

# **GREEN INFRASTRUCTURE PLAYBOOK**

MID-AMERICA REGIONAL COUNCIL  
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# EXECUTIVE SUMMARY

## WHY GREEN INFRASTRUCTURE

Today, the Greater Kansas City region is struggling to address myriad environmental, economic and social challenges that impact human health and well-being. These include exposure to air, water and soil pollution; select access to green space and quality foods; access to jobs; and greater susceptibility to flooding from storm events and climatic shifts. Measured data over the past half century has shown an increase of four inches of average annual rainfall. It is predicted that rainfall will continue to increase through the last half of this century by as much as six inches of average annual rainfall.

Improving the health of our rivers and streams is a significant goal, but so is a desire to connect people equitably to nature and to foster a pride of place in their Heartland communities. Many vulnerable communities tend to feel the negative impacts of extreme weather events, and also lack access to connected green space, pathways and tree canopy, which help to buffer pollution impacts as well as providing opportunity for active living and safe pedestrian and bike pathways. Integrating green infrastructure solutions that benefit social and economic needs as well is critical to wholistic solutions to regional challenges.

The backbone of good regional planning is a framework that reestablishes and integrates ecological processes into the heart of the region's cultural and economic fabric. The work in the Phase 1 Green Infrastructure Framework set the stage for quality of life that is based on regeneration — a process of analysis and engagement with the purpose of integrating living systems with human aspirations. These two Playbooks for the Rock Island Corridor and the Shawnee Mission School District set the stage for demonstrating replicable approaches for implementing green infrastructure that integrates both ecological and socioeconomic needs.

## ROCK ISLAND CORRIDOR PLAYBOOK

The Rock Island Corridor spans 17.7 miles through the four watersheds, and the railroad corridor was acquired in May 2016 through a partnership with the KCATA and Jackson County. As part of this effort, Jackson County will benefit from providing critical bike and pedestrian linkages to a number of the region's existing and planned trails, as well as the Sports Complex, downtown Raytown, south Lee's Summit, and the View High corridor. These paths will provide opportunities for physical activity, improved residential property values, connectivity of diverse neighborhoods, and bring residents closer to their natural surroundings.

In addition to stakeholder meetings and ground-truthing site visits, a suitability analysis focused on ecological and socioeconomic factors helped determine hotspots along the corridor for where green infrastructure solutions would be impactful. Stepping down in nested scales, the northern trail connectivity was assessed and how green infrastructure solutions integrate into that to benefits the surrounding communities and ecosystem. The Rock Island Corridor trail has the potential to integrate green infrastructure with multi-benefit solutions along its entire length, and the process demonstrated in its Playbook can and should be used to identify additional sites with project momentum, identifiable champions, access, need, and proximity for maximum replicability.

## SHAWNEE MISSION SCHOOL DISTRICT PLAYBOOK

The Shawnee Mission School District embraces the opportunity to lead as it straddles seven watersheds and intends to design sustainable sites using state-of-the-art ecological design principles to increase student achievement, improve environmental quality, and serve the community. Shawnee Mission has already shown its dedication to green infrastructure principles by developing the Center for Academic Achievement (CAA), which includes site stormwater management, native plantings, food production, and community connectivity.

One of the biggest deterrents of green infrastructure is perceived worry and issues of maintaining it after implementation. This playbook explored adaptive management strategies for how to maintain and adapt the CAA's current green infrastructure system, and how these strategies can be implemented district-wide. Additionally, a similar process of stakeholder meetings, site visits, and an ecological, socioeconomic suitability analysis were conducted for the Shawnee Mission School District. This analysis overlapped with school sites identified priority schools for future green infrastructure projects that provide opportunities to link to nearby conservation and restoration initiatives. School facilities offer a unique opportunity to model best practices in green infrastructure for both the future workforce and surrounding communities and help expand the network of green infrastructure strategies at a regional and increasingly impactful scale.

## RECOMMENDATIONS & NEXT STEPS

The next phases of work include additional ecological and human systems research, analysis and map refinement, continuing process definition for opportunity area implementation, green infrastructure solution and policy refinement, a communications platform and web-based Framework interface. These playbooks were created as examples and to give a how to on looking at green infrastructure solutions within projects, and how a networked solution can benefit communities in a myriad of ways. Maintaining the momentum of Phase 1 and the Playbooks' engagement and enthusiasm is key to success of the development and use of the Framework. Feedback from communities and organizations that test the Framework will inform its evolution and opportunities for integration. We must continue this important work to help stakeholders of the Greater Kansas City region make strong investments in a resilient future.



