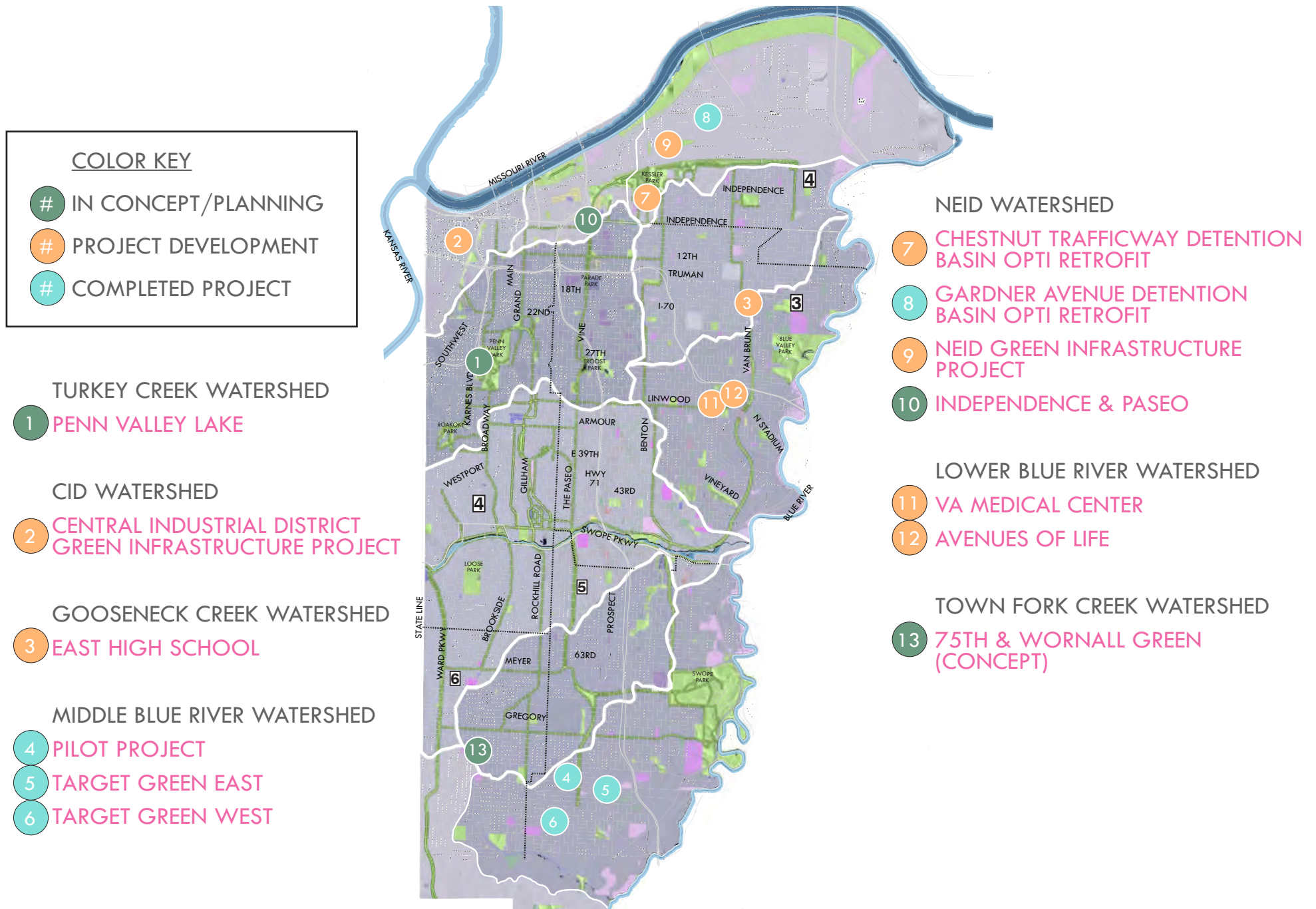
LOWER BLUE RIVER WATERSHED

- 1 **THE BOULEVARDS TRIANGLE / LIBERTY PARK**
Implementation Level III: Stimulate Investment
- 2 **VINEYARD / SEVEN OAKS CORRIDOR**
Implementation Level III: Stimulate Investment
- 3 **JACKSON AVE / I-70 CURVE**
Implementation Level III: Stimulate Investment

TOWN FORK CREEK WATERSHED

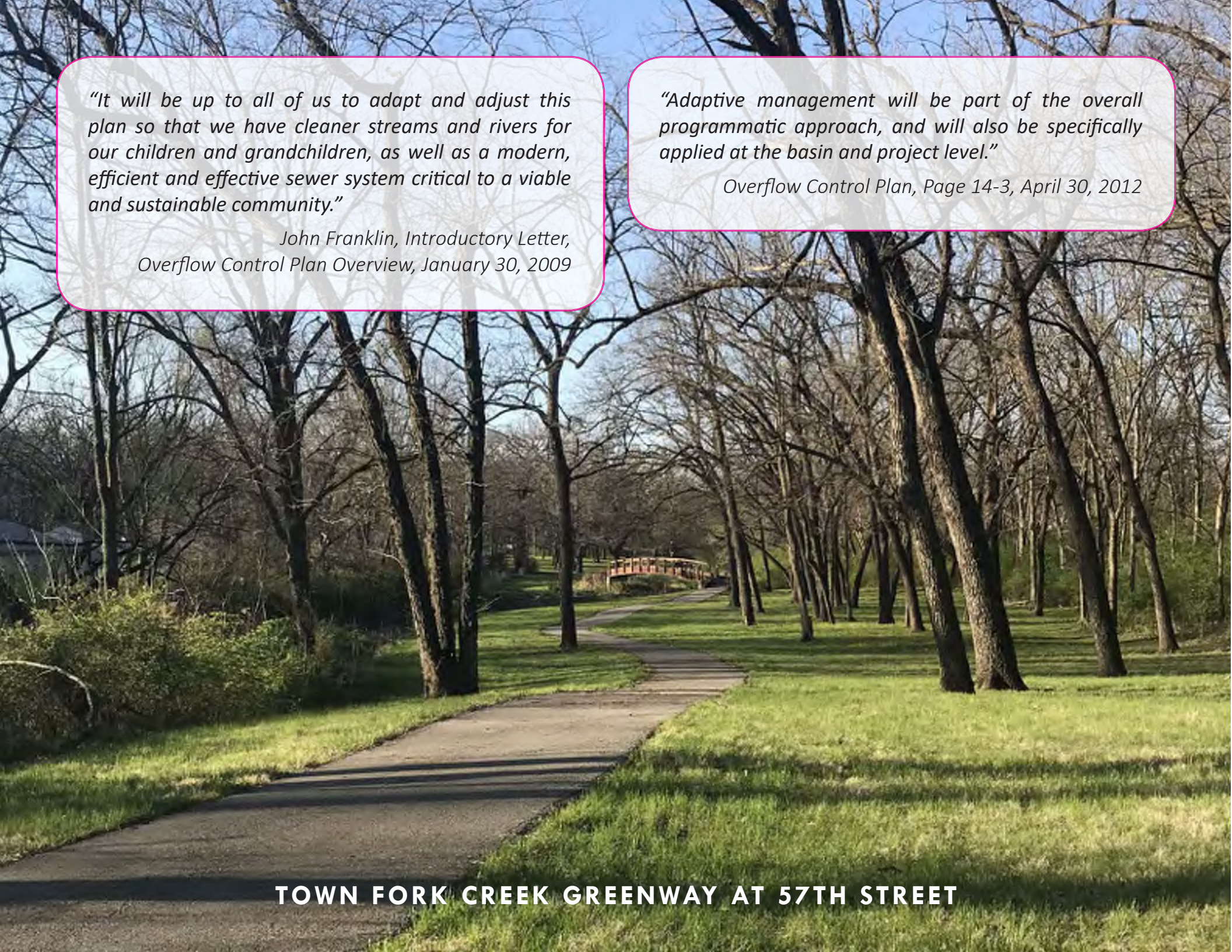
- 1 **63RD STREET AND DANIEL MORGAN BOONE PARK**
Implementation Level III: Stimulate Investment
- 2 **LOWER TOWN FORK CREEK URBAN RENAISSANCE PLAN**
Implementation Level II: Improve Integrated Infrastructure
- 3 **75TH AND WORNALL STREETScape**
Implementation Level I: Incremental Stormwater Reduction

CURRENT SMART SEWER GSI PROJECTS



WATERSHED PROCESS SUMMARY





"It will be up to all of us to adapt and adjust this plan so that we have cleaner streams and rivers for our children and grandchildren, as well as a modern, efficient and effective sewer system critical to a viable and sustainable community."

*John Franklin, Introductory Letter,
Overflow Control Plan Overview, January 30, 2009*

"Adaptive management will be part of the overall programmatic approach, and will also be specifically applied at the basin and project level."

Overflow Control Plan, Page 14-3, April 30, 2012

TOWN FORK CREEK GREENWAY AT 57TH STREET

INTRODUCTION

SMART SEWER PROGRAM AND THE ROLL OF GREEN STORMWATER INFRASTRUCTURE

The **Smart Sewer Program**, formally known as Overflow Control Program, is a long-term implementation plan to prevent sewer overflows and meet federal Consent Decree requirements to improve water quality downstream of Kansas City. The program represents the **largest infrastructure investment in Kansas City's history**, outlining a city-wide plan to significantly reduce sewer overflows and improve water quality in the Blue and Missouri Rivers, to the benefit of all downstream communities.

Kansas City is the first city to incorporate “green” solutions in a Consent Decree, which will advance the City's goal to update the City's aging sewer system, support local workforce development, and allow citizens an opportunity to maximize investment through participation in community revitalization surrounding the infrastructure projects. **Green stormwater infrastructure (GSI)** is an emerging set of engineered stormwater solutions deployed in urban conditions that use vegetation, soils, and natural processes to manage water rather than - or in addition to - traditional “gray” sewer infrastructure. The Consent Decree provides for the adaptation of the agreement to include more green solutions as the city becomes more informed of the new technologies' collective performance in reducing sewer overflows. Following successful pilot project implementation of GSI in the Marlborough neighborhood, the **Smart Sewer Program is encouraged to pursue the expansion of city-wide incorporation of GSI technologies** to reduce or remove the need for more costly solutions such as tunnels and storage tanks.

GREEN STORMWATER INFRASTRUCTURE OPPORTUNITIES: WATERSHED SUMMARY AND PLANS

This document and a separate, more detailed GSI Watersheds Plan collectively make up the GSI Opportunities Plan for Kansas City's Combined Sewer System. They represent the next step toward successful implementation of GSI within the Smart Sewer Program. In the following pages, the reader will discover how the program team developed concepts for five major watersheds within the combined sewer system: Town Fork Creek, Brush Creek, Turkey Creek, Lower Blue River, and Gooseneck Creek.

The Watershed Process Summary clarifies the following critical components that led to each set of GSI opportunity projects:

- how guiding principles, basin location and GSI typology led the concept planning process for each watershed,
- how a kit of parts approach, benefits matrix and assigned implementation levels create actionable opportunity projects,
- how the framework for GSI categorization at the concept level translated to implementation planning,
- how impact performance framework informed the selection of project opportunities, and
- how watershed plans were built through an integrated planning and systems-based process.

Detailed recommendations for project opportunities and how those opportunities were established can be found within each individual Watershed Plan (separate document).

Smart Sewer Program expansion of GSI has the opportunity to redefine infrastructure in Kansas City for future generations. Thanks to Kansas City's position as an EPA Green Infrastructure trailblazer, it also has the opportunity to redefine urban stormwater infrastructure across the United States.

GUIDING PRINCIPLES FOR REGENERATIVE SYSTEM

The team established a set of Guiding Principles to further assist in the selection of the conceptual green stormwater infrastructure (GSI) locations within the watersheds that combined data-driven, technical metrics to identify opportunities for GSI in combined sewer watersheds.

Many of these guiding principles support the quantitative outcomes for combined sewer overflow (CSO) reduction; others, however, serve to **broaden the lens and establish qualitative outcomes to improve the communities where these investments are being made**, further complementing redevelopment efforts. The Guiding Principles offer an additional benefit: they better leverage the limited resources of each City department into a shared effort offering a framework for a City-wide focus on **integrated public infrastructure improvements**.

1) Invest In What We Have

Parks & Boulevards System: Nodes and corridors within Parks and Boulevards System can be ideal locations for stormwater infrastructure improvements. (see page 20)

Complete Streets: Streets that focus multiple modes of transportation and holistic infrastructure systems, placing emphasis on public transit, bicyclists, and pedestrians integrating with both gray and green stormwater infrastructure systems to manage transportation and stormwater management needs.

Workforce Development Opportunities: Investment should provide jobs, especially within communities that would best benefit from access to new or better employment opportunities.

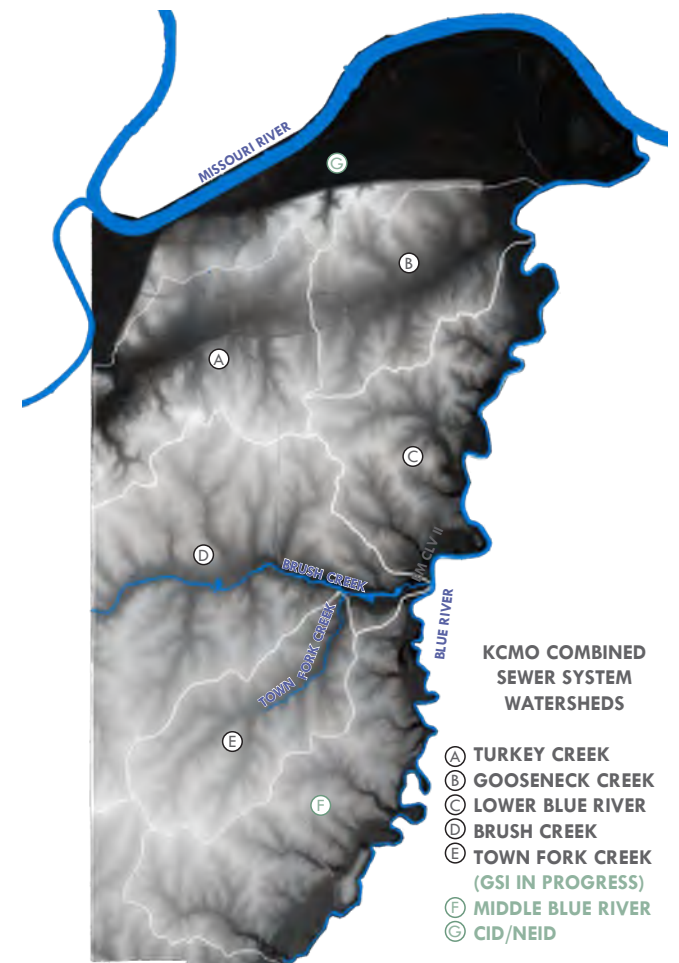
2) Integrate Public Infrastructure Improvements

Public Realm Investment = Cost Effective: Improvements can be more efficient across City departments when coordinated.

Resilient Infrastructure: Creating a smart system that more effectively and efficiently handles stormwater today and in the future.

3) Focus on Healthy, Walkable Communities

Infrastructure that Supports Community Health: Enhancing corridors to improve walkability, providing improved access to recreation and healthy food.



Topographic Relief Map Illustrating Kansas City's Drainage Corridors

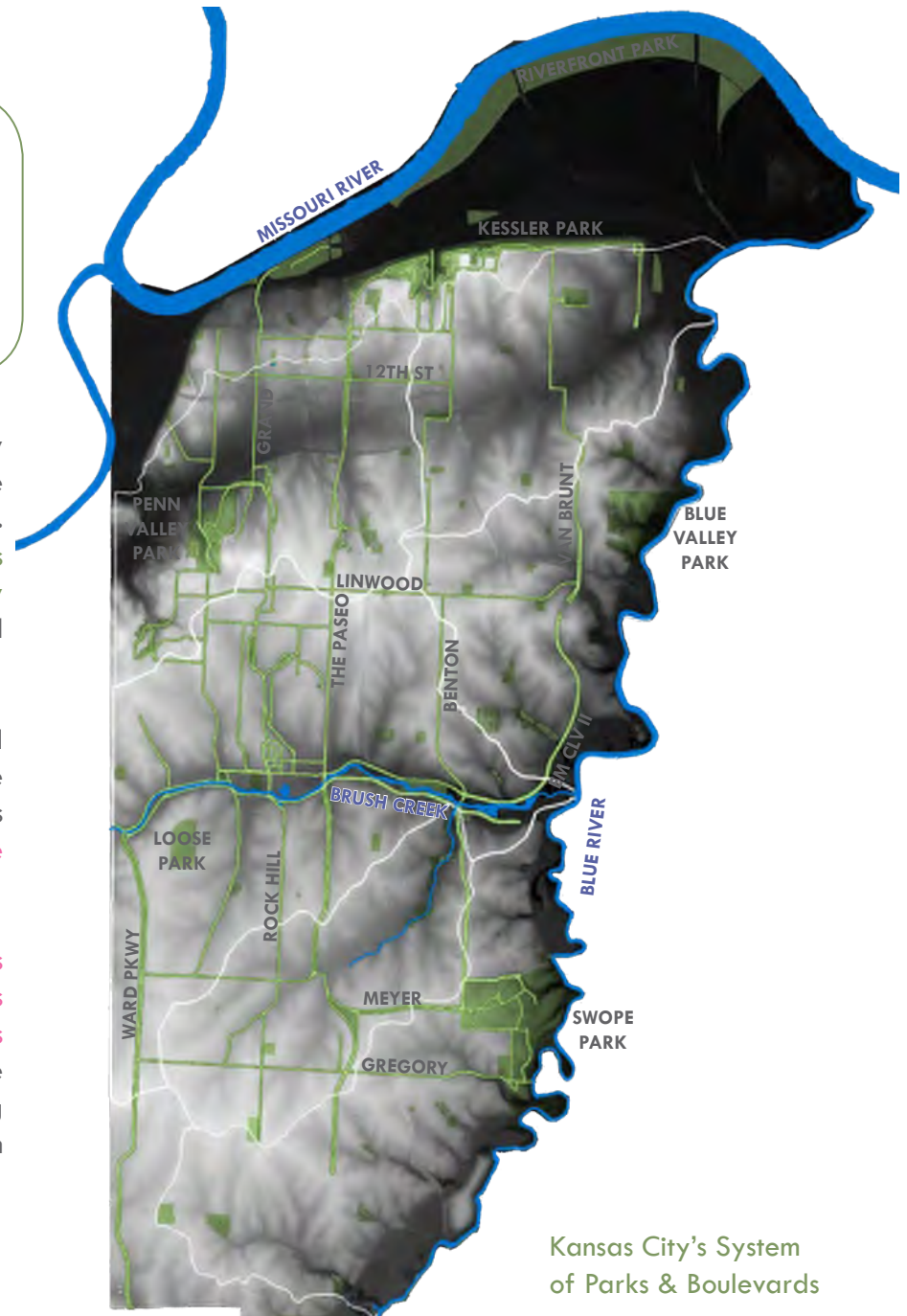
PARKS & BOULEVARDS SYSTEM: “GREEN INFRASTRUCTURE MOVEMENT”

City Parks and Boulevards can provide additional benefits to Kansas Citians besides recreation and beautification: they can help control stormwater and address planning and development goals while improving aging infrastructure.

Kansas City was at the forefront of an urban design reform philosophy at the turn of the 20th Century called “The City Beautiful Movement.” The Parks and Boulevards System that emerged became a national model. The System took otherwise undevelopable riparian corridors, steep valleys and riverbluffs and developed a system of City Park lands connected by low-lying Boulevard corridors. Today, the system remains a foundational part of Kansas City’s identity and urban structure.

Kansas City is again at the forefront of a national movement focused on the renaissance of city infrastructure and health of citizens and the environment. The foundational network of Parks & Boulevards that Kansas City is fortunate to claim will naturally assist today’s “Green Infrastructure Movement” thanks to the preservation of low-lying Boulevards and Parks.

As Kansas City’s Green Infrastructure opportunities are identified, nodes and corridors within Parks and Boulevards System will be ideal locations for stormwater infrastructure improvements throughout many of Kansas City’s focus watersheds. Kansas City’s green stormwater infrastructure implementation program will extend our community’s precedent-setting history and provide much-needed infrastructure improvements for urban dwellers.



Kansas City’s System
of Parks & Boulevards

Topographic Relief Map Illustrating Kansas City’s Drainage Corridors



BRUSH CREEK AT PROSPECT AVE

IDENTIFYING IMPLEMENTATION LEVEL

Identification of green stormwater infrastructure (GSI) opportunity projects is developed on a watershed basis. Opportunity projects are generally categorized by GSI typology, watershed location, and implementation level. The inclusion of categorization by Implementation Level provides guidance about general scale of project impact, which may assist in long-term system-wide planning of project implementation.

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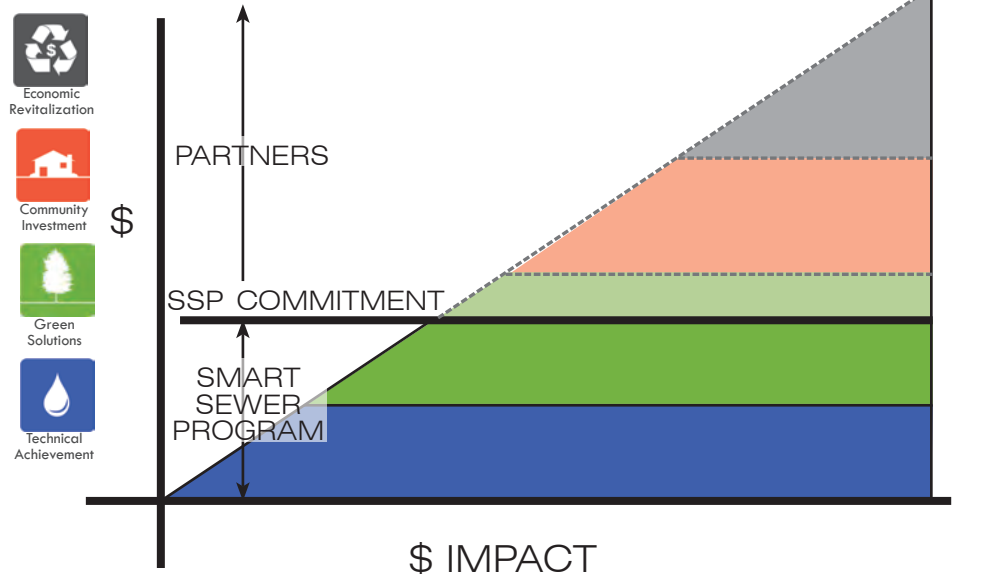
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IDENTIFYING GSI TYPOLOGY

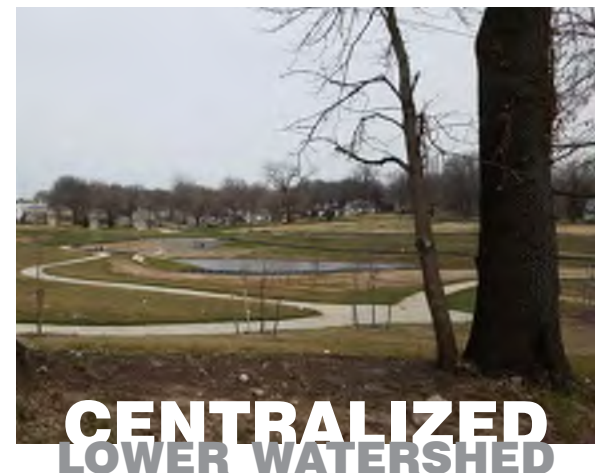
The Watershed Summary Plans provide watershed-scale guidance for green stormwater infrastructure (GSI) projects in Kansas City's combined sewer system area that can be linked into a smart, connected system and integrated into other city or community-focused projects.

The advancement of projects from concept stage to implementation can take on varying avenues, from major Smart Sewer opportunity focal projects to small-scale standardized infrastructure rehabilitation and replacement. Opportunity projects are categorized into **Implementation Levels** to better define scale of project impact (see page 13 for further definition). In cases of all opportunity projects, implementation of GSI technologies will take guidance from **Kansas City's Green Stormwater Infrastructure Design Manual**. The Manual is "a platform to build GSI per a consistent design and construction criteria."

The Green Stormwater Infrastructure Design Manual establishes a framework for GSI facility implementation that ties directly to the Watershed Plans. Position within a defined watershed generally guides the needed performance criteria for a GSI facility. GSI facilities can be generally framed by their position in the watershed (upper, mid, lower); for example, GSI in the upper third of the watershed likely support small drainage areas requiring small, distributed facilities while GSI in the lower third likely engage larger drainage areas supported by large, centralized facilities.

The following page provides further description of the GSI facility typologies for **upper : distributed** GSI, **mid : neighborhood** GSI, and **lower : centralized** GSI.

Watershed Plans utilize **Green Streets Manual** typologies to identify general project opportunities and categorize scale of project impact into Implementation Levels as defined on page 15.



IDENTIFYING WATERSHED LOCATION

The position of a potential green stormwater infrastructure (GSI) site within the watershed played an important role as the team identified opportunities and concepts for GSI. In general, sites and corridors located in upper portions of the watershed are candidates for green stormwater infrastructure solutions that control runoff from small, distributed subwatersheds; sites and corridors in mid portions provide control of small to medium sized subwatersheds and conveyance opportunity to larger storage sites; and sites and corridors in lower portions of the watershed handle the largest control opportunities due to the large size of their subwatersheds and general availability of large, flat sites suitable for detention.

The **upper portions** of our urban watersheds are generally flatter, developed areas that utilize each city street gutter as primary rainwater conveyance. **Distributed GSI** facilities that are most effective at controlling small impervious areas will be targeted for use within the street R.O.W. When these areas are not in the public realm, or are tied to new development projects, public-private partnerships could be identified to expand rainwater control opportunities.

The **mid portions** of watersheds tend to have steeper slopes connecting flatter upper areas to flat low-lying areas, and includes prominent valley drainage corridors that carry rainwater from upper to lower areas. **Neighborhood GSI** facilities can handle the larger volumes of rainwater associated with larger controlled watershed areas, connecting upper areas through bioswales and infiltration trenches where street widths can be narrowed, or within existing valleys through more natural settings like parks and boulevards. Where other city infrastructure projects are already targeted for drainage corridors, integrated Neighborhood GSI opportunities can effectively be accomplished through city departmental collaboration.

The **lower portions** generally offer great opportunities to provide **Centralized GSI** facilities for the runoff that is collected and conveyed from the upper and middle portions. Many of these areas offer large, more gradually sloped areas in publicly owned parks, boulevards, or government owned properties. These are ideal locations for large detention basins. Where practical, this should enhance connections to the City's primary waterway / greenway corridors and provide civic amenities that can help to stimulate further development opportunities.



KIT OF PARTS ENHANCES ADAPTABILITY OF CONCEPTS

GSI concepts will be identified in the watershed summary figures using a “**kit of parts approach**.” With this approach, GSI facilities are selected, linked together, and optimized to achieve performance goals. The facilities can be scaled to be utilized in any of three general GSI typologies defined (Distributed, Neighborhood, or Centralized). They perform different functions for rainwater management, which can be described in three functional categories: collection, capture, and conveyance. The kit of parts approach allows for highly adaptable design solutions that respond to site conditions and the needs of the neighborhood.

