

Wakarusa Design Development

LAR 420 | Spring 2025 | Dr. Hyung "Jin" Kim
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Project Background

The Wakarusa River Valley in northeast Kansas' Douglas County flows from the Clinton Dam south of Lawrence to the Kansas River north of Eudora. Surrounding landscape is composed of agriculture, wetlands, parks, and urbanization, each of which is associated with unique problems such as flooding, habitat fragmentation, ecological disconnection, and growing pressure from urban development into natural and agricultural areas.

This project aims to identify and preserve tracts of high ecological connectivity potential, safeguard the Wakarusa River riparian corridor, create recreational access and enhance Lawrence-Eudora connections. Through selective conservation and careful planning, the corridor can be a resilient, accessible zone that balances community use and environmental integrity.

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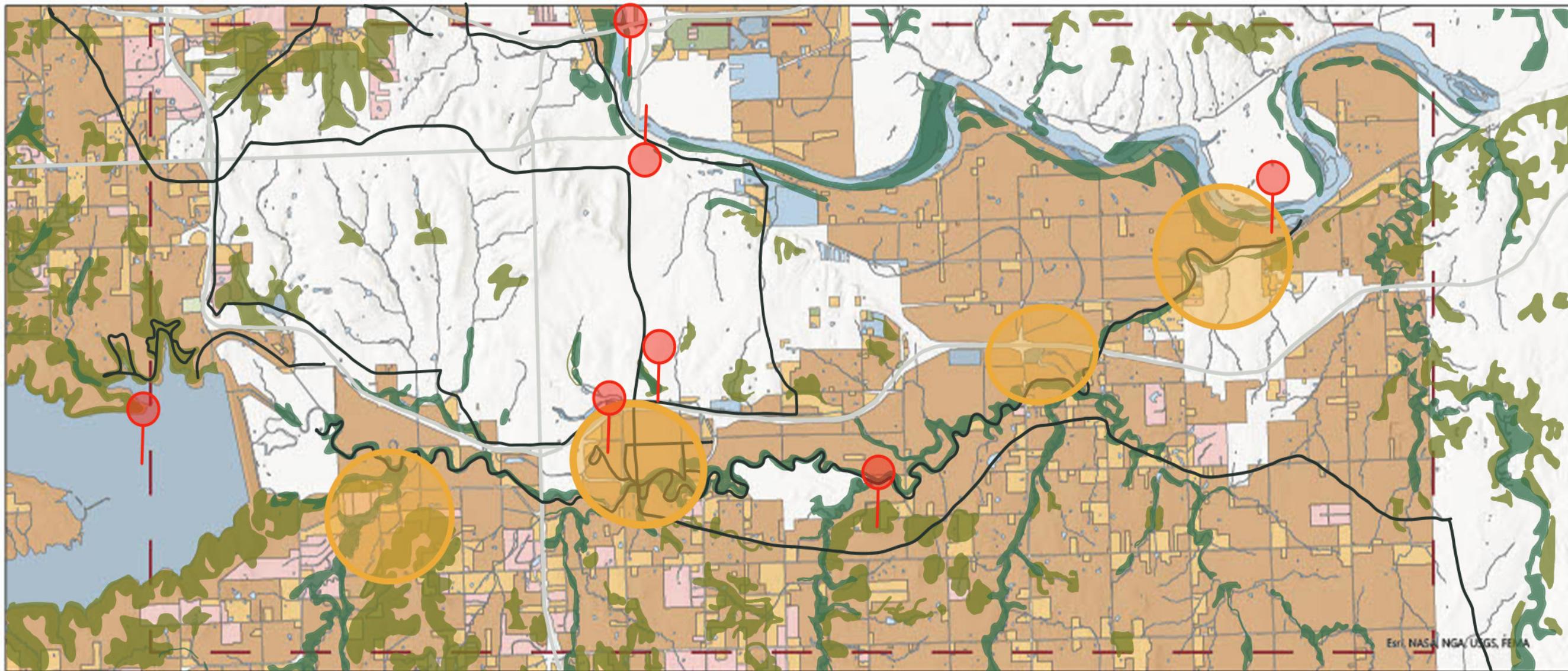
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Synthesis



After looking into historic infrastructure, existing trails, riparian buffers, and the surrounding land use we were able to determine our focus areas of choice. These are prime areas for community connectivity and natural habitat and ecosystem rejuvenation that could serve as a floodplain buffer if the river floods.



Examined Precedents

Mill River Park and Greenway

Stamford, Connecticut

Main goals were to mitigate impending flood threats through returning Mill river to a natural free flowing state.

The mimicry of native morphology of the river through reimplenting native vegetation and wildlife to the area

Work to only use design elements on trails and features that are permanent under the guise of flooding and watershed

Sanhile Corridor

Qian'anzen, China

Main goals were to reduce pollution along the Sanhile river, while providing urban development opportunities and regenerating ecological opportunities

Works by using a green belt along the river which is adjacent to the fully accessible bike and pedestrian trails

Wetlands were expanded along the river to be natural pollution deterrents for urban storm water runoff