# WHY GREEN INFRASTRUCTURE?

## WHAT IS GREEN INFRASTRUCTURE?

The Environmental Protection Agency (EPA) defines green infrastructure as, “...a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits.” The Nature Conservancy defines green infrastructure solutions as, “...planned and managed natural and semi-natural systems which can provide more categories of benefits, when compared to traditional gray infrastructure.” Both of these commonly accepted definitions focus on benefits to the environment and to people.

The systems that the Nature Conservancy definition refers to are often soil or vegetation-based and include planning approaches (e.g., tree preservation, stream buffer zone protection and impervious surface reduction) as well as physical strategies (e.g., tree planting, prairie restoration, stream bank stabilization, and permeable pavement). Green infrastructure treats rain as a key ingredient to solutions rather than a waste and thereby allows community development goals to align with water, land and air quality goals. The purpose of this document is to show the potential of an expanded approach to green infrastructure that connects our region’s natural resources to people in ways that create networks of environmental, economic and social benefits in all communities.

## WHY - GREEN VS. GRAY

Just as significant as the goals for improving the health of our rivers and streams, is a desire to connect people equitably to nature and to foster a pride of place in their Heartland communities. Too often our most vulnerable populations are the most susceptible to the negative impacts of a degraded environment and extreme weather events. Some communities suffer increased pollution and related health issues based on proximity to major roadways. Many have aging streets and sewers that flood in all rain events and more severely in the increasing number of flash floods.

When trying to alleviate wet weather impacts, the instinct is to turn solely to human-engineered infrastructure such as pipes and drains that collect and push the water downstream. However, grey infrastructure is challenged more and more with urbanization and high volumes of impervious surfaces, which leads to undersized, piped systems that are difficult and costly to replace. In addition, grey infrastructure typically only assists with managing stormwater without being able to layer in other benefits to its surrounding communities and ecosystems.

Green infrastructure solutions are solutions that simultaneously help to alleviate the pressures of wet-weather events as well as provide important amenities to our communities. In addition to providing the ecosystem services of cleaning the air and slowing and cleaning water, green infrastructure systems also improve the economic value of our built environment and connect people to nature and to one another. Pathways for water are also pathways for pedestrians and cyclists, and provide healthy lifestyle and mobility opportunities that are needed for the health and resilience of our community systems.

## WHAT IS A GREEN INFRASTRUCTURE PLAYBOOK?

A playbook is a framework that demonstrates replicable approaches for implementing green infrastructure for ecological and socioeconomic benefits using nested scales of analysis. It looks beyond analyzing ecological value areas and ecosystem benefits, but also looks at the human outcomes and social benefits that a green infrastructure solution can provide. A playbook project may fall within an area prioritized regionally because it depicts high ecological and socioeconomic factors that a green infrastructure solution could benefit. However in addition to these factors that show need, three other non-geospatial criteria for near-term implementation serve as catalysts. These include momentum, accessibility, and proximity (as described below). These criteria add additional weight to projects to help understand the impact and timing of green infrastructure solutions implemented.

The following introduction and chapters explain the context and processes of a playbook as well as flush out two playbook examples. These two playbooks show in depth two very different projects, processes for integrated ways to incorporate green infrastructure solutions, and how to adaptively manage green infrastructure solutions once implemented.

## MOMENTUM

- > Projects Already Started
- > Partners in Place

## ACCESSIBILITY

- > Translatable to Wide Audience
- > Projects’ Lessons Learned
- > Exemplify Replication and Education

## PROXIMITY

- > Connect The Dots / Ripple Effect
- > Through Trails, Schools, or Recreation Links

## NEED

- > Natural Resource and Human Health Need
- > Nexus of Food, Active Living, Jobs, Water, Energy, Transportation



# CONTEXT

## GREEN INFRASTRUCTURE PLAYBOOK

### BACKGROUND

This Playbook is the next step in the process of examining green infrastructure opportunities within the Kansas City region and builds upon these earlier phases:

- *Phase 1 Green Infrastructure Framework - Connecting People with Nature:* This document addresses the question of “Why green infrastructure?” and provides the background qualitative and quantitative analysis used to establish a methodology and process for next steps. The Atlas maps created during this process highlight ecological and social needs in the region, and outline integrated strategies for specific areas in the region that are ripe for action based on criteria of need, momentum, accessibility and proximity to other high value projects.
- *Phase 2 Green Infrastructure Framework - Suitability Analysis Report:* Stakeholders within the region submitted their projects to MARC for technical support and/or to be highlighted as success stories in the Atlas. Two projects were prioritized for technical support based on their alignment with criteria established in the Phase 1 Framework, and are included in this Playbook:
  - *Rock Island Corridor*, selected because of its clear connection to regional transportation priorities, and because of its current funding and committed partners (momentum) as well as its accessibility to a wide audience for advocacy and education on the benefits of green infrastructure to people and nature.
  - *Shawnee Mission School District (represented by the CAA)*, selected because of its significant momentum, accessibility for lessons learned and proximity to many other school sites for replication.

Additional data analysis and input from stakeholders have guided the contents of this Playbook. Both projects are specific to their place within the Kansas City metro, while serving as examples for implementation of similar strategies throughout the region. Further, these are but two examples upon which to base other entries into the Playbook, the goal of which is to add many more projects from the region that are prime for green infrastructure and all the benefits associated with it.

### CONTRIBUTORS

The following projects were submitted as applications for inclusion in the green infrastructure Atlas and Playbook. These success stories remain critical contributions to the good work occurring within the region. The team has deep gratitude for all applicants that took the time to respond to the call for entries in both categories.

#### Atlas

- 151st Street and Lindenwood Drive Floodwater Project
- 20th Street Streetscape
- 56 Commerce Center of Johnson County
- Blue River Trailhead
- Chestnut Detention Real-Time Control
- Green Infrastructure Demonstration Project
- Hiawasse Park
- Kansas City Municipal Farm Habitat Restoration
- Kansas City Parks with Purpose
- Lexington Lake Park
- Middle Blue River Green Infrastructure Pilot
- Northeast Industrial District Green Infrastructure
- Olathe Environmental Laboratory
- Olathe West High School BMPs
- Peetwood Park
- Pollinator Plot at Heritage Park
- Swope Campus Parking Lot Supplemental Environmental Project
- Target Green East (Phases 2, 3)
- Target Green West (Phases 1, 3)
- Willow Lake
- Wornall Road and 75th Street Green Infrastructure

#### Playbook

- Blue Valley Oxbow Habitat Enhancement
- Charlotte Sawyers Nature Area Restoration
- East High School Green Infrastructure Project (collaboration between KC Public Schools and city of Kansas City, Missouri)
- Golf Hill Development
- Rock Island Corridor
- Schools as Hubs Lead Communities to Thrive with Nature
- Shawnee Mission School District Sustainable Sites
- The Giving Grove

### PURPOSE

The purpose of the MARC Green Infrastructure Playbook is to help communities see how integrated green infrastructure planning can benefit high value community needs as well as natural resources. It is also to demonstrate a replicable method for:

1. Using watershed-based mapping to identify multi-benefit opportunity areas embedded within a network of planned or ongoing projects;
2. Identifying potential partners within an opportunity area where green infrastructure conversations serve as a catalyst to build community connections, and;
3. Designing green infrastructure strategies that support, restore, and enhance natural landscape functions while providing social benefits.

Nonprofits, neighborhood organizations, and government agencies are encouraged to use the approaches described here to find partners to address common issues and work with MARC to build community connections that leverage momentum, funding, and development and implementation of creative solutions.



# OVERVIEW

## GREEN INFRASTRUCTURE PLAYBOOK

### PROCESS

The steps of preliminary study for integrated green infrastructure strategies include both qualitative and quantitative evaluation. An outline of the steps follows:



1. Define a study area boundary or buffer zone around your focal project area, including community connections.



2. Identify priority ecological and human assets and needs in the area using regional mapping resources (e.g., MARC's Atlas and models).



3. Engage with stakeholders to set goals and identify upcoming challenges and opportunities within the study area.



4. Identify and evaluate the places with the strongest intersections of opportunities and needs for the application of green infrastructure strategies.



5. Assign responsibilities and implement strategies.

This Playbook is designed for use by municipal and county staff, environmental conservation organizations, transportation organizations, neighborhood leadership, school administrators, and facility managers of campuses and public land holdings. As shown in the Playbook examples, there are many ways to start applying this process, depending on the momentum of other ongoing projects.