The watershed planning process operates at a conceptual scale too wide for specific definition of appropriate GSI facilities but does provide general guidance of functional categorization for purpose of design intent. Below are examples of GSI facilities organized by functional category.



BENEFITS MATRIX TO INFORM PROJECT OPPORTUNITY

In order to better compare project opportunities impacts, a **benefits matrix** that includes several non-traditional project comparison categories such as greenhouse gas emissions is applied to potential project opportunities. The approach emphasizes the identification of opportunities that support both resilient infrastructure strategies and catalytic redevelopment opportunities within Kansas City combined sewer watersheds.



TECHNICAL ACHIEVEMENT

- Control target volume within budget
- Integrate use of green solutions with gray
- Intergovernmental collaboration
- System optimization

Each project is required to reach the level of **Technical Achievement of cost-effectively reducing combined sewer overflows**, as an initial standard. Beyond the technical achievement, **project opportunities are evaluated for several other impacts to a Kansas Citian's daily life. The impact performance framework is a way to evaluate more holistic impacts to project decisions to better understand the true cost/benefit of a potential GSI opportunity.**

IMPACT PERFORMANCE FRAMEWORK



ECONOMIC PROSPERITY

- Workforce Development and Green Jobs
- Increase Property Values
- Business opportunities and Economic Incubators
- Triple Bottom Line Values



SOCIAL EQUITY

- Community Action
- Public/Private collaborations
- Programs that Enrich Health, Education, Pride
- Livable Streets Approach

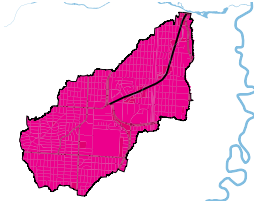






ENVIRONMENTALLY SOUND

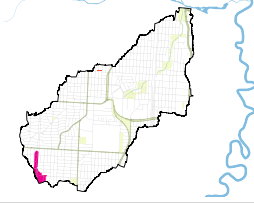




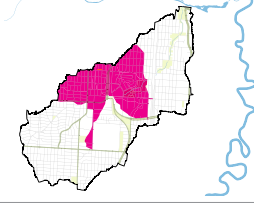



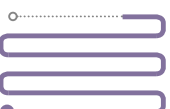
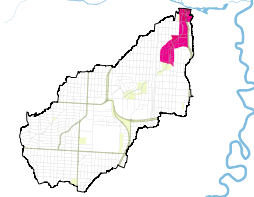




- Sustainable Design
- Inform & Influence
- Regenerative, Integrated Infrastructure
- Ecological Systems Thinking

EXAMPLE PROJECT BENEFITS MATRIX: TOWN FORK CREEK BASIN

The Benefits Matrix is a tool that is utilized to help compare the relative value of potential opportunity projects. Development of accurate project comparisons is one of the next steps towards project implementation. The following example illustrates an initial look at GSI project impacts as compared to each other and the baseline Overflow Control Plan Tunnel.

OPPORTUNITY		WATER QUALITY WET WEATHER	WATER QUALITY DRY WEATHER	WATER MAIN REPLACEMENTS	SEWER REPLACEMENTS
BASELINE		MG/24HR EVENT	MGY	#	LINEAR FT
TOWN FORK CREEK OCP TUNNEL DRAINAGE AREA: 3,400 AC					

TOWN FORK CREEK GSI PROJECTS:

75TH & WORNALL DRAINAGE AREA 37 AC LEVEL II: IMPROVE INTEGRATED INFRASTRUCTURE					
63RD STREET AND DANIEL MORGAN BOONE PARK DRAINAGE AREA: 860 AC LEVEL III: STIMULATE INVESTMENT					
LOWER TOWN FORK CREEK URBAN RENAISSANCE PROJECT DRAINAGE AREA: 155 AC LEVEL III: STIMULATE INVESTMENT					

EXAMPLE PROJECT BENEFITS MATRIX: TOWN FORK CREEK BASIN

1) Invest In What We Have

Parks & Boulevards System
Complete Streets
Workforce Development Opportunities

2) Integrate Public Infrastructure Improvements

Public Realm Investment = Cost Effective
Resilient Infrastructure

3) Focus on Healthy, Walkable Communities

Infrastructure that supports Community Health

STREETS REPAIRED / REPLACED	SIDEWALKS ADDED / REPAIRED / REPLACED	GREEN ACRES ADDED	ENHANCE WETLAND SURFACE/WATER FUNCTIONS	REDUCE GREENHOUSE GAS EMISSIONS	REDUCE AIR POLLUTION EMISSIONS	ECONOMIC PROSPERITY / DEVELOPMENT	LOCAL JOBS
LINEAR MI	LINEAR FT	ACRES	0-10*	TONS OF CO2*	TONS OF POLLUTANTS REMOVED*	PROPERTY VALUE INCREASE*	# OF JOBS*

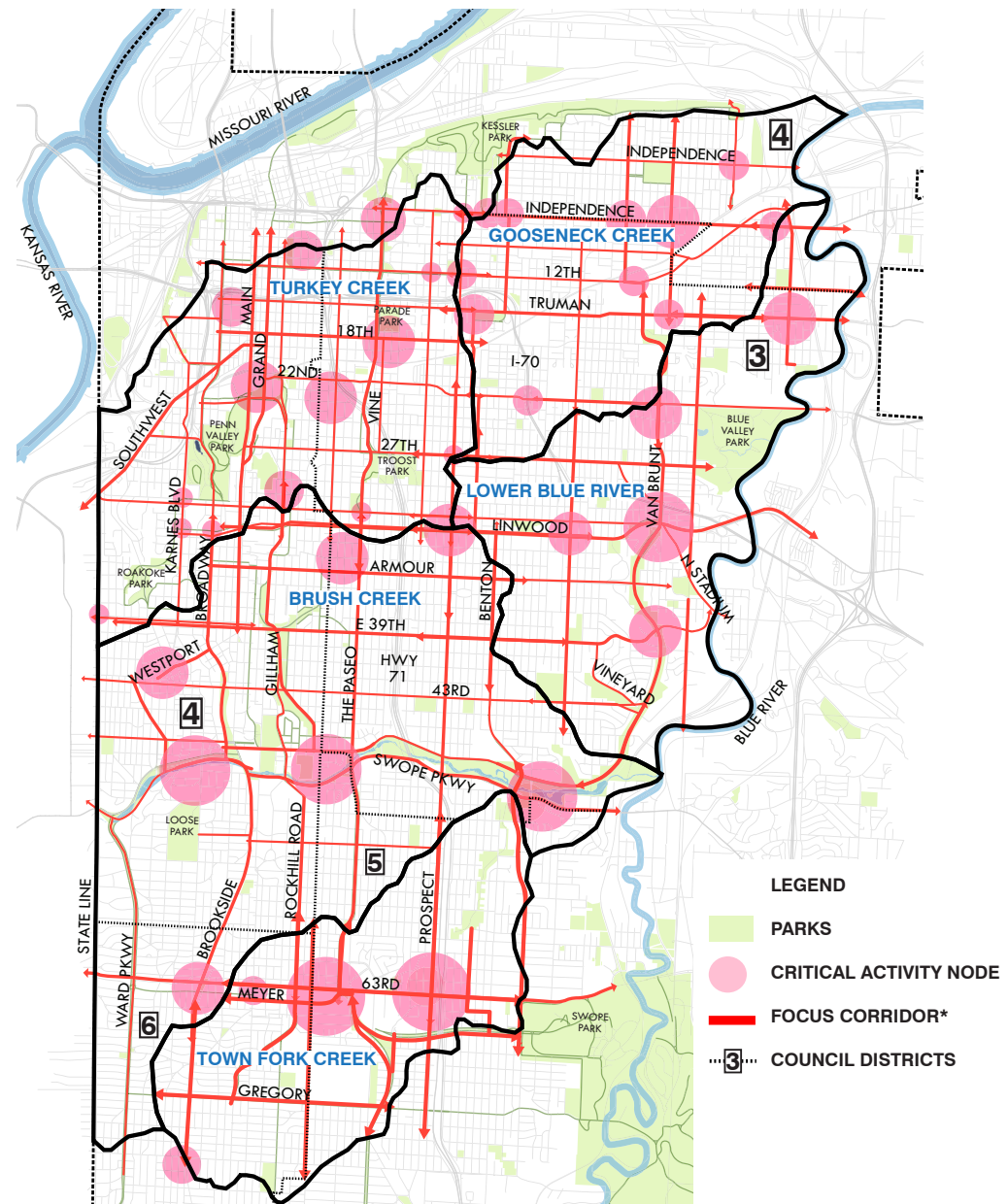
URBAN ACUPUNCTURE & A CITY WIDE URBAN DESIGN FRAMEWORK

Cities infrastructure investment to make their combined sewer system compliant in the next two decades is the most definitive opportunity to implement substantial changes to our urban conditions through a truly collaborative, focused effort of **Urban Acupuncture**. This shift focuses at the scale of the urban core and commits to **transforming blighted landscapes and deteriorating, highly impervious infrastructure into healthy, walkable resource-rich environments**.

Urban Acupuncture is a planning approach in which infrastructure systems leverage multiple community benefit outcomes. This method of planning moves toward a holistic approach centered around highly strategic, node-based redevelopment initiatives; adapts for present day and future residents to live; and integrates into the natural environment in a more sustainable manner.

Watershed plans propose initiatives centered around safe, walkable, digitally-connected, resource-rich environments with a goal of driving systemic change within watershed communities and leveraging our limited infrastructure resources. A broad understanding of systems-based thinking affords large scale infrastructure opportunities like transit-oriented development, affordable housing, and mixed use developments to actualize; it can **leverage limited resources into very strategic urban revitalization outcomes**.

► The graphic to the right showcases the collective city-wide **urban design framework**. Taken as a whole, it showcases an interconnected network of areas of civic focus: priority corridors and critical activity nodes defined through city planning & development's various area plans, neighborhood plans, corridor studies, and community-based planning efforts.

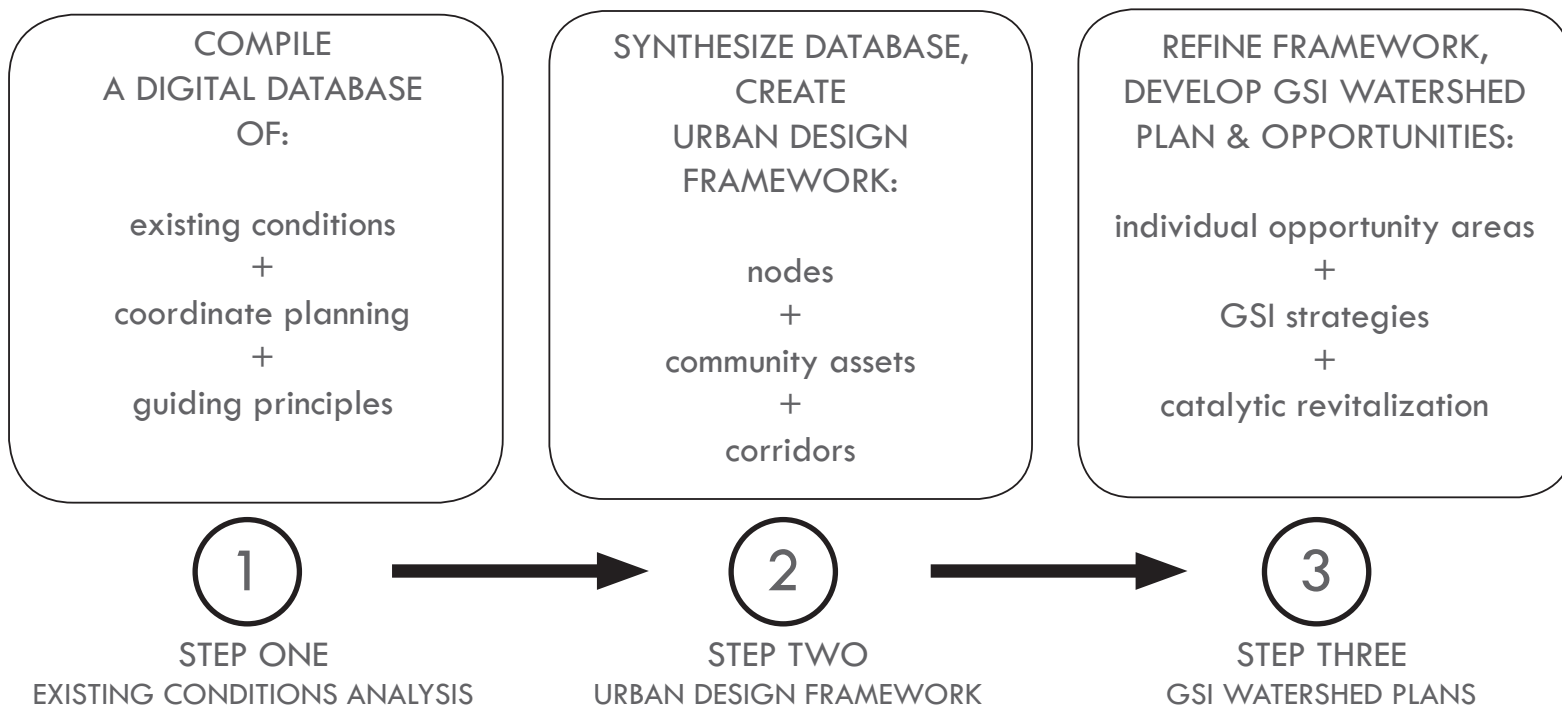


GREEN STORMWATER INFRASTRUCTURE WATERSHED PLANNING: SUMMARY OF AN **INTEGRATED PLANNING AND SYSTEM-BASED APPROACH**

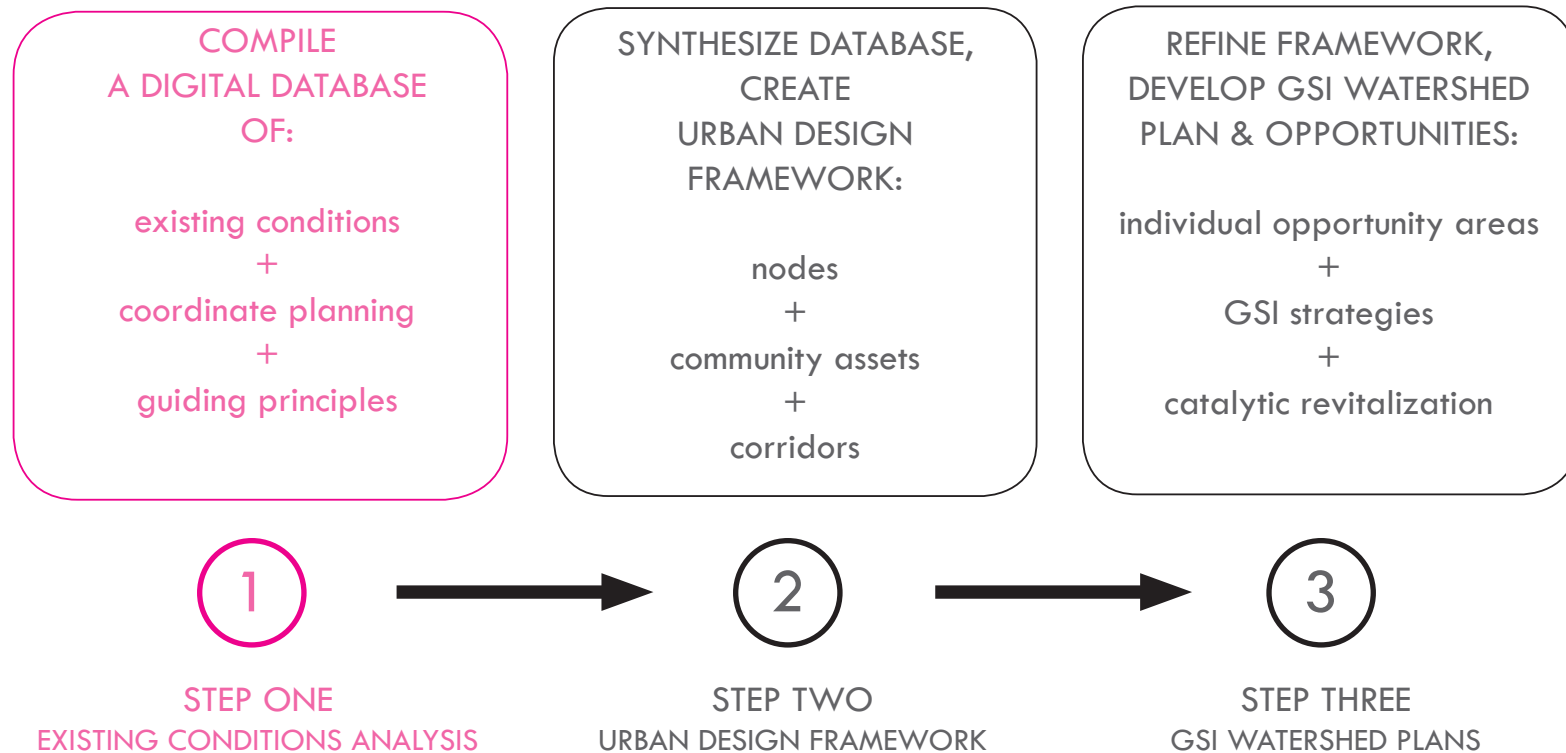
To achieve the vision of holistic green stormwater infrastructure the team used an iterative and integral process focused on planning principles defined by Urban Acupuncture.

- > **STEP ONE: Digital Database of Existing Conditions** - Review and analyze existing conditions along with a collaborative planning process with multiple City Departments, coordinating existing plans and studies completed to date for study area
- > **STEP TWO: Urban Design Framework Plan** - Synthesize digital database into key nodes and community assets connected by corridors
- > **STEP THREE: Green Stormwater Infrastructure Watershed Plans** - Refine the Framework plans with technical analysis to develop green stormwater infrastructure watershed plans and opportunities in each watershed for a connected green stormwater infrastructure system.

We will illustrate this process in the Turkey Creek watershed. Within each Watershed document, Step 1 can be found in Appendix A and Step 2 in Appendix B. Step 3 is located in the Green Stormwater Infrastructure Watershed Plans.



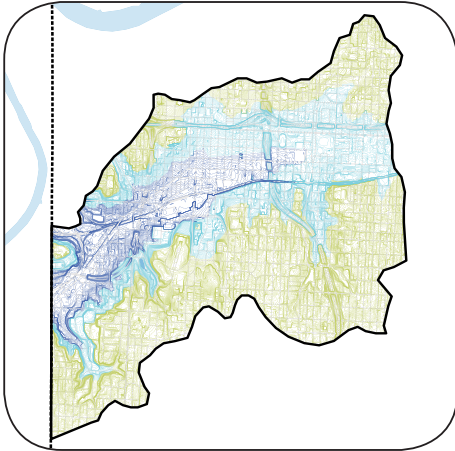
WATERSHED PLANNING PROCESS STEP 1: EXISTING CONDITIONS ANALYSIS



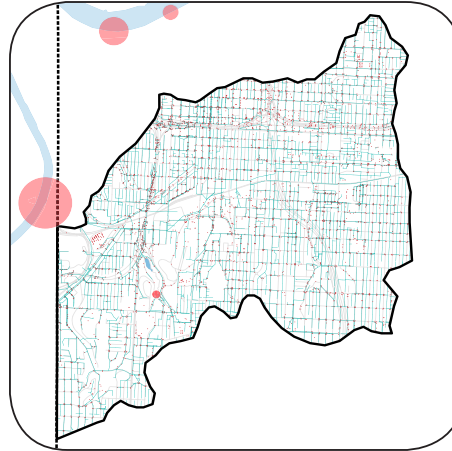
- **Inventory of physical conditions:** topography, drainage corridors, sewer systems, combined sewer outfalls, impervious surfaces, Parks & Boulevards system
- **Assess community assets and future investment areas** by mapping all city planning & development studies and planned infrastructure projects
- **Collaborative planning overlay** identifies where community assets and future investment areas may overlap with major drainage corridors and city-controlled open space areas.

WATERSHED PLANNING PROCESS STEP 1: EXISTING CONDITIONS ANALYSIS

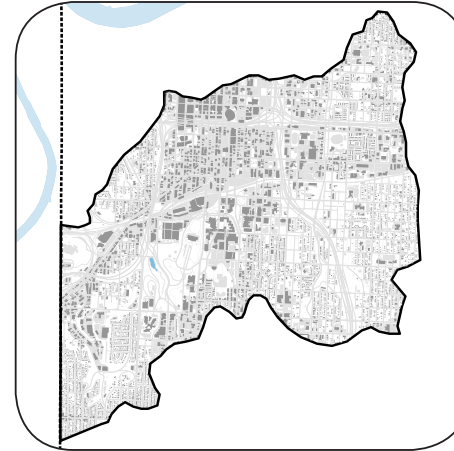
INVENTORY OF PHYSICAL CONDITIONS



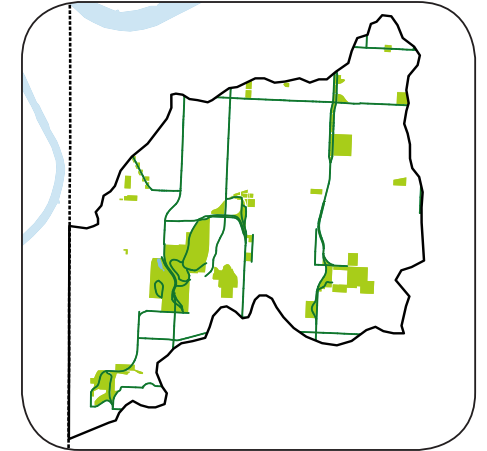
Topography



Sewers and Inlets

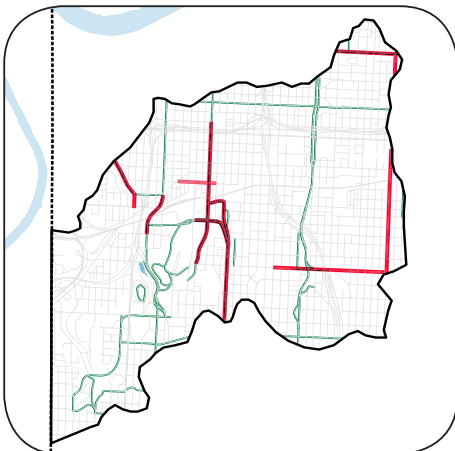


Existing Impervious Surfaces

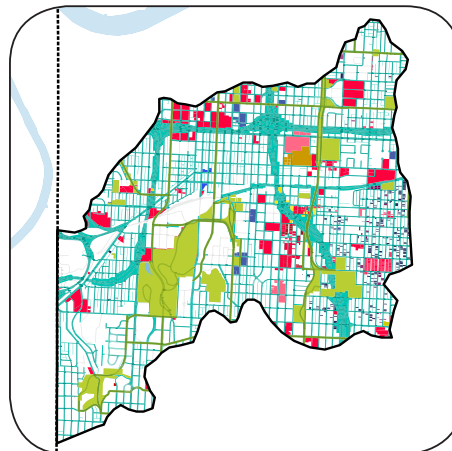


Parks & Boulevards System

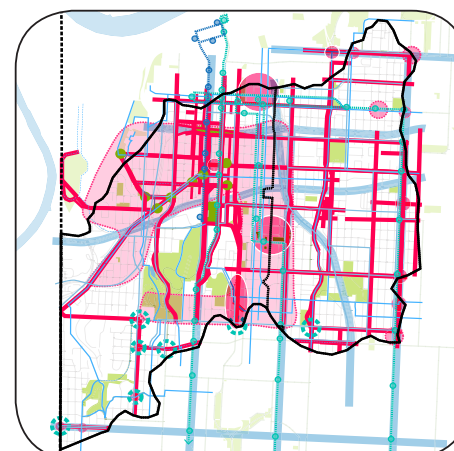
ASSESS COMMUNITY ASSETS & FUTURE INVESTMENT AREAS



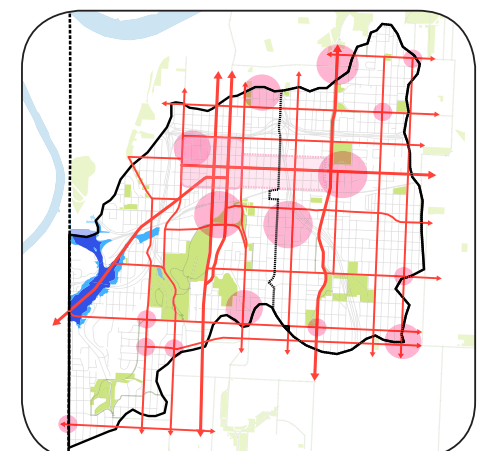
Planned Infrastructure Projects



City-Controlled Properties



Coordinated Planning Overlay



City Planning Studies Overlay &
Development Nodes

WATERSHED PLANNING PROCESS STEP 1: SUMMARY OF PLANNING DOCUMENTS

The following planning documents identify community assets and future investment areas. Study recommendations were mapped and combined into a coordinated planning overlay (second from bottom right diagram, pg 21) that identify where community assets and future investment areas align.