Regional Vision Plan

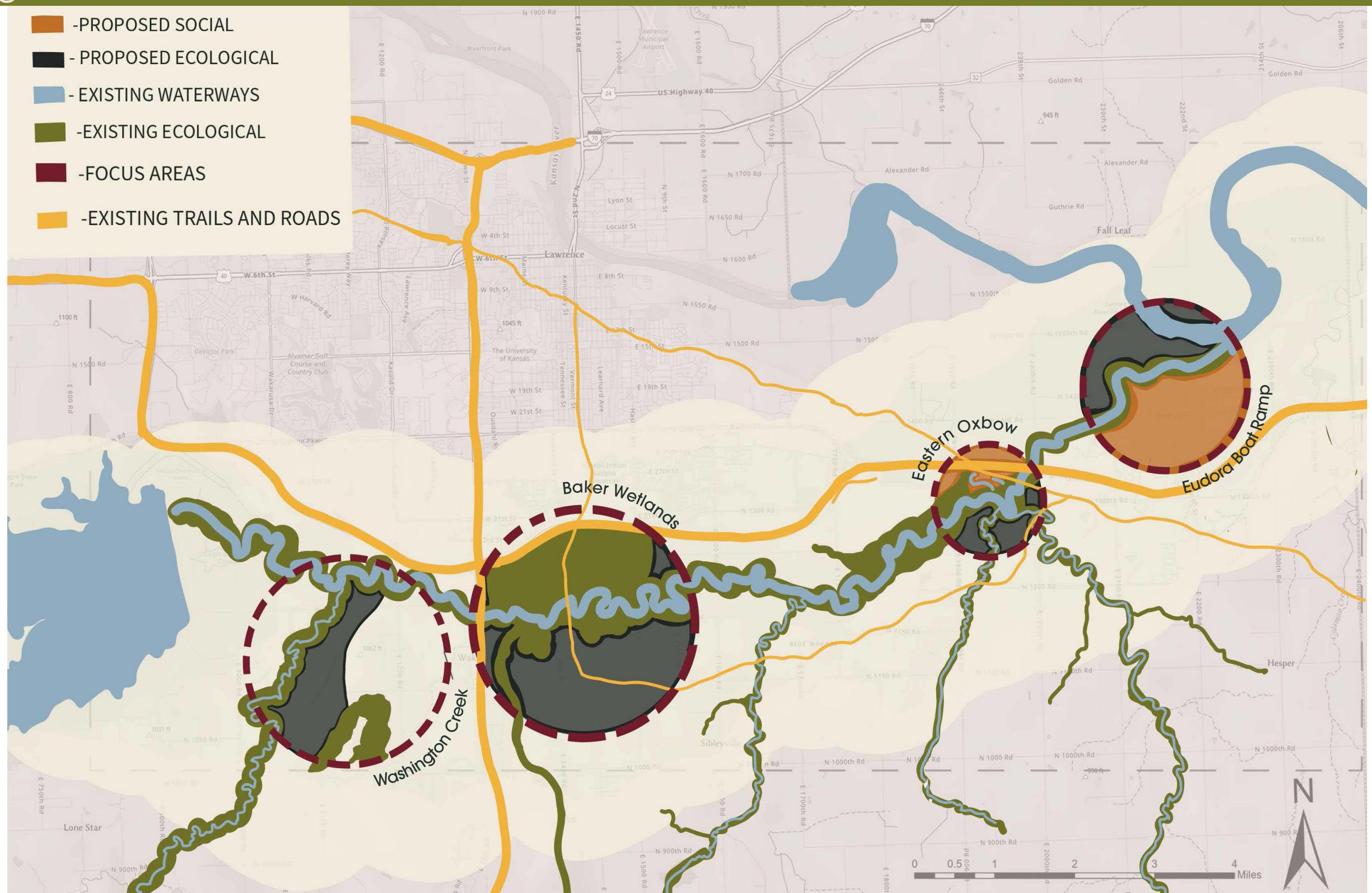
Goals and Objectives

1. Repair and extend the riparian corridors
 - a. Determine and implement a floodplain buffer along the Wakarusa River
 - b. Select key areas for floodwater management and mitigation
 - c. Enhance water quality and overall river health
2. Promote connectivity and community engagement from the surrounding urban environments
 - a. Select ideal locations for low-impact recreation activities along the river
 - b. Enhance trail connectivity between Lawrence and Eudora
 - c. Provide educational opportunities and activities for community engagement
3. Increase plant biodiversity through habitat expansion
 - a. Locate areas of increased habitat fragmentation and improve connectivity
 - b. Protect key habitats from projected urban growth
 - c. Identify keystone species in order to prevent future habitat loss along the river



Regional Vision Plan

- PROPOSED SOCIAL
- PROPOSED ECOLOGICAL
- EXISTING WATERWAYS
- EXISTING ECOLOGICAL
- FOCUS AREAS
- EXISTING TRAILS AND ROADS



River and Water Vision



Excessive flooding on site has been a bigger issue for the site due to the dam and control of the rivers flow.

Working to sufficiently reduce these negative effects by providing storm water mitigation areas along the problem locations of the corridor.

Adjacent creeks that connect are big problems so especially focusing on floodways and mitigation areas here to discourage excess overflow of water.

Ecology and Biodiversity Vision



Working to reconnect the previously fragmented habitats across the corridor.

Reinvesting in these ecosystems to provide stable and thriving homes for more native wildlife to reside in.

The ecosystems that we are focusing on in particular are the Oak-Hickory cuestas, wetlands, and tallgrass ecosystems.

Outskirts of privately owned agriculture land along the river will be the main source of land for extended habitats.

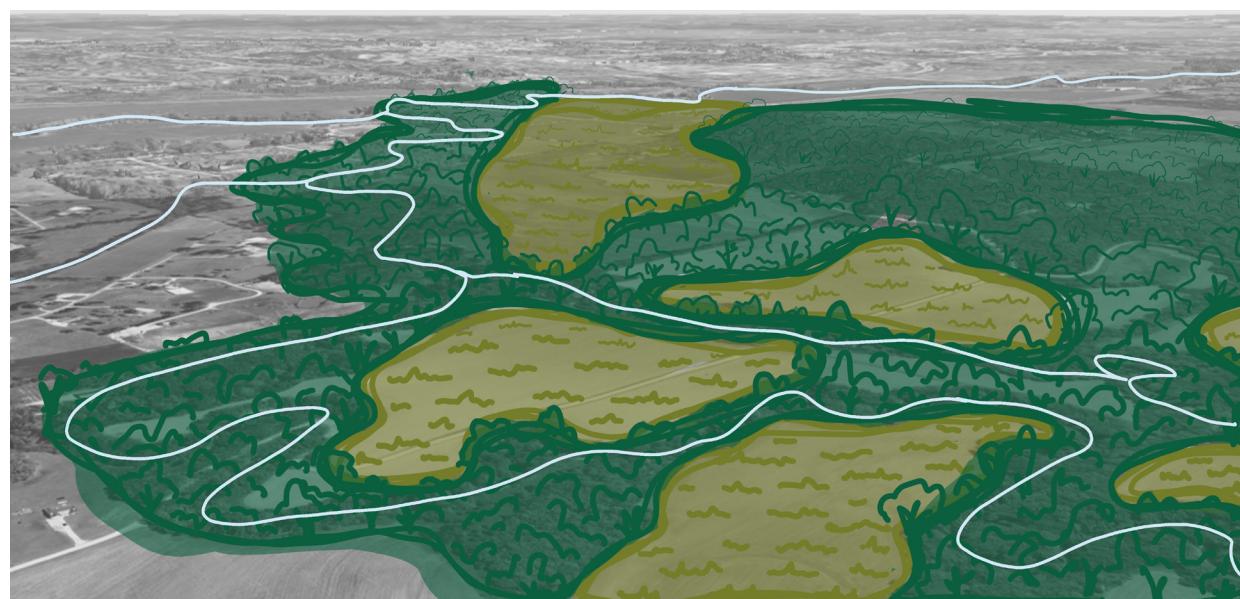
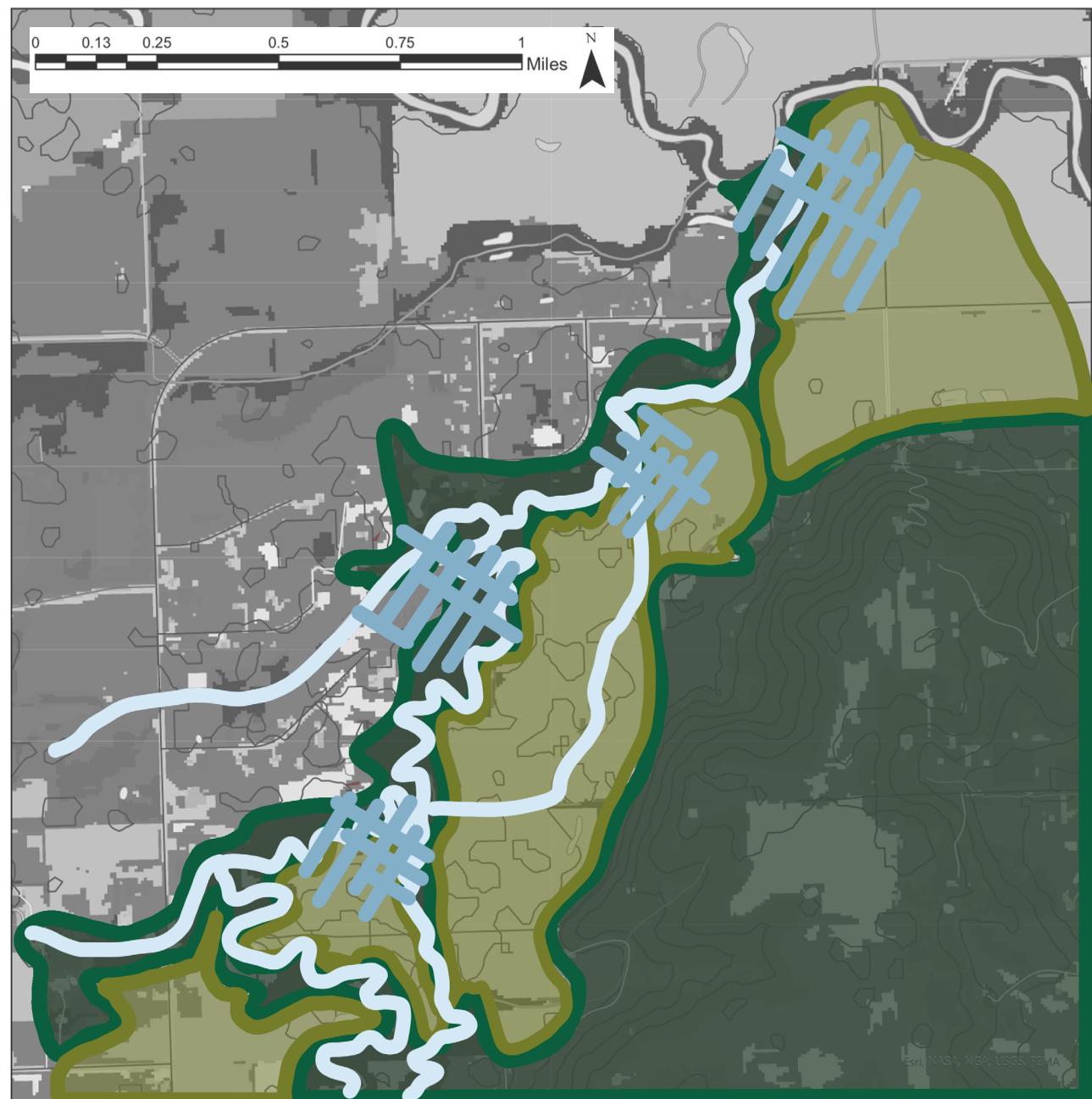
Social Connectivity Vision