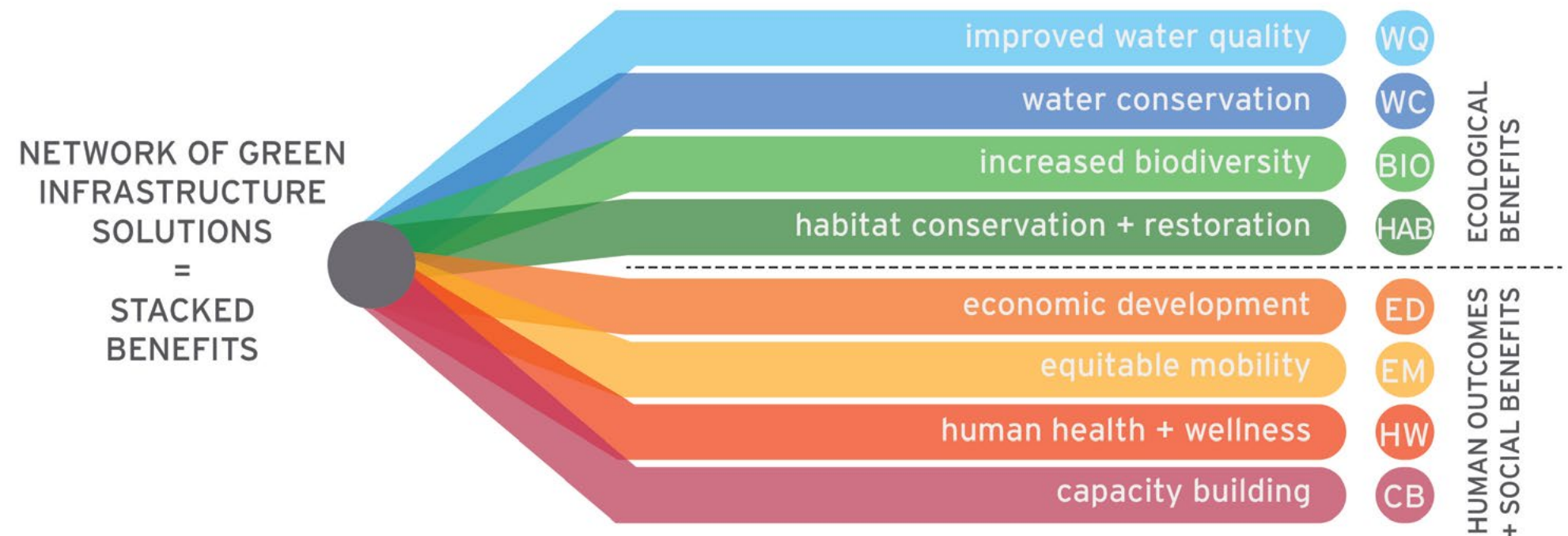
## GREEN INFRASTRUCTURE BENEFITS

This Playbook provides on-the-ground examples in the Greater Kansas City region of the mutual benefit and beauty of considering green infrastructure solutions as a network. This model looks to a healthy state of nature for solutions on how to support resilient and connected communities of people. When implemented together these nature-based solutions not only assist stormwater infrastructure, but also benefit:

- Water quality.
- Water conservation.
- Biodiversity.
- Habitat conservation and restoration.
- Economic development.
- Equitable mobility.
- Human health and wellness.
- Capacity building of communities (to create the places each community wants to live in, through education and partnership).

The outcomes sought are straightforward, and the solutions are proven, but achieving a network of solutions that provide much greater benefit through being implemented together is what requires a new way of thinking and acting. As you will see in the following examples of Rock Island Corridor and Shawnee Mission School District, the planning and implementation of each requires coordinated involvement from multiple perspectives and responsible parties. The factors of influence include public and private landholders, conservation/restoration projects underway, neighborhood cohesion, regional attractions, educational opportunities, employment opportunities, pollution sources, city codes and regulations, funding sources, and many others depending on the unique conditions of each area. By implementing green infrastructure solutions as a network, you can achieve both ecological and social benefits to a project, beyond just assisting with stormwater infrastructure. A network of green infrastructure solutions can create a stack of benefits for a project.

The diagram below depicts eight broad categories of potential benefits green infrastructure can create. It can be broken down into more specifics and is not exclusive, but a green infrastructure project done well can stack many of these benefits and be impactful. Benefits listed here are linked to strategies discussed in the Rock Island and Shawnee Mission playbooks that follow.





