

ROCK ISLAND CORRIDOR
GREEN INFRASTRUCTURE PLAYBOOK

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INTRODUCTION

ROCK ISLAND CORRIDOR

WHY TRAIL PROJECTS FOR GREEN INFRASTRUCTURE IMPLEMENTATION?

Trail projects are unique in their ability to cross ecological and social boundaries. They have the potential to transcend these boundaries and connect people and systems at a local and regional scale. Because of this, they are ideal frameworks for the implementation of green infrastructure (GI).

The Rock Island Corridor in particular was 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 GI to people and nature. Implementing green infrastructure along a 17+ mile trail corridor has the potential to connect and positively impact many cities and neighborhoods, watersheds, underserved areas, and a wide range of ecosystems.

HOW TO USE THIS PLAYBOOK

The Rock Island Playbook is the next step in the process of examining green infrastructure opportunities within the Kansas City region and builds upon the Phase 1 Green Infrastructure Plan and the Phase 2 Suitability Analysis, which identified the Rock Island Corridor as a priority, and demonstrates how to strategically move from a regional scale to smaller scales for GI implementation.

The Rock Island Playbook shows the methodology the team used to identify and prioritize GI opportunities along the corridor. The team began at the Corridor Scale shown in the Suitability Analysis, and in studying the intersection of ecological and social needs along the corridor, began to zoom in, first at a Sub-Corridor Scale, then a Neighborhood Scale, and finally a Site Scale. At each of these scales, the Playbook provides examples of GI implementation, with each subsequent scale demonstrating more specific and detailed strategies.

This Playbook entry was created in collaboration with the Rock Island team specifically for the Rock Island corridor and its unique conditions, but the methodology and strategies outlined in the following pages provide a model that should be highly applicable to other trail corridor projects, especially those looking for ways to move from regional planning to “on-the-ground” site implementation.



The MARC GI and Rock Island team exploring the current state of the Rock Island rail corridor.



Reuse of rail trestle at West Fork in West Virginia

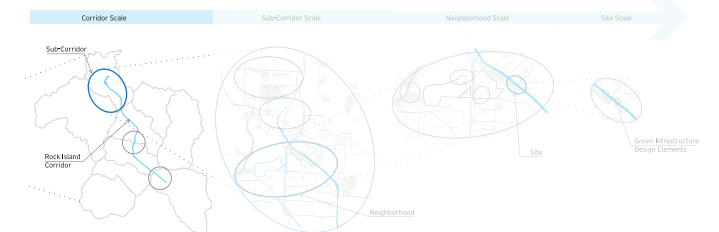


Completed “rails to trails” project in British Columbia

INTRODUCTION

ROCK ISLAND CORRIDOR

CORRIDOR SCALE



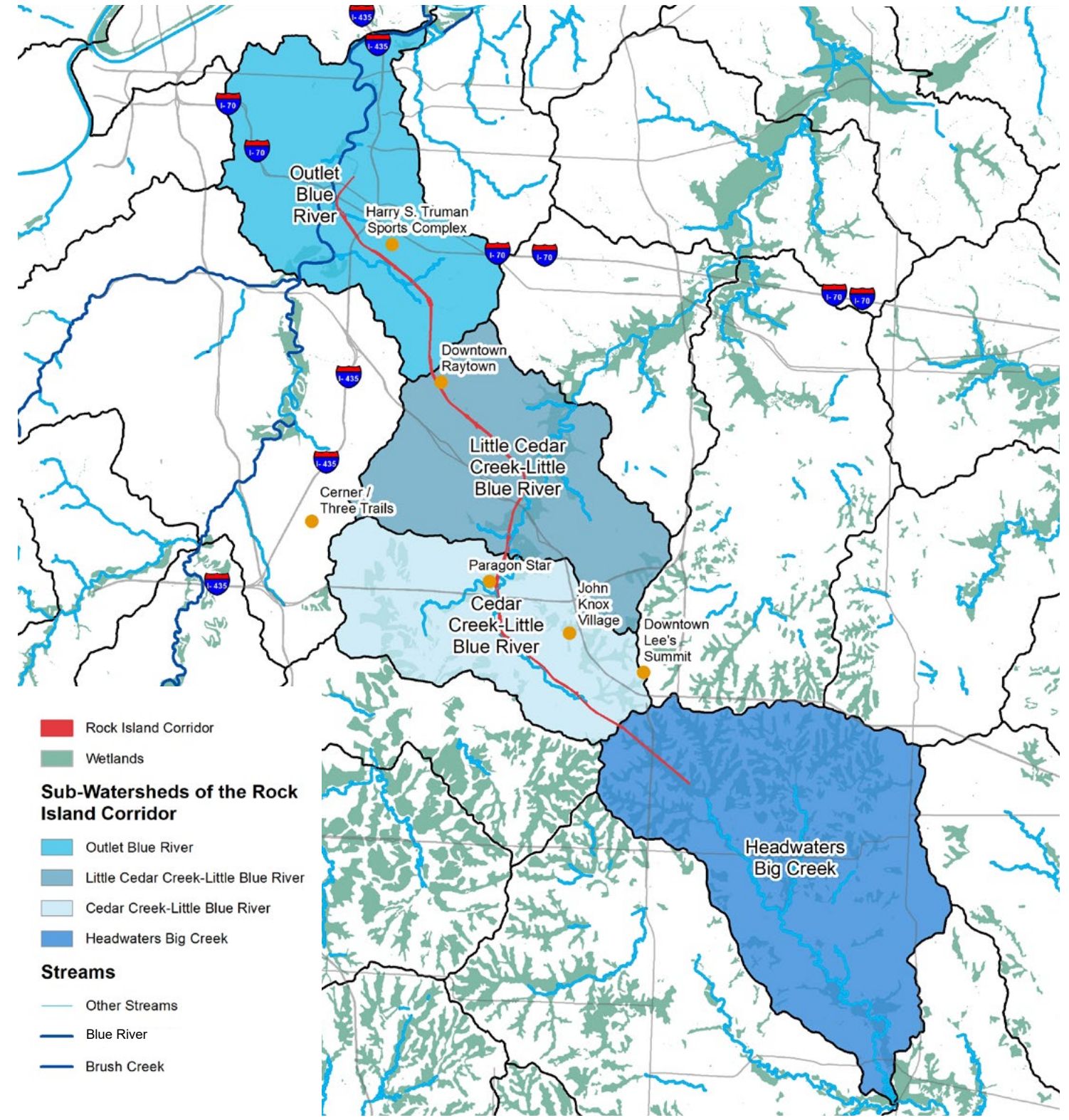
The Rock Island Corridor spans 17.7 miles through the four watersheds shown on the adjacent map. Through over a decade of community capacity building and outreach, the corridor was identified as the Kansas City region's ideal connection to the Katy Trail. Additionally, through transportation planning efforts spearheaded and supported by Jackson County, the corridor was sought as a future commuter rail connection to the Harry S. Truman Sports Complex, city of Raytown, and city of Lee's Summit. The railroad corridor was acquired in May 2016 through a partnership with the Kansas City Area Transportation Authority (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.

KEY CONSIDERATIONS AND ISSUES

- *Transportation:* Access to multi-modal transportation, including public transit, walkability and bikeability are not in neighborhoods adjacent to the corridor.
- *Economy:* Indicators of equity show conditions are below average for income and education in portions of the corridor.

BENEFITS AND METRICS

- *Transportation equity:* Increased number of people/communities with improved access to bike/walk routes, especially supporting access to jobs. Metrics include tracking pedestrian and biking traffic counts over time as infrastructure and access points are constructed.
- *Water resources:* Protected water resources through green infrastructure strategies linked to ecological zones. Metrics include monitoring of water quality and runoff quantities at green infrastructure sites and on sensitive sites downstream in watershed.
- *Connected and restored habitat:* Opportunities to conserve and restore native habitat and increase species diversity. Metrics include population and habitat surveys of indicator plant and animal species in habitat zones over time, and animal tracking studies.
- *Human health and wellness:* Increased healthy food access, education, and outreach programs for healthy lifestyles. Metrics include surveys to determine effectiveness of outreach, data from wearable tracking devices, and opportunities to engage in wellness programs (in person or via mobile devices).
- *Economy:* Community hubs that attract businesses and investments that increase opportunities for lower-income communities. Metrics include monitoring local job opportunities and household incomes.



INTRODUCTION

ROCK ISLAND CORRIDOR

MAPPING AND SCREENING PROCESS

Ecological and social mapping from the Phase 1 Atlas were refined and intersected to show areas where high quality natural resources and potential community connections exist along the trail corridor. Four of these maps are presented and described on the following pages with additional mapping provided in the Appendix.

Interviews with the Rock Island Corridor project coordinator provided additional mapping of challenges and connectivity considerations along the regional trail. Site visits were conducted to observe the trail first-hand (i.e., ground-truth) and identify possible opportunity areas. Initially based on this screening process, multiple opportunity areas were identified. The three areas identified on this map focused around the northern trail segment near the Harry S. Truman Sports Complex, the trail segment near Raytown, and the trail segment at Paragon Star — a mixed-use project underway at View High Drive and Interstate 470 in Lee's Summit to be anchored by a youth sports complex.

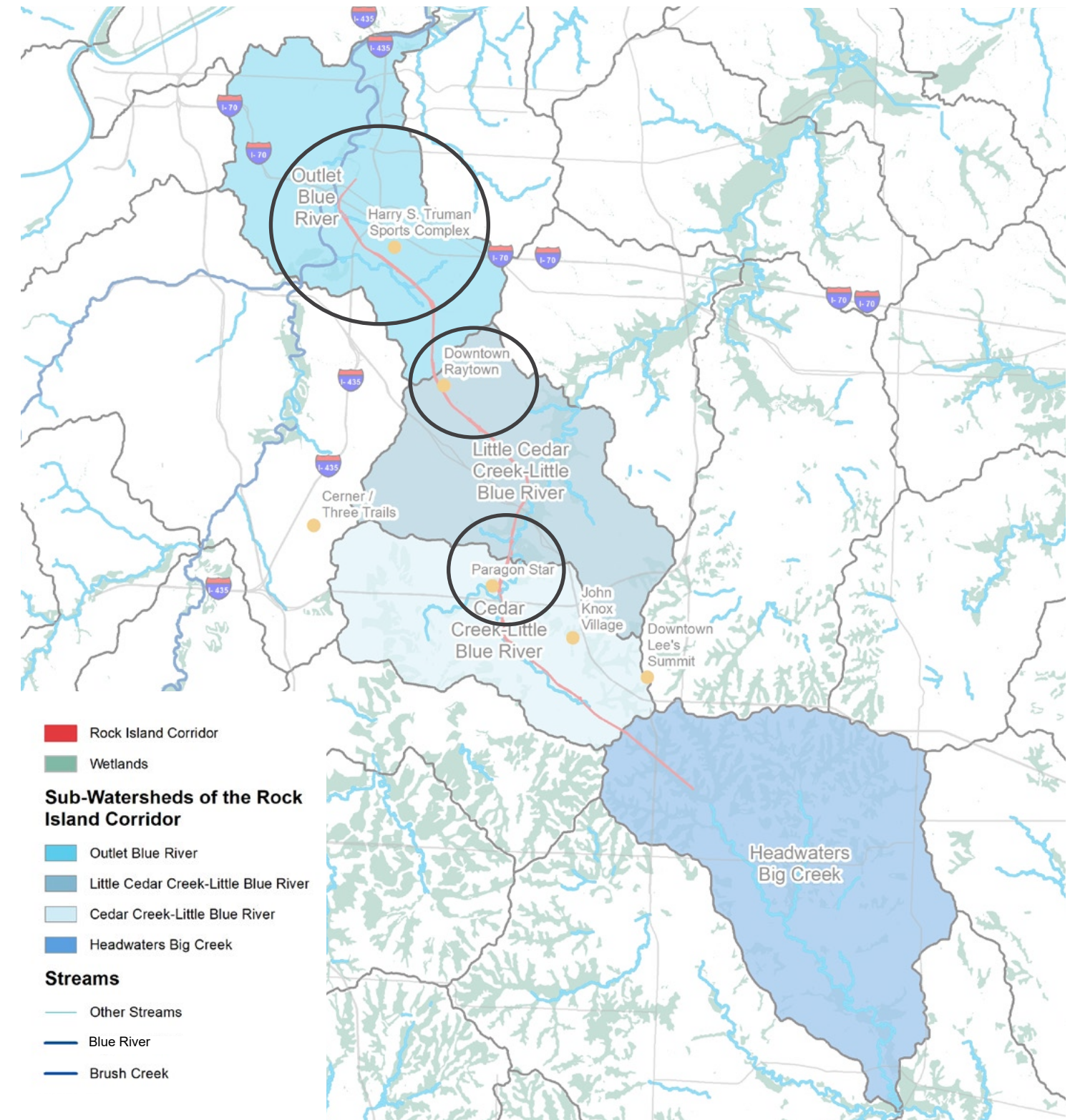
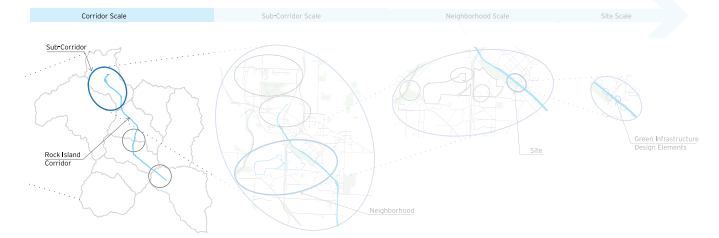
Based on the mapping, site visits, and additional stakeholder/partner interviews, the northern trail segment and its connection to the Blue River Corridor were selected to explore further in the Playbook. The selection criteria included:

- Proximity to land owned by Jackson County.
- Connection to multiple organizations interested in green infrastructure such as those listed below.
- Opportunity to connect to Blue River, Round Grove Creek, additional trails, and nearby East High School.
- Opportunity where diversity of challenges meets an existing capacity to act.

GREEN INFRASTRUCTURE: 1 - Ideation and Planning Stage

The earlier that all involved parties come together, the more interconnection of design and implementation can occur. However, it is more likely that one or two projects have already started and created some momentum, as in the case of our two project examples. In this case, the process begins with getting up to speed on current projects and setting goals that define the opportunities that weave into the current projects in order to expand their benefits. The next set of projects grow from the goals and process established.

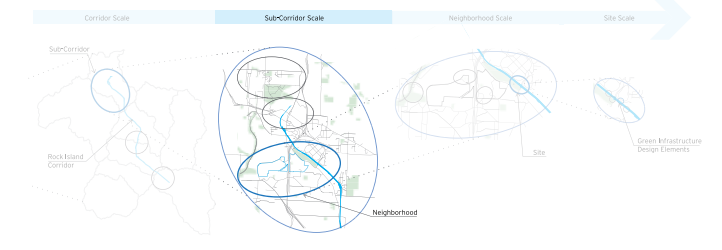
CORRIDOR SCALE



GEOGRAPHIC ANALYSIS CONTEXT

ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE



GEOGRAPHIC ANALYSIS

To move from suitability analysis of the Rock Island Corridor to the development of networked strategies, a closer look at indicators of health and livability related to green infrastructure was taken on the northern opportunity area. Some of the factors used to evaluate types of beneficial strategies and locations for the strategies that can positively impact ecological and social connectivity are:

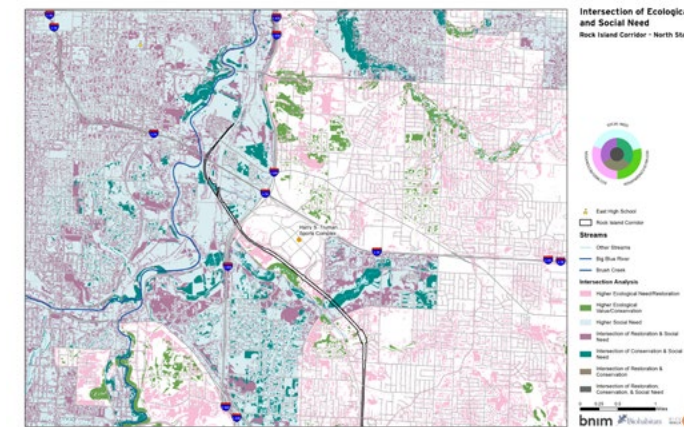
- Ecological-hydrologic zones, such as uplands, lowlands, rocky slopes and floodplains.
- Existence of community hubs and service providers, such as parks, hospitals, clinics, social service providers, schools, grocery stores, corner stores, community gardens, libraries, police stations and other meeting places.
- Areas to develop green infrastructure components to manage stormwater, such as the intersection of large land holders (five acres or more, public or private) with conservation and restoration need.
- Communities with vulnerability such as those with high percentage of households without a vehicle, at or below poverty level, with high minority population, and with low educational attainment.

Maps showing this geographic information may be seen in the Appendix. While this is not a comprehensive process of analysis, these outcomes, paired with local stakeholder interviews, result in the design of strategies that are well-suited to the place and people and have support from local organizations to carry them out, such as:

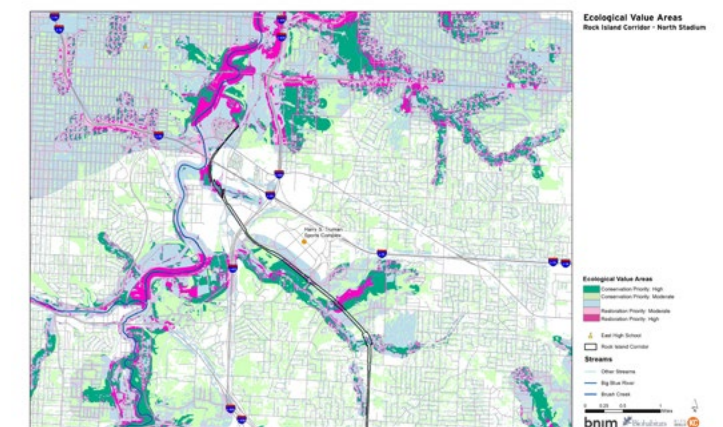
- Complete and green streets for safe multi-modal connectivity and reduced air and water pollution.
- Continuous trails linking activity centers and neighborhoods.
- Stream bank stabilization to increase water quality and stabilize water quantity for healthy habitat.
- Advocacy, education, and training on green infrastructure benefits, landscape maintenance, and job opportunities for all ages.
- Development of green infrastructure components for stormwater management that increase land use potential and density without increasing the strain on the environment and infrastructure.
- Access to safe outdoor active recreation options.

As the regional green infrastructure framework continues to benefit from success stories of other projects and data from their metrics, the process of analysis can be informed by accurate data on health and wellness of people and nature.