The south side of the Wakarusa river is secluded from connecting social elements and is underutilized by the surrounding community.

Revamping the existing historical trails on site is important to promote this connectivity in this plan.

Working to implement low-impact material parks for rest and interaction along key areas adjacent to the river and existing roads.



Washington Creek Vision

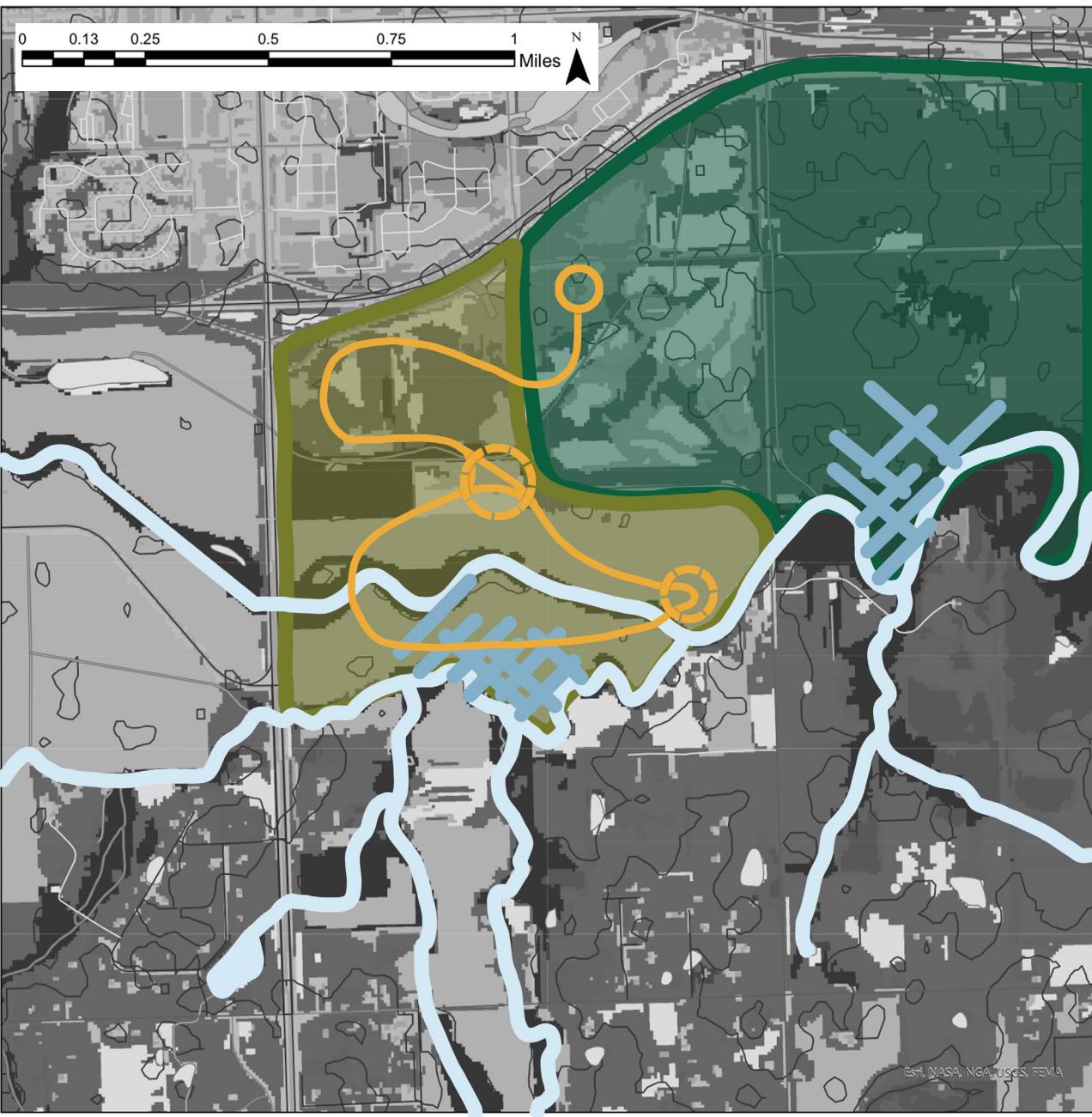
Within our first focus area, Washington Creek connects to the Wakarusa River. Over time, the native habitats in this area have been fragmented through agricultural practices and low-impact urban development. The aging Mixed Oak-Hickory Woodlands, Ruderal Deciduous Woodlands, Unglaciated Eastern Upland Grasslands, and Floodplain Ruderal Grasslands have been separated from Washington Creek and the Eastern Floodplain Forests along its banks. This separation from the creek plays a roll in stormwater mitigation along the Wakarusa River. Washington Creek is the first tributary to enter into the Wakarusa River after the Clinton Dam, so its ability to mitigate floodwater is key to preventing increased flooding down the Wakarusa River, especially during times of increased rainfall. Restoring the native habitat in key locations will increase the water absorption along Washington Creek.