# SCALES OF STUDY

## GREEN INFRASTRUCTURE PLAYBOOK

### GLOSSARY OF TERMS

The Green Infrastructure Framework begins at the regional scale with a series of maps called the Atlas that serve to highlight priority areas based on value and need (see Phase 1 for these maps). As previously explained, a playbook is a project framework that demonstrates replicable approaches for implementing green infrastructure for ecological and socioeconomic benefits using nested scales of analysis.

Based on a watershed-scale analysis, Priority Areas are locations selected for further study based on the established criteria of momentum, need, access and proximity set forth in Phase 1 of the Green Infrastructure Framework. The foundation of a playbook is the watershed scale because it groups priority areas and partners based on ecological and hydrological relationships that go beyond municipal/political boundaries. A watershed-scale area is natural drainage area boundaries developed by the U.S. Geological Survey. Within each Priority Area of a watershed, there are often multiple clusters of opportunities that merit further analysis to identify a starting point that will have the greatest potential for immediate impact, which is called an Opportunity Area. For the Rock Island playbook, this translates to the scale of a transit corridor. For the Shawnee Mission School District, this translates to the school district boundaries. Within an Opportunity Area, a Focus Area is the neighborhood or community-scale area that is used to establish connections between projects and to develop recommendations for implementable, site-specific green infrastructure strategies. Both the Rock Island and Shawnee Mission School District playbooks illustrate this scale through the context of adjacent neighborhoods. Another term used is Network Connectors, which is a list of green infrastructure solutions that work within an area to address multiple challenges and link smaller project sites together to strengthen the network of watershed-scale benefits.

These playbooks vary in the scale selection and naming based on the unique features of each project (see diagram on following page). When

reading each playbook, these scale names will be used to describe geographically the scale of the study and the level of detail for that current analysis. For the Rock Island playbook, the Corridor scale is the largest scale within multiple watersheds that identifies a common focus for infrastructure improvements along a common transit zone. Zooming further in on scale, a Sub-Corridor scale is a more manageable area to comprehend the benefits of integrated green infrastructure within the context of specific neighborhoods and partnerships with local stakeholders. Within a Sub-Corridor scale, a Neighborhood scale is critical to green infrastructure implementation because of the engagement required of local landowners and stakeholder organizations to steward the work and champion the benefits for people and nature. Lastly, within a Focus Area or Neighborhood, the Site scale is where on-the-ground implementation occurs for fundable projects that address site-specific needs, while contributing to the integrated green infrastructure approach that is envisioned for all other scales.

For the Shawnee Mission School District playbook, the School District scale allows the school administration to understand the breadth of green infrastructure implementation across their property holdings and the municipalities within which they operate. Like the other playbook, it steps down in scale from the school district to the Neighborhood scale. This Neighborhood scale looks at the engagement required of local landowners and stakeholder organizations to steward the work and champion the benefits for people and nature to implement green infrastructure. Lastly again, the site scale is where on-the-ground implementation occurs for fundable projects that address site-specific needs while contributing to the integrated green infrastructure approach that is envisioned for all other scales.

The following page depicts this study of scales in a diagram showing how the team stepped from the regional scale analysis of the Atlas down to a site scale for each playbook.

### GREEN INFRASTRUCTURE: Three Stages

For each project in the Playbook, there are three main stages of the work: Ideation and Planning, Design, and Maintenance. A sidebar is included to briefly describe the critical nature of each stage, which is necessarily customized for each project.

**Ideation and Planning:** The emphasis in this stage lies on engagement with key stakeholders that can facilitate an integrated green infrastructure framework. At times, momentum already exists with a project that is underway and that can be bolstered by green infrastructure to expand both ecological and human benefits.

**Design:** Crucial in this stage is the identification of clear points of influence, focusing on human and ecological values and needs. Design is the vehicle for integrating solutions that provide greater connectivity for existing conditions and future projects anticipated in the area.

**Maintenance:** After implementation of green infrastructure, focus turns toward increasing their benefits over time. These are living systems that require stewardship with an adaptive management approach that learns over time. Ongoing engagement with key partners is often critical to success at this stage; successful projects then become models for future integrated green infrastructure projects.



## SCALE DIAGRAMS

These diagrams depict the progression of scales for the Rock Island Corridor and Shawnee Mission School District playbooks. These two Playbook examples vary in the scale selection and naming, based on the unique features of each project and the process the team went through to filter priorities and create an integrated network of green infrastructure strategies. The language from the glossary on the previous page further describes the scales of focus.