TOWN FORK CREEK WATERSHED

AREA PLANS

1. Country Club Waldo Area Plan
2. Waldo Area Plan
3. Swope Area Plan

NEIGHBORHOOD PLANS

1. Blue Hills Neighborhood Plan
2. Troost Village Plan

CORRIDOR STUDIES

1. 63rd Street Corridor Land Use & Development Plan
2. Troost Corridor Action Plan

IMPROVEMENT PLANS

1. 63rd Street Capital Improvement Plan
2. 75th and Wornall Improvements

TURKEY CREEK WATERSHED

AREA PLANS

1. Heart of the City Area Plan
2. Midtown Plaza Area Plan
3. Greater Downtown Area Plan
4. Truman Plaza Area Plan

NEIGHBORHOOD PLANS

1. Vine Street District Economic Development Plan
2. East Downtown PIEA Urban Design Framework
3. Reconnect Westside
4. Urban Neighborhood Initiative

CORRIDOR STUDIES

1. South Loop Link Truman Corridor
2. Main Street Corridor Plan
3. 20th Street Streetscape Plan
4. Grand Boulevard Streetscape Plan
5. Prospect Corridor Initiative Strategic Plan
6. 22nd/23rd Street Replacement and Crosstown Circle Plan
7. RideKC Regional Transit Map
8. BikeKC Map
9. Smart Moves Executive Summary

INSTITUTIONAL PLANS

1. UMKC Master Plan
2. Master Plan Concept for Washington Square Park

VISION PLAN

1. Reconnecting: Comprehensive Vision Plan for Green + Civic Spaces in Greater Downtown Kansas City (KCDC)

BRUSH CREEK WATERSHED

AREA PLANS

1. Country Club Waldo Area Plan
2. Heart of the City Area Plan
3. Midtown Plaza Area Plan
4. Swope Area Plan
5. The Plaza Urban Design and Development Plan

NEIGHBORHOOD PLANS

1. Blue Hills Neighborhood Plan
2. Ivanhoe Neighborhood Plan
3. South Volker Neighborhood Plan
4. Troostwood Neighborhood Plan
5. Plaza / Westport Neighborhood Plan
6. Cultural/Heritage District Plan

CORRIDOR STUDIES

1. Main Street Corridor Plan
2. MARC 2017 Planning Sustainable Places
3. Prospect Corridor Initiative Strategic Plan
4. RideKC Regional Transit Map
5. Smart Moves Executive Summary
6. Troost Corridor Action Plan
7. Brush Creek Corridor & Land Use Plan

INSTITUTIONAL PLANS

1. Rockhurst University Master Plan
2. UMKC Capital Improvement Plan

USACE STUDIES

1. Brush Creek Basin
2. Brush Creek Feasibility Study

LOWER BLUE RIVER WATERSHED

AREA PLANS

1. Heart of the City Area Plan
2. Truman Plaza Area Plan

NEIGHBORHOOD PLANS

1. Santa Fe Neighborhood Action Plan
2. Seven Oaks Vineyard Neighborhood Action Plan
3. Urban Neighborhood Initiative

CORRIDOR STUDIES

1. Truman Road Corridor Redevelopment Study
2. Prospect Corridor Initiative Strategic Plan
3. RideKC Regional Transit Map
4. BikeKC Map
5. Smart Moves Executive Summary
6. Blue River Greenway Master Plan (USACE)

REDEVELOPMENT ASSESSMENT

1. Blue River Valley Redevelopment Opportunity Assessment (EDC 2017)

GOOSENECK CREEK WATERSHED

AREA PLANS

1. Truman Plaza Area Plan
2. Heart of the City Area Plan

CORRIDOR STUDIES

1. St. John Corridor Plan
2. Truman Road Corridor Plan
3. Blue River Valley Redevelopment Opportunity Assessment (EDC 2017)

OVERLAY DISTRICTS

1. Independence Avenue CID
2. Independence Avenue Pedestrian Overlay District
3. Independence Avenue Zoning Overlay District

WATERSHED PLANNING PROCESS STEP 1: SYNTHESIS OF PLANNING DOCUMENTS

An important part of the existing conditions analysis is the synthesis of planning documents into one coordinated overlay of planning recommendations provided within the studies. In general, the planning documents identify certain city corridors and nodes for future focal attention. Planning documents synthesis ultimately relies upon the areas of civic focus hubs and image streets to identify focus corridors and critical activity nodes defined by this process to inform future establishment of GSI locations.

Planning documents were inventoried to determine areas of civic focus. **Areas of civic focus** are economic and social hubs oftentimes centralized around community group(s) or specific civic agencies. The documents located proposed activity nodes, transit oriented development, image corridor development, transit route improvements, and green corridors expected to see improvements in the future.

Image streets are identified in the summary documents as corridors that determine location identity through land use development and character. These streets set precedent through visual and aesthetic standards. Some of the corridors identified require significant improvements to create the desired goals. **A high quality, sustainable approach to enhancing these primary corridors will ensure successful development.**

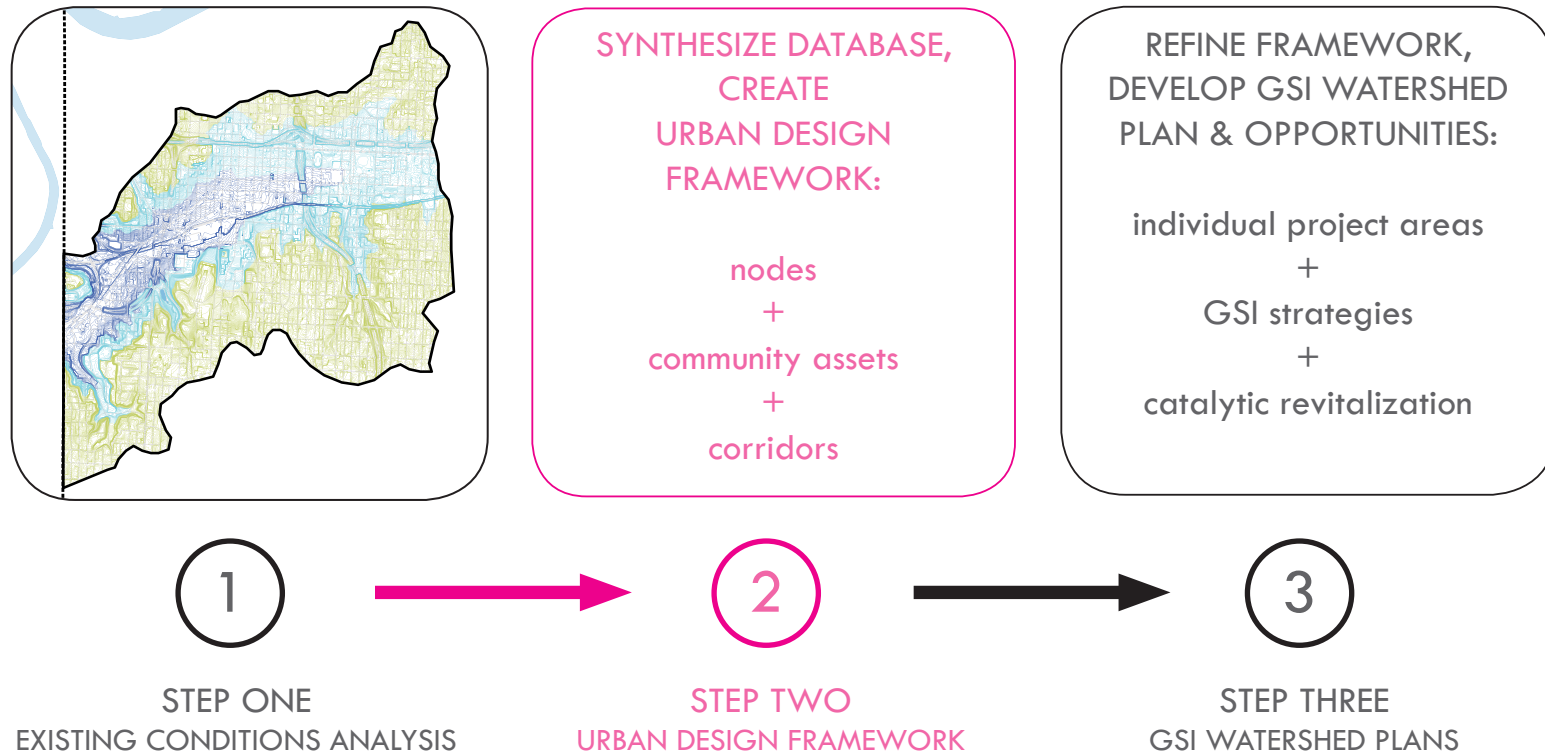
The planning documents' summary analysis exposed a number of locations within each watershed displaying a moderate to high level of current and projected development with poor walkability and connections. These areas are identified as Critical Activity Nodes and Priority Corridors.

Critical Activity Nodes are forecasted to include a larger proportion of development focus in the coming years; from an urban acupuncture perspective, these nodes are where city resources and community resources are expected to be focused. Investment in green stormwater infrastructure opportunities in critical activity nodes can help to catalyze action or further highlight community improvements.

Focus Corridors are corridors of special priority defined by:

1. **Boulevards**
2. **City Planning Documents by neighborhood (Image Streets)**
3. **City Planning Documents by city-wide planning**
4. **Known near-term infrastructure projects identified by City Departments.**

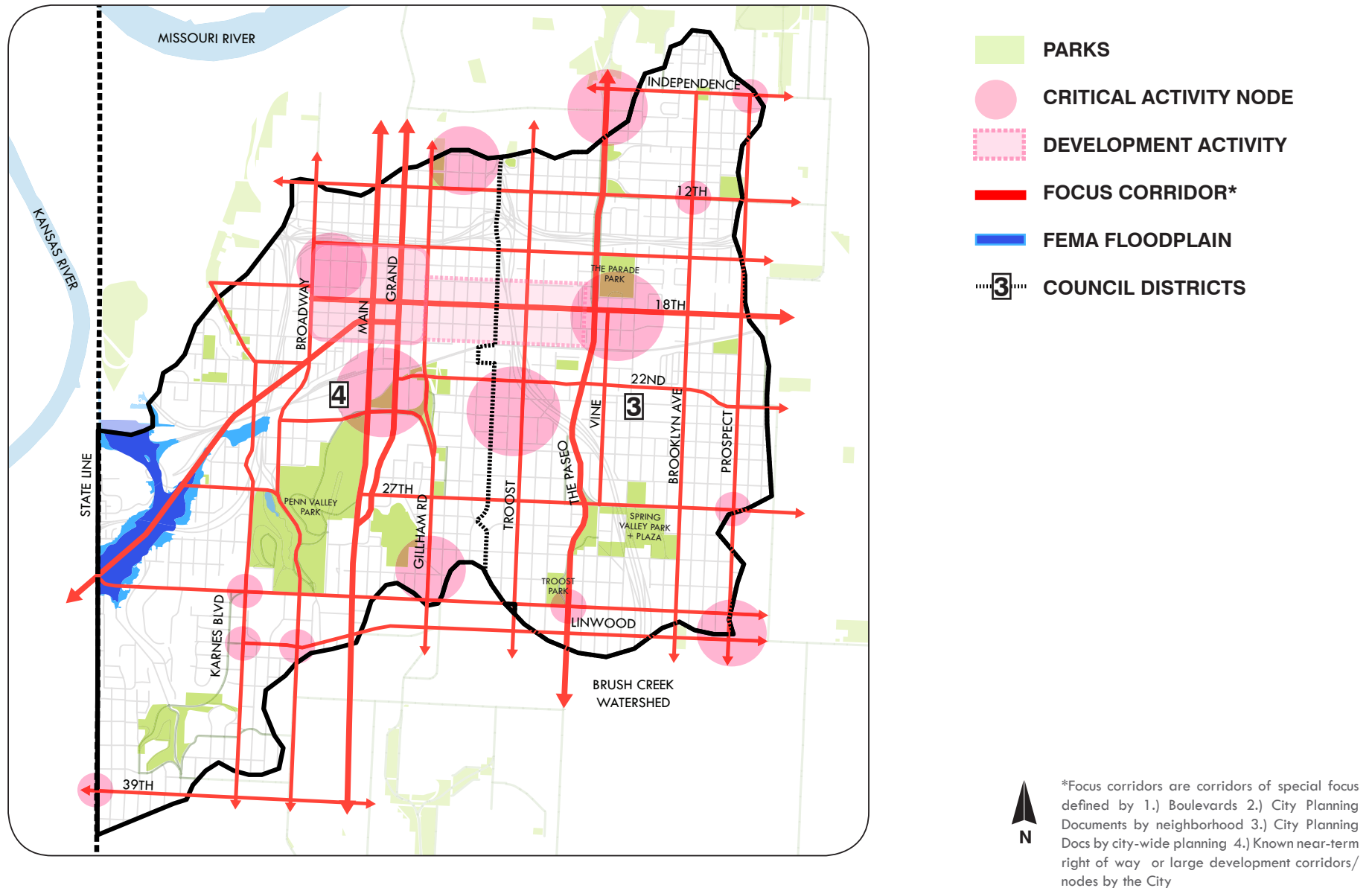
WATERSHED PLANNING PROCESS STEP 2: URBAN DESIGN FRAMEWORK



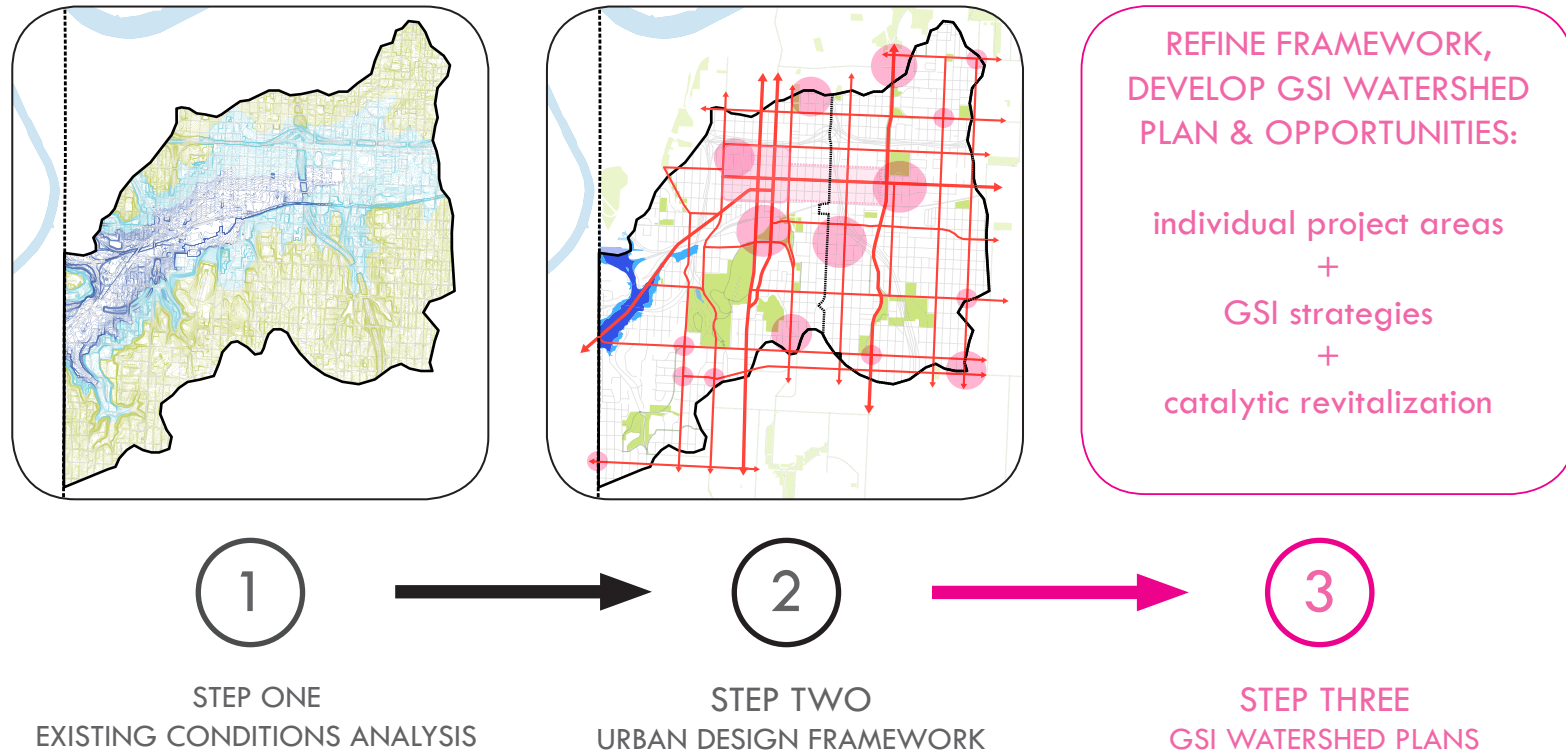
- Identify the nodes, corridors, and connectivity for GSI opportunities.
- **Urban Design Framework** serves as a synthesis of the redevelopment plans, key corridors, and important nodes within the community.
- Areas of civic focus, including image streets and critical activity nodes, emerged from the coordinated planning analysis to establish the Urban Design Framework

WATERSHED PLANNING PROCESS STEP 2: URBAN DESIGN FRAMEWORK

Focus corridors and critical activity nodes emerge from the coordinated planning analysis that identified community assets and future investment areas. These corridors and nodes represent areas that are likely to see infrastructure investments at the city level over the course of Smart Sewer Program infrastructure investment period.

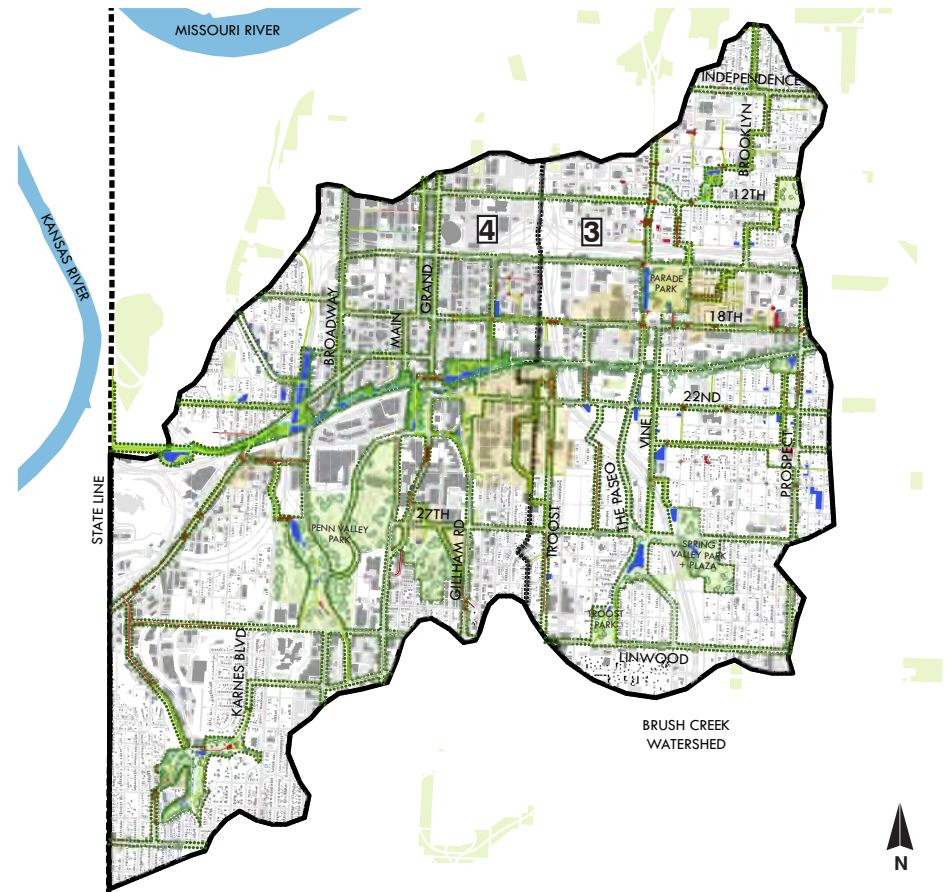
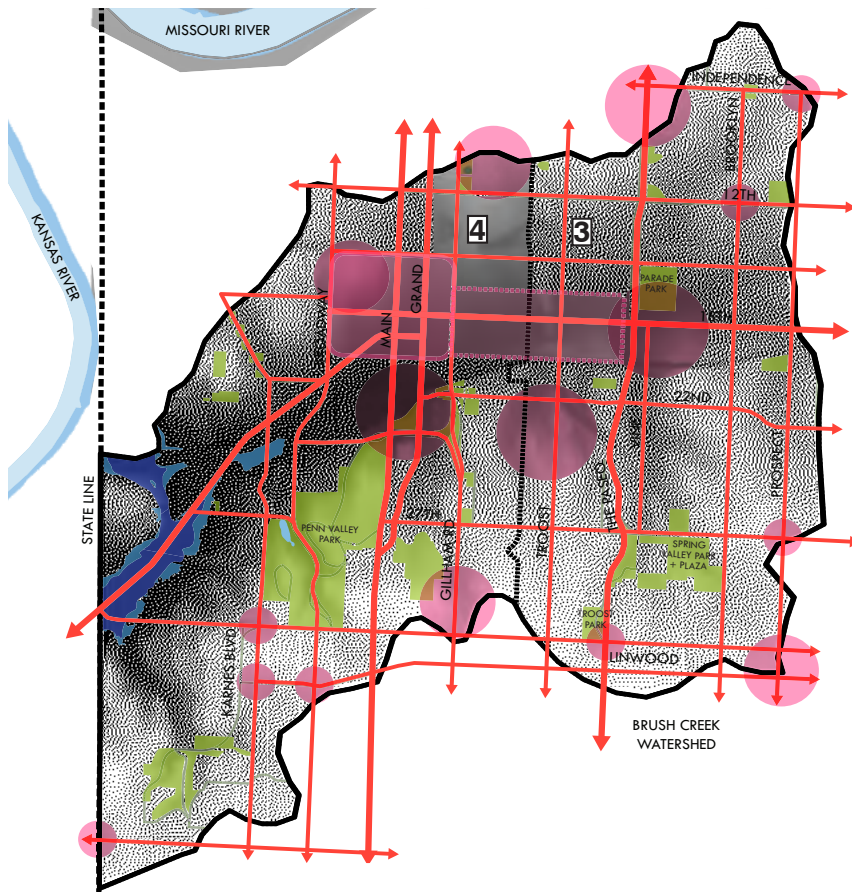


WATERSHED PLANNING PROCESS STEP 3: GSI WATERSHED PLANS



- Analysis of existing conditions provides the design team with an understanding of the most probable areas for cost-effective GSI implementation based on physical conditions
- The urban design framework provides a synthesis of the planning overlay process, establishing the nodes and corridors most likely to see future infrastructure investment.
- **GSI watershed plan** identifies where community assets and future investment areas may overlap with major drainage corridors and city-controlled open space to identify the most cost effective green stormwater infrastructure projects in order to establish a prioritization for projects with the largest community impact.

WATERSHED PLANNING PROCESS STEP 3: CONTROL OPPORTUNITIES



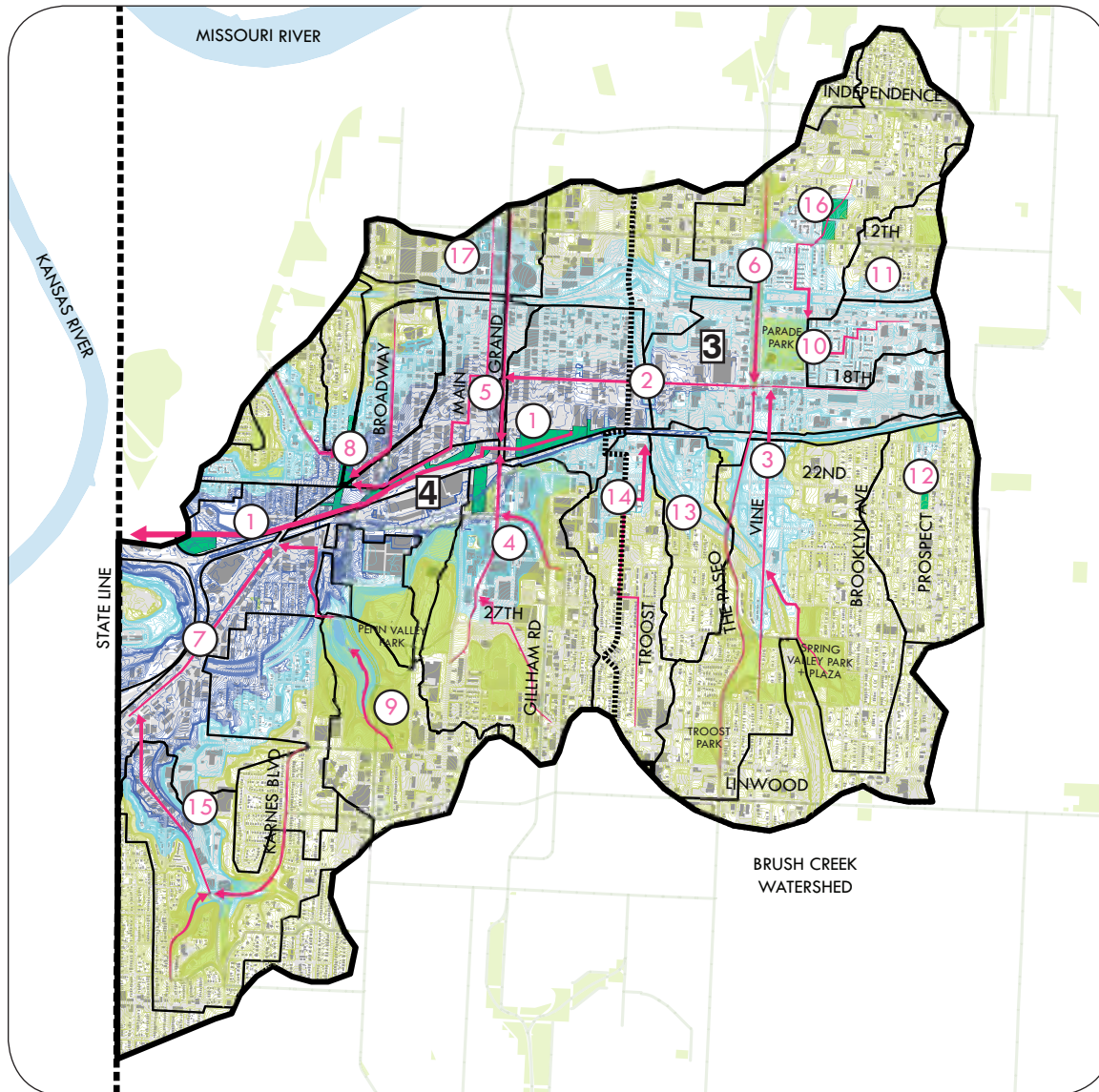
- Urban Design Framework is overlaid onto physical conditions inventory/analysis to identify where GSI can be integrated into future city infrastructure in the most cost-effective locations
- GSI watershed plan identifies watershed-wide control opportunities along appropriate focus corridors, drainage corridors, low-lying areas, and critical activity nodes. Many potential projects emerge.

LEGEND

- ■ GSI Opportunities
- Pervious Collection
- Bioswale Conveyance
- Detention Capture
- Public Private Partnership Opportunity
- Parks & Boulevards
- 3 Council District

WATERSHED PLANNING PROCESS STEP 3: GSI PROJECT OPPORTUNITIES

Potential GSI projects are further defined by sub-watershed, relative watershed location implementation level, and GSI typologies. Collectively, projects work together to establish an interconnected network that, through system integration, can provide resilient performance.