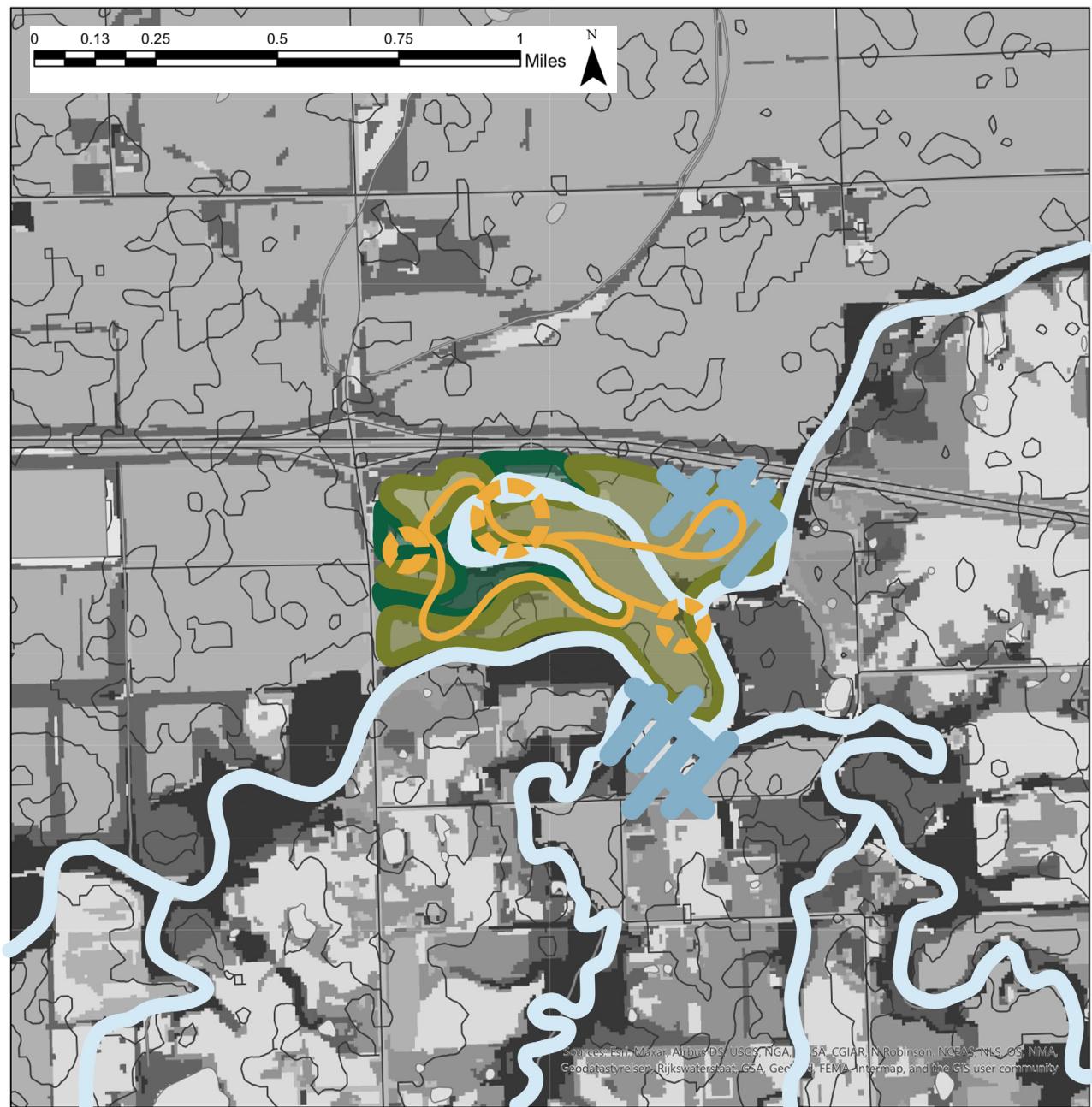
Baker Wetlands Vision

Our second focus area looks at The Baker Wetlands and the surrounding environment. The well established Eastern Floodplain Ruderal Grassland ecosystem of the Baker Wetlands provides a stepping stone habitat for the native animals traveling along the Wakarusa River. It is isolated from other native ecosystems in the area by agricultural practices, transportation infrastructure, and urban development. With close proximity to both high- and low- intensity urban areas, and existing connection to the community, there is the opportunity to improve community engagement and establish the human-nature connection in the region. Expanding the trails in the area to the river, establishing the Riparian Corridor barrier and barrier around the wetlands, and expanding the native ecosystems in the region will create an area that allows animals to travel safely within the river corridor.

Legend

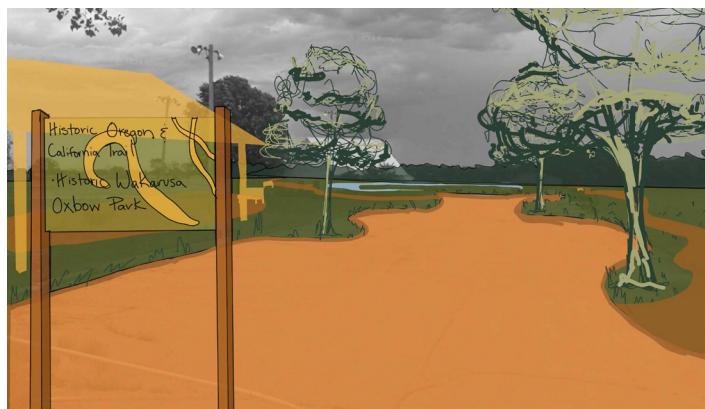
- Hydrology
- Key Stormwater Mitigation Areas
- Proposed Mixed-Use Trails
- Proposed Community Engagement
- Existing Community Engagement
- Proposed Habitat Expansion
- Habitat Restoration (As Needed)





Legend

- Hydrology
- Key Stormwater Mitigation Areas
- Proposed Mixed-Use Trails
- Proposed Community Areas
- Proposed Habitat Expansion
- Habitat Restoration (As Needed)