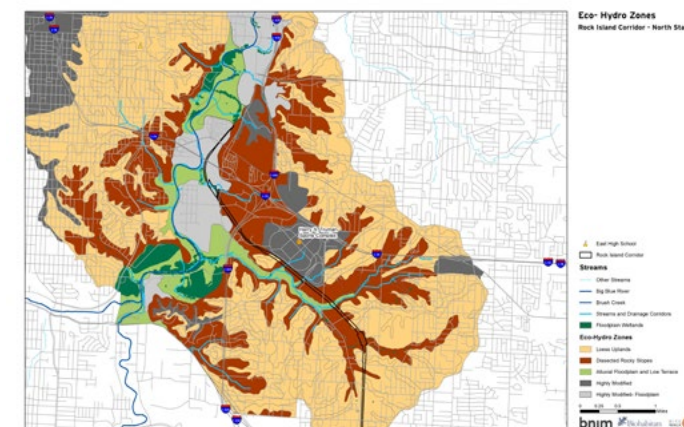
Intersection of Ecological and Social Needs



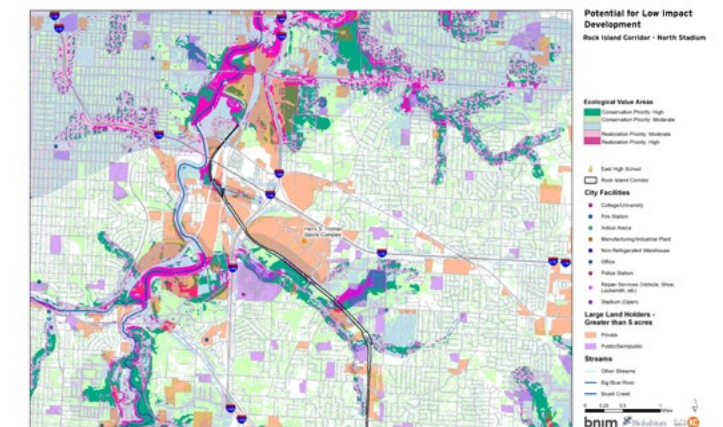
Ecological Value



Eco-Hydro Zones



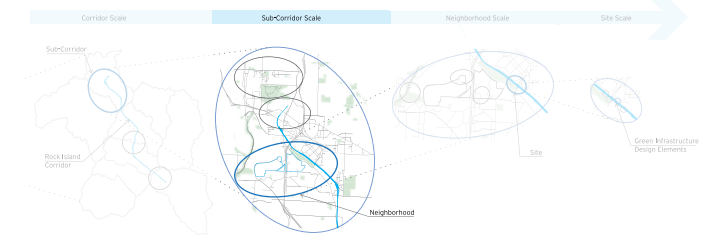
Potential for low impact Development



GEOGRAPHIC ANALYSIS CONTEXT

ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE

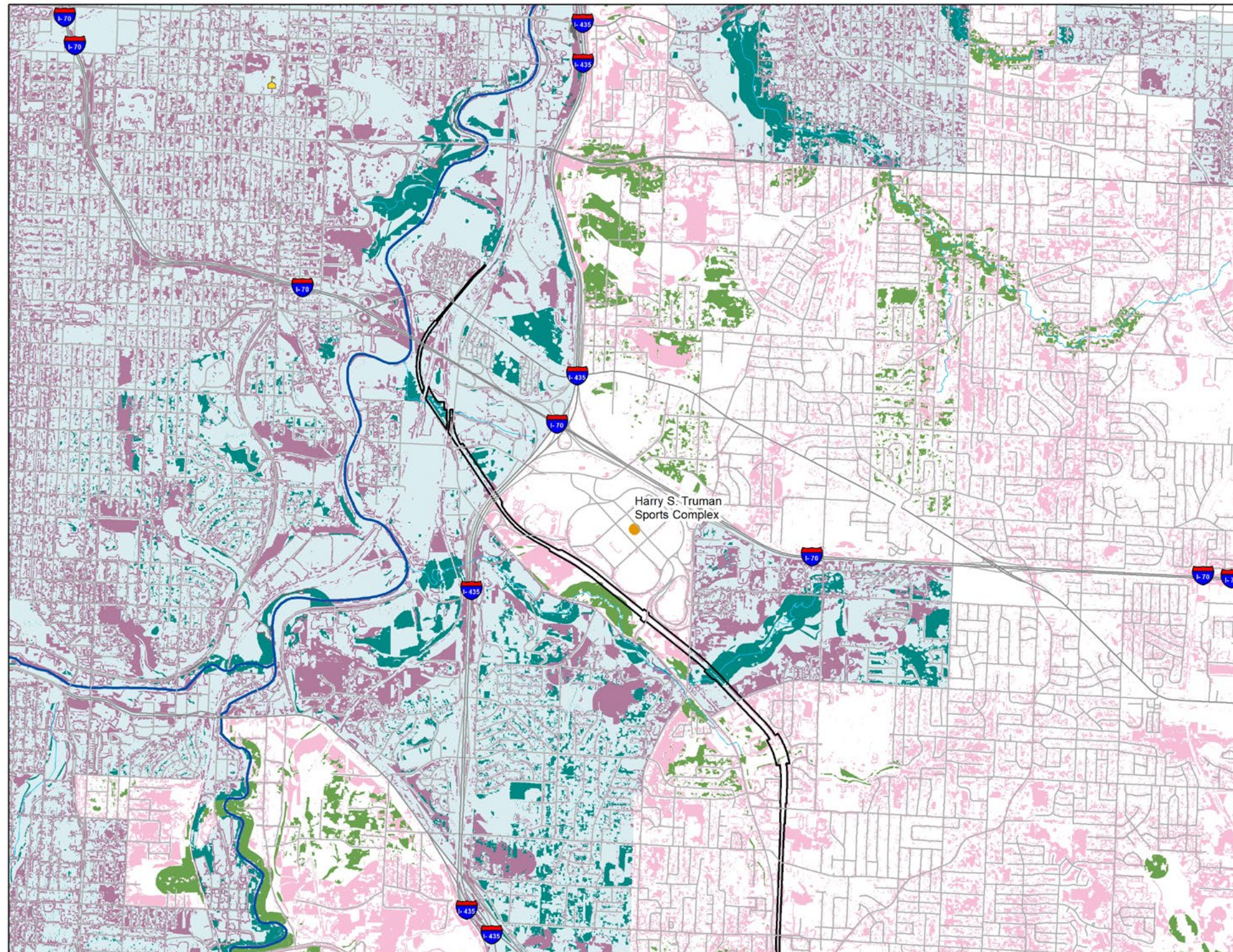


INTERSECTION OF ECOLOGICAL AND SOCIAL NEED

The value of green infrastructure exists in the potential it has to enhance the health and well-being of our communities. Locations where ecological needs intersect with social needs become ideal places to focus attention and investment. In these places, the connection between the ecological functions of the land and the communities who live there are most direct.

Social needs can be varied and wide-ranging and depend greatly on the context and history of a place. In general, measures of community health, mobility, economic opportunity, and equity can provide a measure of social need. The social need areas on this map represent a composite of the following factors: high percentage of households without a car, in poverty, with high minority population, low educational attainment, food deserts, CDC health indicators, population loss, and hazardous waste indicators.

This is not an exhaustive mapping of social needs, nor an exact template for other areas of study, but provides a starting point for identifying locations of opportunity for green infrastructure.



Intersection of Ecological and Social Need Rock Island Corridor - North Stadium



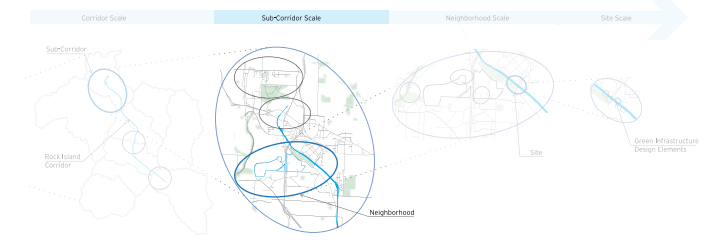
- East High School
- Rock Island Corridor
- Streams**
- Other Streams
- Blue River
- Brush Creek
- Intersection Analysis**
- Higher Ecological Need/Restoration
- Higher Ecological Value/Conservation
- Higher Social Need
- Intersection of Restoration & Social Need
- Intersection of Conservation & Social Need
- Intersection of Restoration & Conservation
- Intersection of Restoration, Conservation, & Social Need



GEOGRAPHIC ANALYSIS CONTEXT

ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE

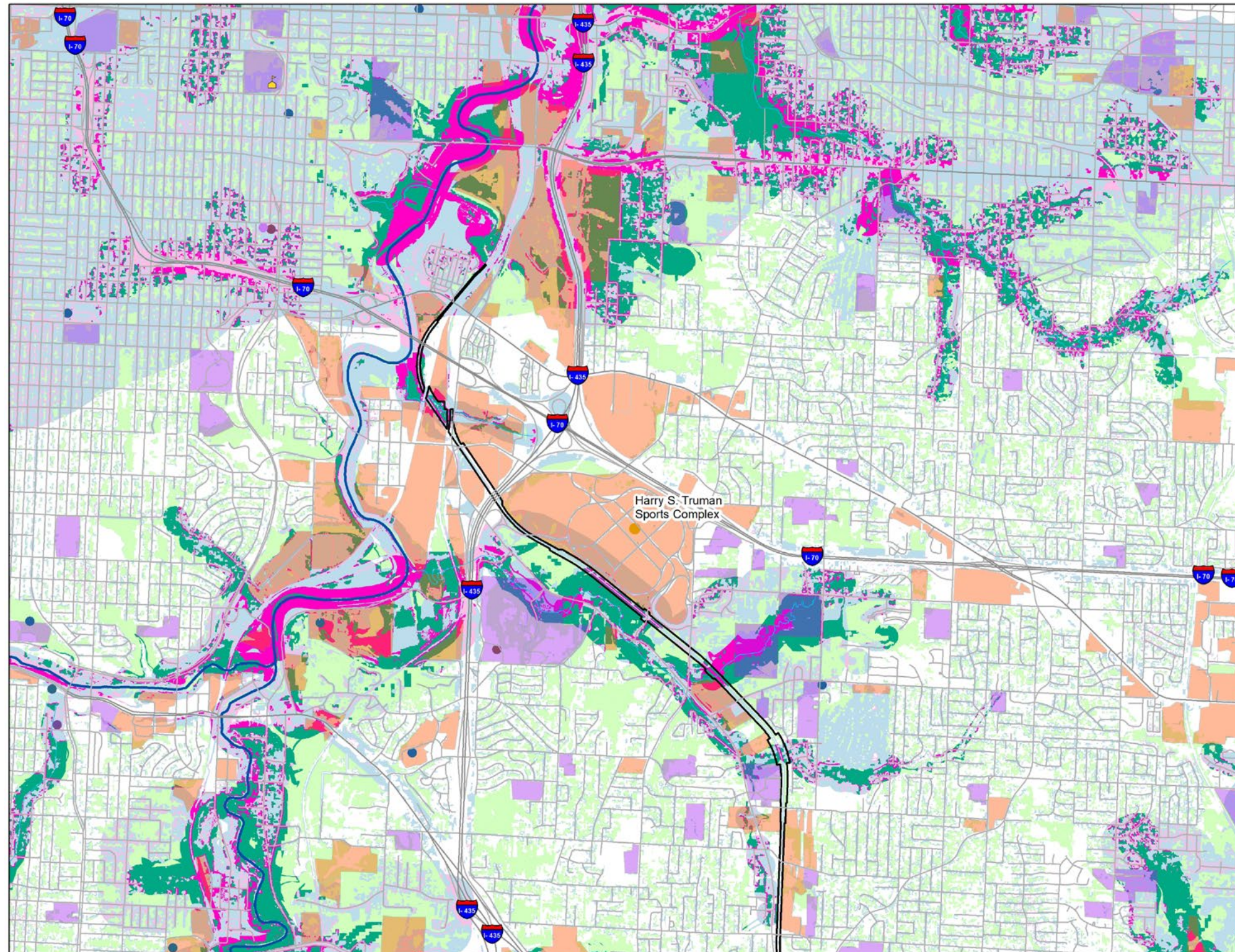


ECOLOGICAL VALUE AREAS & THE POTENTIAL FOR LOW-IMPACT DEVELOPMENT

Every part of the landscape plays a role in a watershed. The areas of highest ecological value are defined by the presence of streams, lakes, wetlands, floodplains, glades, caves and karst, and forest, along with weighted combinations of ecosystem service benefits for clean water and wildlife. The factors of ecological impact or need are impervious surfaces, major roads, and highest forest restoration priority.

The map indicates priority conservation areas where development impacts should be avoided. Large parcels, such as the area directly south of the Sports Complex, indicate locations to avoid and minimize impacts when aligning alternative trail routes. Dark pink areas identify potential locations for reforestation or grassland restoration, primarily along the drainageways. Examples of priority restoration patches include larger areas where parcel ownership can facilitate a project and areas where restoration can reconnect fragmented parcels.

By mapping restoration areas, we can identify locations where development and green infrastructure can be coordinated to improve ecological functions while creating new communities that are healthy, accessible and livable.



Potential for Low Impact Development Rock Island Corridor - North Stadium

- Ecological Value Areas**
- Conservation Priority: High
 - Conservation Priority: Moderate
 - Restoration Priority: Moderate
 - Restoration Priority: High

- East High School
- Rock Island Corridor

- City Facilities**
- College/University
 - Fire Station
 - Indoor Arena
 - Manufacturing/Industrial Plant
 - Non-Refrigerated Warehouse
 - Office
 - Police Station
 - Repair Services (Vehicle, Shoe, Locksmith, etc)
 - Stadium (Open)

Large Land Holders - Greater than 5 acres

- Private
- Public/Semipublic

Streams

- Other Streams
- Blue River
- Brush Creek

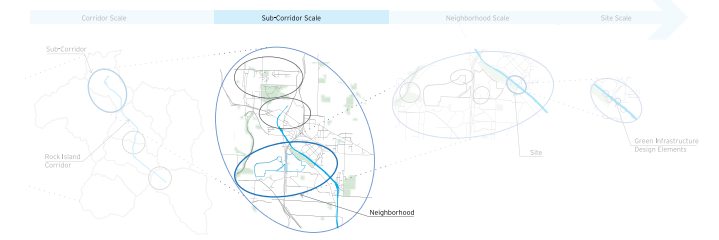
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bnim Biohabitats **BIKE WALK KC**

GEOGRAPHIC ANALYSIS CONTEXT

ROCK ISLAND SUB-CORRIDOR

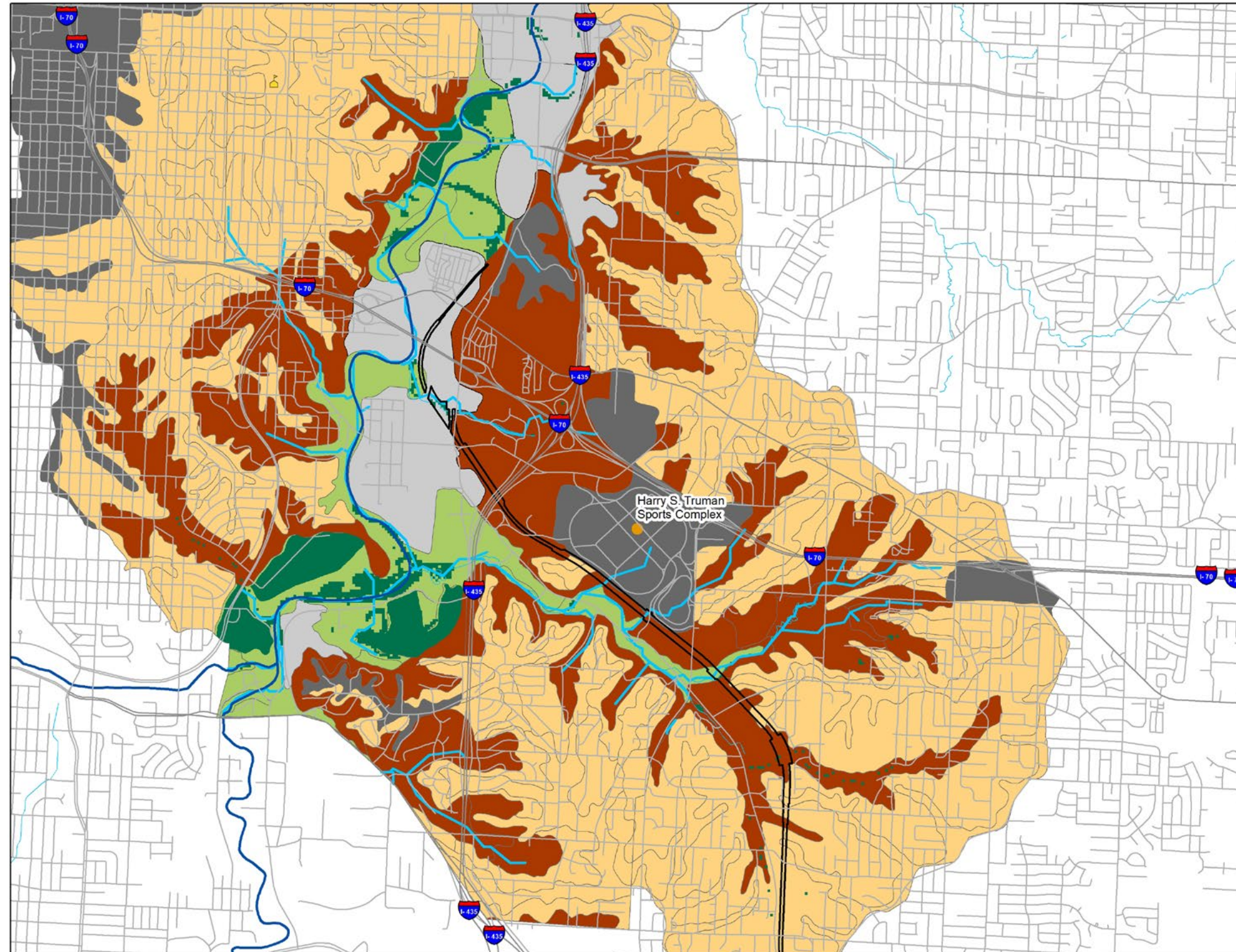
SUB-CORRIDOR
SCALE



ECO-HYDRO ZONES

Green infrastructure strategies can be most effective when they are based on an understanding of landscape patterns and how water moves through a site. The Rock Island Corridor project provides an opportunity to demonstrate how geology, soils, topography, and hydrologic processes can be used to classify ecologic-hydrological zones (eco-hydro zones). This analysis was carried out at the sub-watershed scale to best understand how the corridor and associated sites fit within the greater landscape following existing watershed boundaries. Study of specific properties such as topographic position, dominant slope range, hydrologic soil grouping, soil available water capacity, and off-trail soil erodibility, led to the identification of five zones.

The classification of these zones suggests constraints and opportunities for green infrastructure and guides recommended treatments and approaches associated with the Rock Island Corridor and connections. For example, higher elevation areas tend to be best suited for methods that infiltrate flows; dissected rocky slopes are potential locations to slow flows; and lowland floodplains have good potential for restoration. Taking into account eco-hydrologic zones helps water flow paths support a soil's potential for: plant productivity, erosion control, subsurface water storage, and stormwater collection for microbial ecosystems.