INTEGRATED CONTROL PROJECTS

- 1 OK CREEK GREENWAY
- 2 18TH STREET
- 3 VINE STREET
- 4 MAIN / GRAND/ GILLHAM CORRIDORS
- 5 GRAND BOULEVARD
- 6 THE PASEO
- 7 SOUTHWEST BOULEVARD
- 8 CROSSROADS/WESTSIDE UNDERSTORY PARK
- 9 PENN VALLEY LAKE
- 10 PARADE PARK
- 11 PROSPECT PLAZA
- 12 PROSPECT AVE/BLUES PARK
- 13 BEACON HILL
- 14 UMKC HEALTH SCIENCES DISTRICT
- 15 ROANOKE PARK
- 16 FORGOTTEN HOMES/PARKVIEW
- 17 DOWNTOWN

SMART SEWER FOCUSED CONTROL ZONE

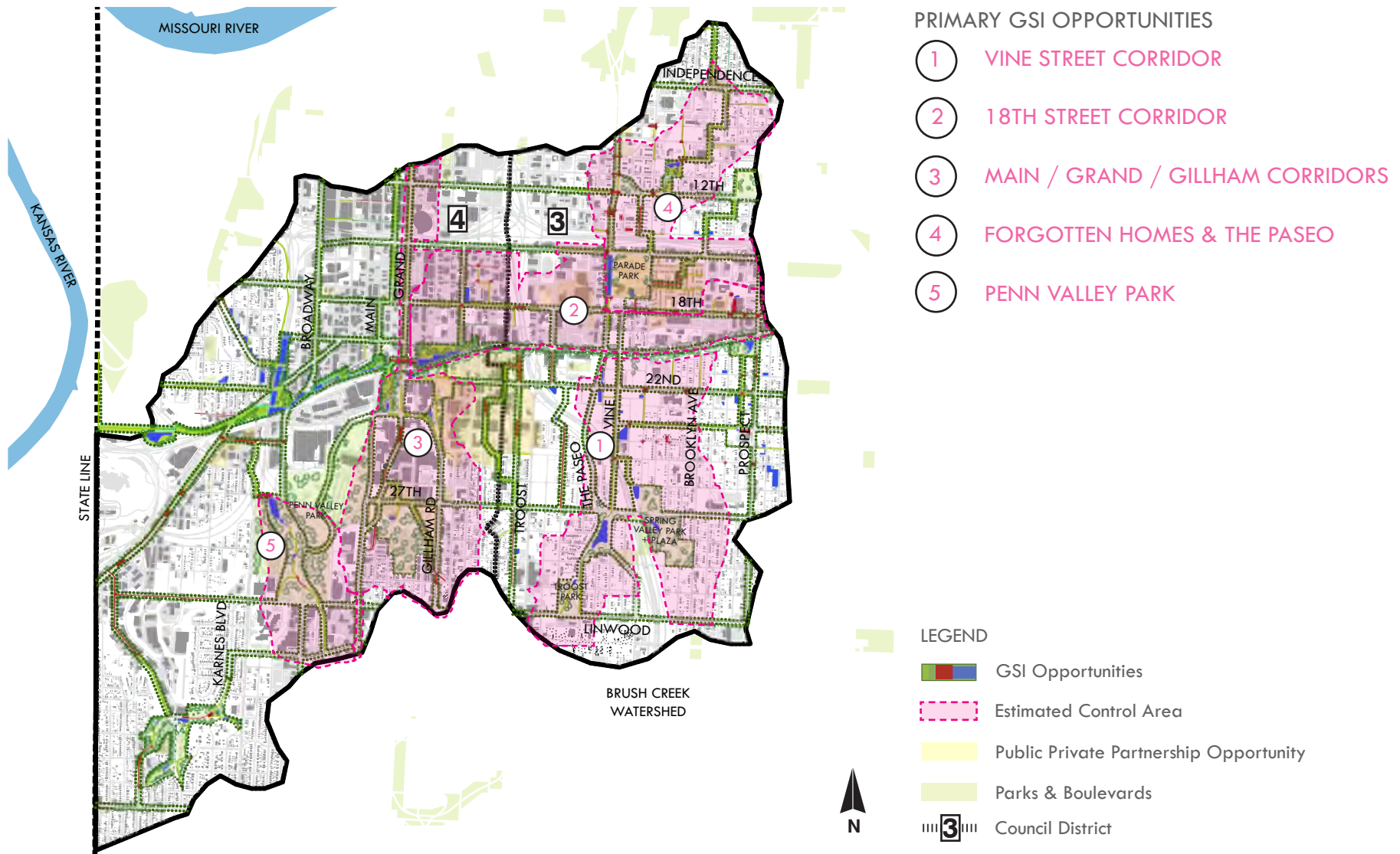
- Focus on reducing impervious area through development incentives
- Small-scale, green stormwater infrastructure solutions at the site or block scale within the top third of the watershed

LEGEND

- Turkey Creek Watershed Boundary
- Council Districts
- Smart Sewer Focused Control Zone
- Smart Sewer & Stormwater Integration Projects
- Stormwater Focus Zone: Turkey Creek

WATERSHED PLANNING PROCESS STEP 3: GSI OPPORTUNITY PROJECTS

From the list of defined projects, primary opportunity projects emerge that best combine GSI impact (initial triple bottom line analysis) and projected city infrastructure investments.

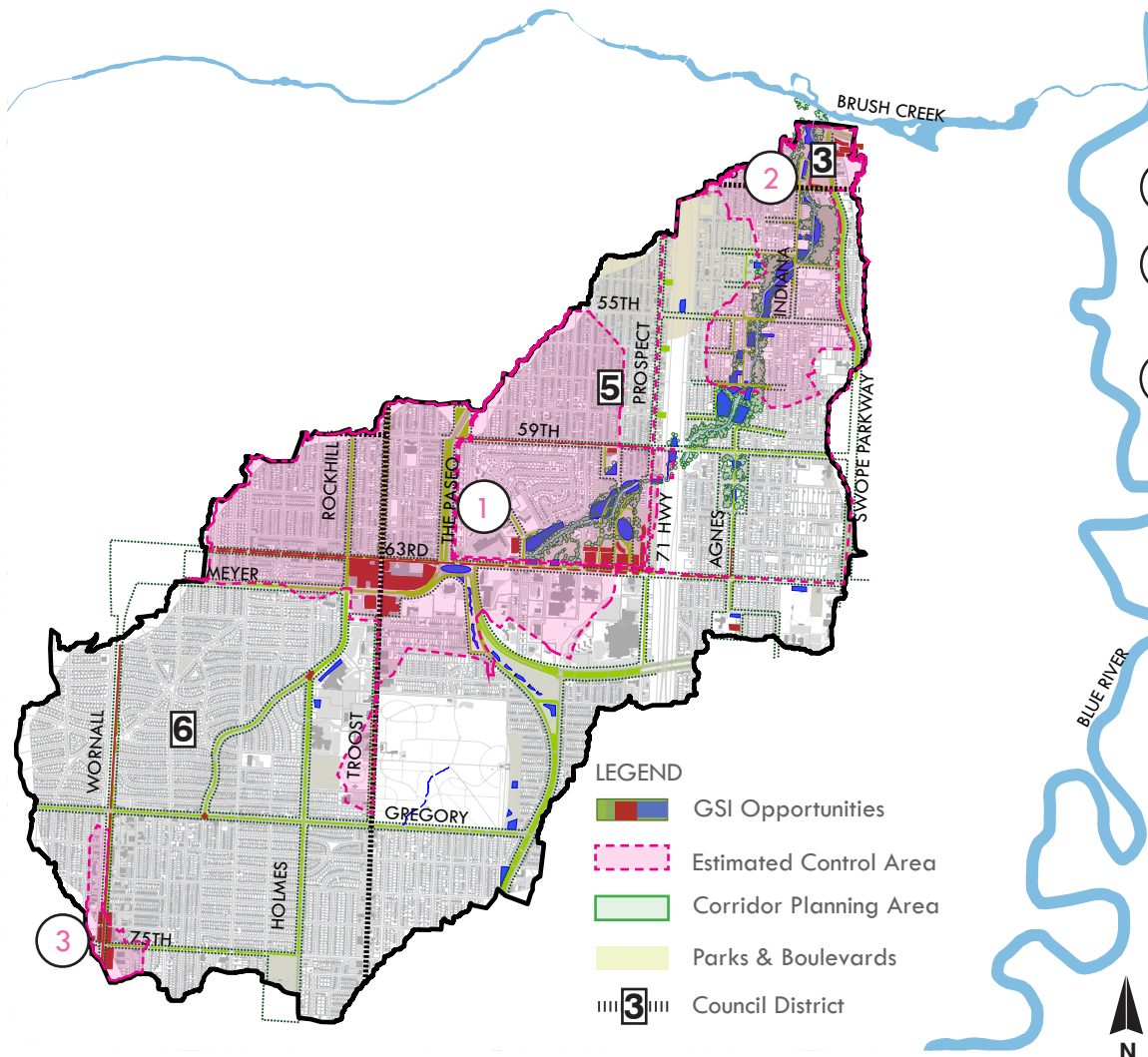


PHOTOGRAPHIC CREDITS INCLUDED FOR THE FOLLOWING PAGES:

- 5. Phronesis. River Confluence. 2018.
- 6. Phronesis. Town Fork Creek Greenway at 57th Street. 2018.
- 9. Phronesis. Brush Creek at Prospect Ave. 2018.
- 12. LEFT: Phronesis. 20th Street Streetscape. 2018.
- 12. MIDDLE: Beacon Hill at 24th Street and Forest Ave from "Kansas City, Missouri." Street View, Google Maps. Accessed 21 Nov. 2016.
- 12. RIGHT: Phronesis. 81st & Troost Site at 82nd Terrace. 2018.



TOWN FORK CREEK WATERSHED SUMMARY



VISIONARY INTEGRATED GREEN STORMWATER INFRASTRUCTURE OPPORTUNITY PROJECTS

- 1 63RD STREET AND DANIEL MORGAN BOONE PARK
Implementation Level III: Stimulate Investment
- 2 LOWER TOWN FORK CREEK URBAN RENAISSANCE
PLAN
Implementation Level II: Improve Integrated Structure
- 3 75TH AND WORNALL STREETScape (IN PROGRESS)
Implementation Level I: Incremental Stormwater
Reduction

NOTE: Level III Implementation projects generally will include smaller Level I and Level II project opportunities.

PUBLIC R.O.W. IMPROVEMENTS:

- Coordinated/Shared Infrastructure Improvements
- Green Streets
- Park Improvements

CITY PROJECTS ALIGNED WITH GSI:

- Community Engagement
- 63rd Street Reconstruction
- Prospect Village Redevelopment
- Prospect MAX
- Troost Village Redevelopment

Town Fork Creek is a subwatershed of Brush Creek and includes several combined sewer outfall locations within its corridor. The City has established a greenway east of Highway 71 along the Creek that has potential for additional stormwater-related improvements. West of Highway 71 has large impervious areas, especially along 63rd Street, Troost, and surrounding Research Hospital. Opportunities exist to convey water along boulevards and capture water in wide swaths of the boulevards and at the Landing Mall future redevelopment site.



DUNN PARK AND THE PASEO BOULEVARD

TOWN FORK CREEK WATERSHED

PROJECT OPPORTUNITIES & NEXT STEPS

Project Opportunities Summary

63rd Street and Daniel Morgan Boone Park:

- Major traffic and urban design improvements along 63rd St to catalyze economic growth and pedestrian infrastructure
- Highly visible GSI improvements
- Several high profile redevelopment opportunity projects afford PPP led by Smart Sewer
- Prime example how GSI can reduce, improve and stimulate to elevate neighborhoods and cities
- Multi city-agency approach to improve traffic, bicycle and pedestrian experience
- Potential to reconnect natural stream corridors
- Provide community amenity through naturalized stream corridor and park land

Lower Town Fork Creek Urban Renaissance:

- GSI improvements along greenway will incentivize already needed maintenance while improving pedestrian connections
- Minimize Bruce R Watkins Dr as neighborhood connection barrier
- Develop sustainable greenway plan and organization responsible for greenway improvements
- Manage greenway access to visible, controllable neighborhood access nodes.
- Connect Trolley Track Trail east to Upper Town Fork Creek Greenway via Meyer Blvd, completing 8 mile loop in the heart of Kansas City neighborhoods

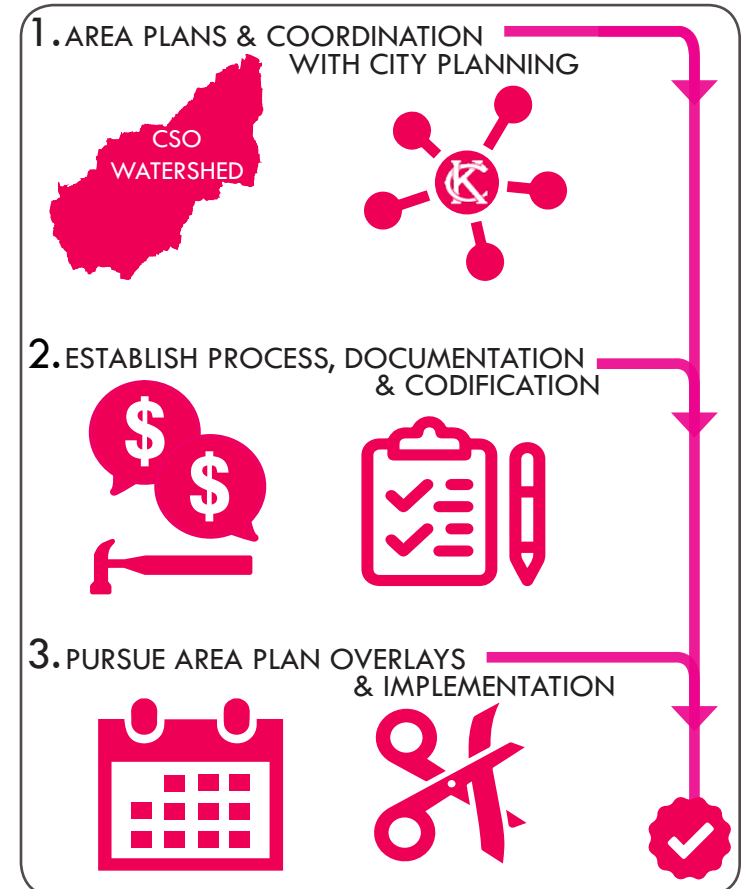
75th and Wornall Streetscape (IN PROGRESS)

- Integrated green street GSI into public works street scape project.

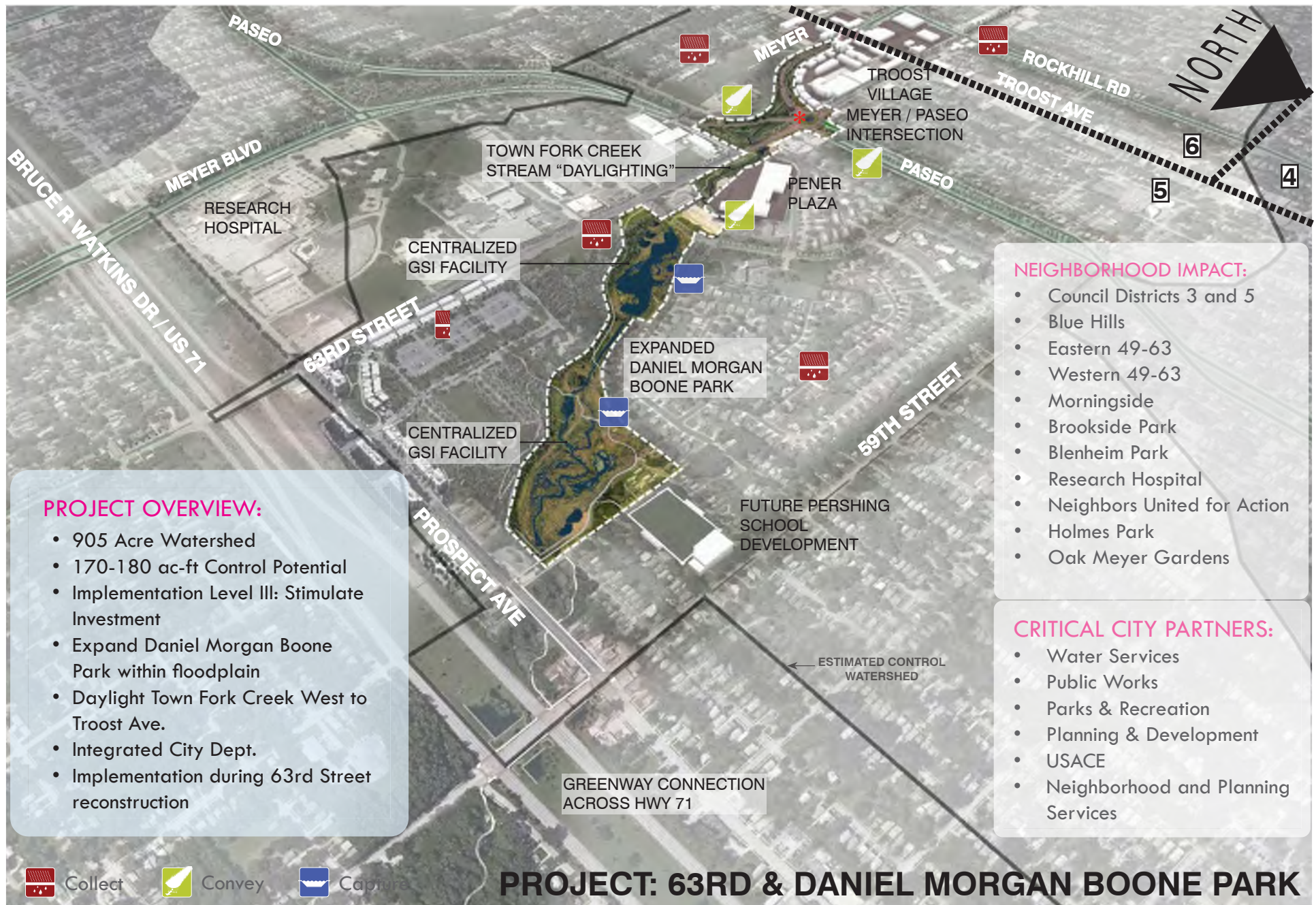
NEXT STEPS:

- Establish Stakeholder Engagement Process
- Begin Integrated Planning Process with City
- Develop Action Plan & Area Plan Overlay
- GSI Feasibility Study
 - Technical Evaluation
 - Design Recommendations

NEXT STEPS PROCESS



INTEGRATED CONTROL PROJECT: 63RD STREET AND DANIEL MORGAN BOONE PARK



INTEGRATED CONTROL PROJECT: 63RD STREET AND DANIEL MORGAN BOONE PARK

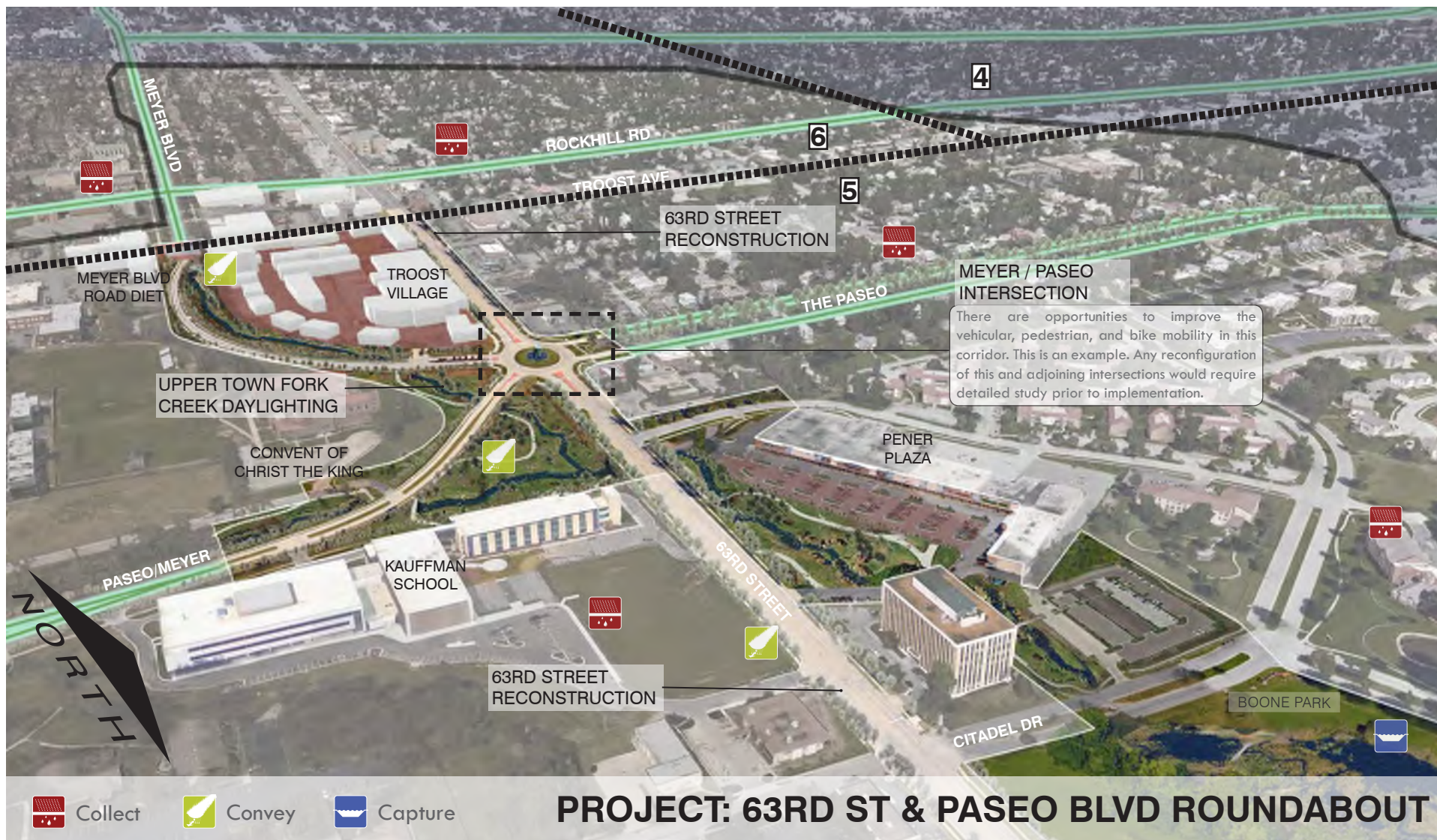


INTEGRATED CONTROL PROJECT: 63RD STREET AND DANIEL MORGAN BOONE PARK



INTEGRATED CONTROL PROJECT: 63RD STREET AND BOONE PARK

The current roundabout intersection does not meet the traffic level of service for this area and additional analysis as well as other configurations need to be analyzed. Several city-focused opportunities combine at the aforementioned intersection of The Paseo, Meyer Blvd, Troost Ave, and 63rd Street including Smart Sewer's overflow control reduction program, Public Works' 63rd Street reconstruction project, Parks & Recreation's bicycle facilities improvements, and Planning's Swope Area Plan, Country Club/Waldo Area Plan, Troost Corridor Action Plan, and 63rd Street Corridor Plans. Taken together, these projects can be organized along the re-establishment of the **natural stormwater connection to Town Fork Creek from Troost**, providing multiple benefits for all aligned projects.



INTEGRATED CONTROL PROJECTS: LOWER TOWN FORK CREEK URBAN RENAISSANCE PLAN

PROJECT OVERVIEW:

- 255 Acre Watershed
- Implementation Level II: Improve Integrated Structure
- Re-establish open-air connection of Town Fork Creek to Brush Creek
- Integrated planning effort with USACE and City departments.

NEIGHBORHOOD IMPACT:

- Council Districts 3 and 5
- North Town Fork Creek
- Mount Cleveland
- Swope Parkway - Elmwood
- Blue Hills
- South Town Fork Creek

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development
- Neighborhood and Housing Services
- USACE

A LOWER TOWN FORK CREEK CONTROL

Neighborhood GSI

Collected rainwater from adjacent neighborhood streets can be stored in small to medium sized detention areas within greenway corridor

B RECONNECTION TO BRUSH CREEK

Centralized GSI

Greenway Connection & GSI/
Flood improvements

C GREENWAY IMPROVEMENTS

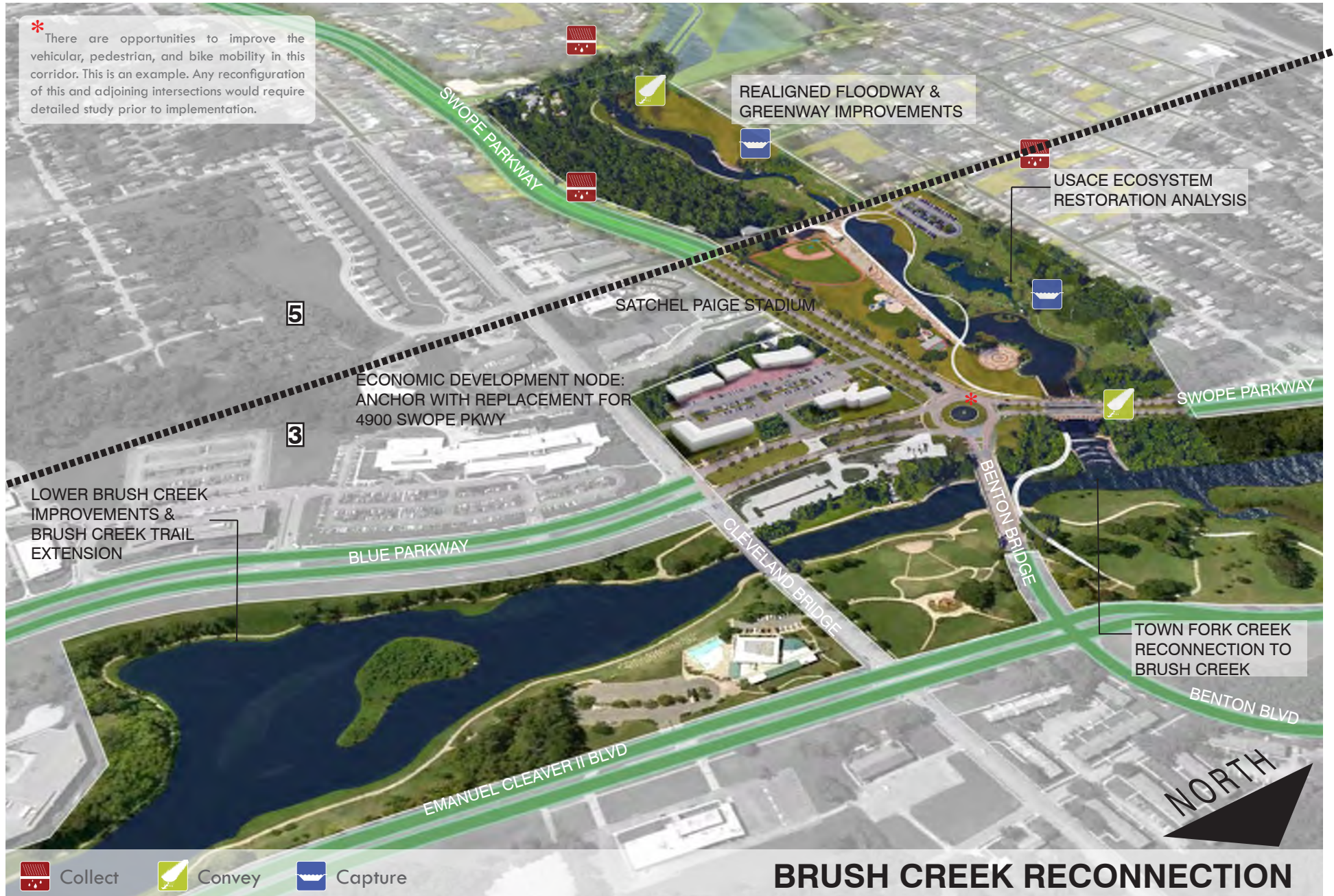
Develop sustainable greenway plan and organization responsible for greenway improvements and upkeep in collaboration with USACE, community organizations, and city.



Bird's eye view of the Lower Town Fork Creek Watershed Green Stormwater Infrastructure Plan.