Eastern Oxbow Vision

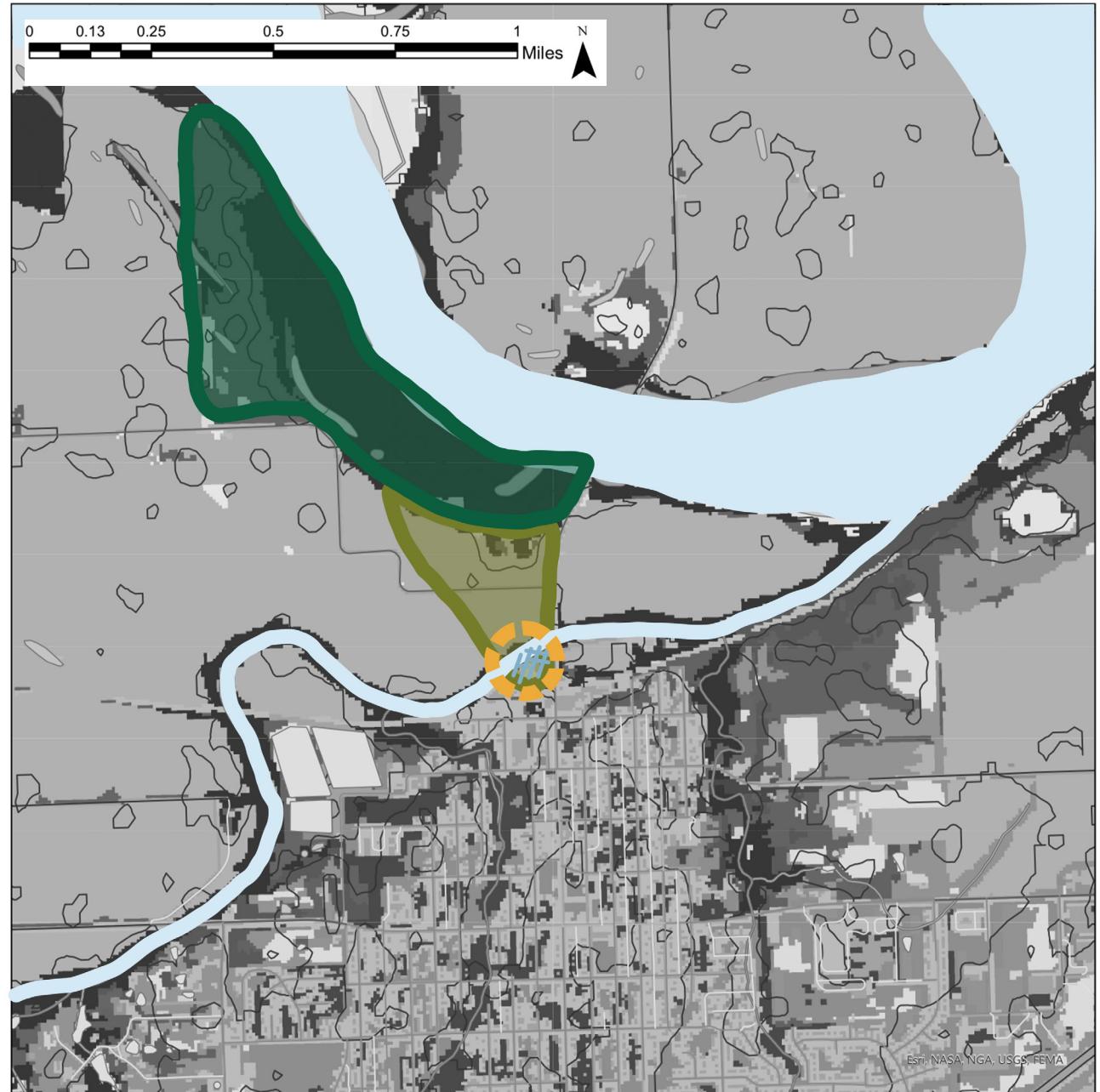
Within the third focus area, two tributaries meet the Wakarusa River along the Southern bank, and an Oxbow lake is located on the Northern side. This explains the large floodway in this area, and provides an ideal location to further develop floodwater management along the Wakarusa River. The oxbow is surrounded by agricultural land, transportation infrastructure, and small patches of Eastern Floodplain Ruderal Grasslands. Its close proximity to the highway provides an easy connection to Lawrence and Eudora, making the site a great location for expanding trails and implementing a new river access point. The site is also close to the historic Oregon Trail and California National Historic Trail. Creating a way-point for bike trails between Lawrence and Eudora, highlighting important historic trails in the region, improving floodwater management, expanding native plantings, and inserting an additional river access point will create an interactive location for community engagement.

Eudora Boat Ramp Vision

The City of Eudora is located along the Wakarusa River where it meets the Kansas River. The Eudora Boat Access Ramp is in an area that is prone to excessive flooding. This problem has been constant for the last century and continues to exist today. Due to the area being poorly lit and isolated, it is underutilized and under appreciated by the community. In order to bring more connectivity between the community and nature, renovating the boat ramp on site, implementing floodwater management, improving lighting, and creating recreation spaces in the area would create a more inviting and interactive location. The floodwater management implemented further up the river will help mitigate stormflow in the Wakarusa River, and prevent flooding on site. Creating floodwater mitigation on the site will also prevent excessive flooding in the area.

Legend

- Hydrology
- Key Stormwater Mitigation Areas
- Proposed Community Areas
- Proposed Habitat Expansion
- Habitat Restoration (As Needed)