Eco- Hydro Zones Rock Island Corridor - North Stadium

- Loess Uplands
- Dissected Rocky Slopes
- Alluvial Floodplain and Low Terrace
- Highly Modified
- Highly Modified-Floodplain

- East High School
- Rock Island Corridor

- Streams**
- Other Streams
 - Blue River
 - Brush Creek
 - Streams and Drainage Corridors
 - Floodplain Wetlands

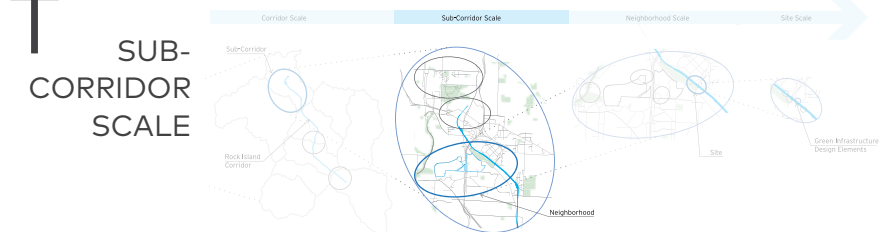
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bnim

OPPORTUNITY AREA NORTHERN TRAIL SEGMENT

ROCK ISLAND SUB-CORRIDOR

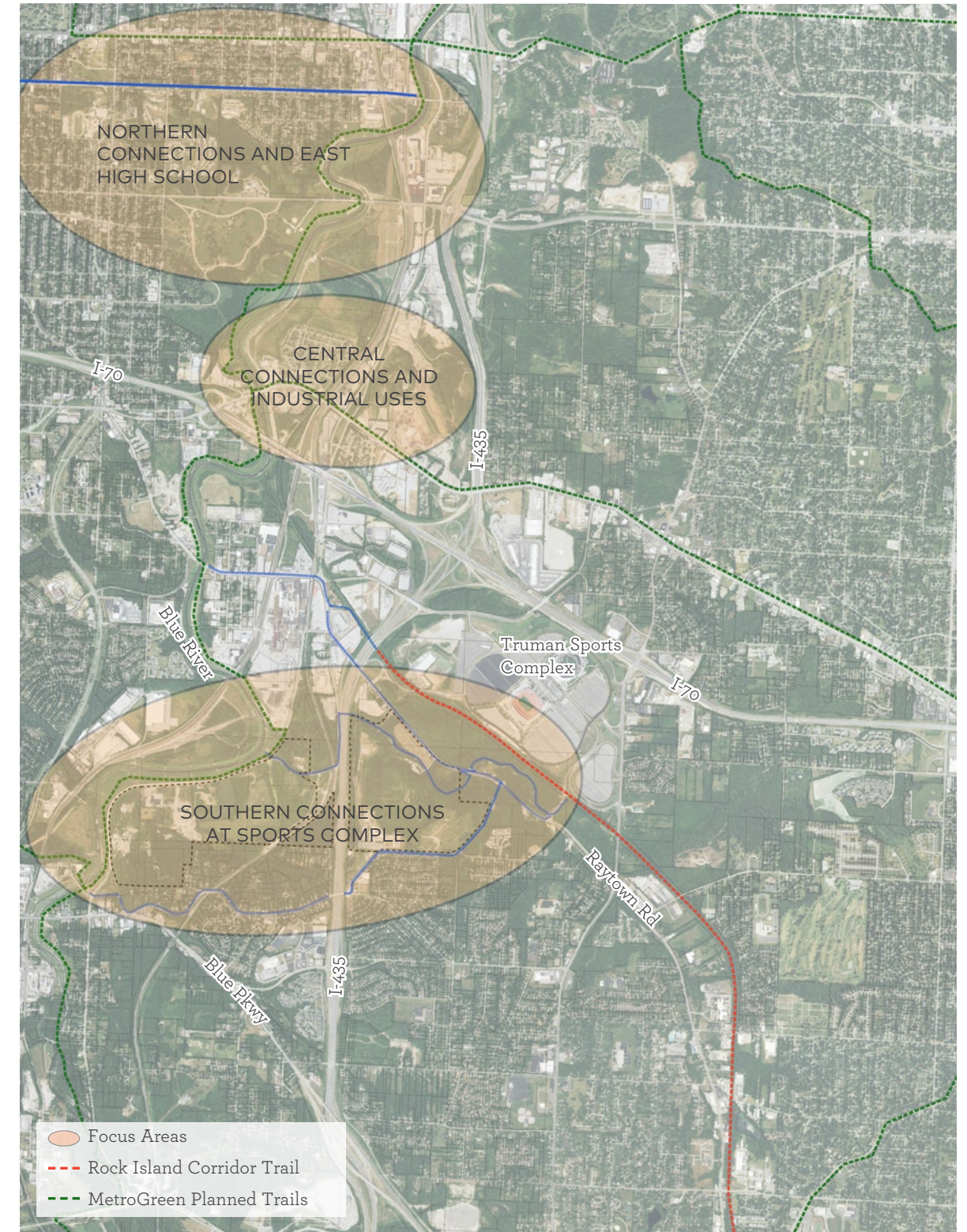


DESCRIPTION

The northern segment of the Rock Island Corridor presents a unique opportunity to realize a wide range of green infrastructure strategies in ways that connect diverse types of natural areas and typologies. Three areas were examined.

- *Northern Connections and East High School:* This area explores the stacked benefits of extending the Rock Island Trail from the Brush Creek and Blue River confluence to 17th Street, and from the 17th Street Corridor to East High School (and potentially beyond to 18th and Vine). This extension would provide opportunities to implement green infrastructure strategies ranging from streambank stabilization on the Blue River to complete streets improvements on 17th Street, as well as incorporating educational and community engagement programming related to these strategies.
- *Central Connections and Industrial Uses:* The industrial and floodplain areas immediately east of the Blue River provide key opportunities to model brownfield remediation, identify green infrastructure development practices for 21st century industries, and conserve or restore land in the floodplain to its highest and best ecosystem service potential.
- *Southern Connections at Sports Complex:* The Rock Island team has identified areas between the Sports Complex and the confluence of Brush Creek and the Blue River as the most likely route to connect north, rather than the obstacle-laden extension of the Rock Island corridor north of the Sports Complex. This east-west connection has the potential to create green infrastructure implementation projects both within the Municipal Farms area and within the neighborhoods to the south.

At the time of this study, the southern neighborhood area and the green infrastructure opportunities surrounding alternate trail routes connecting the Blue River had the most momentum, accessibility, need and proximity to other high value projects.



LOCAL STAKEHOLDERS

These organizations in this sub-corridor area have the potential to support green infrastructure strategies and benefit from them:

- | | |
|---|--------------------------------|
| • A.B. May | • Jackson County |
| • City of Kansas City, Missouri (Municipal Farms) | • KC Community Gardens |
| • CultivateKC | • KC Native Plant Initiative |
| • East High School (KCMO School District) | • MetroGreen |
| • Eastwood Hills Community Organization | • Monarchs on the Move |
| • Eastwood Hills Elementary School (KCMO School District) | • Paragon Star |
| • Eastwood Hills Farmers Market | • The Giving Grove |
| • Hardesty Renaissance | • U.S. Army Corps of Engineers |
| • Heartland Conservation Alliance | |

FOCUS AREA

SOUTHERN CONNECTIONS AT SPORTS COMPLEX

NORTHERN TRAIL SEGMENT

The multi-modal trailhead at the Harry S. Truman Sports Complex is an extremely important piece of the Rock Island Corridor trail. It has the potential to connect the trail to a large number of users at the Sports Complex itself, as well as provide a logical location to extend trail connections to Independence, Missouri to the northeast. It is also unique in that it represents the point at which, due to a number of difficult infrastructure barriers and land use challenges, it becomes increasingly difficult to extend the Rock Island Corridor trail north along the existing rail right-of-way to reach the desired trailhead destination at the intersection of Truman Road and the Blue River. Therefore, an alternative connection to the Blue River trail is needed.

The neighborhood illustrated in the adjacent map provides unique opportunities to solve these connectivity challenges. This can be achieved by creating alternative trail routes that connect underserved neighborhoods and underutilized city-owned land at Municipal Farms to existing and planned trail infrastructure on the Blue River that extend to the desired Truman Road location. These potential routes travel through areas of the city that are highly conducive to green infrastructure strategies, further enhanced by the social and ecological benefits that they can bring. The potential trail and street connections in this area can be envisioned as a series of projects that meet these four green infrastructure objectives:

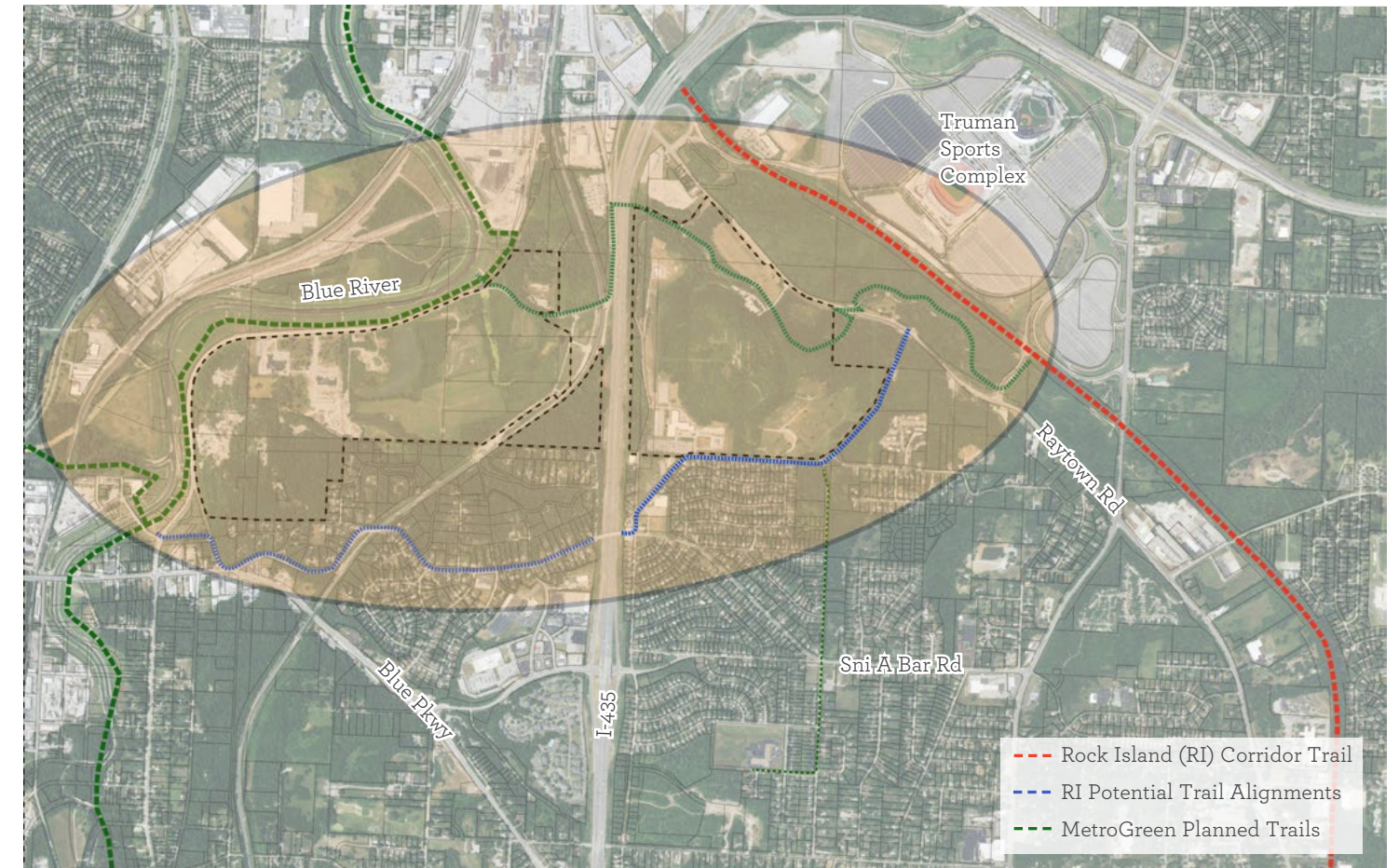
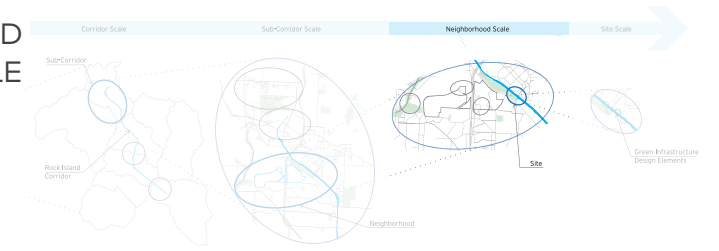
- Zones for Ecological Conservation and Restoration.
- Secondary Multi-Modal Connections and Access to Natural Systems.
- Education and Outreach Opportunities.
- Zones for Economic Development and Conservation.

NETWORK CONNECTORS

Network Connectors are green infrastructure solutions that address multiple challenges in the highlighted neighborhood and link the areas together to strengthen the watershed-scale system of benefits. In this Rock Island sub-corridor area, the following opportunities are present:

- 1 Implement education and demonstration hubs of green infrastructure solutions (i.e., parks, schools, community centers, campuses).
- 2 Remove weed and landscape ordinance barriers to native plantings.
- 3 Coordinate parks and trail planning that prioritizes habitat connection opportunities.
- 4 Commit to the management and restoration of stream and river setbacks and habitats in buffer zones.
- 5 Coordinate with Missouri Department of Transportation and transportation authorities to address and implement landscaping and buffer zones along highways and major roads.
- 6 Continue long-term investment in transit infrastructure such as bus rapid transit and light rail.
- 7 Implement green and complete streets, including pedestrian and bicycle infrastructure.
- 8 Create replicable guidelines to address the connection between industrial uses and the river, with restoration of habitat and public trail connections.
- 9 Adopt form-based zoning codes and transit-oriented development to enhance and preserve the walkability of commercial centers, mixed-use areas and neighborhoods.
- 10 Create partnerships and programs for all-ages wellness programs that streamline access to healthcare and spark a culture of health.

NEIGHBORHOOD SCALE



- 11 Employ educational programs targeted towards developers and property managers regarding best practices for construction and development.
- 12 Create opportunities for increased access to the Middle Blue River that supports community ownership and stewardship.

GREEN INFRASTRUCTURE: 2 - Design Stage

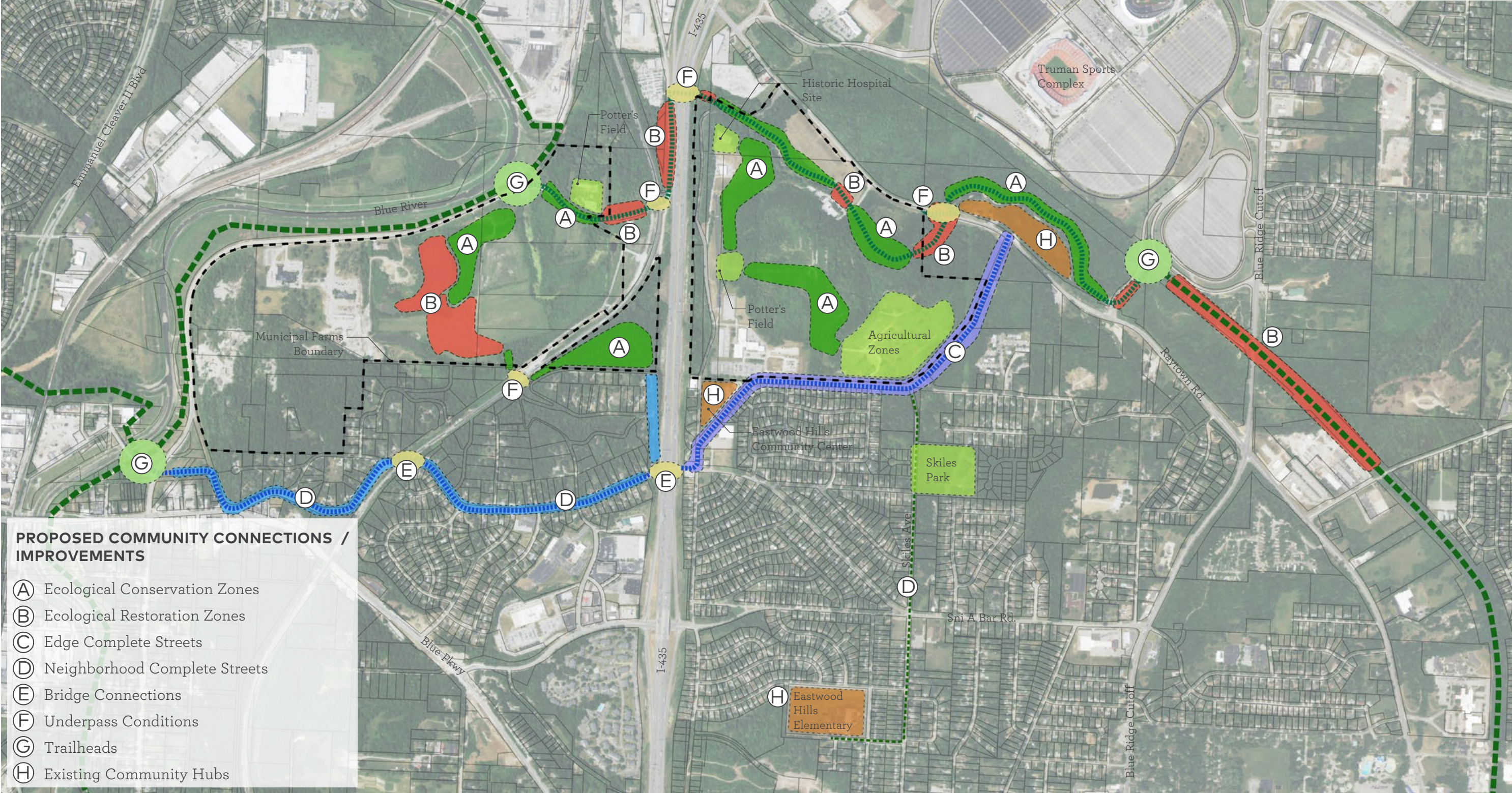
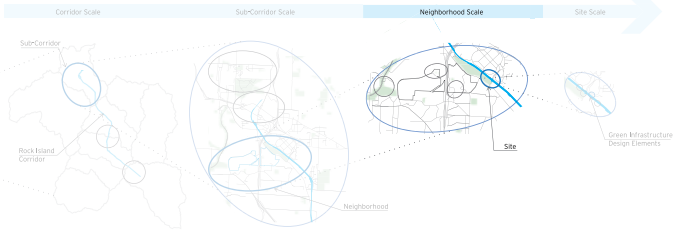
When projects are in a design phase, it is crucial to define the key points of influence within the project. This utilizes the same process as previously described, and focuses on where the most important human and ecological values and needs are in the defined project area first. This helps inform specific design solutions that can be incorporated to adapt the design to greater health, and for greater connectivity to other solutions in the future. This relies on an open and flexible mindset of current and new design team members as well as familiarity with the solutions recommended and their impact on cost, schedule and maintenance.

FOCUS AREA

SOUTHERN CONNECTIONS AT SPORTS COMPLEX

NORTHERN TRAIL SEGMENT

NEIGHBORHOOD SCALE



- PROPOSED COMMUNITY CONNECTIONS / IMPROVEMENTS**
- (A) Ecological Conservation Zones
 - (B) Ecological Restoration Zones
 - (C) Edge Complete Streets
 - (D) Neighborhood Complete Streets
 - (E) Bridge Connections
 - (F) Underpass Conditions
 - (G) Trailheads
 - (H) Existing Community Hubs

NEIGHBORHOOD COMMUNITY CONNECTIONS

SOUTHERN CONNECTIONS AT SPORTS COMPLEX



A ECOLOGICAL CONSERVATION ZONES CONNECTING ROCK ISLAND CORRIDOR AND MUNICIPAL FARM TRAILS

Create multi-modal trails using green infrastructure components to manage stormwater adjoining relatively healthy ecological zones that limit the impact and footprint on ecosystems and habitats. Green infrastructure opportunities include:

- Creation of green trail standards that provide access to rarely experienced natural settings, resources, habitats and historical features while limiting potential damage of these environments.
- Engagement in management and restoration practices, including removal of invasive species, erosion control measures, habitat protection and appropriate green infrastructure strategies for water and ecological management.
- Provision of educational and wayfinding signage that illustrate green infrastructure strategies, historical and ecological features, watershed information, and other significant information.

Refer to detailed Stadium Trailhead study (page 25) for more information on identification of zones and strategies.

PARTNERS

- City of Kansas City, Missouri (Municipal Farm)
- Heartland Conservation Alliance
- Jackson County
- Missouri Department of Conservation
- Missouri Department of Natural Resources



B ECOLOGICAL RESTORATION ZONES ON ROCK ISLAND CORRIDOR AND MUNICIPAL FARM TRAILS

Use multi-modal trail design and construction through highly damaged zones as an opportunity to implement restoration strategies and educate the public on the use and effectiveness of these strategies. Green infrastructure opportunities include:

- Erosion control measures, revegetation and reforestation of damaged sites, reconstruction of water channels and re-establishment of critical habitats.
- Provision of educational and wayfinding signage that illustrate green infrastructure strategies and its role in restoration of damaged sites, historical and ecological features, watershed information, and other significant information.

Refer to detailed Stadium Trailhead study for more information on identification of zones and strategies.