TOWN FORK CREEK WATERSHED OPPORTUNITY PROJECT

INTEGRATED CONTROL PROJECTS: LOWER TOWN FORK CREEK URBAN RENAISSANCE PLAN



TOWN FORK CREEK WATERSHED OPPORTUNITY PROJECT

INTEGRATED CONTROL PROJECTS: LOWER TOWN FORK CREEK URBAN RENAISSANCE PLAN

PROJECT OVERVIEW:

- Necessary maintenance and improved pedestrian connection through GSI improvements.
- Stronger flood management along Town Fork Creek Greenway
- Connection between Bruce R Watkins Dr at 59th St and connection between Brush Creek Trail with Trolley Track Trail.

NEIGHBORHOOD IMPACT:

- Council Districts 3 and 5
- North Town Fork Creek
- Mount Cleveland
- Swope Parkway - Elmwood
- Blue Hills
- South Town Fork Creek

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development
- USACE
- Neighborhoods and Housing Services

A NEIGHBORHOOD CONNECTION TO GREENWAY

Manage greenway access to visible, controllable neighborhood access nodes.

B RECREATIONAL GREENWAY LOOP

Connect Trolley Track Trail east to Upper Town Fork Creek Greenway via Meyer Blvd, completing 8 mile loop in the heart of Kansas City neighborhoods



Bird's eye of the Town Fork Creek Greenway planning area: Prospect to Cleveland/Swope Pkwy, Emmanuel Cleaver II Blvd to 63rd St.

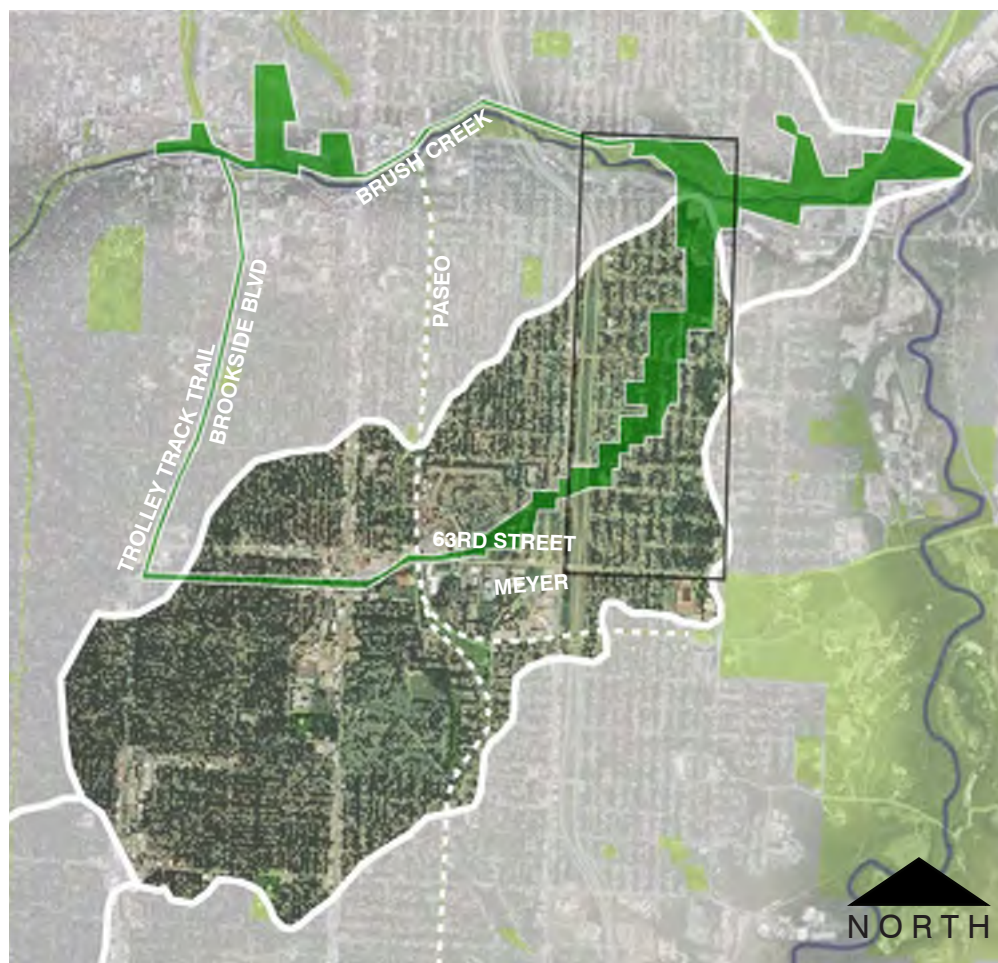
TOWN FORK CREEK WATERSHED OPPORTUNITY PROJECT

INTEGRATED CONTROL PROJECTS: LOWER TOWN FORK CREEK URBAN RENAISSANCE PLAN

Town Fork Creek Flood Control and Greenway Enhancement:

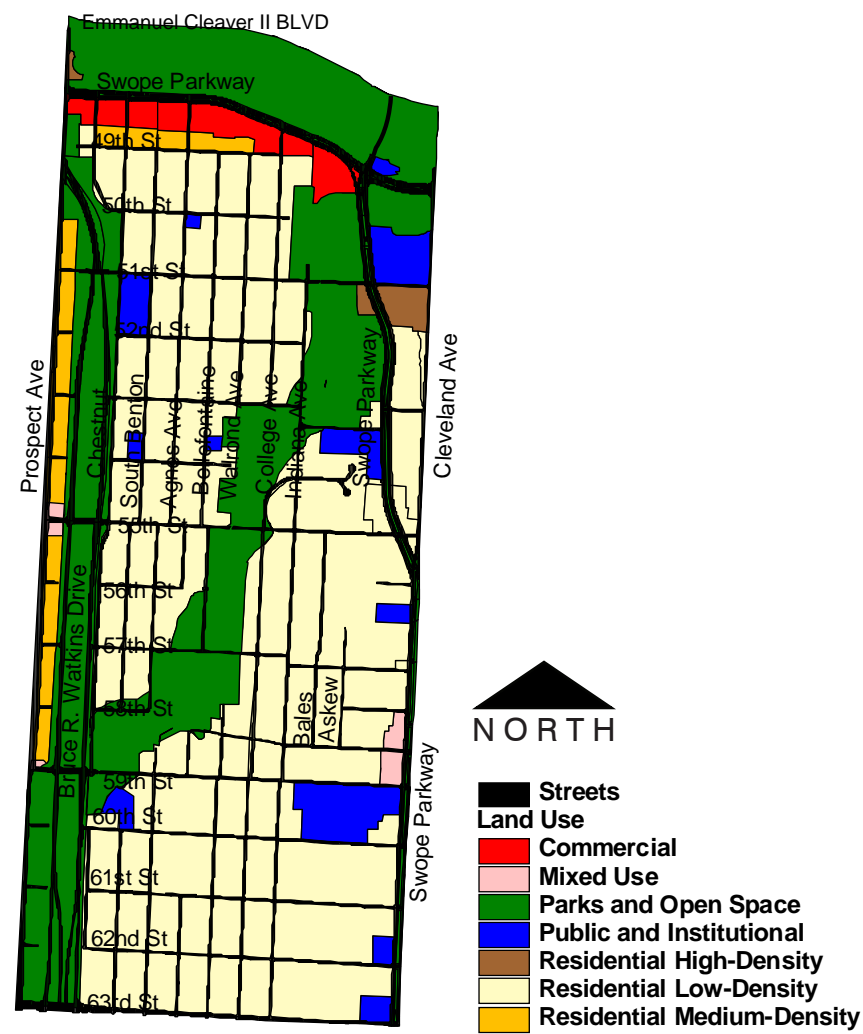
- Alleviate flooding and storm water run-off issues
- Encourage appropriate land use for unkempt vacant parcels
- Provide recreation and alternative transportation routes
- Improve water quality, protect wetlands, and create and conserve habitats for wildlife

RECREATIONAL GREENWAY LOOP



Plan view of Town Fork Creek Greenway loop and Town Fork watershed.

TOWN FORK CREEK NEIGHBORHOOD PLAN (LAND USE AND ZONING PLAN)

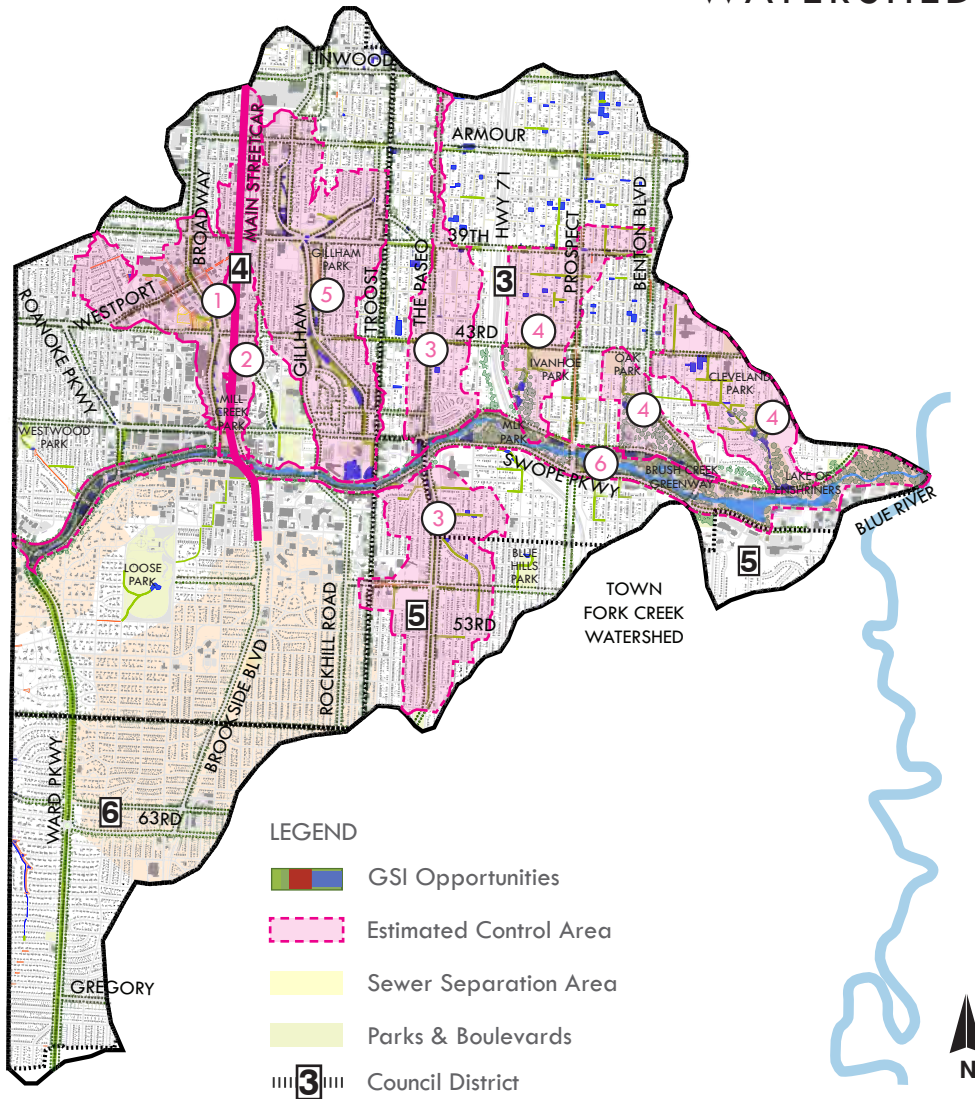


City Planning & Development Department Planning, Preservation & Urban Design Division City of Kansas City, Missouri. *Town Fork Creek Neighborhood Plan*. Adopted November 17th, 2005.

PHOTOGRAPHIC CREDITS INCLUDED FOR THE FOLLOWING PAGES:

32. Phronesis. Dunn Park on Paseo. 2018.

BRUSH CREEK WATERSHED SUMMARY



The watershed-based Green Stormwater Infrastructure (GSI) Watershed Plan for Brush Creek illustrates the ability for green stormwater infrastructure improvements to tie together multiple planning efforts into a cohesive, interconnected effort. This plan includes **redevelopment initiative support, neighborhood planning action steps, road diets, and livable streets improvements**; all addressed through the lens of GSI improvements ultimately providing **a more resilient performance of water control area than building a tunnel.**

VISIONARY INTEGRATED GREEN STORMWATER INFRASTRUCTURE OPPORTUNITY PROJECTS

- 1 **WESTPORT / MILL CREEK PARK**
Implementation Level II: Improve Integrated Infrastructure
- 2 **MAIN STREET CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure
- 3 **THE PASEO CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure
- 4 **IVANHOE, OAK, AND CLEVELAND PARKS**
Implementation Level III: Stimulate Investment
- 5 **GILLHAM PARK**
Implementation Level II: Improve Integrated Infrastructure
- 6 **BRUSH CREEK WATER QUALITY INNOVATION CORRIDOR**
Implementation Level III: Stimulate Investment

NOTE: Level III Implementation projects generally will include smaller Level I and Level II project opportunities.

PUBLIC R.O.W. IMPROVEMENTS:

- Integrated Planning with City
- Coordinated/Shared Infrastructure Improvements
- Green Streets Program
- Park & Boulevards System Improvements

CITY PROJECTS ALIGNED WITH GSI:

- Integrated Planning with Community
- Community Engagement
- Westport Stormwater Improvements
- Streetcar Expansion on Main, Prospect MAX
- Lake of Enshriners Improvements
- Gillham Rd Improvements



BRUSH CREEK AT PROSPECT AVE

BRUSH CREEK WATERSHED

PROJECT OPPORTUNITIES & NEXT STEPS

Project Opportunities Summary

Westport / Mill Creek Park:

- Integrated stormwater and overflow control project
- Control a highly impervious subwatershed
- Integrated planning with Main Street Streetcar project

Main Street Corridor:

- Integrated stormwater and overflow control within complete street
- Integrated planning with Main Street ROW proposed KC Streetcar

The Paseo Corridor:

- Drainage corridor with greenspace available for control
- Integrated planning project with bicycle infrastructure improvements
- Central spine of a GSI corridor from Independence Ave to 79th Street

Ivanhoe, Oak, and Cleveland Parks:

- Integrated stormwater and overflow control project from 39th St to Brush Creek via Ivanhoe Park and effective FEMA floodplain
- City controlled vacant land can be put to productive use in drainage corridors connecting Brush Creek to Ivanhoe, Oak and Cleveland Parks

Gillham Park:

- Greenspace in major drainage corridor and effective floodplain of Brush Creek
- Integrated stormwater and overflow control project from 39th St to Brush Creek through Gillham Park
- Integrated planning with Gillham Rd General Bond infrastructure project

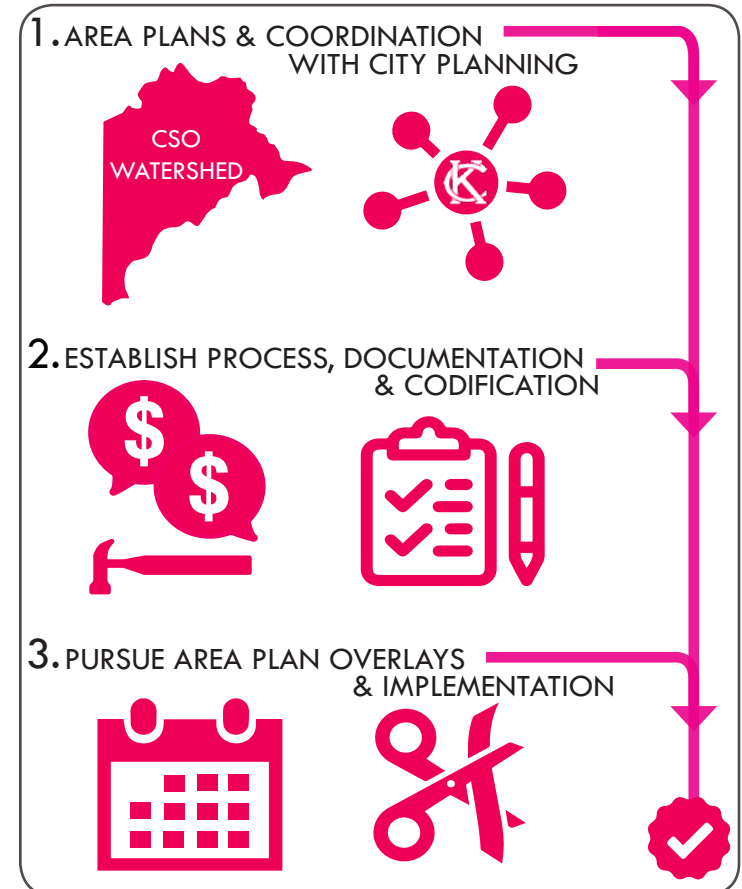
Brush Creek Water Quality Innovation Corridor:

- Integrated stormwater, overflow control, and USACE flood control
- Connect smart sewer projects along Brush Creek
- Opportunities for innovation park providing multiple community benefits adjacent to dry weather treatment corridor

NEXT STEPS:

- Establish Stakeholder Engagement Process
- Begin Integrated Planning Process with City
- Develop Action Plan & Area Plan Overlay
- GSI Feasibility Study
 - Technical Evaluation
 - Design Recommendations

NEXT STEPS PROCESS



BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

WESTPORT & MILL CREEK PARK INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 264 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- Integrated stormwater & overflow control project
- Mitigate flooding in Westport by providing overland flow path to Mill Creek Park
- Walkable connection from Plaza to Westport

NEIGHBORHOOD IMPACT:

- Council District 4
- Plaza/Westport Neighborhood Plan
- Volker Neighborhood
- Old Westport Neighborhood
- Country Club Plaza Neighborhood
- Southmoreland Neighborhood
- Park Central-Research Park Neighborhood

CRITICAL CITY PARTNERS:

- Water Services
- Parks & Recreation
- Public Works
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:



Bird's eye view of Mill Creek Park & Westport: GSI Kit of Parts and Stream Daylight



Strengthen link to Westport along Mill St, consider redeveloping hotel out of natural drainage path.



Collect



Convey



Capture

(A) COLLECT IN STREET R.O.W.: GSI IN WESTPORT

(B) CONVEY: MILL STREET "BLUE" STREET CORRIDOR

(C) ST. LUKE'S - HIGH IMPERVIOUS AREA WESTPORT DETENTION

(D) MILL CREEK STORMWATER CONVEYANCE CORRIDOR

(E) SUBSURFACE STORAGE UNDER PARK PROGRAMMING SPACE

(F) MAIN STREET STREETCAR EXTENSION - GSI INCLUSION

(G) PIPE UNDER MAIN STREET

(H) LOWER PLAZA DETENTION & OUTFALL TO BRUSH CREEK

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

WESTPORT & MILL CREEK PARK COMMUNITY IMPACT

CONTROLLING WATER FOR MULTIPLE BENEFITS

- Integrate flood mitigation conveyance with neighborhood GSI green street components
- Engage in community discussion / desires
- Elevate streetscape to support district walkability
- Healthy, walkable, direct connection to Westport and Brush Creek
- Opportunity for upgraded park facilities

WESTPORT INFRASTRUCTURE IMPROVEMENTS

- GSI green street coordination
- Woonerf street approach to Mill St to include swale conveying water from Westport Rd to detention pond at Mill St and Broadway
- Detention Pond at end of Mill St controls release before overflowing via pipe into Mill Creek Park GSI

MILL CREEK PARK CONTROL & CONVEYANCE

- Subsurface centralized GSI under existing park space
- Recreation field will cap the GSI facility to maintain a highly programmable park green space
- In the event of an intense rainstorm subsurface overflow will be conveyed through the southern half of Mill Creek Park to the Brush Creek corridor via underground pipe



BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

MAIN STREET CORRIDOR INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 136 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- Integrated stormwater & overflow control project within complete street design
- Control and convey overland flow along Main Street using green stormwater infrastructure to filter before entering Brush Creek Corridor

NEIGHBORHOOD IMPACT:

- Council District 4
- Broadway Gillham Neighborhood
- Hanover Place Neighborhood
- Plaza Westport Neighborhood
- Volker Neighborhood
- Old Westport Neighborhood
- Country Club Plaza Neighborhood
- Southmoreland Neighborhood
- Park Central-Research Park Neighborhood

CRITICAL CITY PARTNERS:

- Water Services
- Parks & Recreation
- Public Works
- Planning & Development
- KCATA



GSI FOCUSED PROJECT ELEMENTS:

A MAIN STREET CORRIDOR

Distributed GSI

Opportunity to integrate green stormwater infrastructure within the existing streetcar extension plans. Implementing GSI solutions along the future streetcar right-of-way would be an opportunity to integrate solutions for overflow control into a major city project, providing multiple benefits to citizens.

A WESTPORT / MILL CREEK PARK CONNECTION

Neighborhood GSI

Connect Distributed GSI along Main St. with Westport/Mill Creek Park conveyance to Brush Creek.



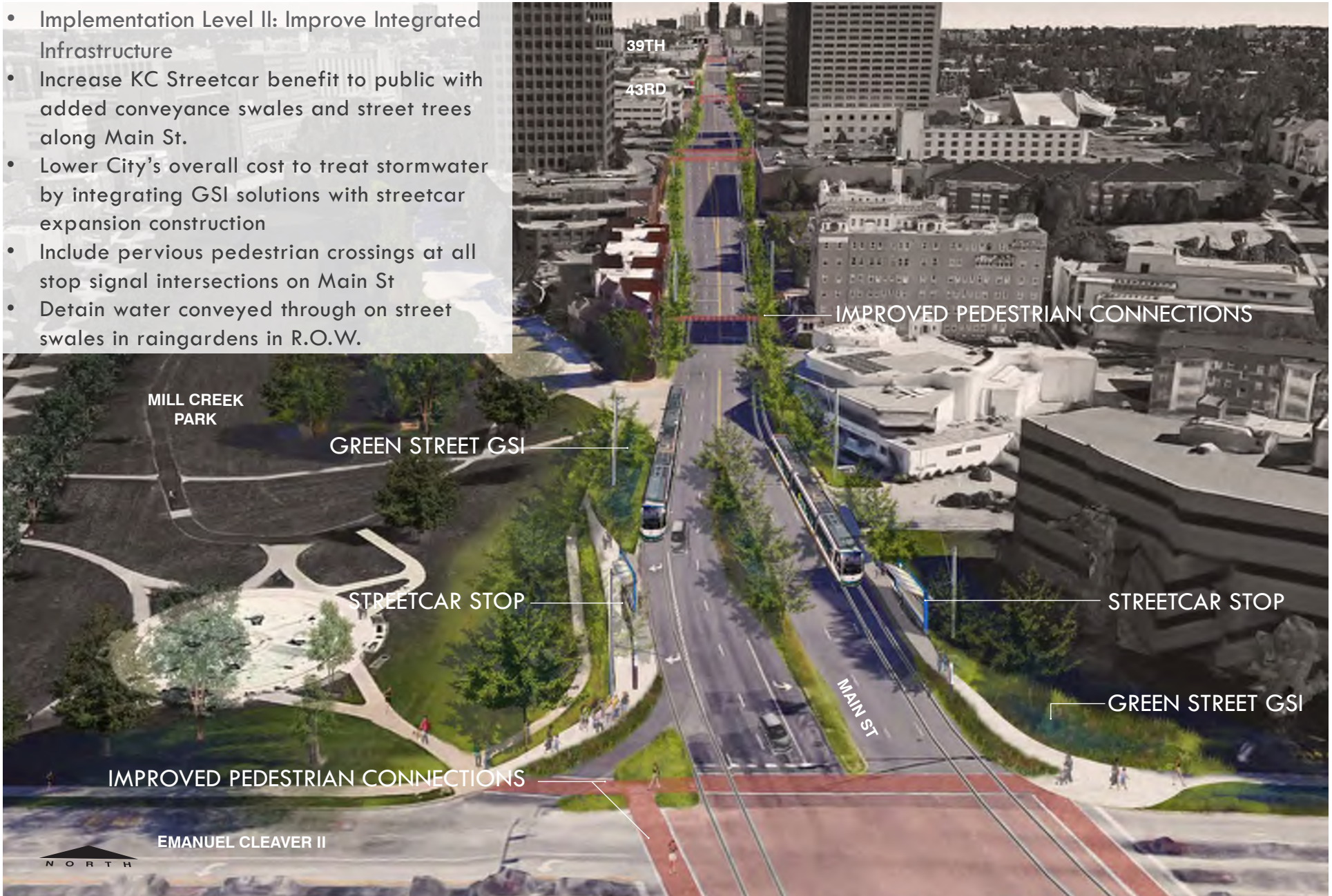
Bird's eye view of Main Street from Ward Parkway to 43rd St

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

MAIN STREET CORRIDOR INTEGRATED CONTROL PROJECT

MAIN STREET CORRIDOR

- Implementation Level II: Improve Integrated Infrastructure
- Increase KC Streetcar benefit to public with added conveyance swales and street trees along Main St.
- Lower City's overall cost to treat stormwater by integrating GSI solutions with streetcar expansion construction
- Include pervious pedestrian crossings at all stop signal intersections on Main St
- Detain water conveyed through on street swales in raingardens in R.O.W.



BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

THE PASEO INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 568 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- Significant opportunity to strengthen a connection between north and south, east and west of The Paseo and Brush Creek crossing using the framework of GSI and complete streets solutions.
- Green stormwater infrastructure framework will accentuate plans for MLK Park, connect to The Paseo to the west, to Gillham Park and Greenway further west, and lower Brush Creek Greenway/ Lake of Enshriners improvements.

NEIGHBORHOOD IMPACT:

- Council District 3
- Center City Neighborhood
- Ivanhoe Northwest Neighborhood
- Linwood Homeowners-Ivanhoe
- Squier Park Neighborhood
- Ivanhoe Southwest Neighborhood
- Manheim Park Neighborhood
- Park Central-Research Park
- Eastern 49-63 Neighborhood

CRITICAL CITY PARTNERS:

- Water Services
- Parks & Recreation
- Public Works
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

- (A) THE PASEO CORRIDOR 49TH- 59TH**
Neighborhood GSI
Large drainage corridor where the Paseo provides wide, grassy center median. Neighborhood scale control unless an area large enough for Centralized is possible.
- (B) TROOSTWOOD / BROOKWOOD CORRIDORS**
Neighborhood GSI
Adjacent to The Paseo, secondary drainage corridors extend up into the neighborhoods with the potential to control and convey to larger opportunity areas along the Paseo.
- (C) ROCKHURST UNIVERSITY**
Neighborhood GSI
Public-Private Partnership opportunity to provide better drainage through the campus to The Paseo; work with university master plan to establish future opportunities.

 Collect
  Convey
  Capture



Bird's eye perspective looking south on The Paseo

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

THE PASEO INTEGRATED CONTROL PROJECT

THE PASEO CORRIDOR

- Focus GSI directly along Paseo Boulevard using vegetated swales and pervious parking lanes to convey stormwater
- Added street trees along both sides of The Paseo
- Detain water in Boulevard median from 49th-51st
- Large detention capacity just south of intersection of The Paseo and Emmanuel Cleaver II, within park



GSI FOCUSED PROJECT ELEMENTS:

- A THE PASEO CORRIDOR 31ST- 45TH**
Distributed GSI
Update section of The Paseo from 31st St to 45th St to Parkway & Boulevard standards, utilize Green Streets GSI to reduce impervious surfaces.
- B BRUSH CREEK BLVD / GILLHAM PARK CONVEYANCE**
Neighborhood GSI
Provide conveyance for Gillham Park drainage corridor from Brush Creek Blvd to Brush Creek.