Eudora Site Redesign

Goals and Objectives

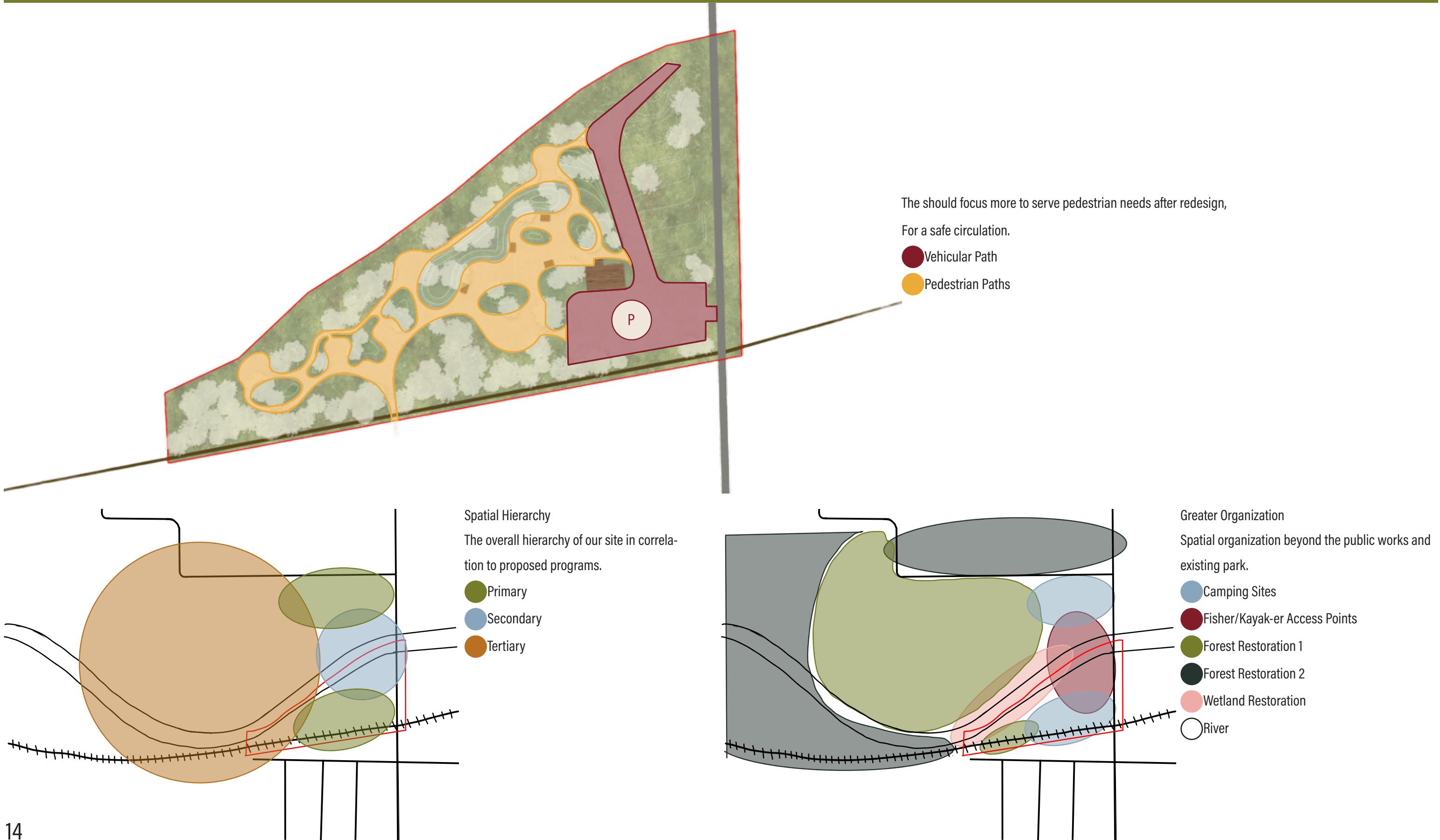
1. Improve floodwater management within the site
 - a. Select key areas for detention ponds and interactive rain gardens
 - b. Improve floodwater infiltration throughout the site
 - c. Enhance water quality and overall river health
2. Promote connectivity and community engagement from the surrounding urban environments
 - a. Improve current boat ramp and enhance Community connection to the Wakarusa River
 - b. Enhance trail connectivity between the site and current active trails
 - c. Introduce low-impact camping and recreational opportunities in key locations throughout the site
3. Increase plant biodiversity through habitat restoration
 - a. Reintroduce native wetland habitats to industrial work site
 - b. Expand native habitats North of the Wakarusa River
 - c. Identify keystone species in order to prevent future habitat loss along the river



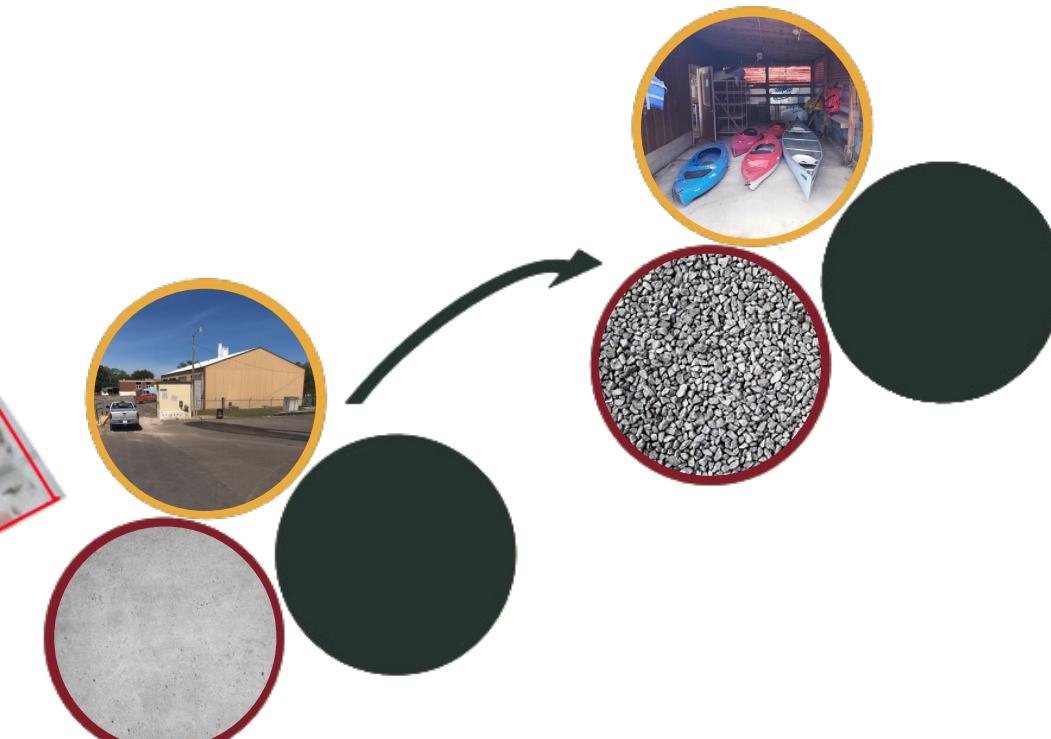
Site Plan



Spatial Reasoning



Spatial Reasoning



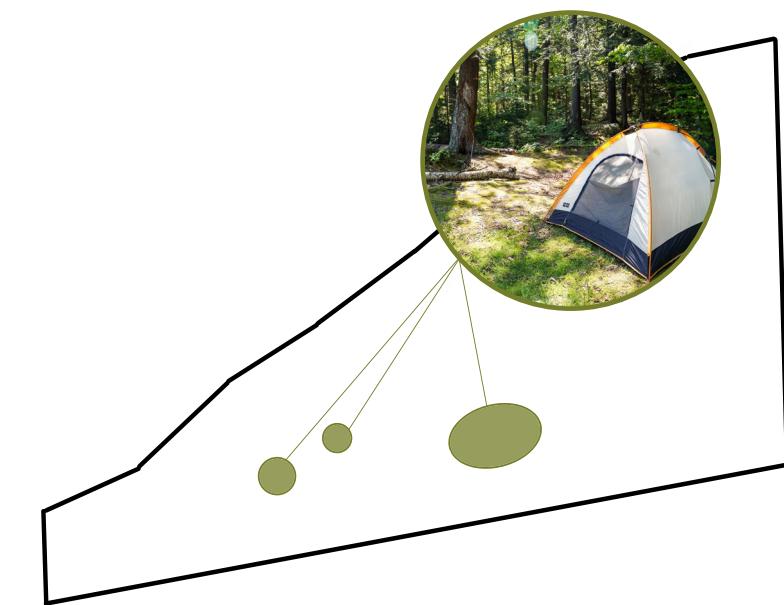
Adaptive Reuse

On-site infrastructure that could be repurposed for and adjusted for new use in the redesign.