PARTNERS

- City of Kansas City, Missouri (Municipal Farm)
- Heartland Conservation Alliance
- KC Native Plant Initiative
- Monarchs on the Move
- Jackson County
- Missouri Department of Conservation
- Missouri Department of Natural Resources



NEIGHBORHOOD COMMUNITY CONNECTIONS

SOUTHERN CONNECTIONS AT SPORTS COMPLEX



© EDGE COMPLETE STREET PROJECT ON OZARK ROAD

Complete street project to connect Eastwood Community Center with the county parcel at Ozark and Raytown Road intersection. Opportunities include:

- Multi-modal connections to key neighborhood amenities and development zones, and creating connectivity between Eastwood Hills neighborhood and Municipal Farms property with access to community gardens.
- Implementation of green infrastructure streetscape components to capture street runoff, with the potential to utilize larger, city-owned areas outside of street right-of-ways for additional treatment of stormwater (e.g., bioretention and biofiltration).
- Educational opportunities, including signage, visible complete streets green infrastructure strategies that include stormwater treatment, neighborhood training and participation related to street amenities and community gardens.

PARTNERS

- City of Kansas City, Missouri (Public Works)
- Eastwood Hills Community Organization
- KC Community Gardens
- KC Native Plant Initiative



© NEIGHBORHOOD COMPLETE STREET ON SNI-A-BAR ROAD

Complete street project connecting Eastwood Hills Community Center to Blue River Trailhead adjacent to Coal Mine Road. Opportunities include:

- Multi-modal connections to key neighborhood amenities, development zones, and creating stronger connections to neighborhoods to the west and to the MetroGreen trail system along the Blue River.
- Implementation of green infrastructure strategies in a neighborhood setting with limited right-of-way, including curb inlets into bioretention zones.
- Educational opportunities, including signage, visible complete streets green infrastructure strategies, neighborhood training and participation related to street amenities.

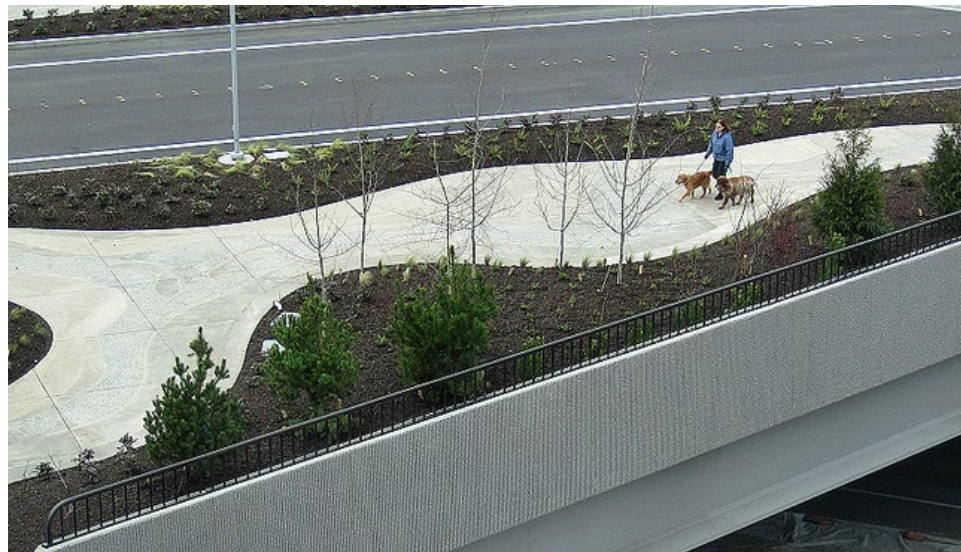
PARTNERS

- City of Kansas City, Missouri (Public Works)
- Eastwood Hills Community Organization
- KC Community Gardens
- KC Native Plant Initiative



NEIGHBORHOOD COMMUNITY CONNECTIONS

SOUTHERN CONNECTIONS AT SPORTS COMPLEX



Ⓔ BRIDGE CONNECTION OVER INTERSTATE 435

Creation of multi-modal connection over I-435 to connect east and west areas of Eastwood Hills neighborhood. Green infrastructure opportunities include:

- Connectivity on existing vehicular infrastructure.
- Creative stormwater management on existing structures to mitigate infrastructure impact.

PARTNERS

- Missouri Department of Transportation (MoDOT)
- Eastwood Hills Community Organization



Ⓕ UNDERPASS CONDITIONS UNDER I-435 AND RAILROAD BRIDGES

Creation of multi-modal connectivity between the east and west portions of Municipal Farm. Green infrastructure opportunities include:

- Safe connector under I-435, overcoming the connectivity challenges presented by the interstate system. This project can become a model for how to creatively connect areas of the city that have been separated by regional infrastructure.
- Connections under Kansas City Southern bridges.

PARTNERS

- Missouri Department of Transportation (MoDOT)
- Kansas City Southern Railroad
- Kansas City Native Plant Initiative



NEIGHBORHOOD COMMUNITY CONNECTIONS

SOUTHERN CONNECTIONS AT SPORTS COMPLEX



Ⓒ TRAILHEADS

Designed trailheads as locations for multi-modal access, regional wayfinding, and education about healthy Kansas City watersheds. Green infrastructure strategies include:

- Trailheads as major activity zones with high traffic to maximize public exposure to green infrastructure strategies and benefits.
- Trailheads as a design showcase for green infrastructure strategies, to link concepts with on-the-ground implementation in a highly visible and understandable way.
- Trailheads as a forum for green infrastructure strategies and public health information.
- Trailheads as outdoor education centers for watershed health, native habitat, regional ecosystem connections, active lifestyles and greater Kansas City pride.

PARTNERS

- The Giving Grove
- Jackson County
- Jackson County Sports Complex Authority
- Kansas City, Missouri Health Department



Ⓗ COMMUNITY HUBS

Community hubs – including Eastwood Hills Community Center, the Jackson County parcel at the intersection of Ozark and Raytown Road, and the Community Garden in Municipal Farms – are critical locations to implement green infrastructure strategies and promote education and community engagement. Green infrastructure strategies include:

- Connections between neighborhoods and food (both food and food education), including Municipal Farms and potential farmers markets in the Eastwood Hills neighborhood and/or at the Sports Complex.

PARTNERS

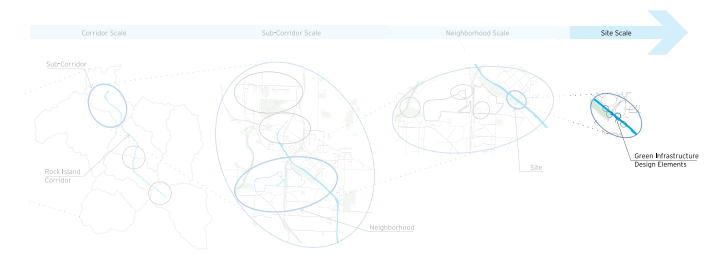
- KC Community Gardens
- CultivateKC
- The Giving Grove
- Eastwood Hills Elementary School, KCMO School District



PROJECT SITE ROCK ISLAND STADIUM TRAILHEAD

SOUTHERN CONNECTIONS AT SPORTS COMPLEX

NEIGHBORHOOD
SCALE



EXAMPLE PROJECT SITE

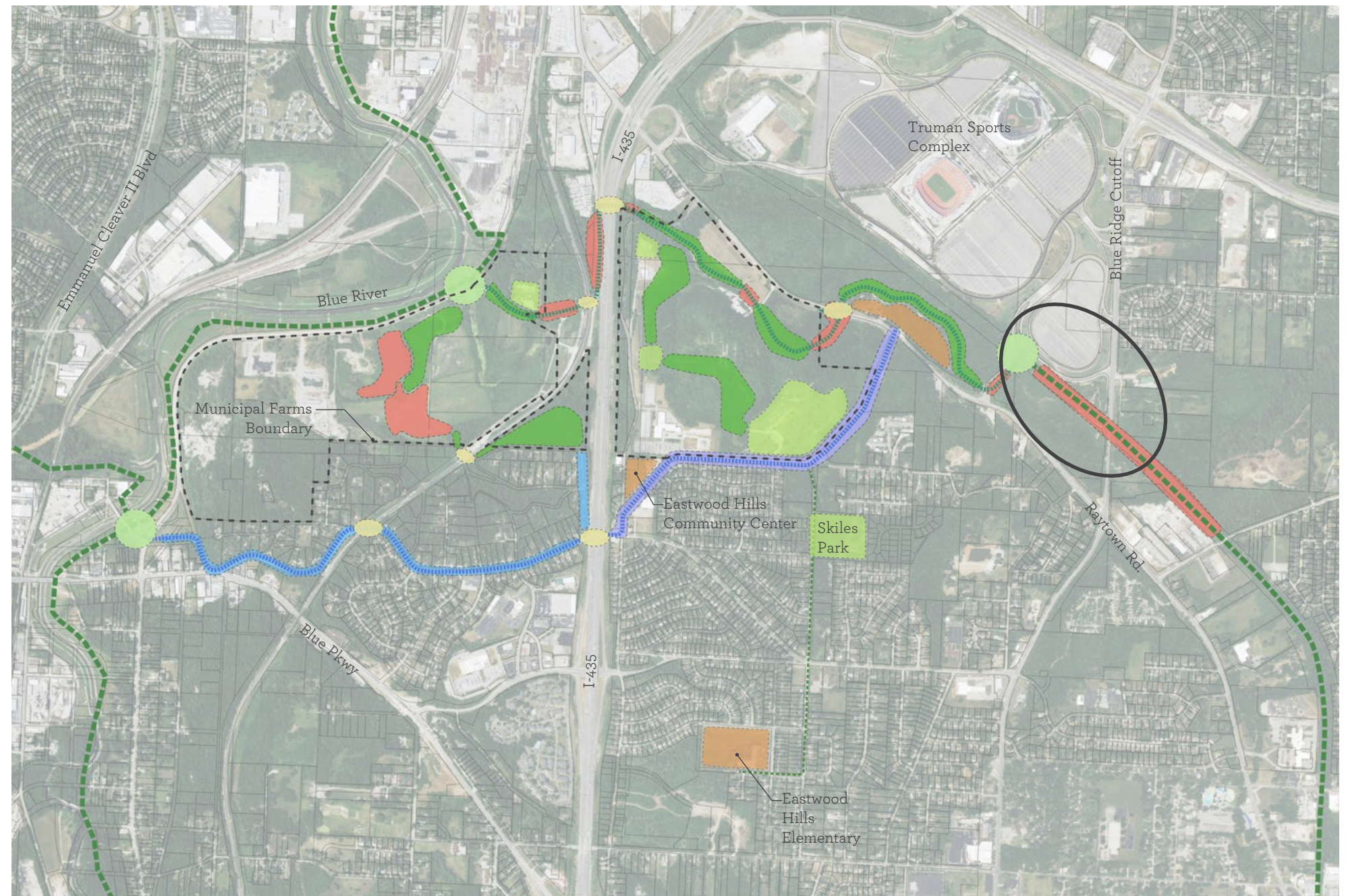
This focus area contains a network of potential Project Sites that can incorporate a series of green infrastructure design elements. For this study, the team explored one such Project Site focused around a potential trailhead near the Sports Complex as indicated on the adjacent map.

The following pages depict types of green infrastructure design elements applied to the Sports Complex trailhead area to help meet overarching goals of protecting and enhancing ecological resources and community experiences.

RESOURCES FOR SUSTAINABLE TRAIL AND GREEN INFRASTRUCTURE

There are a number of excellent existing resources for planning, design and implementation of green infrastructure practices, and sustainable trail design elements including those listed here:

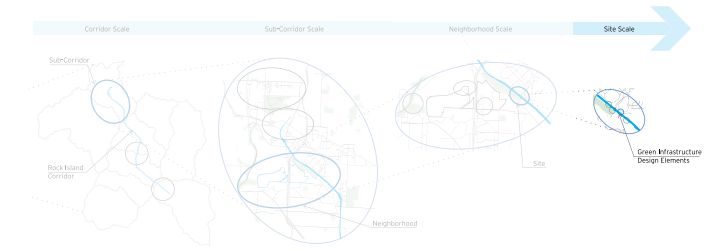
- *Green Infrastructure in Parks Guide*, December 2017 (National Recreation and Parks Association (NRPA)): <http://www.nrpa.org/parks-recreation-magazine/2017/december/nrpas-new-conservation-resource-guide-now-available/>. Note NRPA resources on social equity, facilitation, and funding projects.
- *Guide to Green Infrastructure in Parks*, June 2017 (EPA): https://www.epa.gov/sites/production/files/2017-05/documents/gi_parksplaybook_2017-05-01_508.pdf.
- Round Grove Demonstration Project described in <http://jacksongov.org/DocumentCenter/Home/View/679>.
- *Stormwater Management Plan, 2010* (Jackson County), including the Round Grove Demonstration Project: <http://jacksongov.org/DocumentCenter/Home/View/679>.
- *Sustainable Trail Management Resource Guides*, including Objectives and Standards, 2016 (USFS): <https://www.fs.fed.us/recreation/programs/trail-management/strategy/index.shtml>.
- *Sustainable Transportation* (American Society of Landscape Architects (ASLA)): <https://www.asla.org/sustainabletransportation.aspx>.



GREEN INFRASTRUCTURE DESIGN ELEMENTS

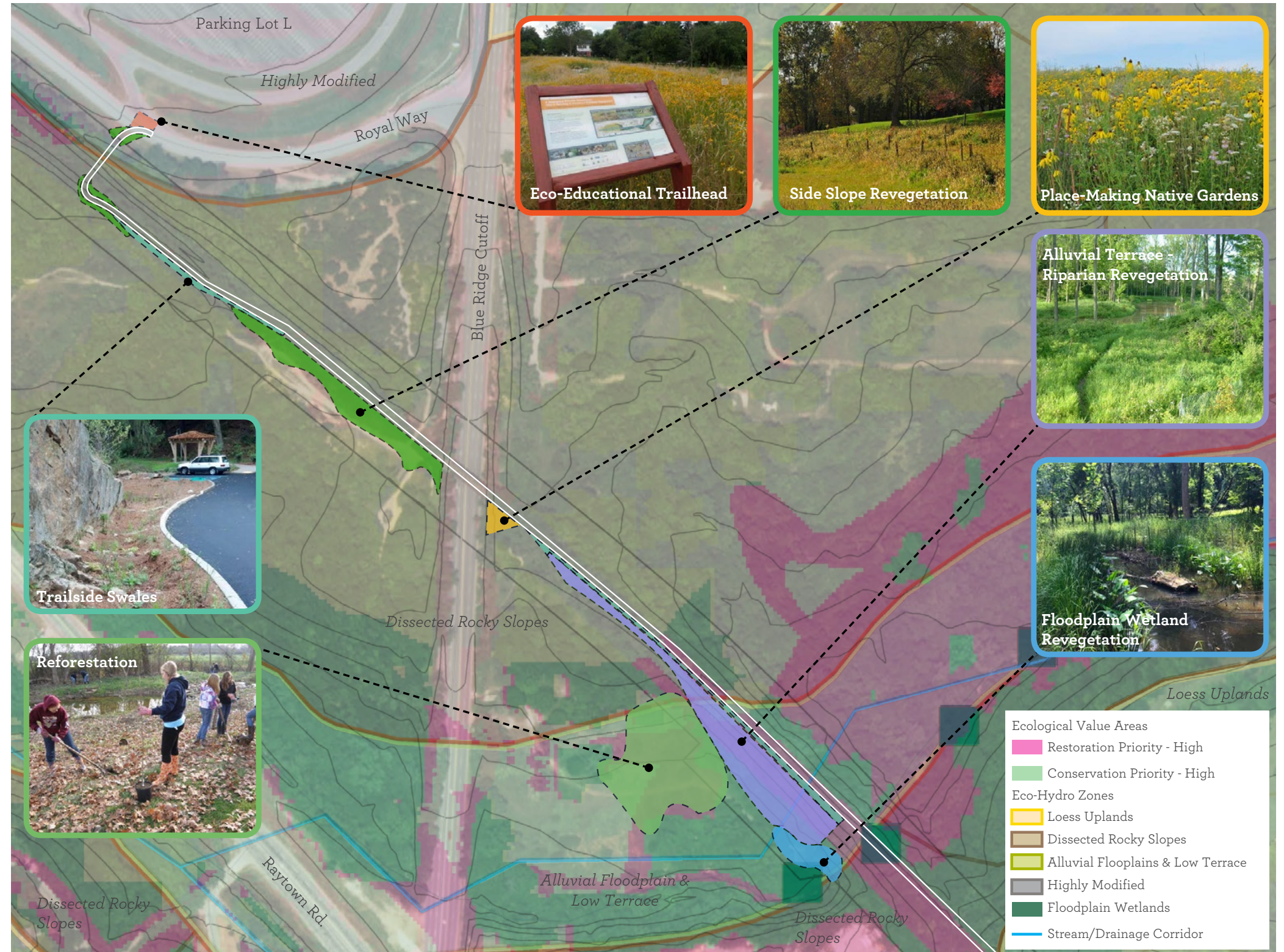
ROCK ISLAND STADIUM TRAILHEAD

SITE SCALE



This conceptual diagram shows how a group of strategies work together to create a network of improvements that can:

- Enhance natural water flow paths for water quality and stormwater management benefits.
- Use native vegetation to improve habitat for pollinators.
- Reforest areas to mitigate project impacts.
- Encourage infiltration at vegetated areas and meadow.
- Enhance protective vegetation (riparian buffer) for habitat and erosion/flood protection benefits.
- Protect existing natural resources.
- Educate about watersheds and health.



GREEN INFRASTRUCTURE: 3 - Maintenance Stage

After the implementation of green infrastructure projects, there are many touchpoints to increase their benefits over time. These living systems require regular stewardship and maintenance that is very different from a more conventional approach to landscape maintenance. An adaptive landscape management plan for the constructed design elements proposed here, in addition to a thoughtful assessment of existing Best Management Practices (BMPs) in the area, can provide annually increasing benefit to the health and biodiversity of the land and waterways, as well as the connectivity and health of adjacent neighborhoods. Successful stewardship and maintenance of these green infrastructure projects also provide a how-to model for even more projects to be initiated and developed throughout the Rock Island Corridor.

GREEN INFRASTRUCTURE DESIGN ELEMENTS

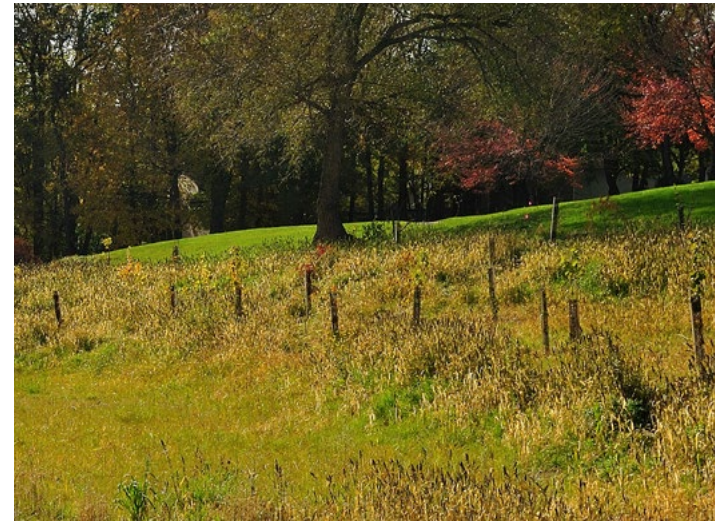
ROCK ISLAND STADIUM TRAILHEAD

NOTE: There are numerous guides available to assist with development and implementation of design elements, a small sampling of which are included here.



① ECO-EDUCATIONAL TRAILHEAD

See “Ride the Shed”: describes watersheds, human influences, watershed zones, and the need for stewardship. Watershed education resources: <http://www.marc.org/Environment/Water-Resources/Reports-and-Publications/Educational-Brochures>.



② SIDE SLOPE REVEGETATION

See Kansas Native Plant Society resources: <http://www.kansasnativeplantsociety.org/resources.php>.



③ TRAILSIDE SWALES

Minimize concentrated runoff with vegetated filter strip and temporary dams in select locations. See also Kansas Native Plant Society resources.