Bird's eye perspective looking north on The Paseo illustrating the street



IVANHOE, OAK, AND CLEVELAND PARKS INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 558 Acre Watershed
- Implementation Level III: Stimulate Investment
- Adding GSI to existing natural corridors to control water and connect neighborhoods and economic development nodes to Brush Creek Corridor using an urban Greenway system
- Focus improvements around areas currently receiving investments (39th & Prospect, Oak Park, Cleveland park and Genesis School)

NEIGHBORHOOD IMPACT:

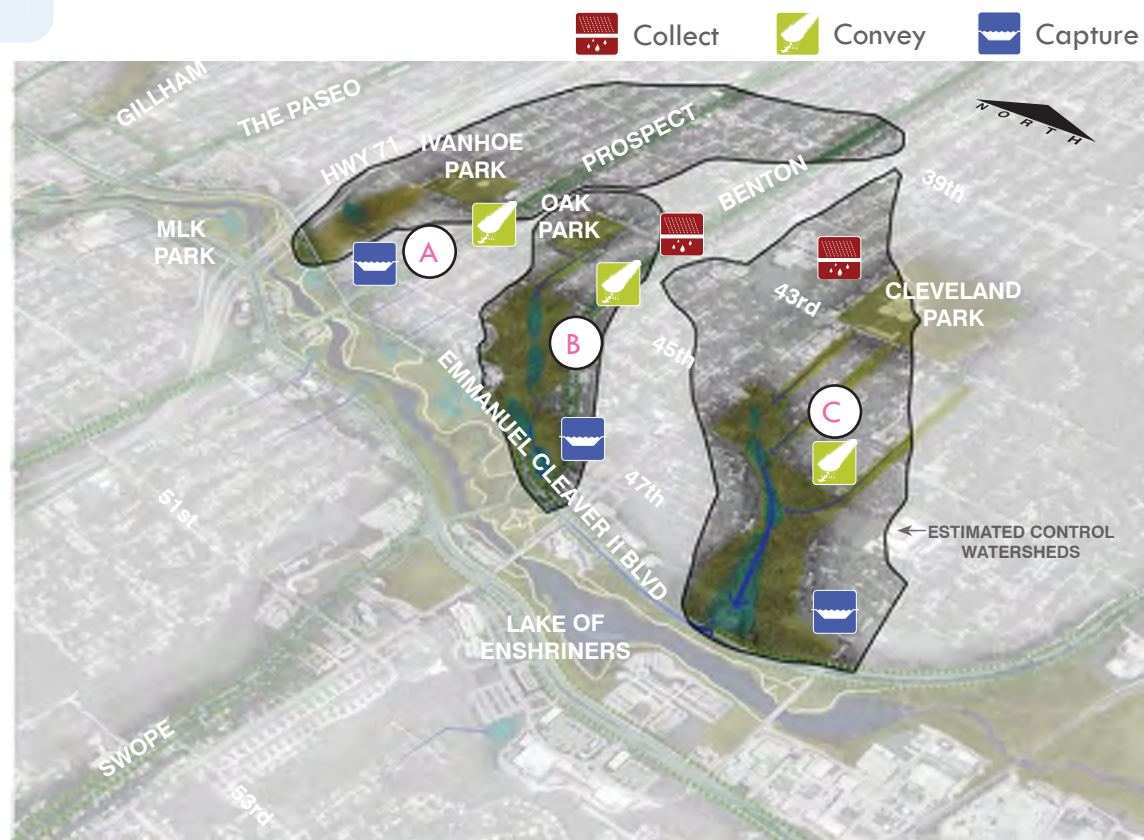
- Council District 3
- Key Coalition Neighborhood
- Oak Park Northwest Neighborhood
- Oak Park Northeast Neighborhood
- Palestine West Neighborhood
- Palestine East Neighborhood
- Oak Park Southeast Neighborhood
- Oak Park Southwest Neighborhood
- Ivanhoe Northeast Neighborhood
- Ivanhoe Southeast Neighborhood
- Vineyard Neighborhood
- Vineyard Northwest Neighborhood
- North Town Fork Creek Neighborhood
- Mt. Cleveland Neighborhood

CRITICAL CITY PARTNERS:

- Water Services
- Parks & Recreation
- Public Works
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

- A** **IVANHOE PARK CORRIDOR-** Collaborative GSI
Significant opportunity to control stormwater along the Ivanhoe Park drainage corridor within the street right-of-way. Integrate with flood mitigation in the area of Prospect & 39th St.
229 Control Acres
- B** **OAK PARK CORRIDOR-** Neighborhood GSI
Coordinate with expected park facility improvements, connect Benton Blvd corridor to city-owned open space corridor leading to Oak Park
102 Control Acres
- C** **CLEVELAND PARK CORRIDOR-** Neighborhood GSI
City-owned drainage corridor can support control of Vineyard neighborhood streets and connect Cleveland Park and nearby schools to Brush Creek
227 Control Acres



Bird's eye view of the "Green Fingers" Park corridors to Brush Creek, looking northwest

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

IVANHOE, OAK, AND CLEVELAND PARKS COMMUNITY IMPACT

IVANHOE PARK CORRIDOR

- Lower Ivanhoe Park corridor includes numerous vacant buildings and parcels, several owned by the City, in an area of high visibility from Hwy 71
- Connect Ivanhoe Park via greenway corridor to Brush Creek
- GSI implementation surrounding development node at 39th St and Prospect Ave
- Current economic development along Prospect Ave generated by incorporating Prospect Ave as a MAX bus route is a highly visible corridor ideal for GSI improvement



BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

GILLHAM PARK INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 569 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- GSI as catalyst to connect Gillham Park and The Paseo with a strong liveable street corridor
- Use GSI to leverage partnerships and provide additional multi beneficial opportunities for community asset improvements
 - MLK Park
 - Economic Development
 - Water Quality

NEIGHBORHOOD IMPACT:

- Council District 3
- Hanover Place Neighborhood
- Central Hyde Park Neighborhood
- South Hyde Park Neighborhood
- Southmoreland Neighborhood
- Manheim Park Neighborhood
- Park Central-Research Park Neighborhood

CRITICAL CITY PARTNERS:

- Water Services
- Parks & Recreation
- Public Works
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

A GILLHAM PARK CORRIDOR

Neighborhood / Centralized GSI Control area and conveyance of surrounding neighborhood, accentuate existing park features, provide centralized detention where feasible within park area

B BRUSH CREEK BLVD CORRIDOR

Conveyance to The Paseo, Green Street GSI improvements on Blvd with generous width



Bird's eye view of Mid Brush Creek area looking north illustrating the connection of Gillham Park GSI Corridor to Brush Creek via The Paseo.

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

GILLHAM PARK INTEGRATED CONTROL PROJECT

GILLHAM PARK CORRIDOR

- Strong liveable street connection between Gillham Park and The Paseo to using GSI to redefine the urban framework
- GSI improvements from 31st -45th will convey stormwater via swales and improve pedestrian connections



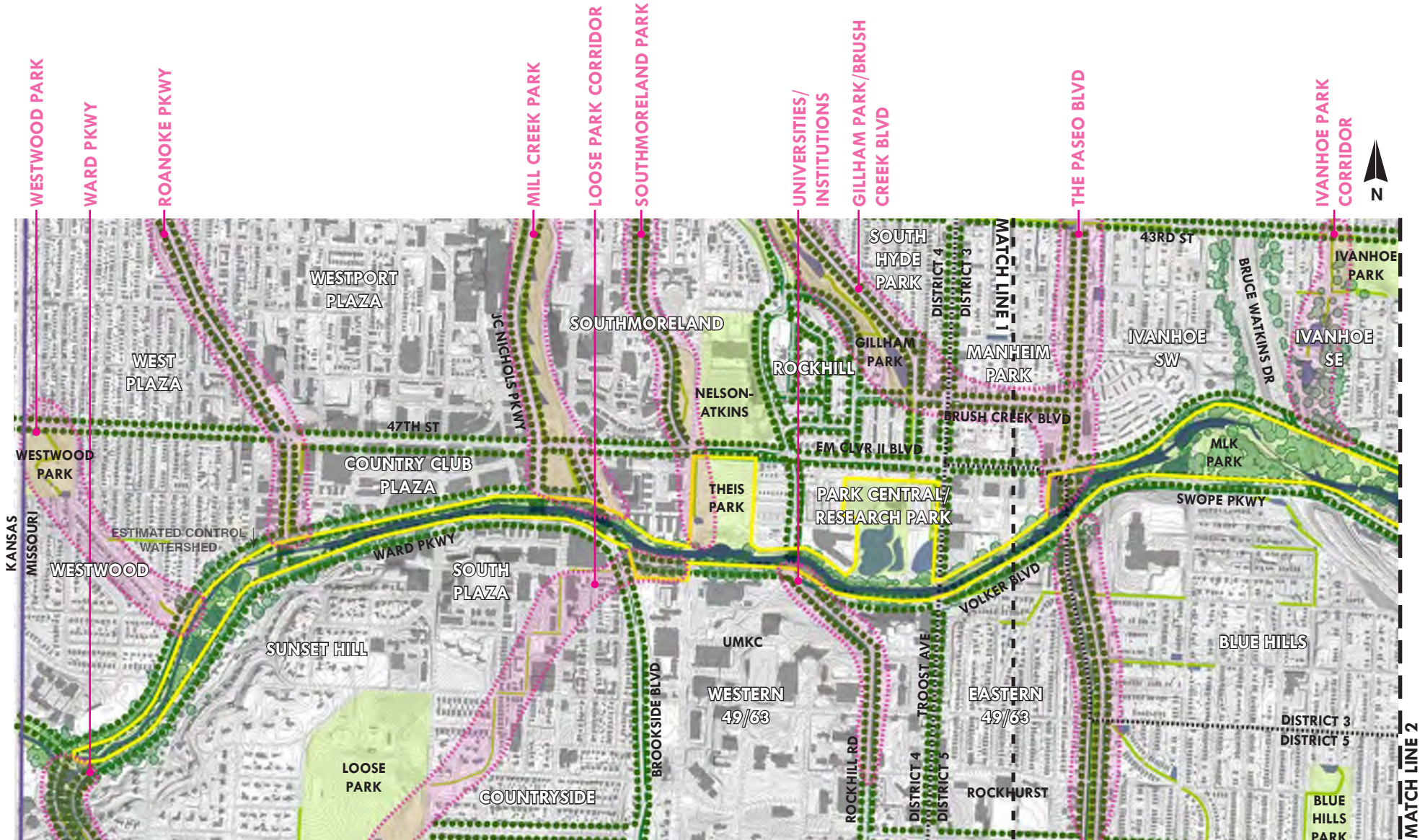
Bird's eye view of Gillham Park liveable street Corridor illustrating the connection to Brush Creek Blvd.

BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

BRUSH CREEK WATER QUALITY INNOVATION CORRIDOR

With the close proximity of Brush Creek to our community, it is vital to focus on the every day water quality of the creek. **There is an opportunity to explore innovative treatment processes for dry weather flow within the creek to improve water quality and ultimately provide Kansas Citian's recreational access to Brush Creek.**

In addition to dry-weather water quality improvements, Brush Creek is poised to connect centers of innovation via a linear Innovation Park that integrates infrastructure improvements to water quality, flooding, and neighborhood connectivity with water-focused hubs that address environmental concerns, local jobs, and neighborhood wants and needs.



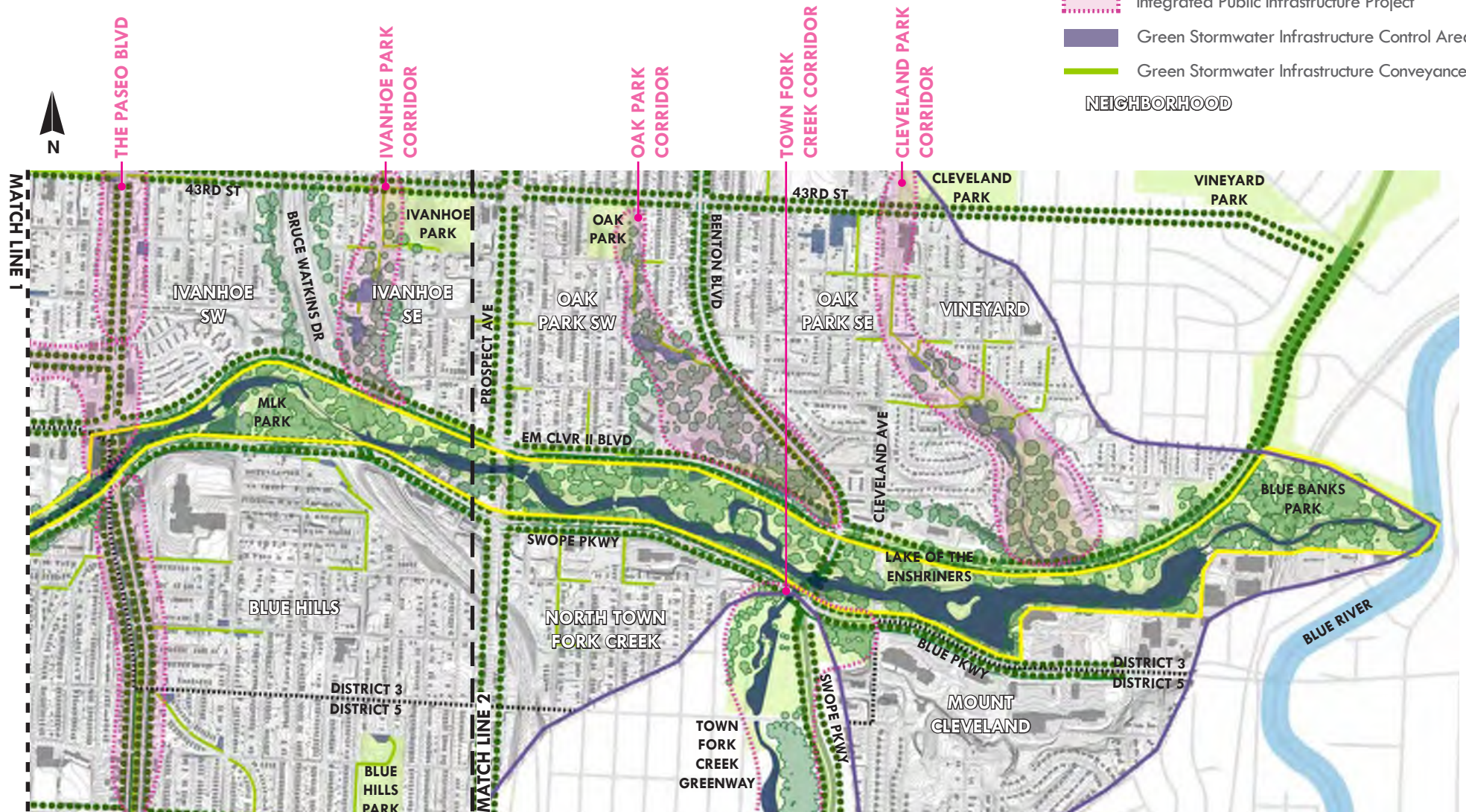
BRUSH CREEK WATERSHED OPPORTUNITY PROJECT

BRUSH CREEK WATER QUALITY INNOVATION CORRIDOR

Dry weather water quality improvements will be accomplished through the Smart Sewer Program; however, further development of innovation nodes along the corridor will require further exploration with community organizations and city agencies to fulfill its maximum potential.

LEGEND

-  Brush Creek Watershed Boundary
 -  Council Districts
 -  Parks & Boulevards System
 -  Brush Creek Innovation Park
 -  Integrated Public Infrastructure Project
 -  Green Stormwater Infrastructure Control Area
 -  Green Stormwater Infrastructure Conveyance
- NEIGHBORHOOD

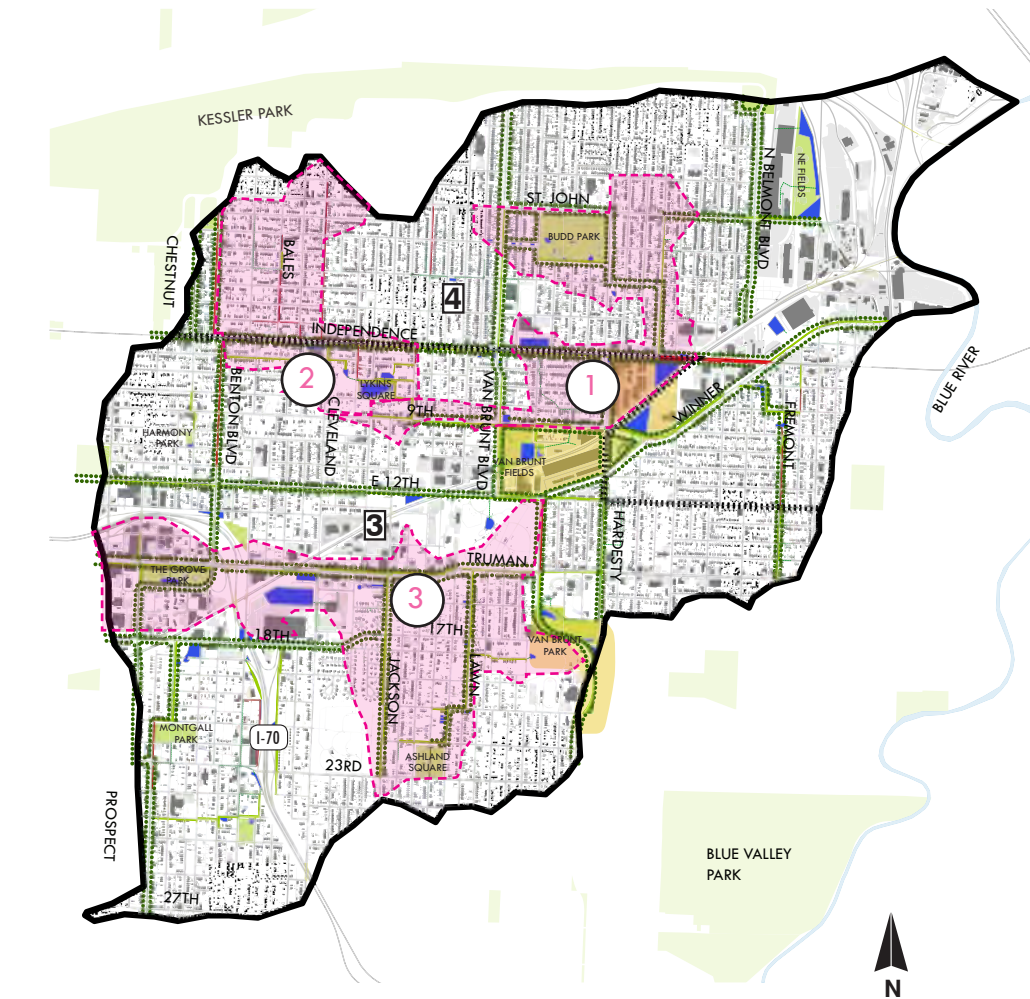


PHOTOGRAPHIC CREDITS INCLUDED FOR THE FOLLOWING PAGES:

44. Phronesis. Brush Creek at Prospect Ave. 2018.



GOOSENECK CREEK WATERSHED SUMMARY



LEGEND

- GSI Opportunities
- Estimated Control Area
- Public Private Partnership Opportunity
- Parks & Boulevards
- Council District

Gooseneck Creek watershed drains to the Lower Blue River. The Kansas City Terminal Railroad follows closely the historic creek corridor, where industrialized land use now dominates. GSI opportunities exist throughout the watershed, but primary opportunities centered at Hardesty & Independence, Lykins Square, and along drainage corridors connected by Truman Road are most likely to provide triple-bottom line benefits for the City and watershed.

VISIONARY INTEGRATED GREEN STORMWATER INFRASTRUCTURE OPPORTUNITY PROJECTS

- 1 HARDESTY / GOOSENECK WATER PARK**
Implementation Level III: Stimulate Investment
- 2 LYKINS SQUARE**
Implementation Level III: Stimulate Investment
- 3 TRUMAN RD CORRIDOR**
Implementation Level II: Improve Integrated Infrastructure

NOTE: Level III Implementation projects generally will include smaller Level I and Level II project opportunities.

PUBLIC R.O.W. IMPROVEMENTS:

- Integrated Planning with City
- Coordinated/Shared Infrastructure Improvements
- Green Streets Program
- Park & Boulevards System Improvements

CITY PROJECTS ALIGNED WITH GSI:

- Integrated Planning with Community
- Community Engagement
- Hardesty Complex Environmental Reclamation Project
- Prospect MAX
- Independence Ave Improvements



VAN BRUNT PARK

GOOSENECK CREEK WATERSHED

PROJECT OPPORTUNITIES & NEXT STEPS

Project Opportunities Summary

Hardesty / Gooseneck Water Park:

- Large underutilized impervious parcels
- Easily acquired land ideal for regional detention
- Natural low point along railway corridor swale
- Existing site momentum catalyzing larger site plan to incorporate community and further economic development

Lykins Square:

- City-owned property
- Available detention space
- Located in high priority community investment area

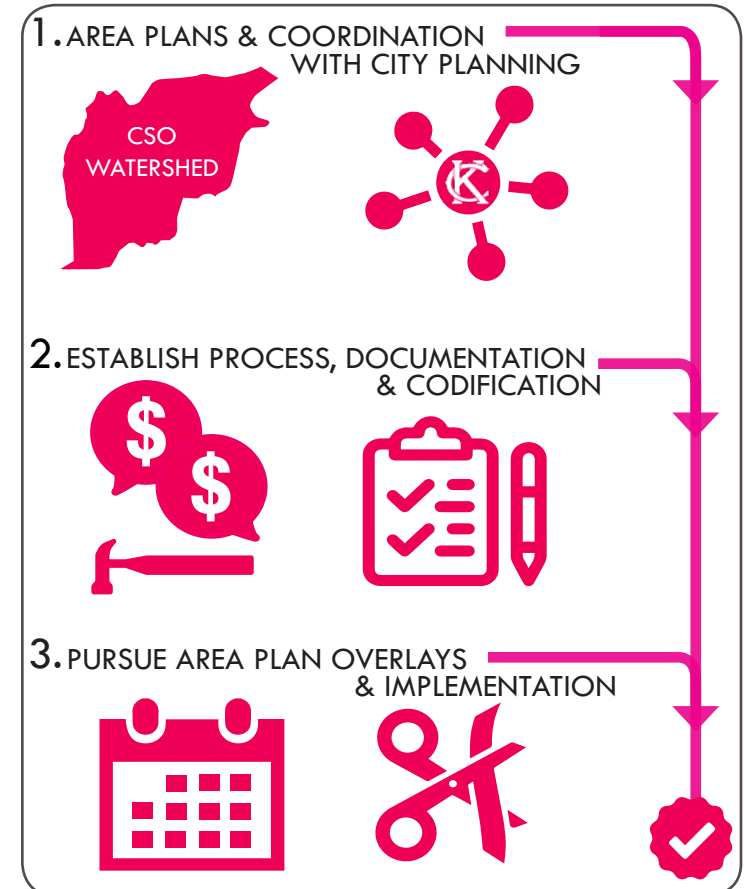
Truman Rd Corridor

- High priority investment corridor
- Integrated city agency approach for complete street improvements (already in need of streetscape/road improvements-- Smart Sewer could lead project to develop holistic approach and plan)
- Well connected - highly used thoroughfare reach downtown KCMO

NEXT STEPS:

- Establish Stakeholder Engagement Process
- Begin Integrated Planning Process with City
- Develop Action Plan & Area Plan Overlay
- GSI Feasibility Study
 - Technical Evaluation
 - Design Recommendations

NEXT STEPS PROCESS



GOOSENECK CREEK WATERSHED OPPORTUNITY PROJECT

HARDESTY/GOOSENECK WATER PARK INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 395 Acre Watershed
- Implementation Level III: Stimulate Investment
- Major site soil reclamation at former federal site provides an opportunity for subsurface storage at bottom of a significant drainage corridor
- Further reinforce redevelopment occurring along Independence Ave

NEIGHBORHOOD IMPACT:

- Council Districts 3 & 4
- North Indian Mound
- South Indian Mound
- Lykins

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Brownfields Office
- Planning & Development
- Parks & Recreation

GSI FOCUSED PROJECT ELEMENTS:

- (A) HARDESTY/GOOSENECK WATER PARK**
Centralized GSI
Significant site rehabilitation leads to “stormwater park” amenity at major Transit Hub
- (B) INDEPENDENCE AVE CORRIDOR**
Distributed GSI
Collaborative R.O.W. GSI improvements along important CID/ Transit corridor
- (C) 9TH STREET CORRIDOR**
Distributed GSI
Connect Lykins Square GSI opportunity to Hardesty via 9th St
- (D) BUDD PARK / LAWNDAL AVE CORRIDOR**
Neighborhood GSI
Connect Budd Park to Hardesty site along Lawndale drainage corridor



Bird's eye of Gooseneck Creek area looking west illustrating former floodplain area suitable for long-term water .

GOOSENECK CREEK WATERSHED OPPORTUNITY PROJECT HARDESTY / GOOSENECK WATER PARK COMMUNITY IMPACT

Rehabilitation of former federal property provides opportunity to provide regional scale detention and offer park amenities adjacent an emerging transit-oriented development hub.

EXAMPLE SMART SEWER REGIONAL DETENTION SITE ON TROOST



Regional detention site with flood control and community amenities in KCMO



Example showcasing the potential overlay of civic programming and rainy day water storage possible in Gooseneck Creek. Renderings by SLA.



GOOSENECK CREEK WATERSHED OPPORTUNITY PROJECT INTEGRATED CONTROL PROJECTS: LYKINS SQUARE

PROJECT OVERVIEW:

- 243 Acre Watershed
- Implementation Level III: Stimulate Investment
- Significant corridor within Gooseneck Creek drains to Lykins Square
- Redevelopment / control opportunity at low point of Independence Ave on large vacant impervious parcel

NEIGHBORHOOD IMPACT:

- Council Districts 3 & 4
- Scarritt Point
- Lykins

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Planning & Development
- Parks & Recreation

GSI FOCUSED PROJECT ELEMENTS:

- A LYKINS SQUARE**
Neighborhood GSI
Utilize neighborhood park situated at low point for capture of surrounding street drainage, connect to drainage from Scarritt Point
- B SCARRITT / INDEPENDENCE AVE**
Neighborhood GSI
Opportunity to control large drainage area via Bates, Monroe, and Independence Ave to large vacant impervious parcel at low point of corridor. Redevelopment partnership or city purchase opportunity.