● On-site Pavement-Crushed Gravel

● Existing Buildings-Kayak Rental/ Camping Facilities

● Unused Existing Infrastructure



Camping Strategies

Added low-impact camping sites for reduction of permanent impact on the site in the new design. (Tent camping)

● Low-impact camping sites



Site Hierarchy

On-site has three zones for activity ranging from pathways to campground and gathering spaces.

● Primary Space

● Secondary Space

● Tertiary Space

Stormwater Mitigation

Through stormwater detention basins, a terraced rain garden, and the use of pervious pavements, our site focuses on increasing the stormwater infiltration rates and water detention found within the site.

By placing the terraced rain garden along the road, runoff is able to be filtered, and sediment and road debris is able to settle before reaching the Wakarusa River. This helps to keep the river clean of toxic materials.



Terraced wetland with gabion walls



Bioswales



Adaptive reuse crushed concrete pavement

Vegetation

Restoring the native vegetation on the site will provide stable and thriving homes for more native wildlife to live and grow in. This will create a more habitable space for wildlife and the community of Eudora alike along the

Wakarusa River. The main ecosystems we aim to focus on restoring and developing on site are Floodplain Forests, Oak Savannas, and wetlands.



Oak Savanna



Big Bluestem
White Oak
Purple Prairie Clover
Swamp Oak
Leadplant



Floodplain Forest



Red Oak
Eastern Redcedar
Solomon's Seal
Bladdernut
Canada Wild Ginger



Wetlands



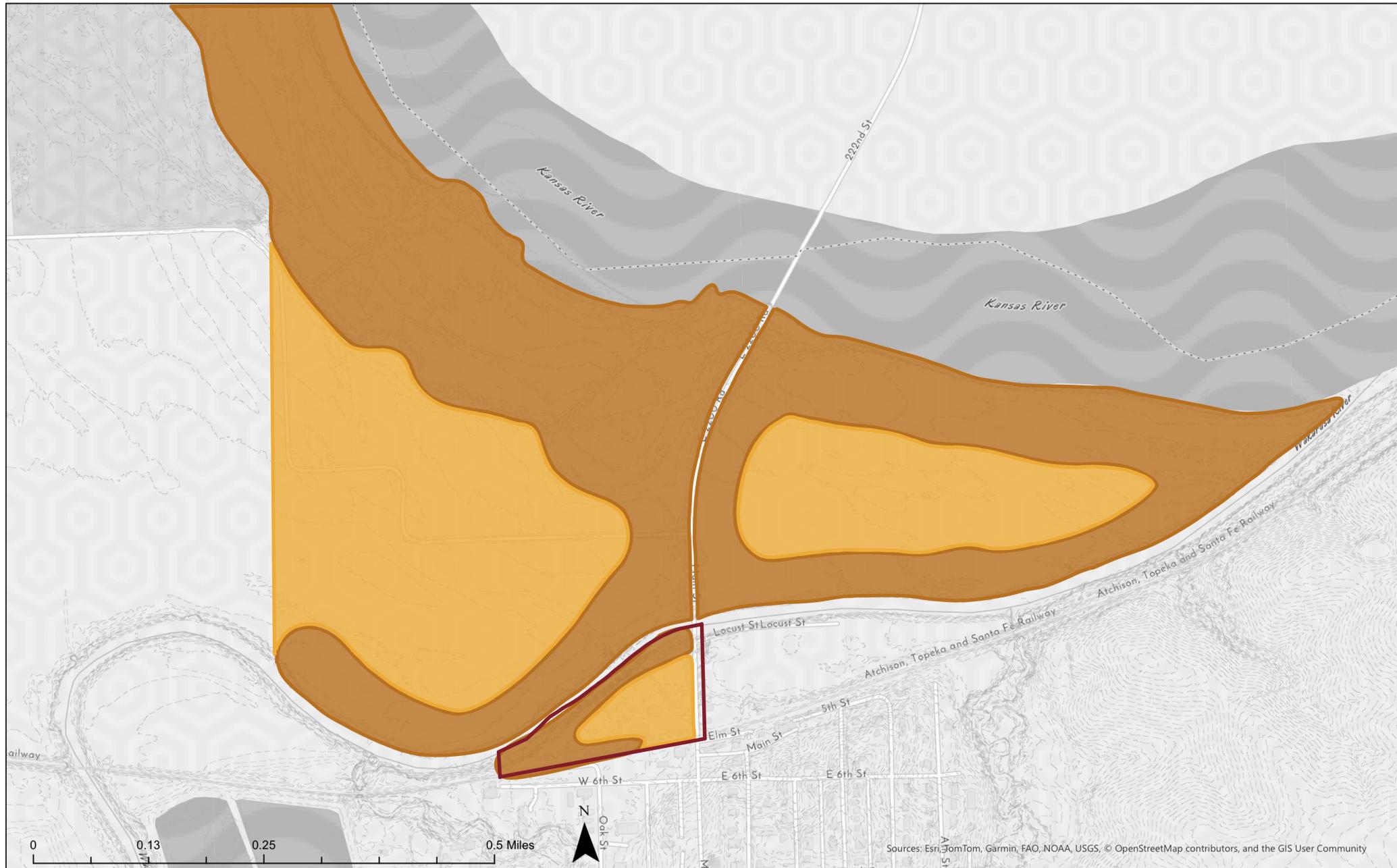
Smooth Sumac
Yarrow
Common Sunflower
Switchgrass
Redbud



Ecological Restoration and Connectivity

This site provides a key starting point to reconnect the wetland forests that line the Kansas and Wakarusa Rivers. By starting at a smaller scale and slowly adding more

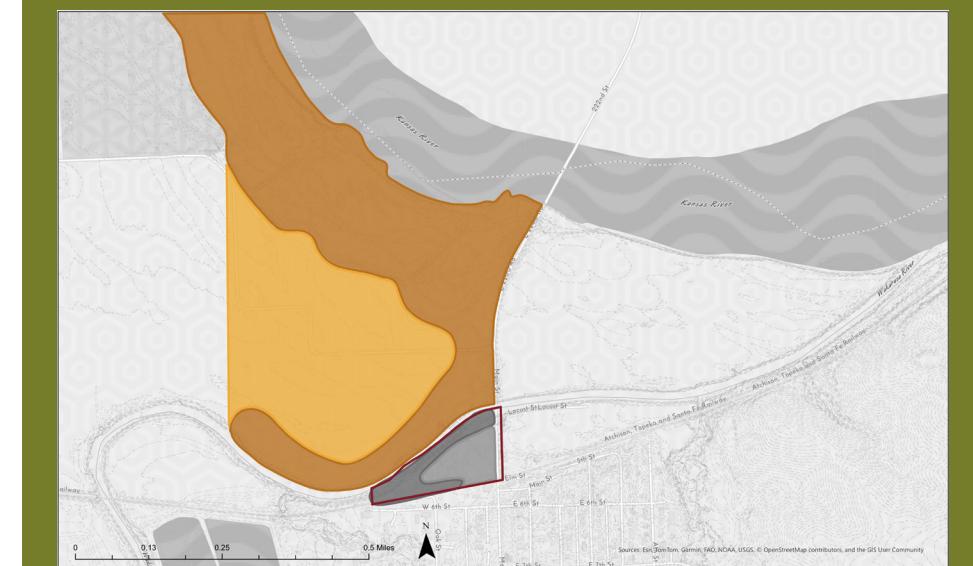
areas of ecological expansion and connection, we can help mitigate flooding to the area and provide key habitat to native plants and animals.