④ NATURALLY-FORMED TERRACE - PROTECTIVE REVEGETATION

Create and maintain stream buffer protection.



⑤ REFORESTATION

Collaborate with school programs to engage volunteers. See also Kansas Forest Service’s Conservation Tree Planting Program: http://www.kansasforests.org/conservation_trees/.



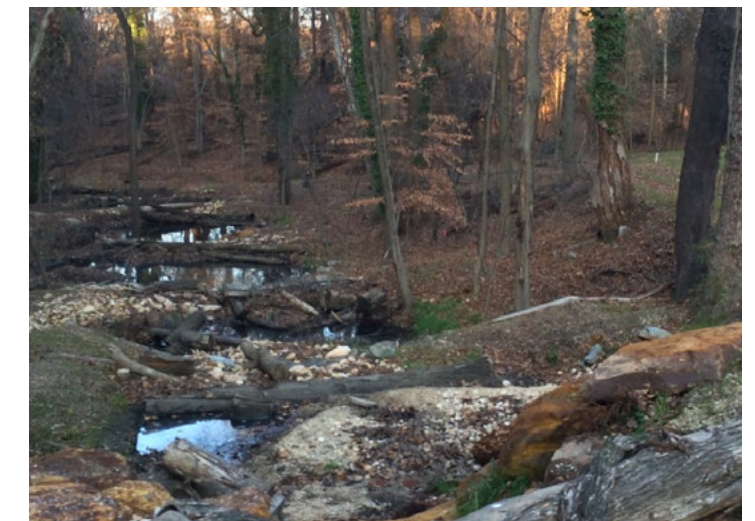
⑥ PLACE-MAKING NATIVE GARDENS

Focus on prairie pollinator habitat. Refer to: <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/pollinate/?cid=nrcseprd402207>.



⑦ FLOODPLAIN WETLAND REVEGETATION

Regrade to expand floodplain width with native revegetation. See: <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/manage/restoration/?cid=stelprdb1247762>.



⑧ BRIDGE RUNOFF TREATMENT

Encourage regenerative stormwater management.

SUMMARY

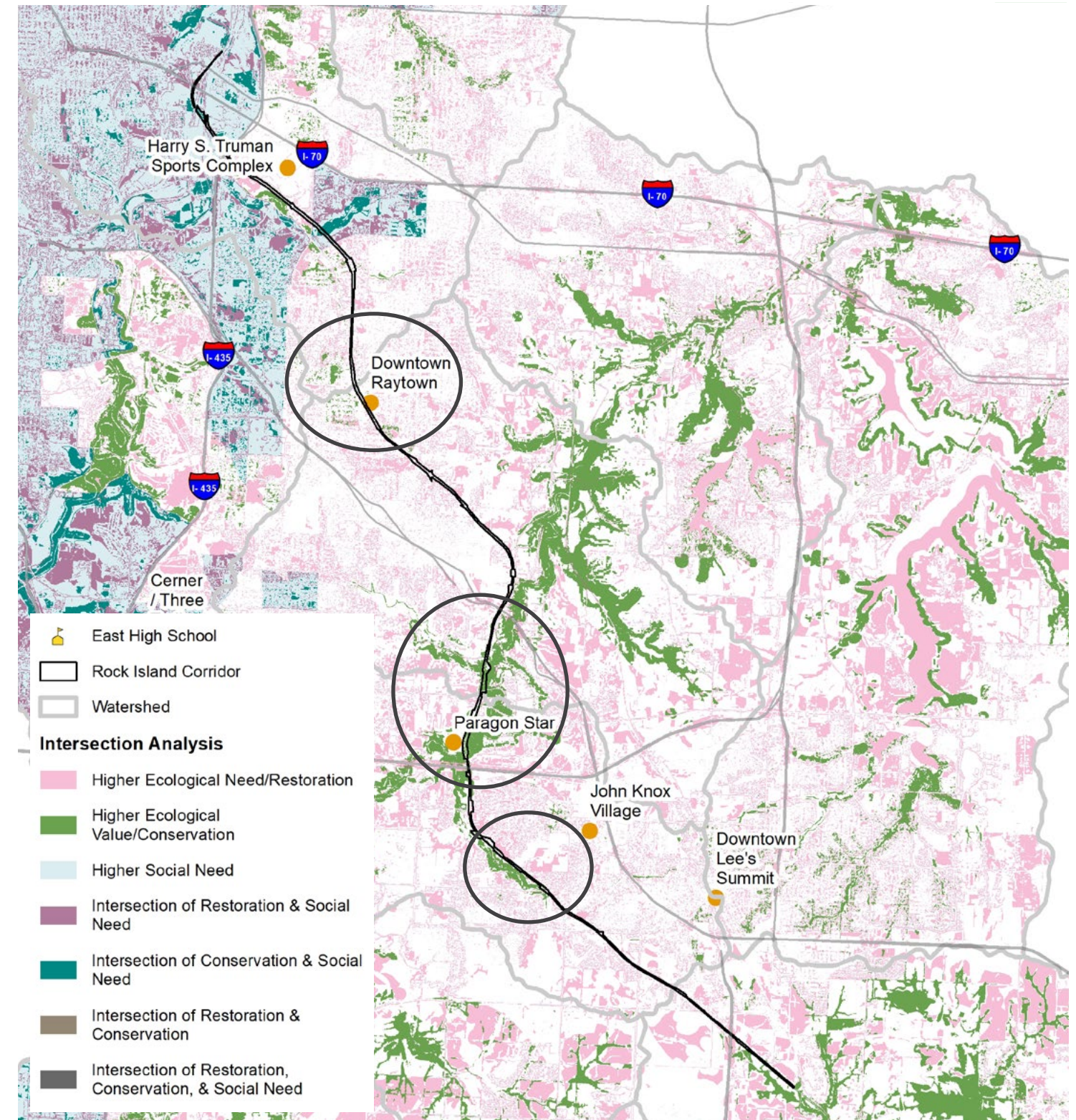
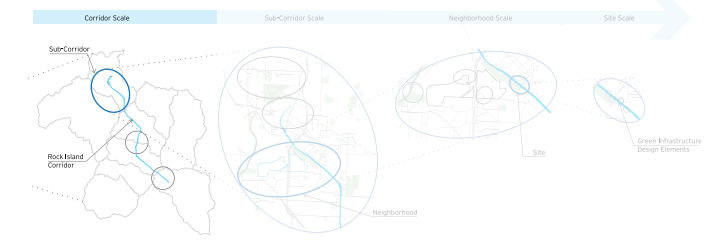
ROCK ISLAND CORRIDOR

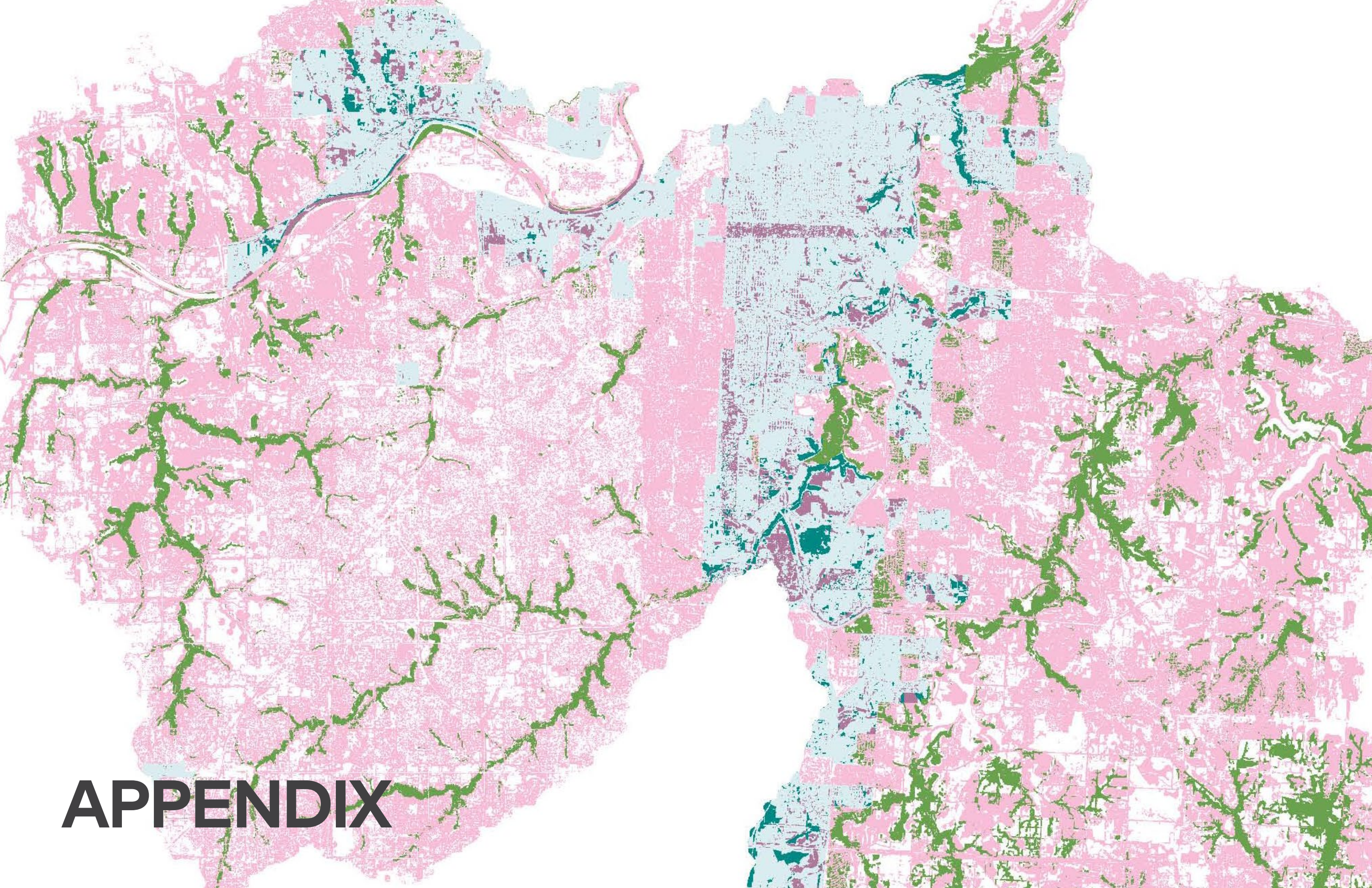
This Playbook followed a process based on watershed-based mapping and stakeholder engagement to identify multi-benefit opportunity areas along different segments of the Rock Island Corridor trail. In tandem, green infrastructure strategies and potential partners were identified. The preceding pages focused on the northern segment of the trail. However, throughout the entire corridor there are multiple hotspots identified through mapping that also have high potential for green infrastructure. The intersection analysis map (shown on the right) depicts areas where ecological value/need intersect with social need. This can be used as a tool to identify additional areas to study for green infrastructure implementation. The following are a few of the other hotspots that could be explored using the replicable process described in the Playbook.

- The zone between the Sports Complex and Raytown, Missouri has a number of access points as well as areas of environmental concern near wetlands. This is a prime area for considering ecological remediation strategies and educational signage, though it is not an area of high social need.
- As the corridor turns south at South Noland Road, it curves around the quarry site. It is not known how soon the quarry site will become dormant and transition to County development opportunities. There are major contamination sites on the trail, on either side of the quarry. This is also an intersection area with high ecological value and need in parallel to the Rock Island Corridor and Little Blue River. Therefore, this is an important zone of the trail to consider for networked strategies of restoration, green infrastructure components, and education as the trail meets the Paragon Star development site and trailhead at I-470.
- The trail continues south and east through Lee's Summit and presents opportunities to access the trail at several at-grade crossings as well as a major trailhead. While this is not in an area of high social need, much of this section of the trail has high ecological value, and the potential to connect older adults to the trail and through future County residential developments (Winterset subdivision and John Knox Village retirement community, for example).

Green infrastructure solutions are those that simultaneously help to alleviate the pressures of wet-weather events as well as provide important amenities to local communities. In addition to providing the ecosystem services of cleaning the air and slowing/cleaning water, living 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 resiliency of our community systems. 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 this Playbook can and should be used to identify additional sites with project momentum, identifiable champions, access, need and proximity for maximum replicability.

CORRIDOR SCALE





APPENDIX

STUDY OF SCALES

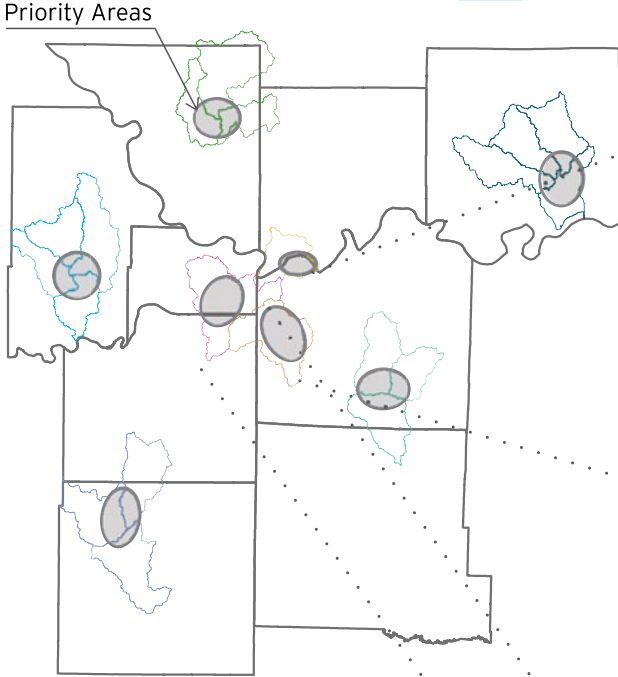
GREEN INFRASTRUCTURE PLAYBOOK

SCALE DIAGRAM

Below is the scale diagram for the Rock Island Corridor, and on the following page is a glossary describing the scales and terms used throughout the Playbook.

ATLAS

Nine-County Scale



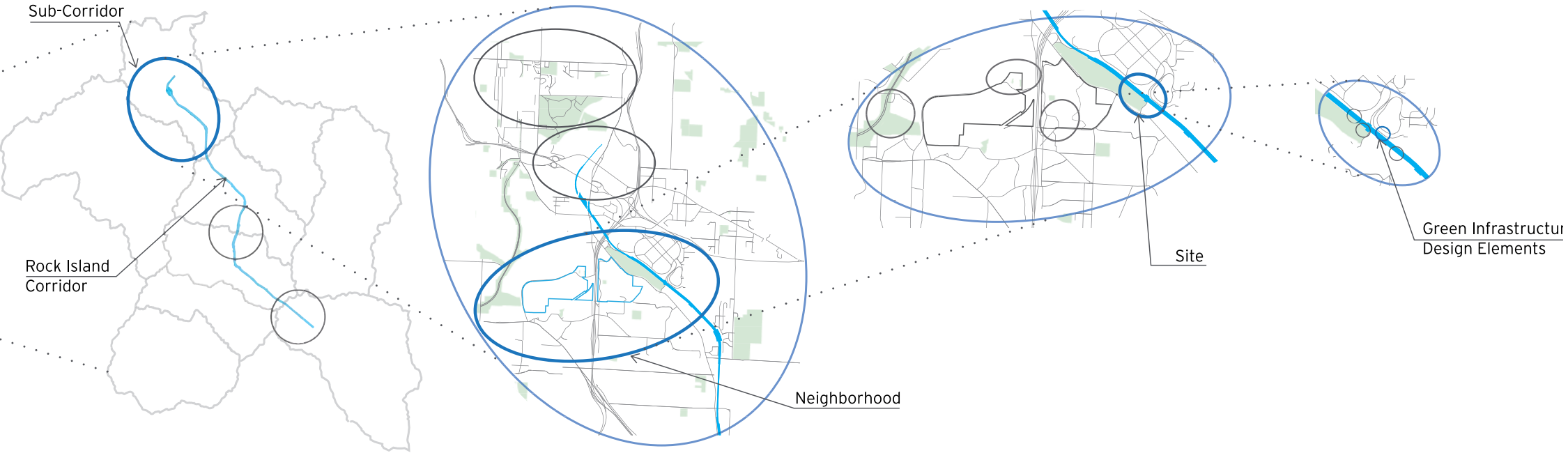
ROCK ISLAND CORRIDOR PLAYBOOK

Corridor Scale

Sub-Corridor Scale

Neighborhood Scale

Site Scale



GLOSSARY OF TERMS (ordered by scale)

Atlas: A set of maps that help identify priority areas for integrated green infrastructure strategies at a regional scale.

Playbook: A framework that demonstrates replicable approaches for implementing green infrastructure for ecological and socioeconomic benefits using nested scales of analysis.

Priority Area: Based on a watershed-scale analysis, these locations are 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.

Watershed: Natural drainage area boundaries developed by the U.S. Geological Survey are the foundation of the Playbook because they group priority areas and partners based on ecological and hydrological relationships that go beyond municipal/political boundaries. In the first map of each playbook, multiple watershed boundaries are illustrated.

Corridor Scale: For the Rock Island playbook, this is the largest scale within multiple watersheds that identifies a common focus for infrastructure improvements along a common transit zone.

Opportunity Area: 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. 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.

Sub-Corridor Scale: This 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.

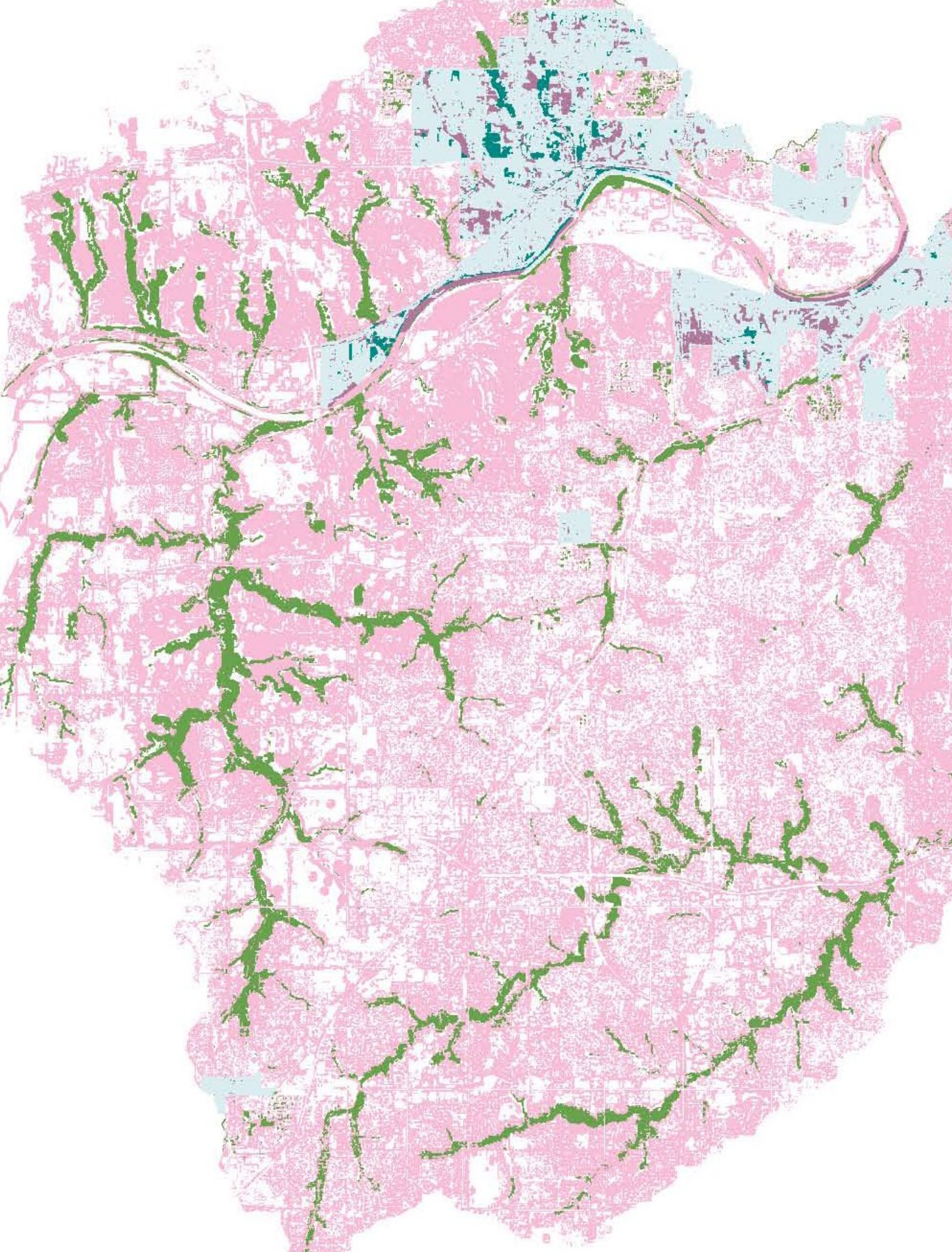
School District Scale: For the Shawnee Mission playbook, this scale allows the school administration to understand the breadth of green infrastructure implementation across their property holdings and the municipalities within which they operate.