 Collect  Convey  Capture



Bird's eye perspective looking northwest toward the Independence Corridor and Lykins Square in the foreground

GOOSENECK CREEK WATERSHED OPPORTUNITY PROJECT INTEGRATED CONTROL PROJECTS: TRUMAN RD CORRIDOR

PROJECT OVERVIEW:

- 471 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- Future Truman Rd infrastructure improvements provide opportunity to integrate Green Street GSI, especially if improvements include road diet
- Lawn, Jackson, and 18th Street each act as drainage corridors that could connect to greater Truman Rod conveyance

NEIGHBORHOOD IMPACT:

- Council Districts 3
- East Community Team North
- 18th And Vine and Downtown East
- Lykins

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Planning & Development
- Neighborhood & Housing
- Parks & Recreation

GSI FOCUSED PROJECT ELEMENTS:

A TRUMAN ROAD CORRIDOR

Distributed GSI
Green Street GSI corridor tied to future infrastructure improvements, additional neighborhood GSI opportunity at The Grove Park

B LAWN, JACKSON, 18TH ST CORRIDORS

Neighborhood GSI
Lawn Ave is the primary drainage corridor for the neighborhood, draining to Elmwood Cemetery. Jackson Ave also provides Green Street GSI potential and could connect to Truman Rd conveyance.

 Collect  Convey  Capture



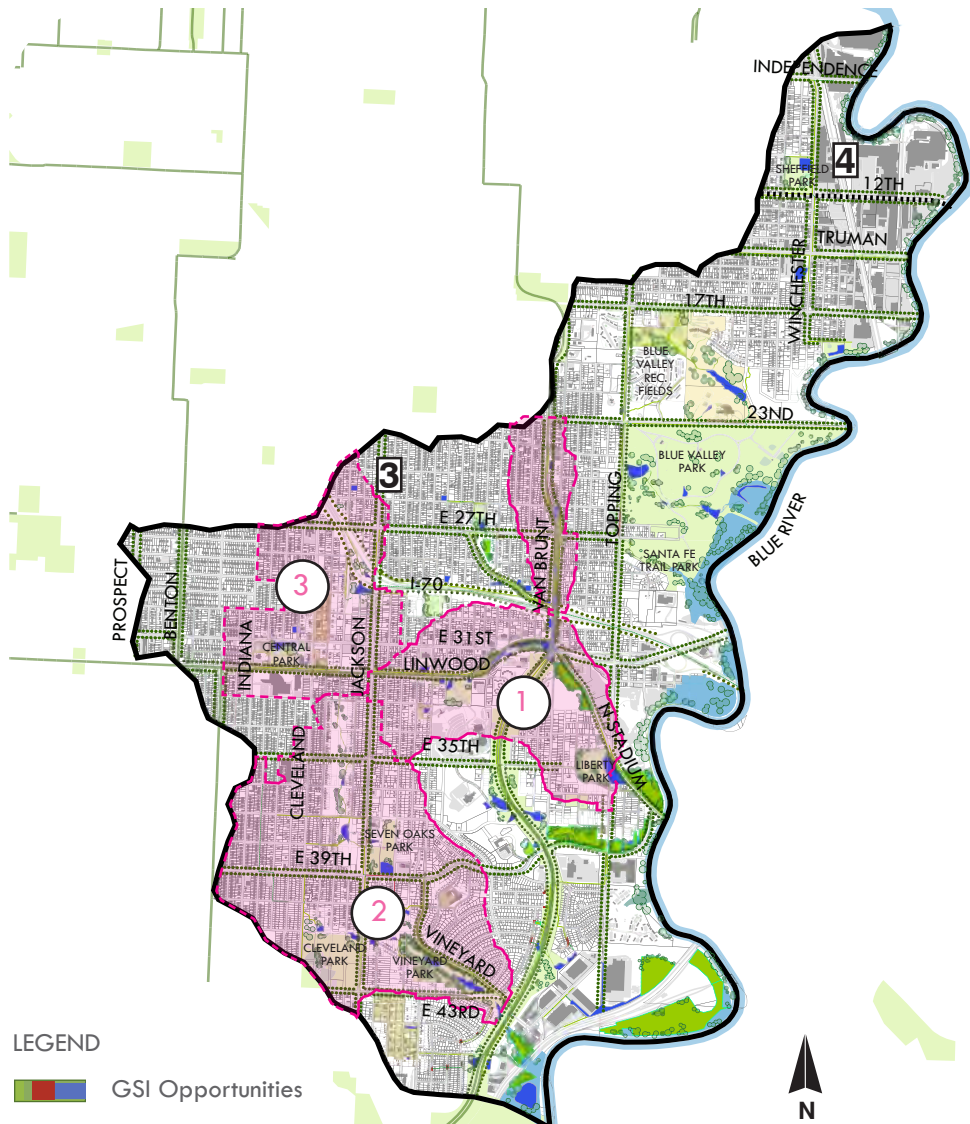
Bird's eye perspective looking northwest with Elmwood Cemetery in the foreground and Ashland Square in the background

PHOTOGRAPHIC CREDITS INCLUDED FOR THE FOLLOWING PAGES:

- 60. Intersection of Hardesty Ave and Van Brunt Rd from “Kansas City, Missouri.” Street View, Google Maps. Accessed 1 Feb. 2018.
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LOWER BLUE RIVER WATERSHED SUMMARY



VISIONARY INTEGRATED GREEN STORMWATER INFRASTRUCTURE OPPORTUNITY PROJECTS

- 1 THE BOULEVARDS TRIANGLE / LIBERTY PARK**
Implementation Level III: Stimulate Investment
- 2 VINEYARD / SEVEN OAKS CORRIDOR**
Implementation Level III: Stimulate Investment
- 3 JACKSON AVE / I-70 CURVE**
Implementation Level III: Stimulate Investment

NOTE: Level III Implementation projects generally will include smaller Level I and Level II project opportunities.

PUBLIC R.O.W. IMPROVEMENTS:

- Integrated Planning with City
- Coordinated/Shared Infrastructure Improvements
- Green Streets Program
- Park & Boulevards System Improvements

CITY PROJECTS ALIGNED WITH GSI:

- Integrated Planning with Community
- Community Engagement
- 31st/Linwood/Van Brunt Intersection
- 39th Street / Leeds Trafficway

The Lower Blue Watershed is located along the west bank of the Lower Blue River. Valleys and parks extending west from Blue River provide control opportunities across the watershed at Vineyard Park, Seven Oaks Park, and Blue Valley Park. The convergence of Linwood, Emanuel Clever II, and Van Brunt Blvds by the VA is highly visible and well-positioned for GSI opportunities that expand beyond the current VA Hospital GSI project.



EMANUEL CLEVER II / VAN BRUNT BOULEVARD AT LINWOOD BOULEVARD

LOWER BLUE RIVER WATERSHED

PROJECT OPPORTUNITIES & NEXT STEPS

Project Opportunities Summary

The Boulevards Triangle / Liberty Park:

- Opportunity to improve pedestrian and bike infrastructure and connections using GSI
- Adjacent redevelopment investment identified in Highway 40 Corridor Plan
- Public Private Partnership (PPP) opportunity along Stadium Dr corridor to expand conveyance and control
- Liberty Park is lacking community amenities and little buffer from adjacent industrial properties

Vineyard / Seven Oaks Corridor:

- Vineyard Park valley collects water from the 28ac park and nearly all adjacent neighborhood streets -- making it a highly visible stream daylight GSI project
- The park extends to the confluence of the Blue River and Brush Creek which could greatly benefit community if connected
- Seven Oaks corridor contributes to Vineyard Park valley creating a long, contiguous stream corridor
- PPP opportunity along corridor to redevelop city-owned and vacant parcels

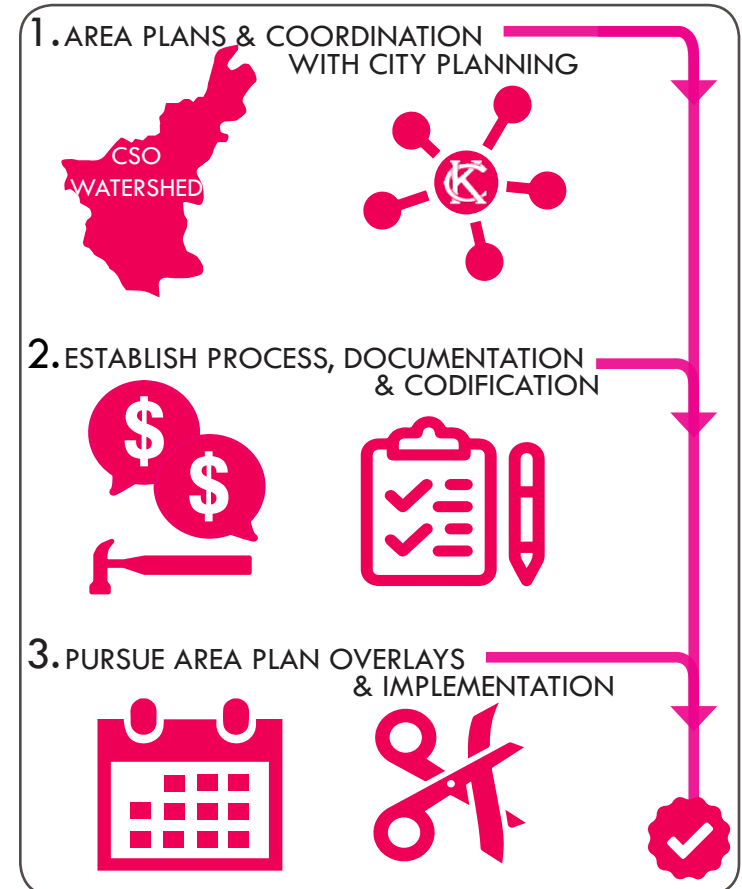
Jackson Ave / I-70 Curve:

- Large, existing low point at curve of Jackson Ave and I-70 is ideal for GSI solutions
- Neighborhood [financial and community driven] investment in South Roundtop to redevelop vacant lots
- Ideal CSO separation opportunities for highly visible GSI installments

NEXT STEPS:

- Establish Stakeholder Engagement Process
- Begin Integrated Planning Process with City
- Develop Action Plan & Area Plan Overlay
- GSI Feasibility Study
 - Technical Evaluation
 - Design Recommendations

NEXT STEPS PROCESS



THE BOULEVARDS TRIANGLE / LIBERTY PARK INTEGRATED CONTROL PROJECTS

PROJECT OVERVIEW:

- 488 Acre Watershed
- Implementation Level III: Stimulate Investment
- Drainage corridors meet at Van Brunt/Linwood/31st Intersection
- Intersection target of Bond improvements
- GSI workforce development opportunities tied to Avenue of Life Training Center

NEIGHBORHOOD IMPACT:

- Council District 3
- East Community Team South
- South Blue Valley
- Knoches Park
- Boulevard Village
- Dunbar
- Leeds

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

A BOULEVARDS TRIANGLE

Centralized GSI
Connected Neighborhood GSI along Boulevards intersect at complex, low-lying traffic intersection targeted for bond improvements; fix both traffic and water flow

B LIBERTY PARK

Centralized GSI
If additional control from Blvds Triangle is desired, connect to Liberty Park via Stadium Dr for Centralized control

C BOULEVARDS CONVEYANCE

Neighborhood GSI
Utilize parks boulevard for control of adjacent draining neighborhood streets, convey to Boulevards Triangle



Bird's eye view looking southwest with Boulevards Triangle near the center of the view.

LOWER BLUE RIVER WATERSHED OPPORTUNITY PROJECT

THE BOULEVARDS TRIANGLE / LIBERTY PARK COMMUNITY IMPACT

DEVELOP SMART SEWER PLAN THAT SUPPORTS DEVELOPMENT, IMPROVES SAFETY, AND BUILDS WORKFORCE

- Smart Sewer plan demonstration project
- GSI improvements creates opportunity for GSI Training program through Avenue of Life Business Training Center, adjacent site
- Healthy, walkable street corridor improvements
- Visible infrastructure upgrades

EXISTING INTERSECTION



PROPOSED TRAFFIC IMPROVEMENT OPPORTUNITY WITH GSI INCORPORATED



LOWER BLUE RIVER WATERSHED OPPORTUNITY PROJECT

VINEYARD / SEVEN OAKS CORRIDOR INTEGRATED CONTROL PROJECTS

PROJECT OVERVIEW:

- 669 Acre Watershed
- Implementation Level III: Stimulate Investment
- Significantly reduce CSO from Vineyard Park drainage corridor
- Connect Vineyard Park, Seven Oaks Park, and city controlled properties up to 33rd St via greenway corridor to Blue River.

NEIGHBORHOOD IMPACT:

- Council District 3
- Knoches Park
- Vineyard
- Vineyard Northwest
- Oak Park Southeast
- Palestine East
- Palestine West and Oak Park Northeast
- Ingleside

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

- A VINEYARD PARK**
Centralized GSI
Strategic separation and distributed GSI from two corridors above Vineyard Park can carry excess capacity into the park where natural basins can detain storm flow
- B SEVEN OAKS DRAINAGE CORRIDOR**
Neighborhood/Centralized GSI
Includes a collection of city-owned properties, provides a significant opportunity to control neighborhood flow within the drainage corridor
- C CLEVELAND PARK AREA SEWER SEPARATION**
Distributed GSI
Utilize GSI where possible, separate storm sewer flow and direct to Vineyard Park

Collect Convey Capture



Bird's eye view looking northwest up Vineyard Park valley and Seven Oaks

LOWER BLUE RIVER WATERSHED OPPORTUNITY PROJECT

VINEYARD / SEVEN OAKS CORRIDOR COMMUNITY IMPACT

CONFLUENCE OFFERS CONSIDERABLE DETENTION OPPORTUNITY AND AMENITY IMPROVEMENT FOR NEIGHBORHOOD

- Sewer separation is targeted for a portion of the Vineyard park drainage basin; include distributed GSI as part of integrated infrastructure upgrades
- Seven Oaks drainage corridor includes a collection of city-owned properties, providing a significant opportunity to further Neighborhood GSI control of rainwater
- Vineyard Park has two large natural basins that can provide Centralized GSI control from neighborhoods above.



GSI IMPROVEMENTS ENHANCE
CORRIDOR EXPERIENCE AND
IMPROVE CONNECTIVITY



UPGRADED PARK FACILITIES



DISTRIBUTED GSI PROJECTS



STORMWATER TREATMENT
TRAIN

LOWER BLUE RIVER WATERSHED OPPORTUNITY PROJECT

JACKSON AVE AND I-70 CURVE INTEGRATED CONTROL PROJECTS

PROJECT OVERVIEW:

- 326 Acre Watershed
- Implementation Level III: Stimulate Investment
- Low-lying city-owned green spaces draining a central segment of highly impervious 31st/Linwood commercial corridor
- Highly visible neighborhood gateway can be a park-like centralized GSI facility
- Integrate GSI into neighborhood development project between Cleveland and Mersington Ave
- Integrate GSI into Greenwood School site changes

NEIGHBORHOOD IMPACT:

- Council District 3
- Ingleside
- Palestine West and Oak Park Northeast
- Palestine East
- Oak Park Northwest
- Santa Fe
- Washington Wheatley
- East Community Team South
- Knoches Park

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development
- KCMO Public Schools



Collect



Convey



Capture

GSI FOCUSED PROJECT ELEMENTS:

A JACKSON AVE / I-70 CURVE

Centralized GSI

Neighborhood gateway in highly visible low-lying park-like setting for overflow control, conveyed from neighborhood drainage corridors

B CENTRAL PARK

Neighborhood GSI

Top-of-watershed drains through Central Park, provide surface or subsurface detention in park or on city-owned properties north of 31st St in drainage corridor

C GREENWOOD SCHOOL CORRIDOR

Neighborhood GSI

Community seeks demolition of Greenwood School, opportunity to integrate neighborhood GSI into project and connect with Jackson Ave Centralized GSI facilities



Bird's eye view looking west with I-70 curve near the center of the view.

LOWER BLUE RIVER WATERSHED OPPORTUNITY PROJECT

JACKSON AVE AND I-70 CURVE COMMUNITY IMPACT



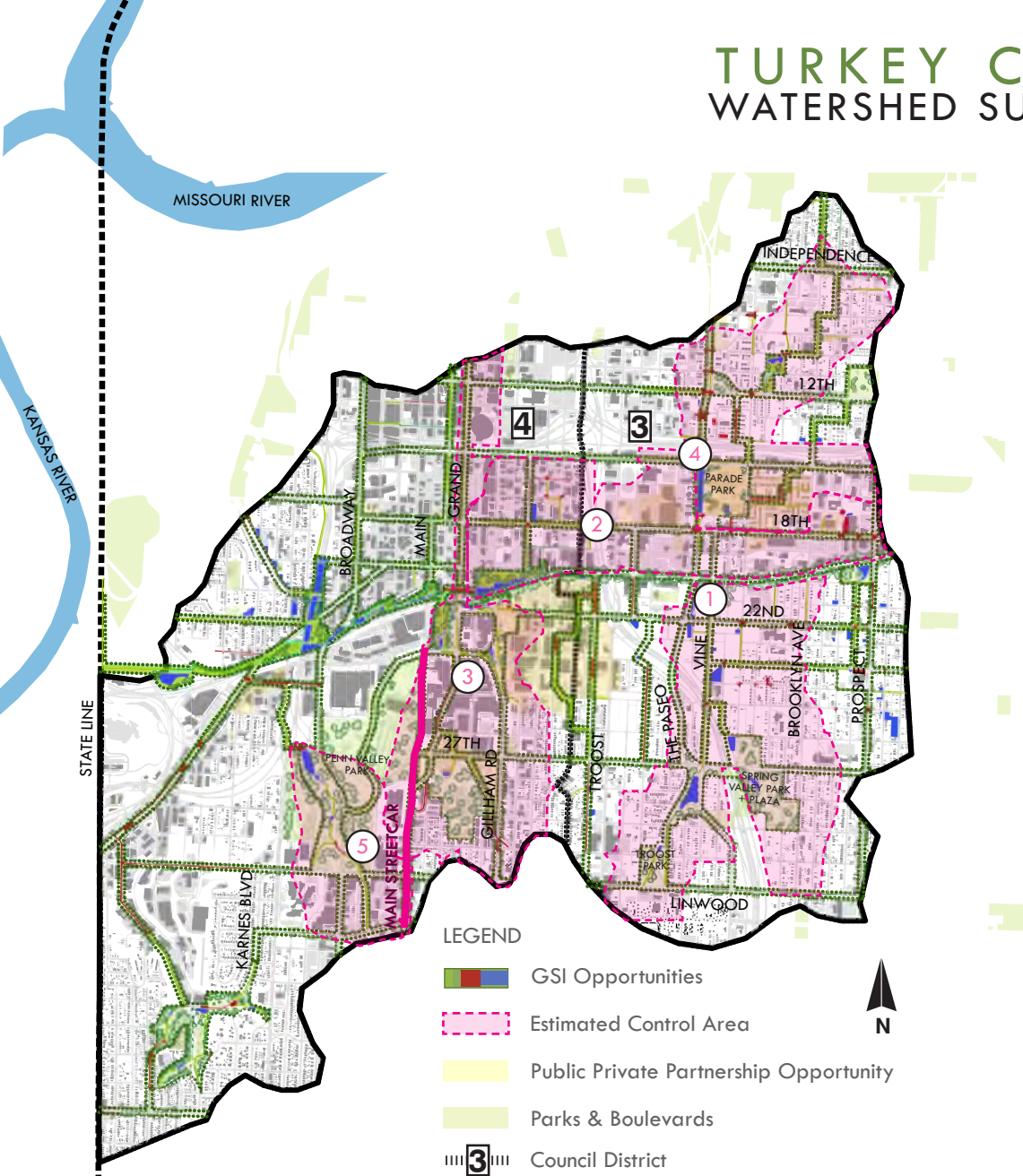
Bird's eye view looking south toward Central High School with I-70 curve in the foreground

PHOTOGRAPHIC CREDITS INCLUDED FOR THE FOLLOWING PAGES:

68. Intersection of 31st Street and Van Brunt Boulevard from “Kansas City, Missouri.” Street View, Google Maps. Accessed 1 Feb. 2018.
71. LEFT: Intersection of 31st Street and Van Brunt Boulevard from “Kansas City, Missouri.” Map, Google Maps. Accessed 1 Feb. 2018.
73. TOP LEFT: Valuing Green Infrastructure in Portland, Oregon. Arbor Day Foundation, February 27, 2014. Accessed April 2nd, 2018. <https://actreesnews.org/research/valuing-green-infrastructure-in-portland-oregon/>
73. TOP RIGHT: Shields Engineering Group. *Stream Restoration*. n.d. Accessed April 2nd, 2018. <http://www.shieldseng.com/civil/services-civil-stream.php>
73. LOWER LEFT: Phronesis. 20th Street Streetscape. 2018.
73. LOWER RIGHT: Phronesis. Beacon Hill Bioswale. 2018.



TURKEY CREEK WATERSHED SUMMARY



The Turkey Creek Watershed includes the OK Creek corridor along the railroad defining the south edge of the Crossroads and 18th & Vine Districts. Grand, Broadway, West Pennway, 18th St, and The Paseo highlight Boulevards with opportunity for water collection and conveyance through streetscape improvements.

VISIONARY INTEGRATED GREEN STORMWATER INFRASTRUCTURE OPPORTUNITY PROJECTS

- 1 **VINE STREET CORRIDOR**
Implementation Level III: Stimulate Investment
- 2 **18TH STREET CORRIDOR**
Implementation Level III: Stimulate Investment
- 3 **MAIN / GRAND / GILLHAM CORRIDORS**
Implementation Level III: Stimulate Investment
- 4 **FORGOTTEN HOMES & THE PASEO**
Implementation Level III: Stimulate Investment
- 5 **PENN VALLEY PARK**
Implementation Level II: Improve Integrated Infrastructure

NOTE: Level III Implementation projects generally will include smaller Level I and Level II project opportunities.

PUBLIC R.O.W. IMPROVEMENTS:

- Integrated Planning with City
- Coordinated/Shared Infrastructure Improvements
- Green Streets Program
- Park & Boulevards System Improvements

CITY PROJECTS ALIGNED WITH GSI:

- Integrated Planning with Community
- Community Engagement
- 18th & Vine District Improvements
- 18th St Streetscape
- Streetcar Expansion on Main
- Grand Blvd Corridor Improvements
- Washington Square Park Improvements
- Gillham Rd / Pershing Rd Improvements



THE PASEO BOULEVARD ADJACENT TO THE PARADE PARK

TURKEY CREEK WATERSHED

PROJECT OPPORTUNITIES & NEXT STEPS

Project Opportunities Summary

Vine Street Corridor:

- Greenspace available in Parks & Boulevards Drainage Corridor
- Use of real-time controls in existing Troost Lake
- Extension of impact of 18th & Vine City investment

18th Street Corridor:

- 18th Street streetscape improvements a priority between Crossroads and 18th & Vine Districts
- 18th Street corridor is low point; high control potential in highly impervious watershed

Main/Grand/Gillham Corridors:

- Grand Streetscape, Main Streetcar Extension, and Gillham General Bond projects all converge at Washington Square Park, a greenspace at a low point and also targeted for major infrastructure changes
- Large impervious subwatershed with significant development expected around Crown Center

Forgotten Homes & The Paseo:

- Greenspace in drainage corridor on city-owned properties
- Excellent opportunity for regional detention as amenity
- Further encourage development adjacent Paseo Gateway development node

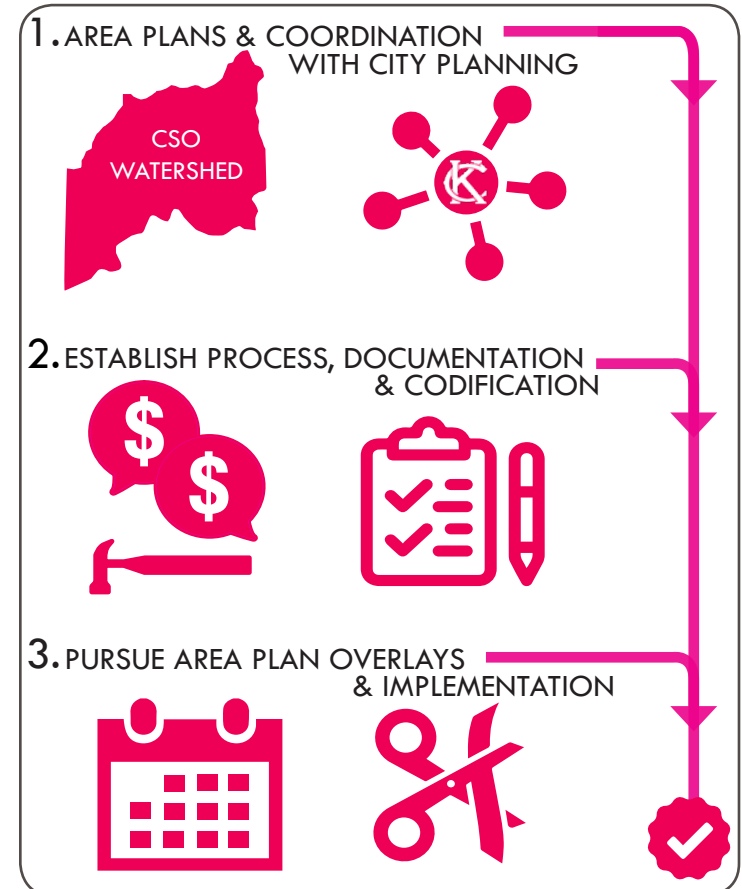
Penn Valley Park:

- Provide cleaner water to Penn Valley Lake
- Use of real-time controls in existing Penn Valley Lake

NEXT STEPS:

- Establish Stakeholder Engagement Process
- Begin Integrated Planning Process with City
- Develop Action Plan & Area Plan Overlay
- GSI Feasibility Study
 - Technical Evaluation
 - Design Recommendations

NEXT STEPS PROCESS



TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

VINE STREET CORRIDOR INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 495 Acre Watershed
- Implementation Level III: Stimulate Investment
- Include GSI in focal area of City
- Extend 18th & Vine community impact
- Project scope flexibility
- Urban Neighborhood Initiative Purpose Built Community Focus Area

NEIGHBORHOOD IMPACT:

- Council District 3
- Wendell Phillips
- Beacon Hill
- Mount Hope
- Key Coalition
- Linwood/Ivanhoe
- Center City