Focus Area: Within an opportunity area, this 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.

Network Connectors: These are a list of green infrastructure solutions that work together within an area to address multiple challenges and link smaller project sites together to strengthen the network of watershed-scale benefits.

Neighborhood Scale: The 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.

Site Scale: Within a focus area or neighborhood, this 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.



GEOGRAPHIC DATA

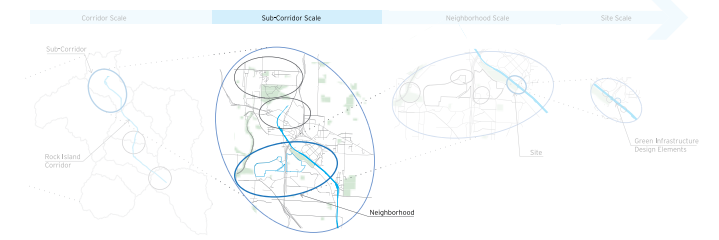
INTRODUCTION

This Appendix contains maps with geographic information for the Rock Island Corridor project. This data was used, in conjunction with stakeholder interviews and site visits, to produce the Playbook guidance for this project. While this data is not an empirically comprehensive process of analysis, these inputs result in the design of integrated strategies that are well-suited to the place and people, and have support from local organizations for implementation.

CULTURAL DENSITY AND PROJECTS

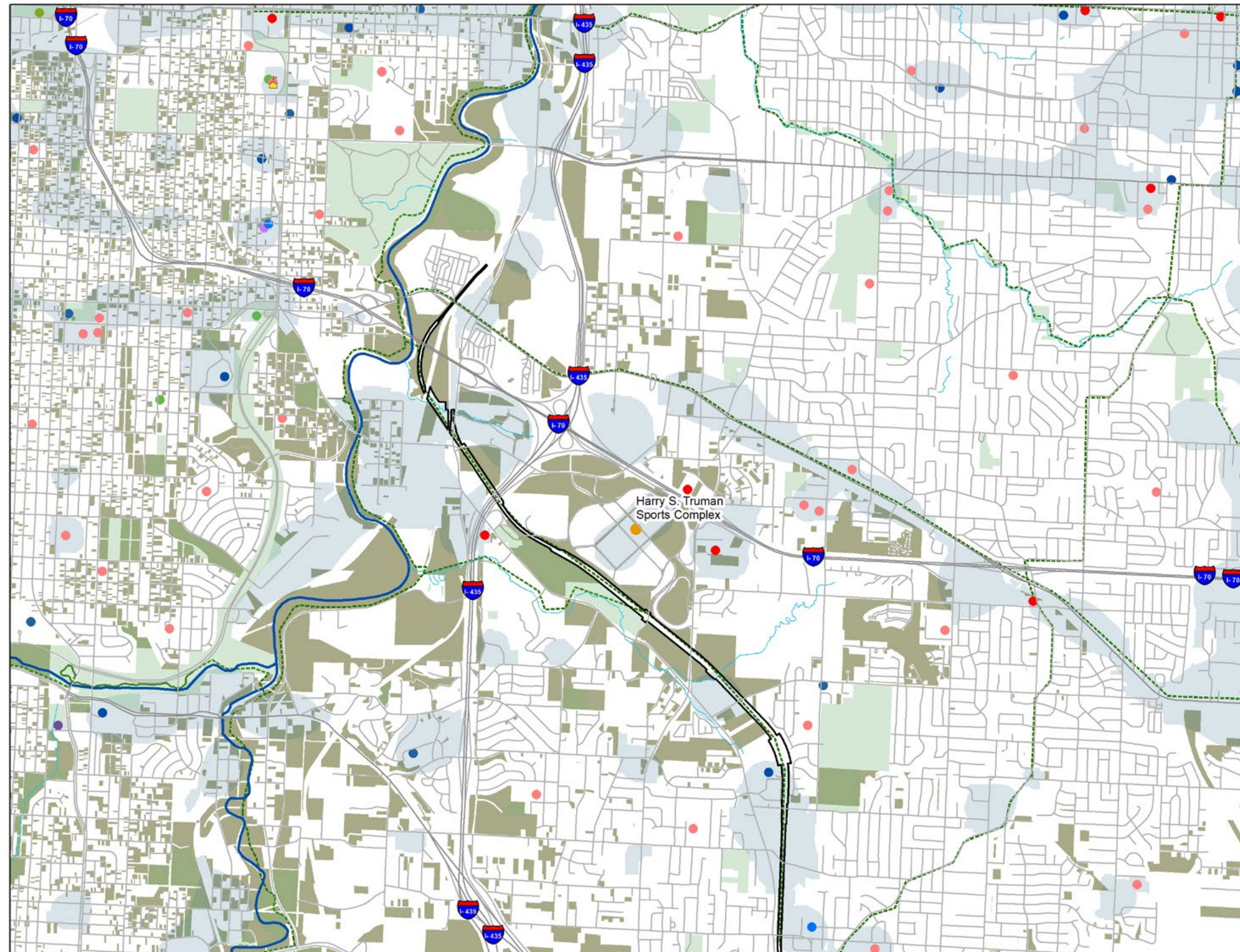
ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE



Within communities, civic and cultural sites are public places where people convene and where services are provided. The public access, service functions and cultural relevance of these sites provide opportunities for communities to engage, understand and benefit from green infrastructure.

While public sites (schools and hospitals, for example) serve community needs that are also relevant for green infrastructure (education and health, for example), it is not necessarily the case that interventions on these civic sites will be most impactful. Reviewing green infrastructure needs and opportunities in the broader context of ecological and social needs is critical for each area of intervention.



Cultural Density & Projects Rock Island Corridor - North Stadium

- East High School
 - Rock Island Corridor
 - Hospitals
 - Police
 - Colleges
 - Schools
 - Giving Grove Orchard Sites
 - Parks
 - Activity Centers
 - Vacant Parcels
- City Facilities**
- Fire Station
 - Indoor Arena
 - Repair Services (Vehicle, Shoe, Locksmith, etc)
 - Social/Meeting Hall
 - Stadium (Open)
 - Swimming Pool
- MetroGreen**
- Planned
 - Existing
- Streams**
- Other Streams
 - Blue River
 - Brush Creek
- 0 0.25 0.5 1 Miles
- N
-

Data Sources: MARC, KCMO Parcel Viewer

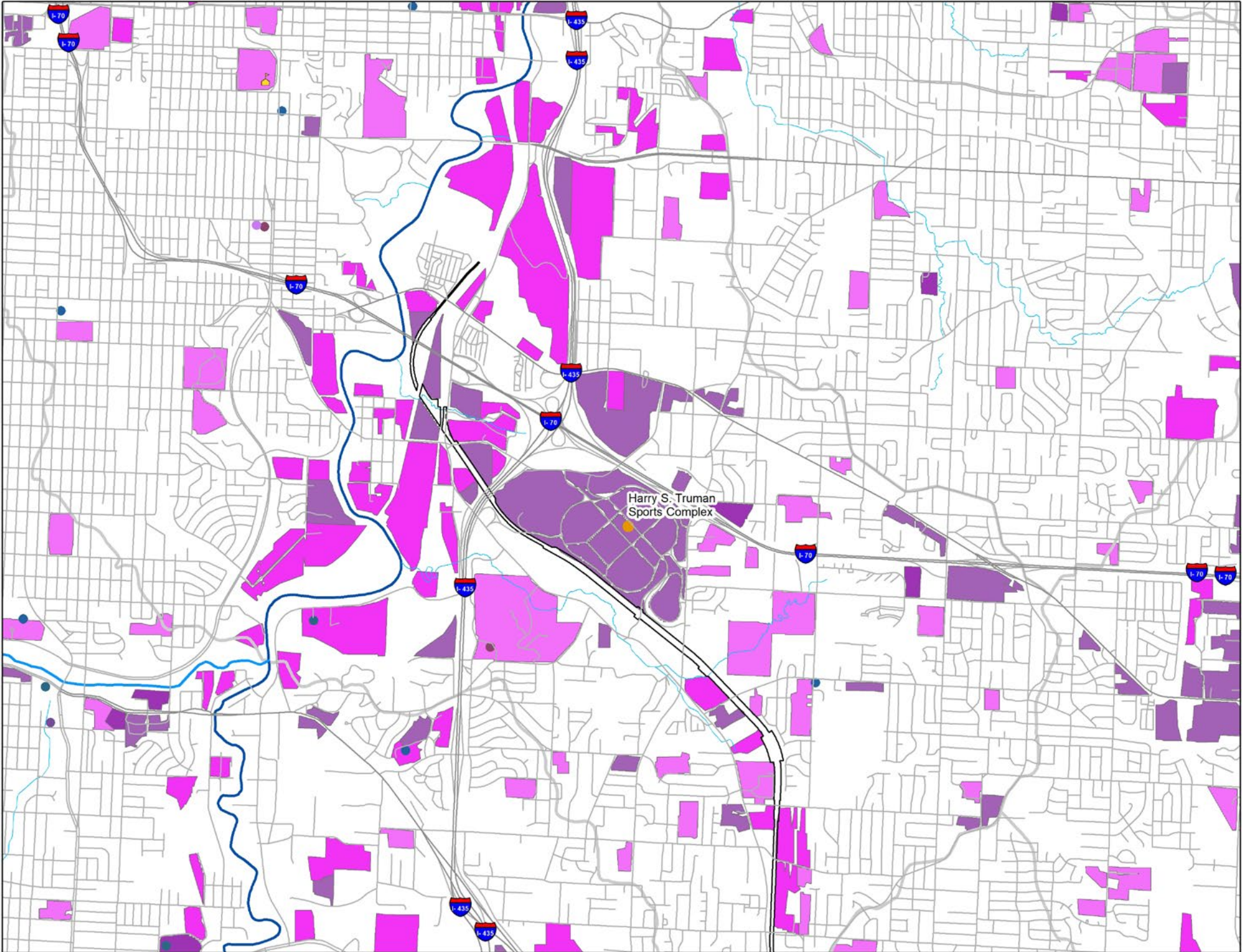
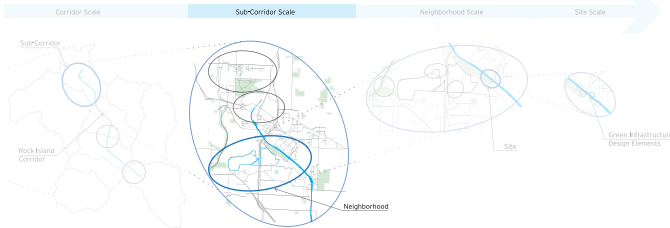
LARGE LAND HOLDERS

ROCK ISLAND SUB-CORRIDOR

Sites with larger acreage are critical to review as they have the potential for green infrastructure strategies that can have a larger impact on the overall watershed system. Knowing the different land use types can also influence what type of green infrastructure strategies should be implemented.

This data is based on land use information and requires verification when sites are identified.

SUB-CORRIDOR SCALE



Large Land Holders Rock Island Corridor - North Stadium

- East High School
- Rock Island Corridor
- Watershed
- City Facilities**
- College/University
- Fire Station
- Indoor Arena
- Manufacturing/Industrial Plant
- Non-Refrigerated Warehouse
- Office
- Police Station
- Repair Services (Vehicle, Shoe, Locksmith, etc)
- Stadium (Open)

Large Land Holders - Greater than 5 acres

- Commercial
- Indust./Bus. Park
- Mixed Use
- Office
- Public/Semipublic

- Streams**
- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles

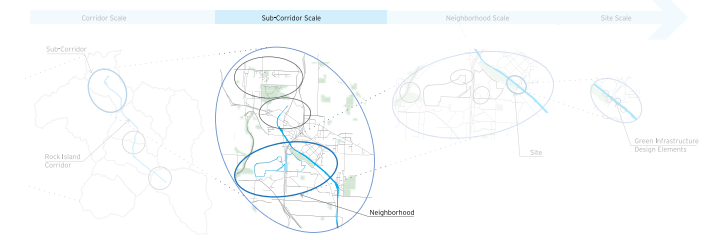
bnim Biohabitats BIKE WALK KC

Data Sources: MARC, KCMO Parcel Viewer

LARGE LAND HOLDERS - PUBLIC / PRIVATE

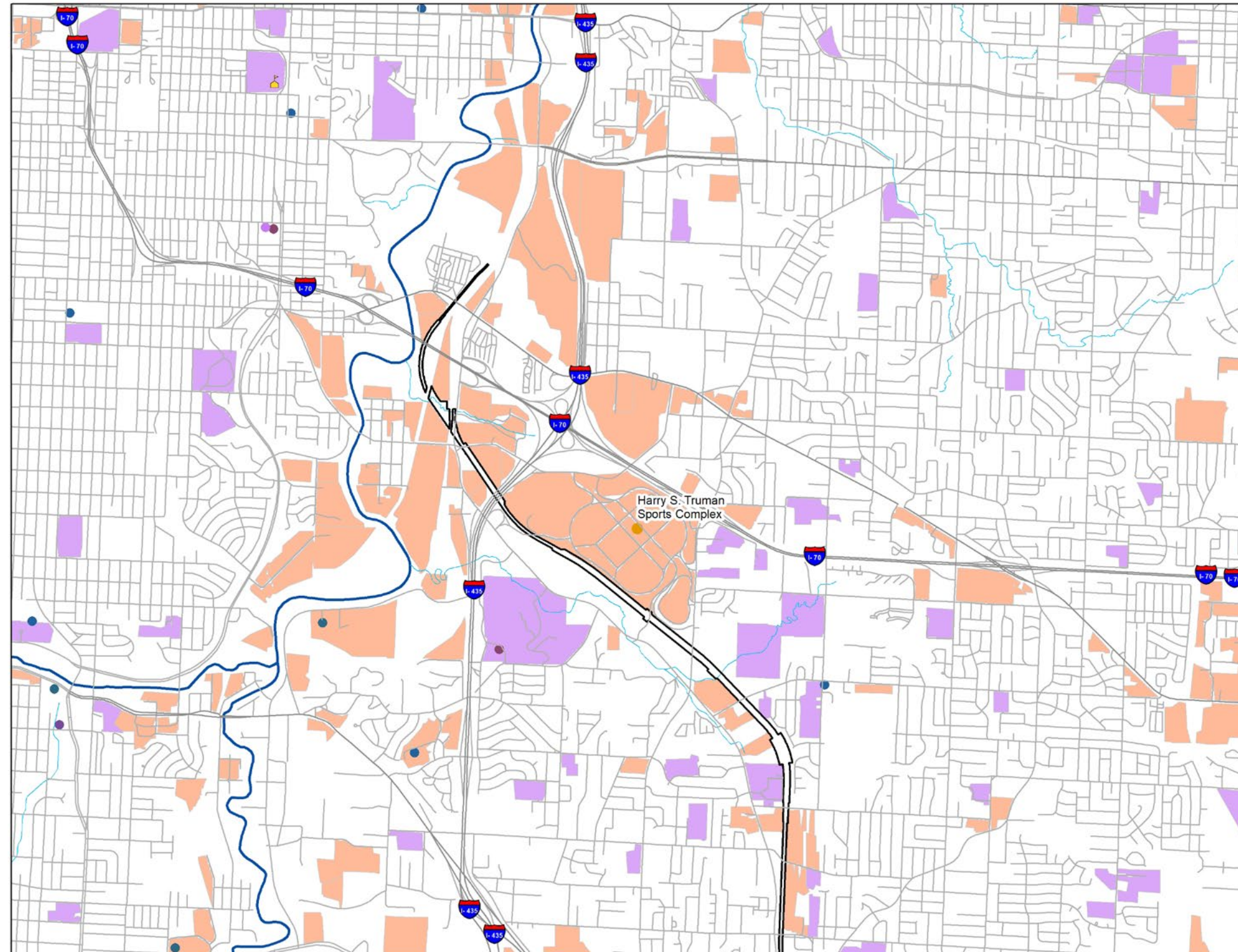
ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR
SCALE



When looking at sites for green infrastructure opportunities, it is important to look back on the criteria of momentum, need, proximity and access. Understanding ownership and status of publicly- or privately-owned property can help to identify sites that may have more momentum or may be more implementable in the coming years compared to others. Large acreage can create potential for large impacts to the watershed.

This data is based on land use information, so ownership requires verification when sites are identified.



Public vs Private Large Land Holders Rock Island Corridor - North Stadium

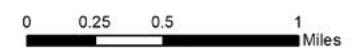
- East High School
- Rock Island Corridor
- City Facilities**
- College/University
- Fire Station
- Indoor Arena
- Manufacturing/Industrial Plant
- Non-Refrigerated Warehouse
- Office
- Police Station
- Repair Services (Vehicle, Shoe, Locksmith, etc)
- Stadium (Open)

Large Land Holders - Greater than 5 acres

- Private
- Public/Semipublic

Streams

- Other Streams
- Blue River
- Brush Creek

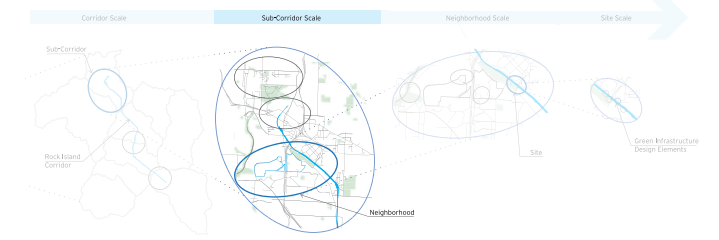


Data Sources: MARC, KCMO Parcel Viewer

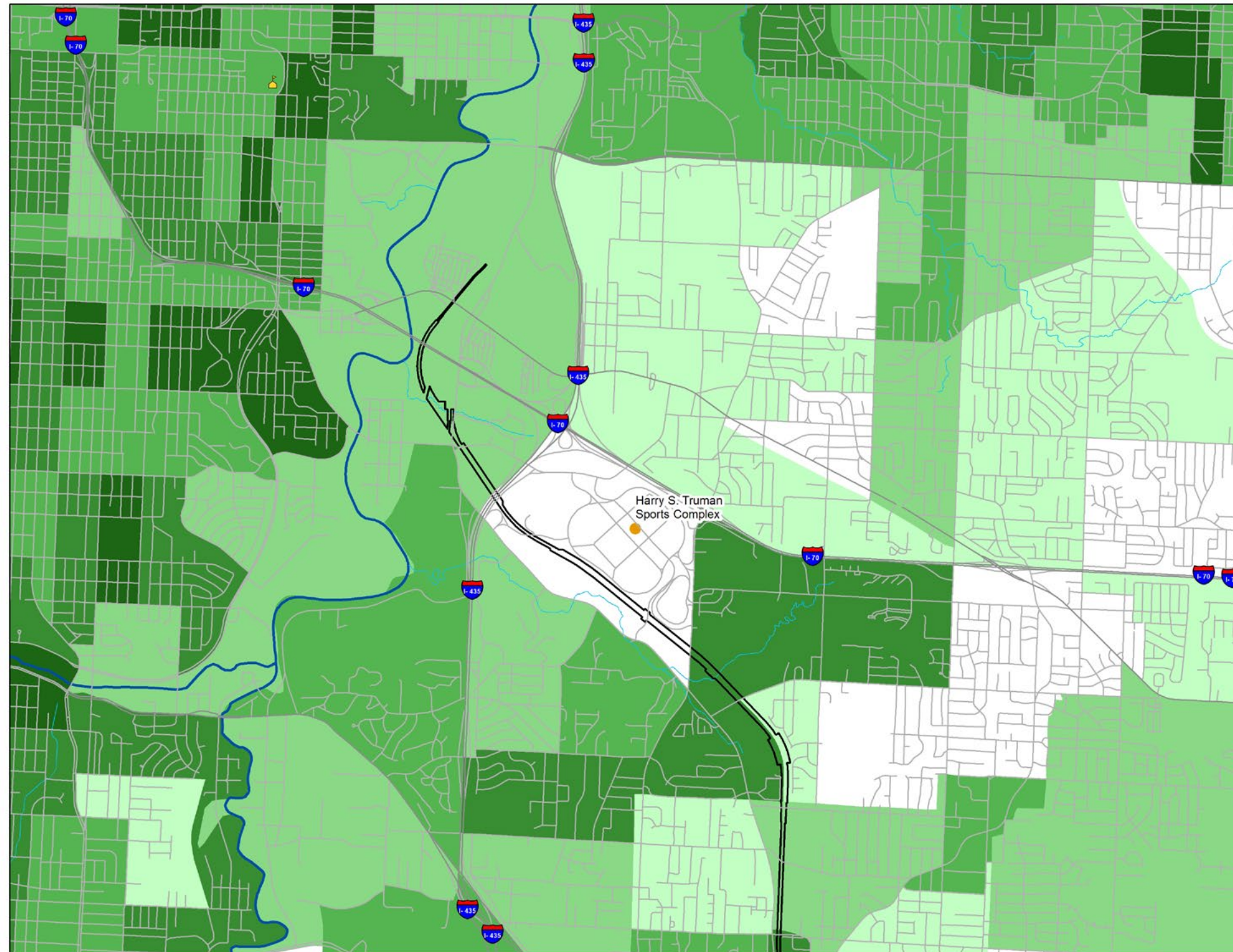
ZERO-VEHICLE HOUSEHOLDS

ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR
SCALE



Zero-vehicle households were mapped as one component of social need. Trail projects of all types, and the Rock Island Corridor in particular, are important components of green infrastructure for a variety of reasons, and in large part because they provide transportation alternatives to the automobile, with all of the environmental impacts that automobile use entails. Zero-vehicle households are those who use alternative transportation modes by necessity rather than by choice, and so represent an important consideration when identifying trail and green infrastructure opportunities.



Percent of Zero-Vehicle Households
Rock Island Corridor - North Stadium

- East High School
- Rock Island Corridor

Percent of Zero-Vehicle Households

- 1% - 4%
- 4% - 11%
- 11% - 21%
- 21% - 34%
- 34% +

Streams

- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles

N

Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

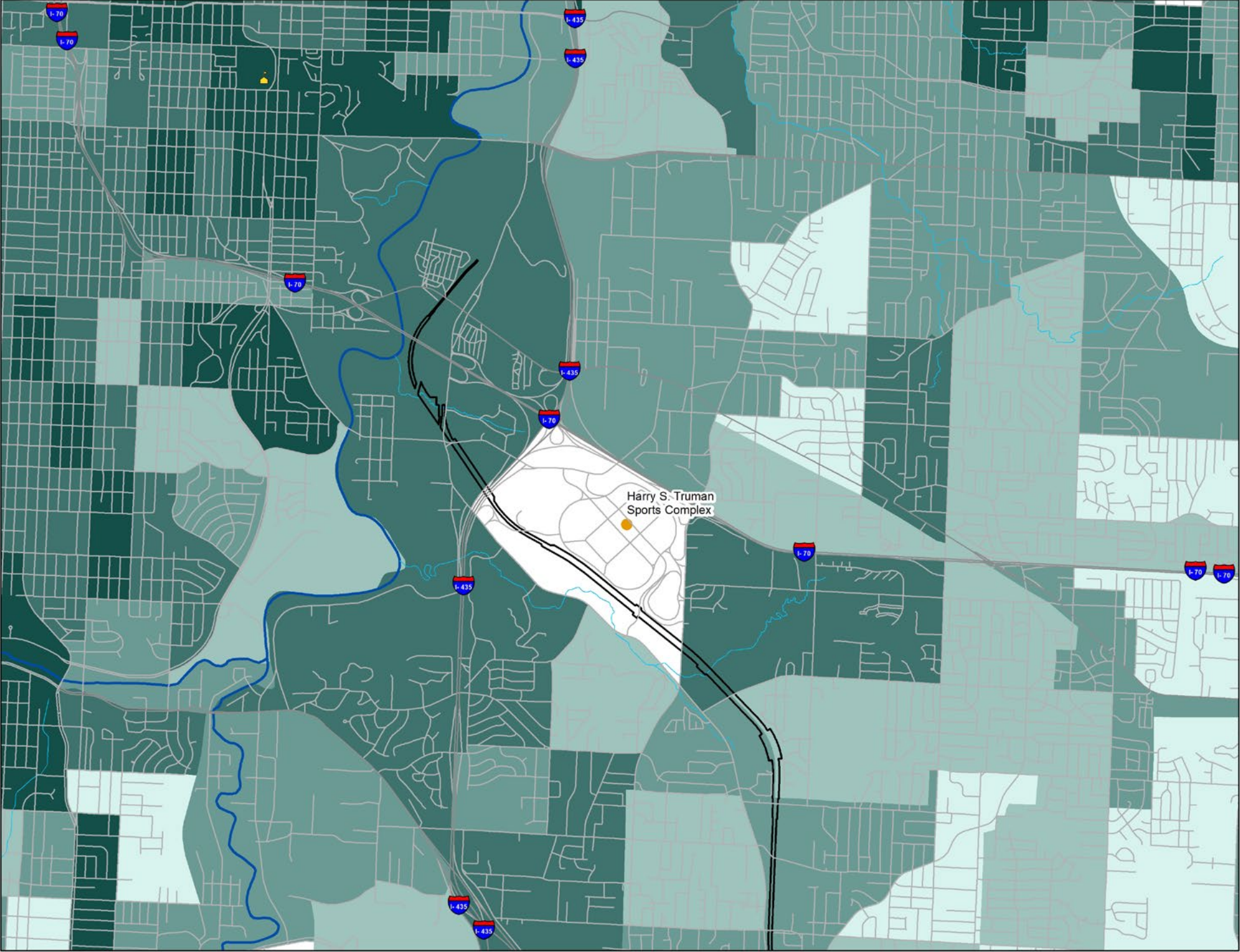
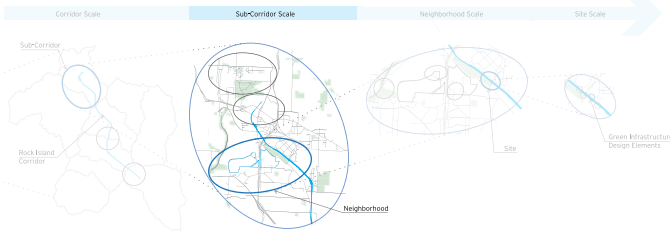
PERCENT OF POPULATION WITH INCOME BELOW POVERTY

ROCK ISLAND SUB-CORRIDOR

Poverty was mapped as one component of social need. Areas of poverty are places of particular vulnerability, where health, education, access to opportunity and equity needs are pronounced.

The white area around the Truman Sports Complex has no population contributing to this data.

SUB-CORRIDOR SCALE



Percent of Population with Income Below Poverty
Rock Island Corridor - North Stadium

- East High School
- Rock Island Corridor
- Percent of Population with Income Below Poverty**
- 1% - 6%
- 6% - 15%
- 15% - 27%
- 27% - 42%
- 42% +

- Streams**
- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles

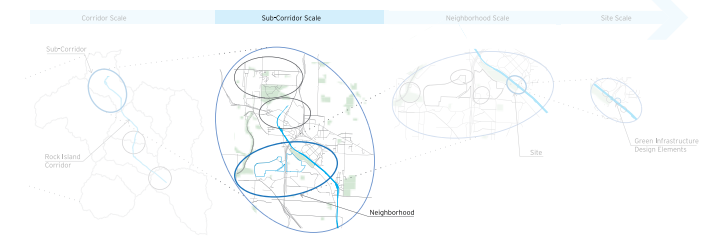
bnim Biohabitats **BIKE WALK KC**

Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

EDUCATIONAL ATTAINMENT

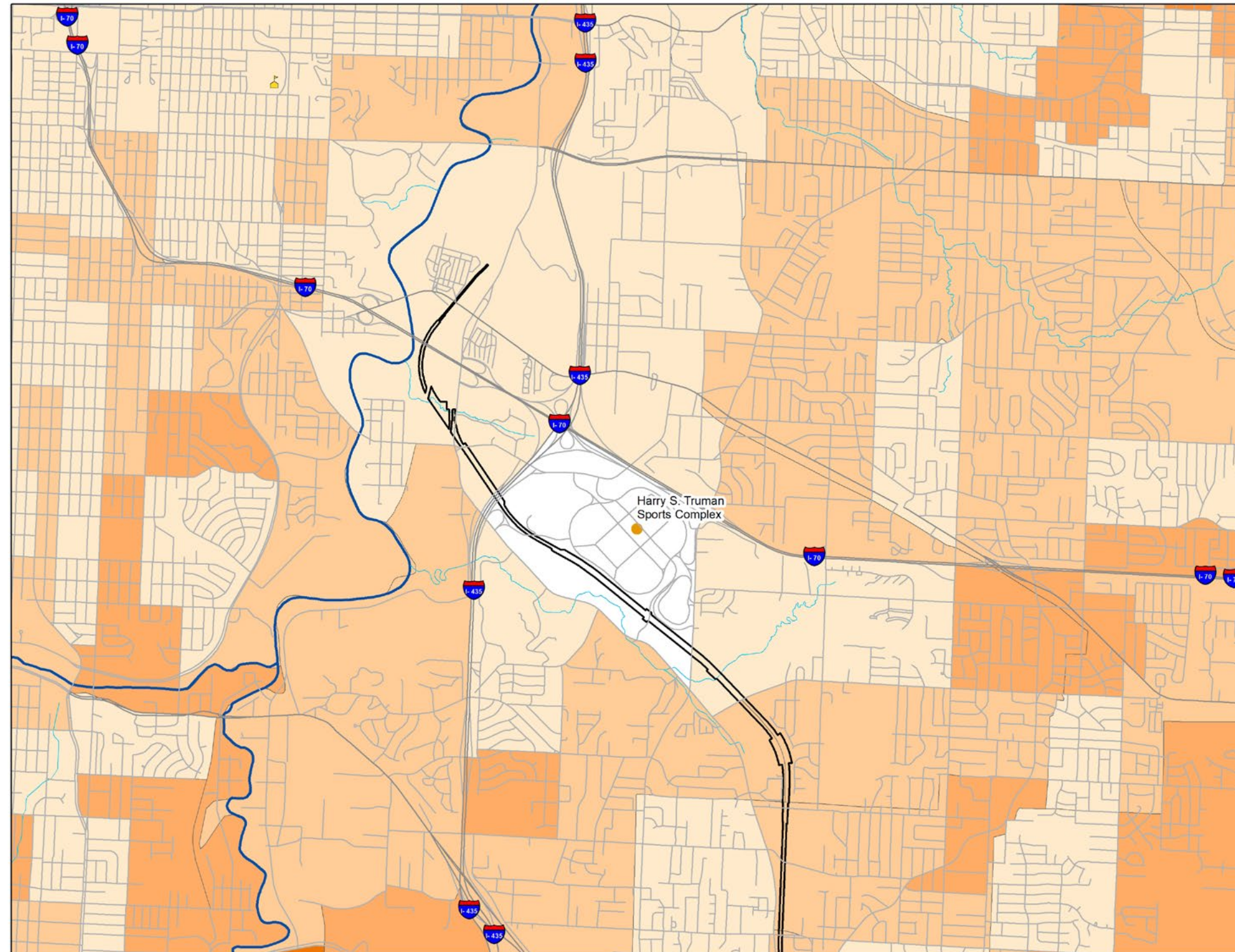
ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR
SCALE



Educational attainment was mapped as one component of social need. Areas of low educational attainment are places of particular vulnerability, where health, education, access to opportunity and equity needs are pronounced.

The white area around the Truman Sports Complex has no population contributing to this data.



Percent with Associate Degree of Higher
Rock Island Corridor - North Stadium

- East High School
- Rock Island Corridor
- Percent with Associate Degree or Higher**
- 6% - 17%
- 17% - 25%
- 25% - 35%
- 35% - 62%
- 62% +

- Streams**
- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles

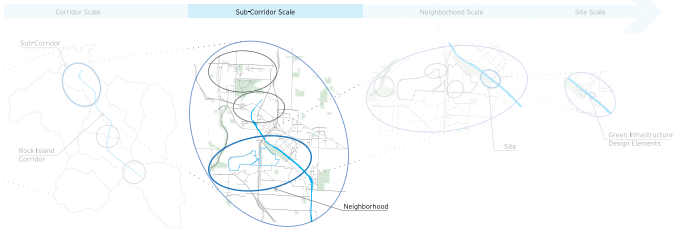
bnim Biohabitats BIKE WALK KC

Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

MINORITY POPULATION

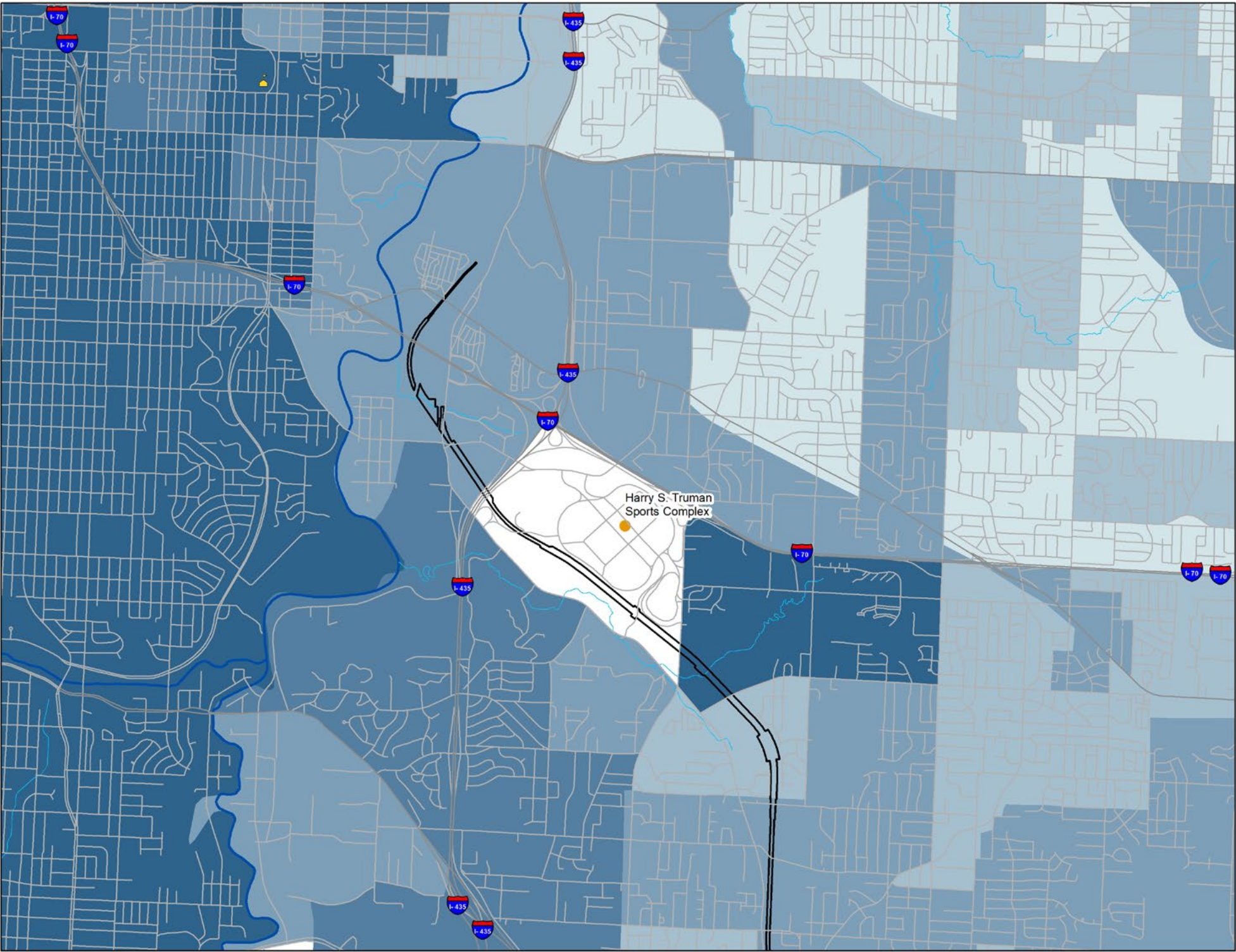
ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE



Minority populations were mapped as one component of social need. Historically, minority communities are places of particular vulnerability, where health, education, access to opportunity and equity needs are pronounced.

The white area around the Truman Sports Complex has no population contributing to this data.