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

A VINE STREET CORRIDOR

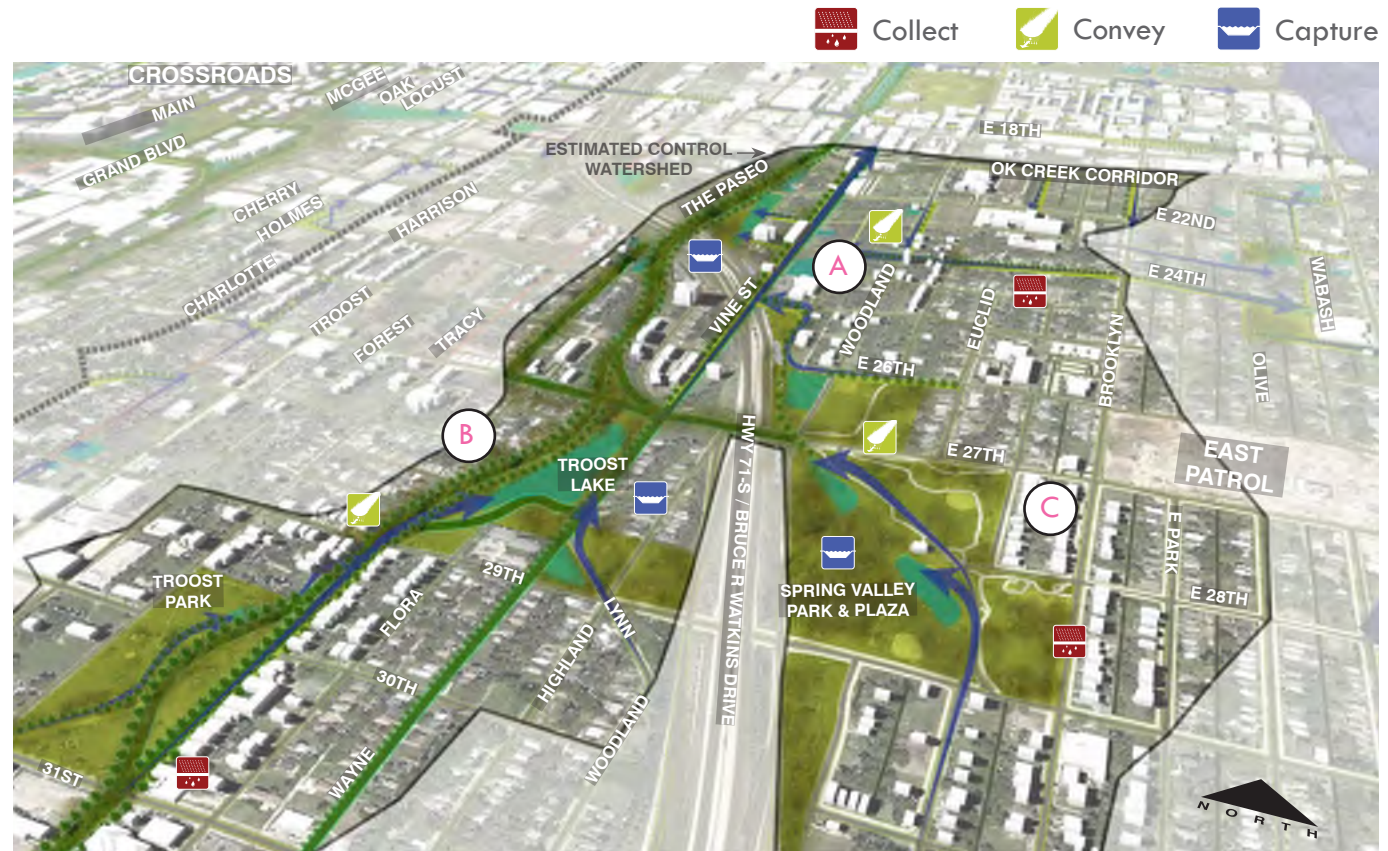
Distributed GSI
Drainage corridor for subwatershed; green street GSI can control up to 5 blocks parallel through gravity flow/piping; several open space detention opportunities adjacent corridor

B TROOST LAKE PARK

Centralized GSI
Real-time control of lake, control drainage from Mt Hope and Beacon Hill neighborhoods, additional detention opportunities in Park

C SPRING VALLEY PARK

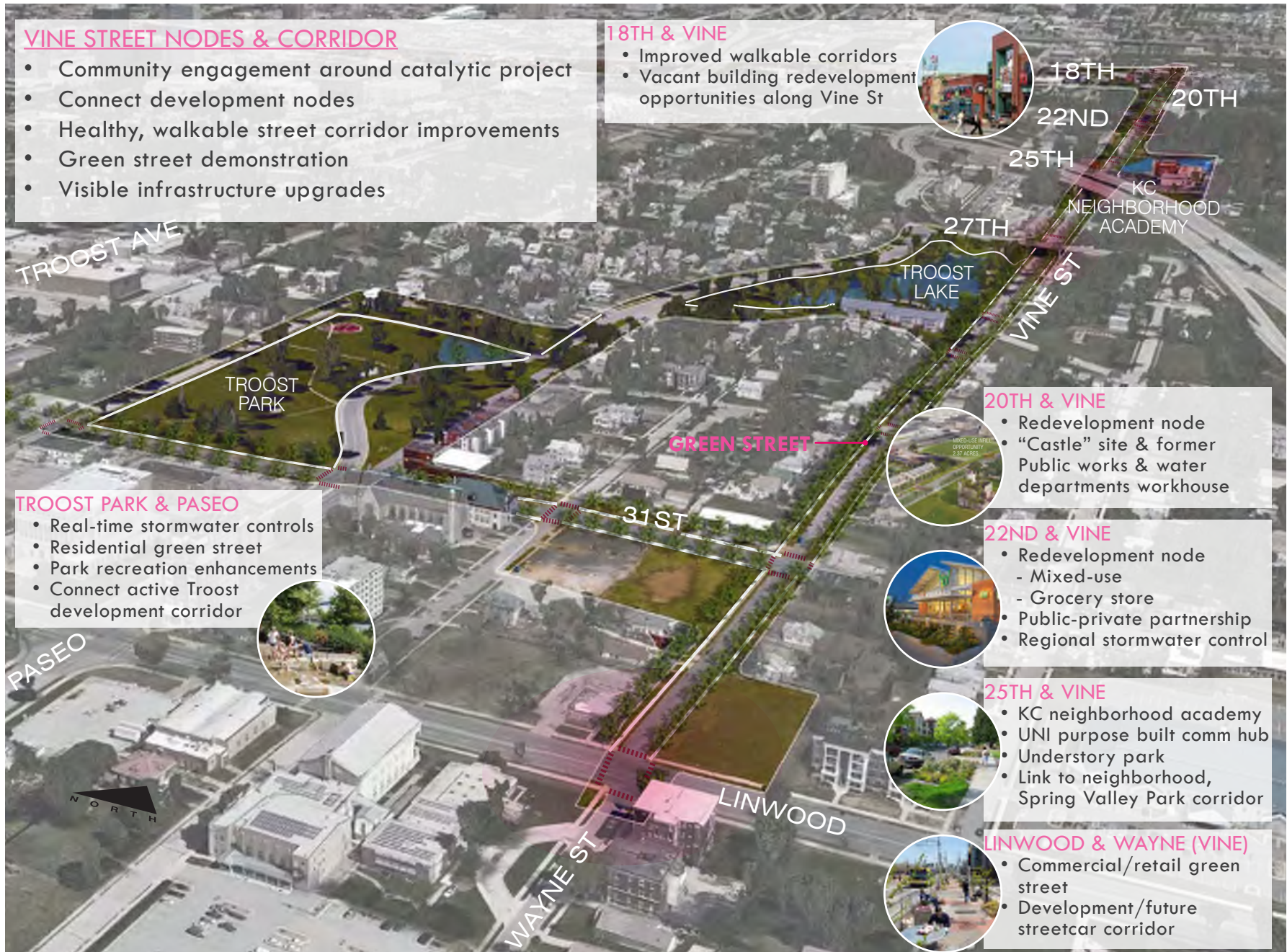
Neighborhood GSI
Use natural drainage corridor, real-time control and new detention opportunities within Park and adjacent US-71, strengthen connection to East Patrol, Prospect



Bird's eye perspective looking northwest toward Vine Street, The Paseo, and 18th & Vine and Crossroads Districts

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

VINE STREET CORRIDOR COMMUNITY IMPACT



Bird's eye perspective looking northwest along Vine St Corridor toward Troost Park and Troost Lake

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

18TH STREET CORRIDOR INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 343 Acre Watershed
- Implementation Level III: Stimulate Investment
- Integrate into existing community improvements underway along 18th & Vine corridor
- Primarily Green Streets GSI due to lack of available open space

NEIGHBORHOOD IMPACT:

- Council Districts 3 & 4
- 18th And Vine
- Crossroads
- Wendell Phillips
- Crown Center
- Hospital Hill
- Beacon Hill

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Planning & Development

GSI FOCUSED PROJECT ELEMENTS:

A 18TH STREET CORRIDOR

Distributed GSI
Green street GSI corridor; overlay with planned streetscape improvements connecting districts, control stormwater in highly impervious area of city

B EAST CROSSROADS

Centralized GSI
Green street GSI corridor captures flow from highly impervious district; low point shifts south to 20th St. between Locust and Campbell; large control area potential at parking lots south of 20th St.

C 18TH & VINE DISTRICT

Distributed GSI
Incorporate green street GSI where possible on 18th St. and within developing areas, including Urban Youth Academy, capturing flow from Parade Park homes.



Collect



Convey



Capture



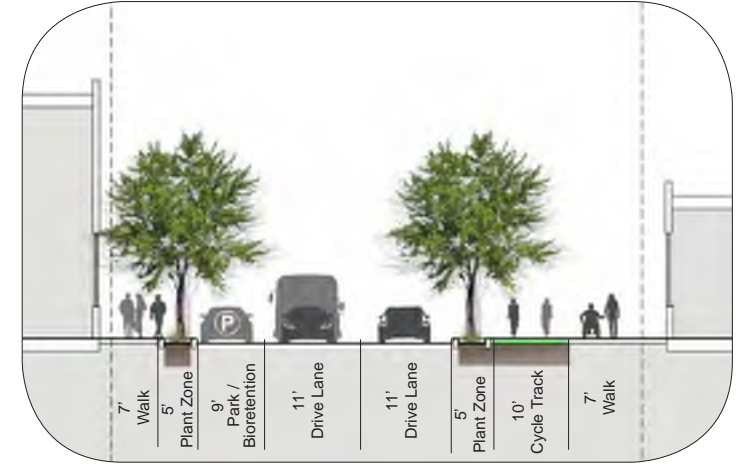
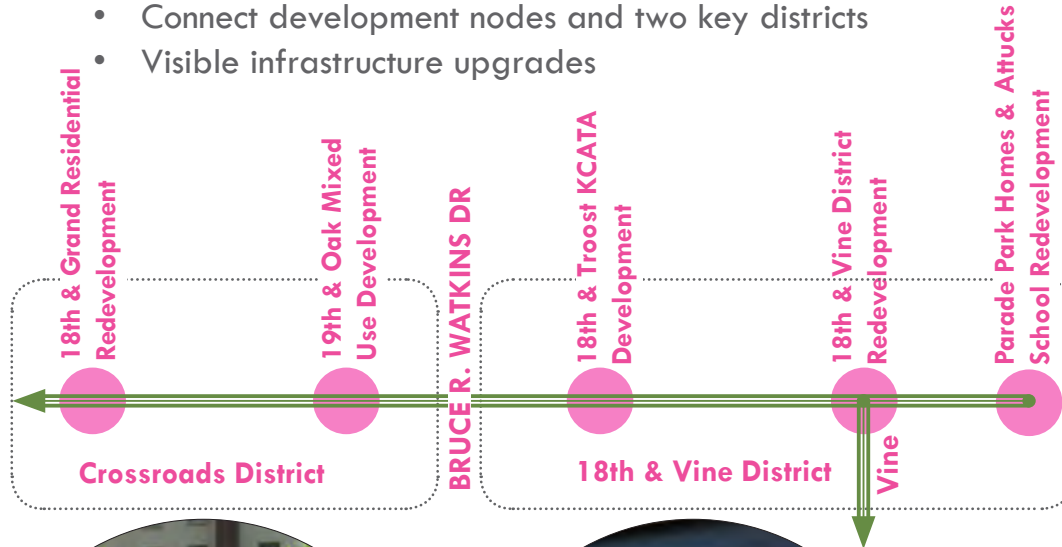
Bird's eye perspective looking north toward 18th & Vine, Crossroads, Paseo Gateway, and Downtown

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

18TH STREET CORRIDOR COMMUNITY IMPACT

18TH STREET NODES & CORRIDOR

- Distributed GSI green street demonstration
- Green corridor reduces impervious surfaces while increasing sub-surface storage
- Community engagement around catalytic project
- Connect development nodes and two key districts
- Visible infrastructure upgrades



DISTRIBUTED GSI IMPROVES PEDESTRIAN AND GREATER CORRIDOR EXPERIENCE



GSI INTEGRATED STREETScape IMPROVEMENTS



COMMUNITY FOCUSED ENGAGEMENT



HEALTHY, WALKABLE STREET CORRIDOR



STRENGTHENED DISTRICT CONNECTIVITY

MAIN / GRAND / GILLHAM CORRIDORS INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 394 Acre Watershed
- Implementation Level III: Stimulate Investment
- Comprehensive GSI Plan can influence future development both public and private
- Integrated design to include GSI in Main St. Streetcar extension, Grand Blvd, and Gillham Rd infrastructure upgrades

NEIGHBORHOOD IMPACT:

- Council Districts 3 & 4
- Hospital Hill
- Crown Center
- Union Hill
- Beacon Hill
- Longfellow
- Crossroads
- Mount Hope
- Broadway-Gillham

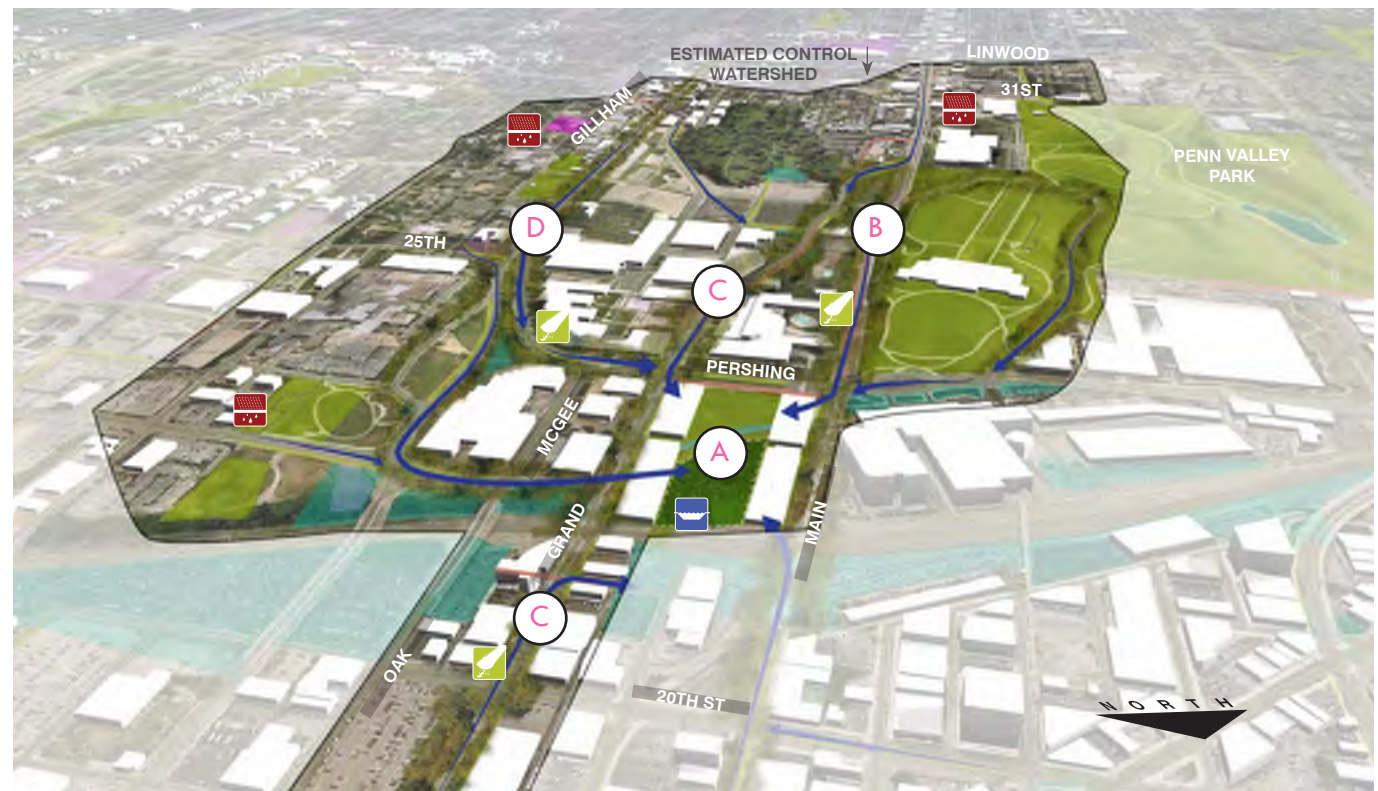
CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Planning & Development
- Parks & Recreation
- KCATA

GSI FOCUSED PROJECT ELEMENTS:

- A WASHINGTON SQUARE PARK**
Centralized GSI
Redevelopment of the park can include regional control potential
- B MAIN ST. STREETCAR EXTENSION**
Distributed GSI
City's next major street infrastructure project can include GSI components on a highly impervious corridor
- C GRAND BOULEVARD**
Distributed GSI
Include GSI within City's primary Complete Street development corridor, offers PPP opportunity
- D GILLHAM RD**
Distributed GSI
General Bond project can also provide benefits to Smart Sewer by including GSI

 Collect
  Convey
  Capture



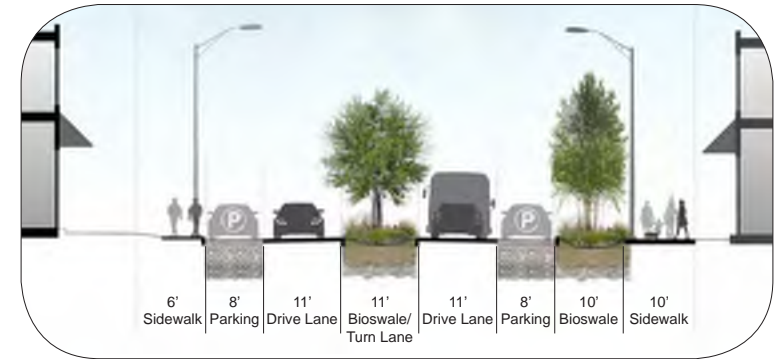
Bird's eye perspective looking southeast toward Washington Square Park, Crown Center, National WWI Museum, and Midtown

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

MAIN / GRAND / GILLHAM CORRIDORS COMMUNITY IMPACT

DEVELOP SMART SEWER PLAN THAT ANTICIPATES DEVELOPMENT

- Substantial redevelopment is on the horizon for this subwatershed: include comprehensive GSI plan now
- Healthy, walkable street corridor improvements
- Visible infrastructure upgrades
- Integrated planning and public-private partnerships
- Potential of hundreds of acres of rainfall controlled in high permeability area
- Street corridor low points: Grand, Main, Pershing/Gillham, and 22nd



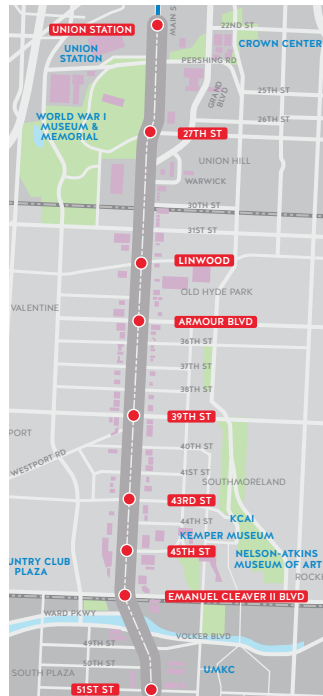
DISTRIBUTED GSI IMPROVES PEDESTRIAN AND GREATER CORRIDOR EXPERIENCE

WASHINGTON SQUARE PARK REDEVELOPMENT CONCEPT



Graphics from Washington Square Park Concept: The River by Coen + Partners, 2014

MAIN ST. STREETCAR EXPANSION PLAN



Graphic from the RideKC Smart Moves 3.0 Regional Transit & Mobility Plan by Kansas City Streetcar Authority, 2012

GRAND BOULEVARD REDEVELOPMENT PLANS



Graphics from the Grand Boulevard Streetscape Plan by BNIM, 2012

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

FORGOTTEN HOMES & THE PASEO INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 451 Acre Watershed
- Implementation Level III: Stimulate Investment
- Opportunity for regional detention in large city-owned greenspace in drainage corridor
- Include GSI in Truman Road road diet project, as well as within The Paseo Blvd corridor
- Project scope flexibility

NEIGHBORHOOD IMPACT:

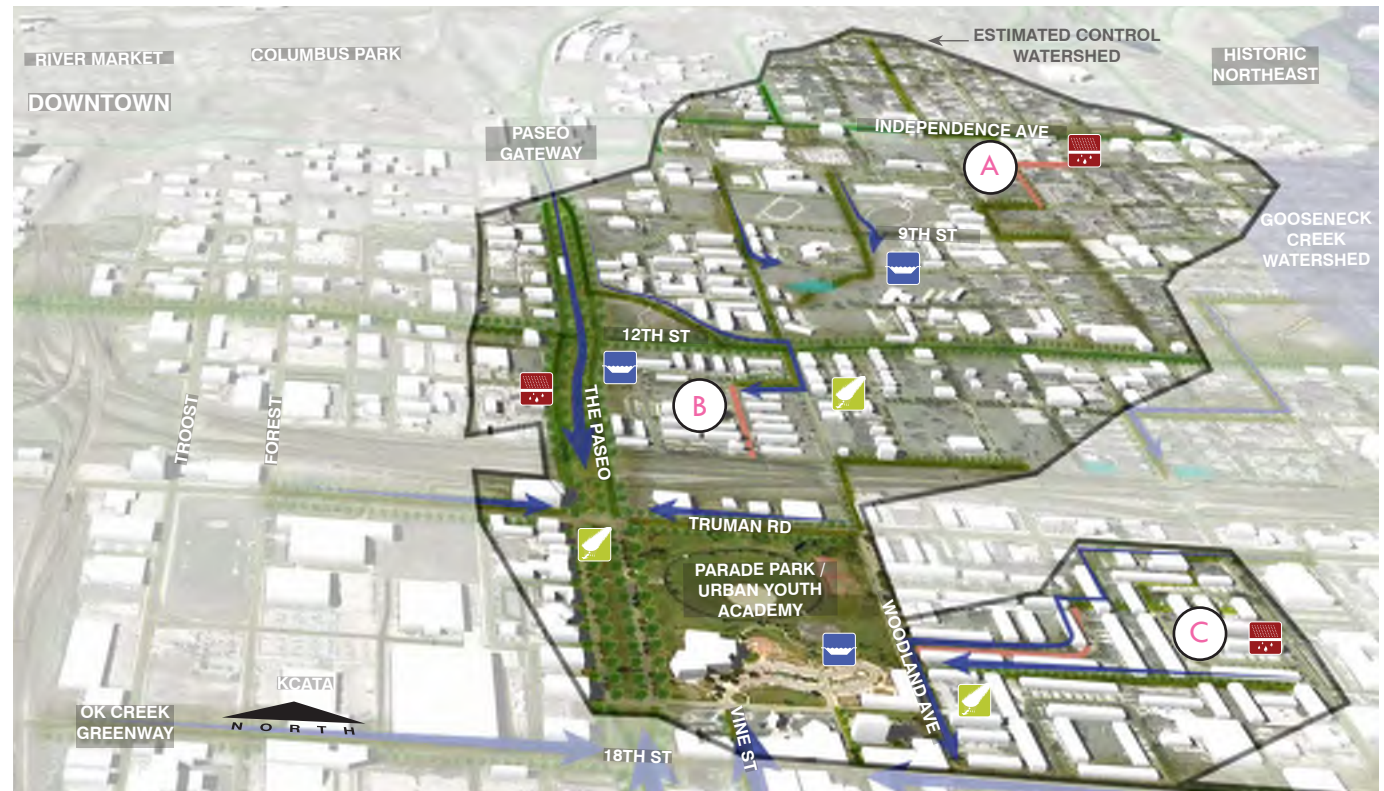
- Council Districts 3
- Forgotten Homes / Parkview
- Independence Plaza
- Paseo West
- 18th And Vine
- Pendleton Heights
- Northeast Kansas City

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Planning & Development
- Neighborhood & Housing
- Parks & Recreation

GSI FOCUSED PROJECT ELEMENTS:

- A FORGOTTEN HOMES/PARKVIEW**
Centralized GSI
Large open City-owned sites offer excellent regional detention opportunity and park-like amenity
- B THE PASEO**
Distributed GSI
Historic boulevard offers opportunity for significant control in area targeted for upgrades
- C PARADE PARK/URBAN YOUTH ACADEMY**
Neighborhood GSI
Redevelopment zones offering opportunity to include cost effective GSI solutions



Bird's eye perspective looking north toward 18th & Vine, Crossroads, Paseo Gateway, and Downtown

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

FORGOTTEN HOMES & THE PASEO COMMUNITY IMPACT

PROVIDE PRODUCTIVE USE GREENSPACE

- Opportunity: low lying city-owned greenspaces within The Paseo Gateway redevelopment area
- Centralized GSI in Park-like setting, design as amenity for any surrounding potential development
- Can tie into Paseo Gateway development narrative
- Understand history, existing uses, and community desires for future
- Community-defined uses overlaid with City infrastructure investment
- Can be development amenity for future residential: ponds, trails, recreation spaces



Bird's eye perspective looking north toward Forgotten Homes/Parkview

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

PENN VALLEY PARK INTEGRATED CONTROL PROJECT

PROJECT OVERVIEW:

- 182 Acre Watershed
- Implementation Level II: Improve Integrated Infrastructure
- Include integrated GSI in Penn Valley Sewer Separation Project
- Opportunity for regional detention in large city-owned greenspace in drainage corridor
- Project scope flexibility

NEIGHBORHOOD IMPACT:

- Council Districts 3
- Crown Center
- Broadway-Gillham
- Westside South
- Coleman Highlands
- Valentine
- Union Hill

CRITICAL CITY PARTNERS:

- Water Services
- Public Works
- Parks & Recreation

GSI FOCUSED PROJECT ELEMENTS:

- A SEPARATE NEIGHBORHOOD**
Neighborhood GSI
Utilize GSI where possible, separate storm sewer flow and direct to Penn Valley Park conveyance
- B PENN VALLEY PARK CONVEYANCE**
Neighborhood GSI
Strengthen drainage corridor to accept more frequent flows to Penn Valley Lake via train of cascading stormwater treatment units
- C PENN VALLEY LAKE**
Centralized GSI
Improve lake water quality and add real-time control of lake capacity to increase control potential ahead of storms



Bird's eye perspective looking south toward Southwest Blvd, Penn Valley Park, and Roanoke Park

TURKEY CREEK WATERSHED OPPORTUNITY PROJECT

PENN VALLEY PARK COMMUNITY IMPACT

BROADWAY GILLHAM

NEIGHBORHOOD IMPROVEMENTS

- Enhance neighborhood by integrating distributed GSI in sewer separation areas
- Connect distributed GSI, convey along Wyandotte Street, Penn Valley Dr. and into Penn Valley Park swale
- Visible infrastructure upgrades



IMPROVED WATER
QUALITY THROUGH ADDED
COMMUNITY AMENITIES



STORMWATER TREATMENT
TRAIN

PENN VALLEY PARK IMPROVEMENTS

- Drastically improve water quality of lake
- Establish stormwater treatment train for pollutant removal along swale above lake
- Allow for recreational use as identified by community
- Real-time control measures to provide added capacity before storms
- Opportunity for upgraded park facilities
- Expand fishing opportunity in partnership with Missouri Department of Conservation (MDC)



DISTRIBUTED GSI PROJECTS



UPGRADED PARK FACILITIES

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