Percent Minority Population Rock Island Corridor - North Stadium

- East High School
 - Rock Island Corridor
- Percent of Minority Population**
- 1% - 12%
 - 12% - 27%
 - 27% - 50%
 - 50% - 76%
 - 76% +

- Streams**
- Other Streams
 - Blue River
 - Brush Creek

0 0.25 0.5 1 Miles

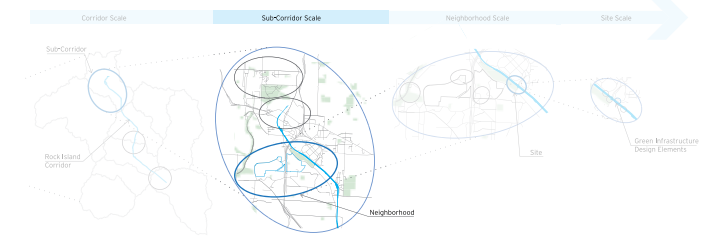
bnim

Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

SOCIAL-NEED INTERSECTION ANALYSIS

ROCK ISLAND SUB-CORRIDOR

SUB-CORRIDOR SCALE

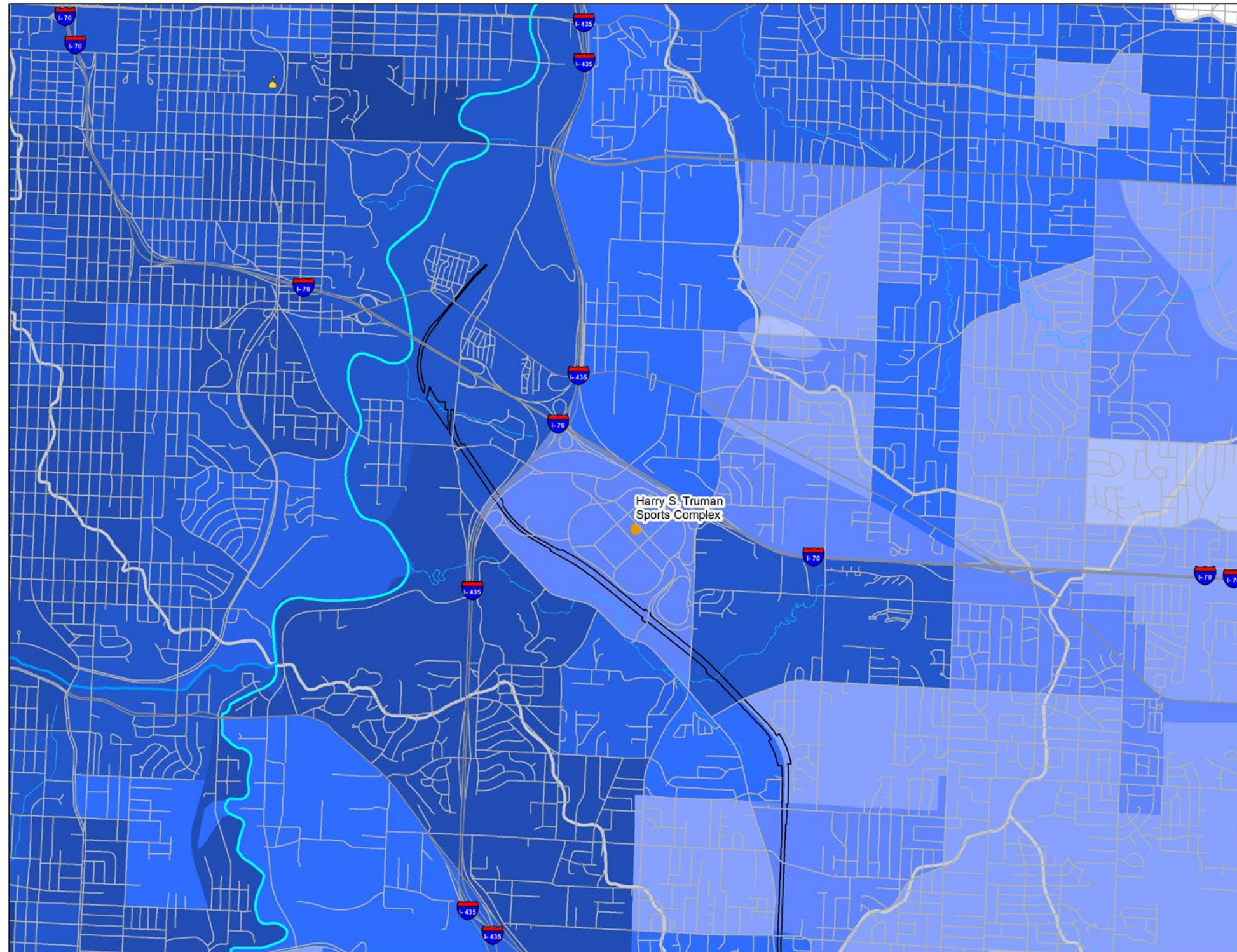


Social need was modeled along with data for the watersheds and analyzed the following social factors:

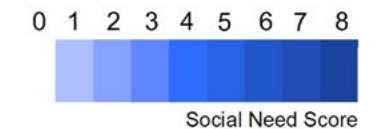
- Poverty.
- Hazardous Waste.
- Population Loss.
- Health Indicators.
- Food Deserts.
- Educational Attainment.
- Zero-vehicle Households.
- Minority Populations.

On this map, the darker the blue the higher number of intersection/overlap of these social factors.

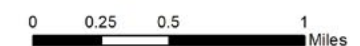
The data sets of Health Indicators and Food Deserts were selected as proxies for access to healthcare and healthy environments. Hazardous waste was selected as a proxy for the nexus between land use, environmental conditions, and human health. Population loss, poverty and patterns that imply minority segregation were selected as proxies for economic disinvestment and vulnerability. Educational Attainment was selected as a proxy for access to education. Zero-vehicle households was selected as a proxy for general access to opportunity and services. Areas identified with high levels of intersection are identified as high social need and therefore a priority for using green infrastructure to address social needs.



Intersection of Social Needs
Rock Island Corridor - North Stadium



- 📍 East High School
- ▭ Rock Island Corridor
- ▭ Watershed
- Streams**
- Other Streams
- Blue River
- Brush Creek

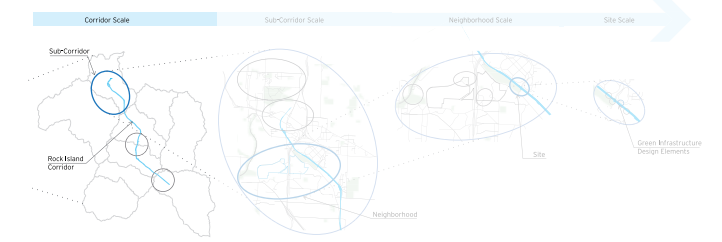


Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

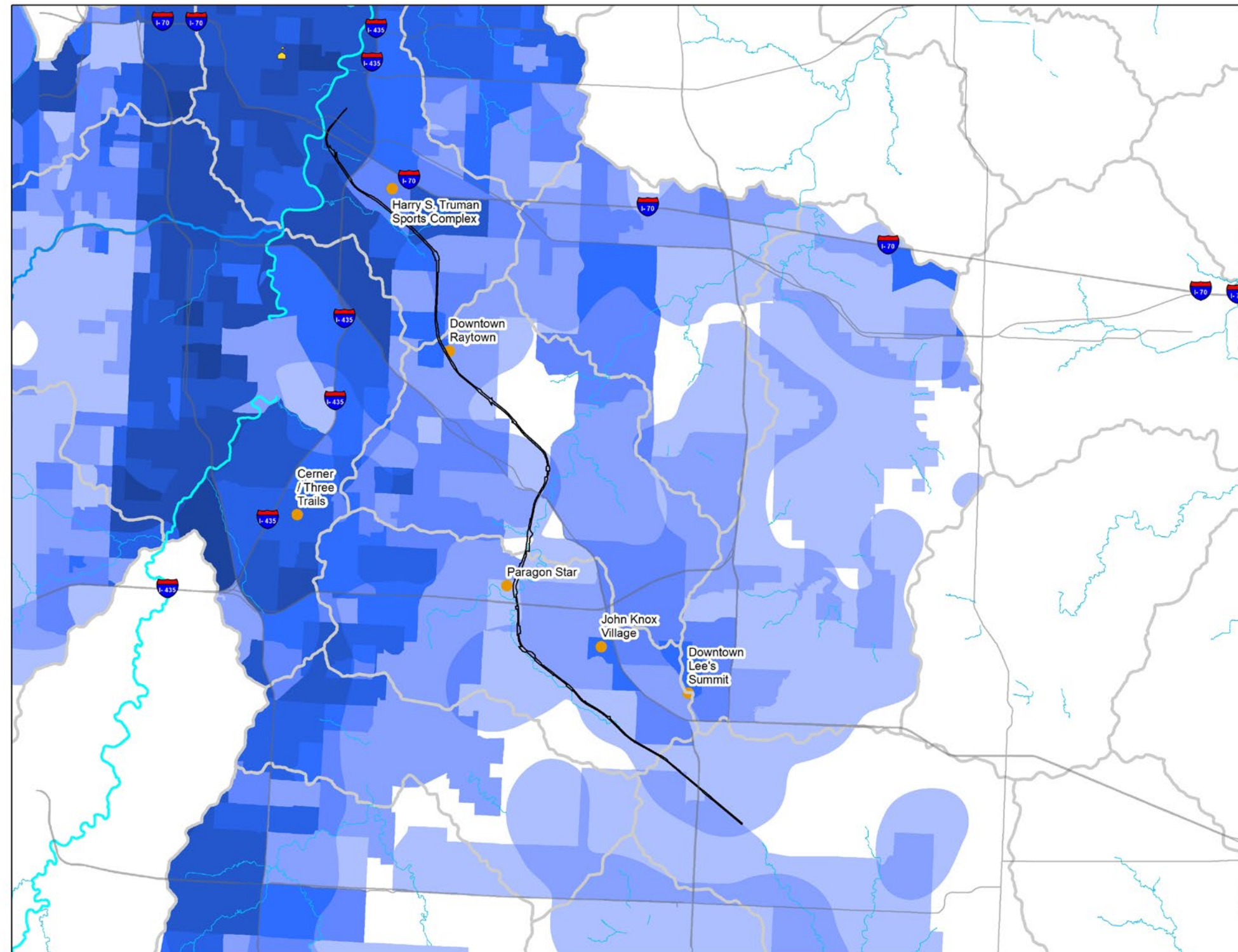
SOCIAL-NEED INTERSECTION ANALYSIS

ROCK ISLAND CORRIDOR

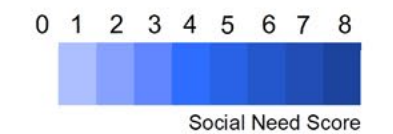
CORRIDOR SCALE



This is the same social-need intersection analysis as described on the previous page, looking at the larger, corridor-wide scale. See previous map for explanation of map content.



Intersection of Social Needs Rock Island Corridor



- East High School
- Rock Island Corridor
- Watershed
- Streams**
- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles

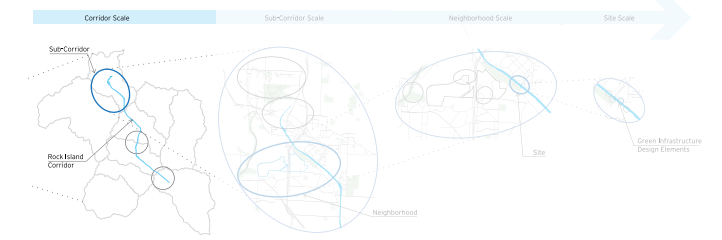


Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer

ECOLOGICAL VALUE AREAS

ROCK ISLAND CORRIDOR

CORRIDOR SCALE



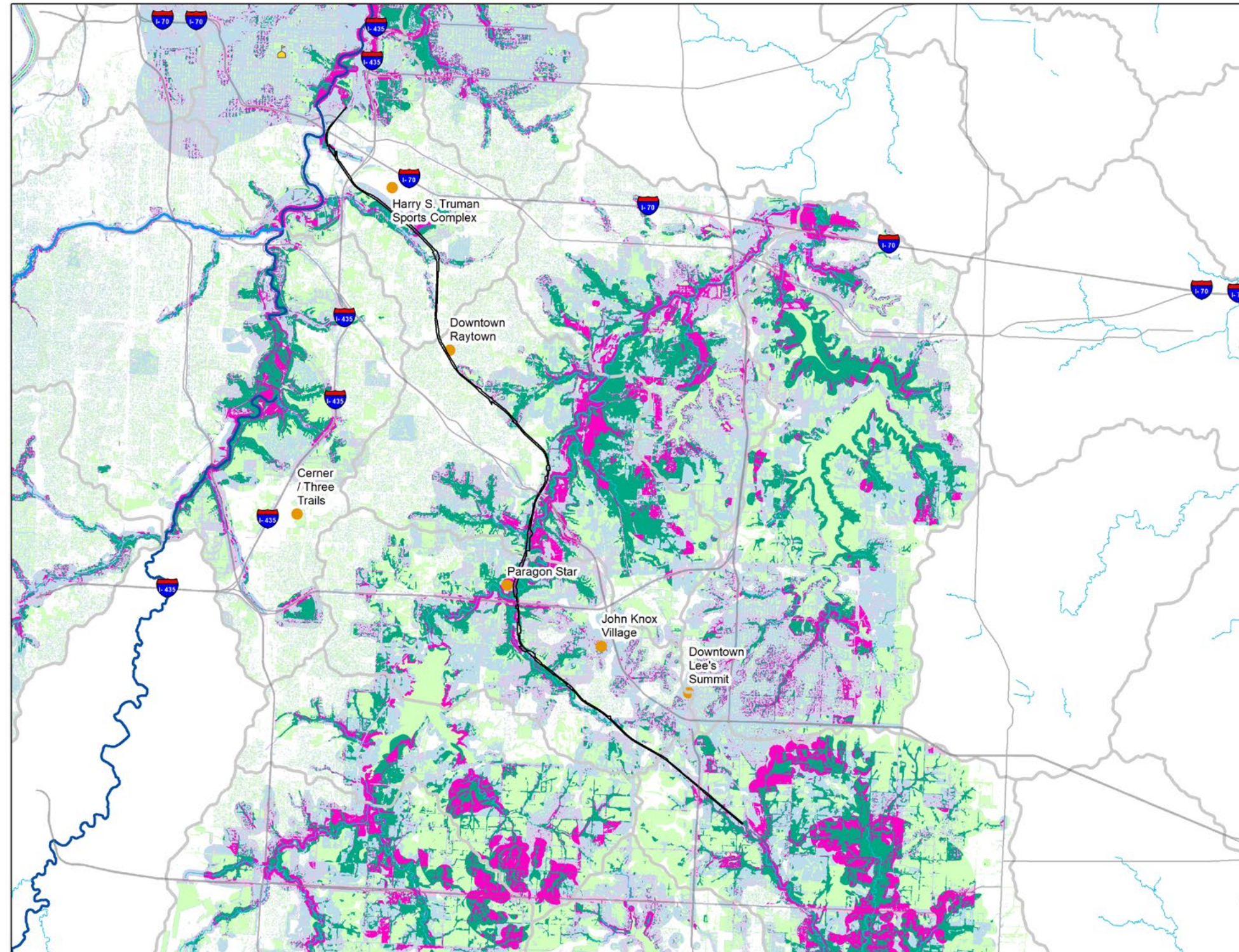
This map was created to show the intersections between the values and needs. Areas with moderate- and high-ecological value and no impacts or needs are considered a conservation priority (light and dark green). Areas with moderate- and high-ecological value that do have impacts or needs are considered a restoration priority (pink and magenta).

The factors of high ecological value include:

- Streams.
- Lakes.
- Wetlands.
- Floodplains.
- Existing Forest.
- Large Herbaceous Patches.
- Caves and Karst.
- Glades.
- Clean Water Benefits.
- Wildlife Benefits.

The factors of ecological impact or need are:

- Impervious Surface.
- Major Roads.
- Highest Forest Restoration Priority.



Ecological Value Areas Rock Island Corridor

- Ecological Value Areas**
- Conservation Priority: High
 - Conservation Priority: Moderate
 - Restoration Priority: Moderate
 - Restoration Priority: High

- East High School
- Rock Island Corridor
- Watershed

- Streams**
- Other Streams
 - Blue River
 - Brush Creek

0 0.25 0.5 1 Miles



Data Sources: MARC, KCMO Parcel Viewer, The Conservation Fund

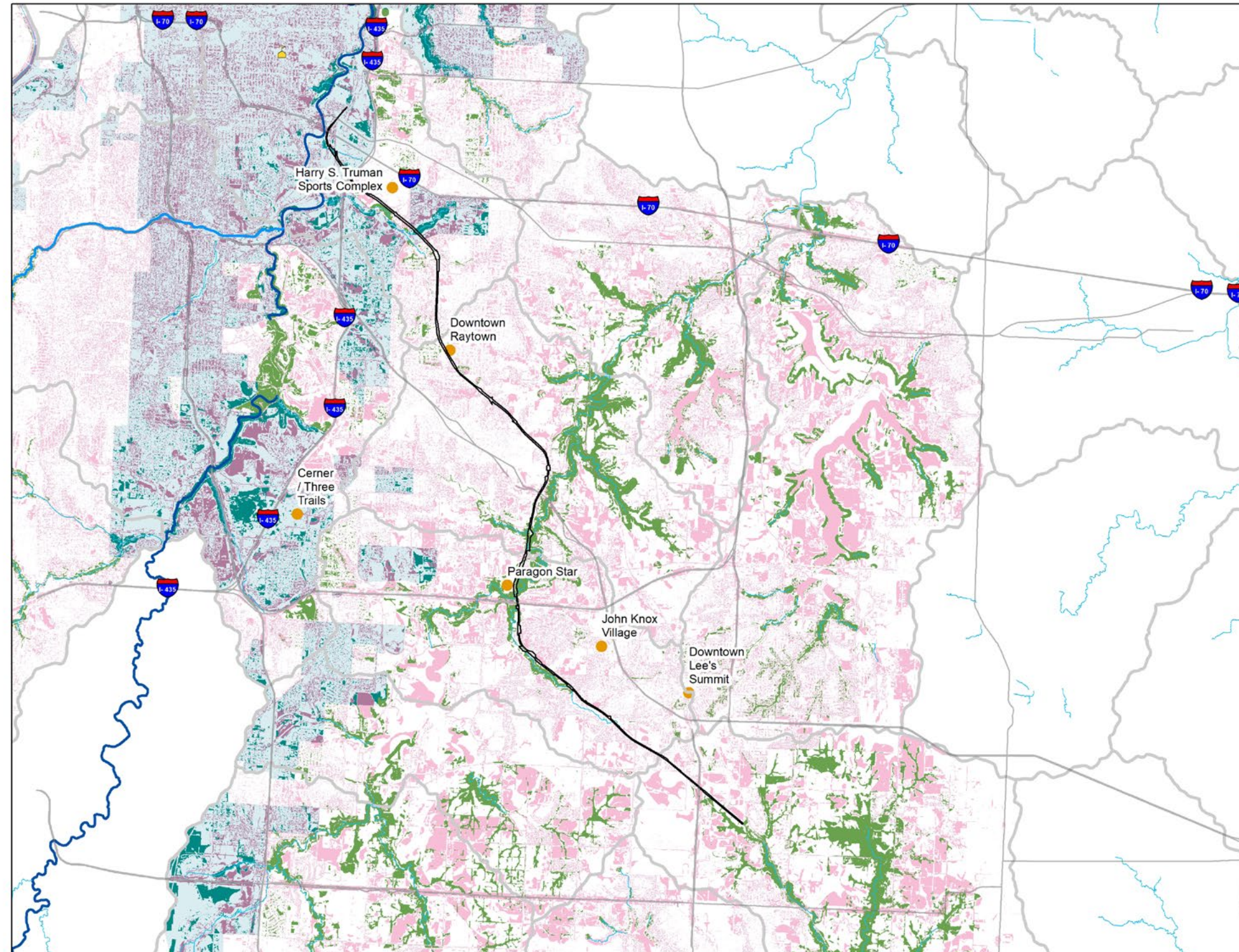
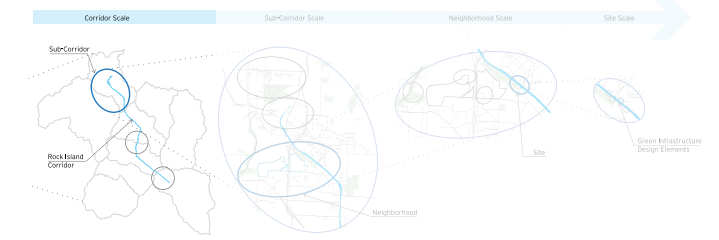
INTERSECTION OF ECOLOGICAL AND SOCIAL NEEDS

ROCK ISLAND CORRIDOR

The primary purpose of this analysis is to find areas of the greatest intersection of ecological and social need, so the areas of black, dark teal, and dark purple indicate areas of high interest in this study.

The quantitative analysis used was an intersection analysis to view ecological value and need and social need jointly and holistically. This is a trivariate map, where each unique color represents a different combination of intersection. Light pink indicates the presence of high-value ecological resources and conservation needs, but no other need intersection. Green and blue indicate ecological need for restoration and social need, respectively. Darker shades are used to represent greater intersection: dark teal for areas of social and restoration intersection, and dark purple for social and conservation intersection. Black indicates an intersection of all three needs, which does not occur as restoration and conservation values do not typically overlap.

CORRIDOR SCALE



Intersection of Ecological and Social Need Rock Island Corridor



- East High School
- Rock Island Corridor
- Watershed
- Intersection Analysis**
- Higher Ecological Need/Restoration
- Higher Ecological Value/Conservation
- Higher Social Need
- Intersection of Restoration & Social Need
- Intersection of Conservation & Social Need
- Intersection of Restoration & Conservation
- Intersection of Restoration, Conservation, & Social Need

Streams

- Other Streams
- Blue River
- Brush Creek

0 0.25 0.5 1 Miles



Data Sources: ACS 2015 5-year Block Group, MARC, KCMO Parcel Viewer, The Conservation Fund