Phases Completed



Phase 1: Site Restoration

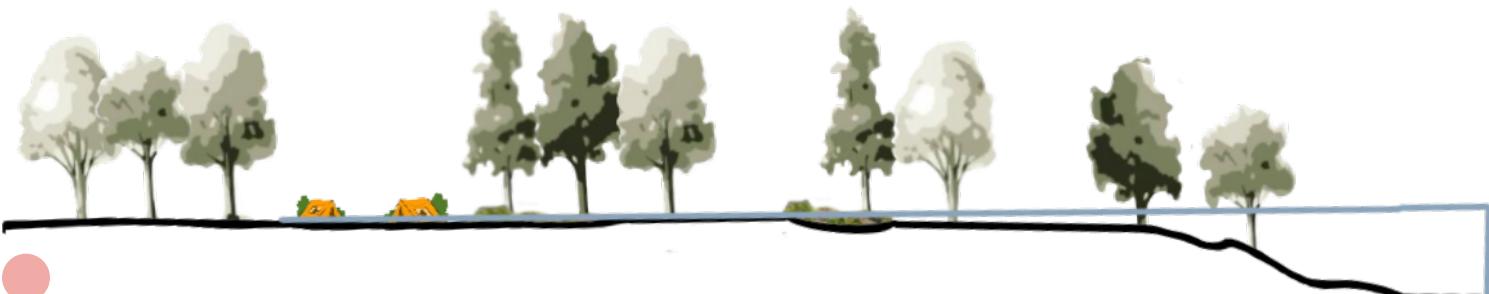


Phase 2: Habitat Reconnection

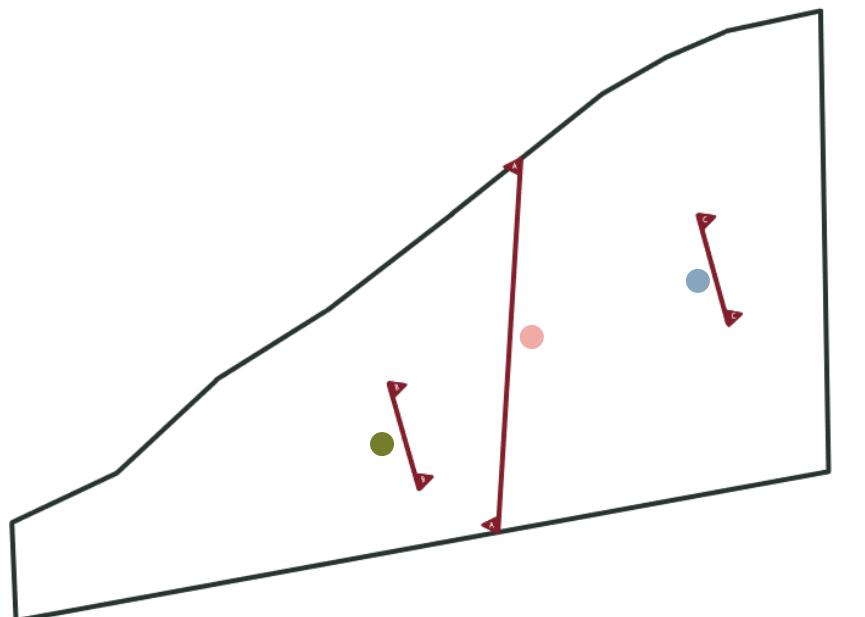


Phase 3: Restoration Expansion

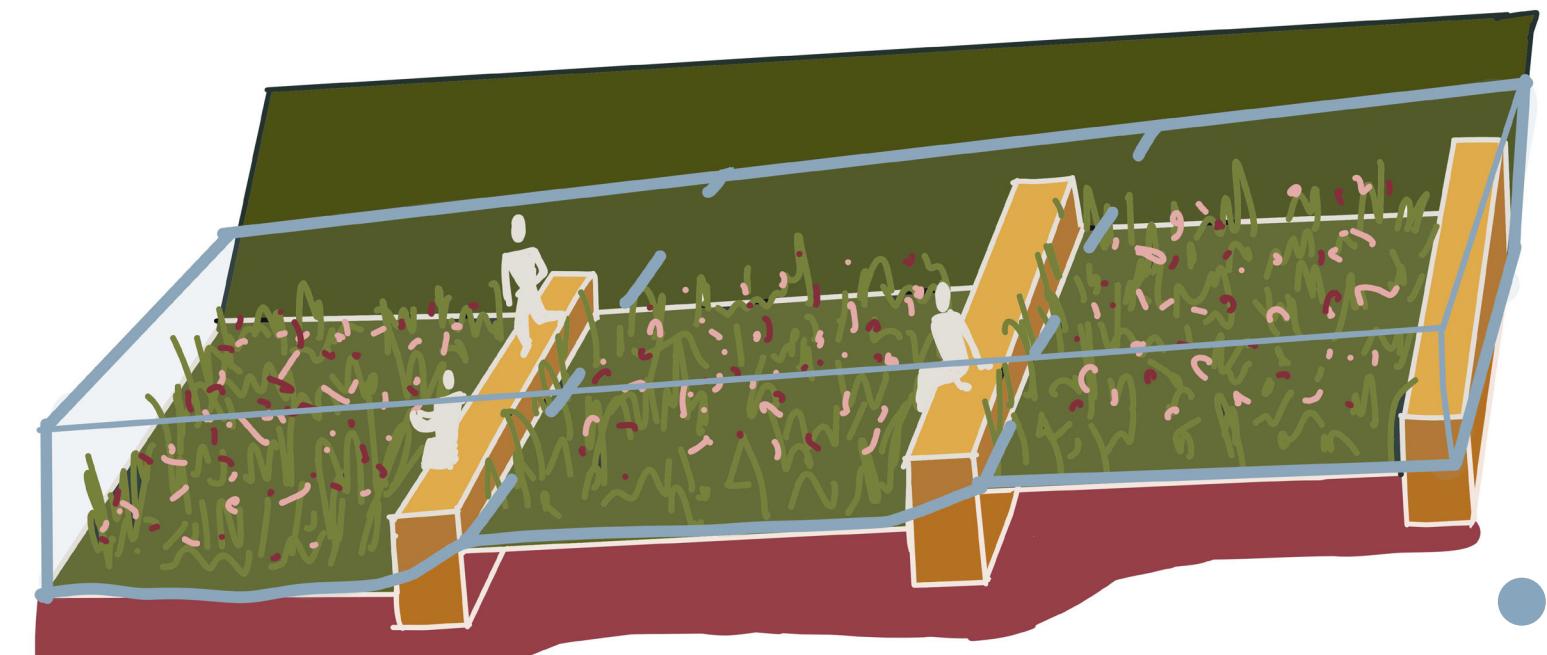
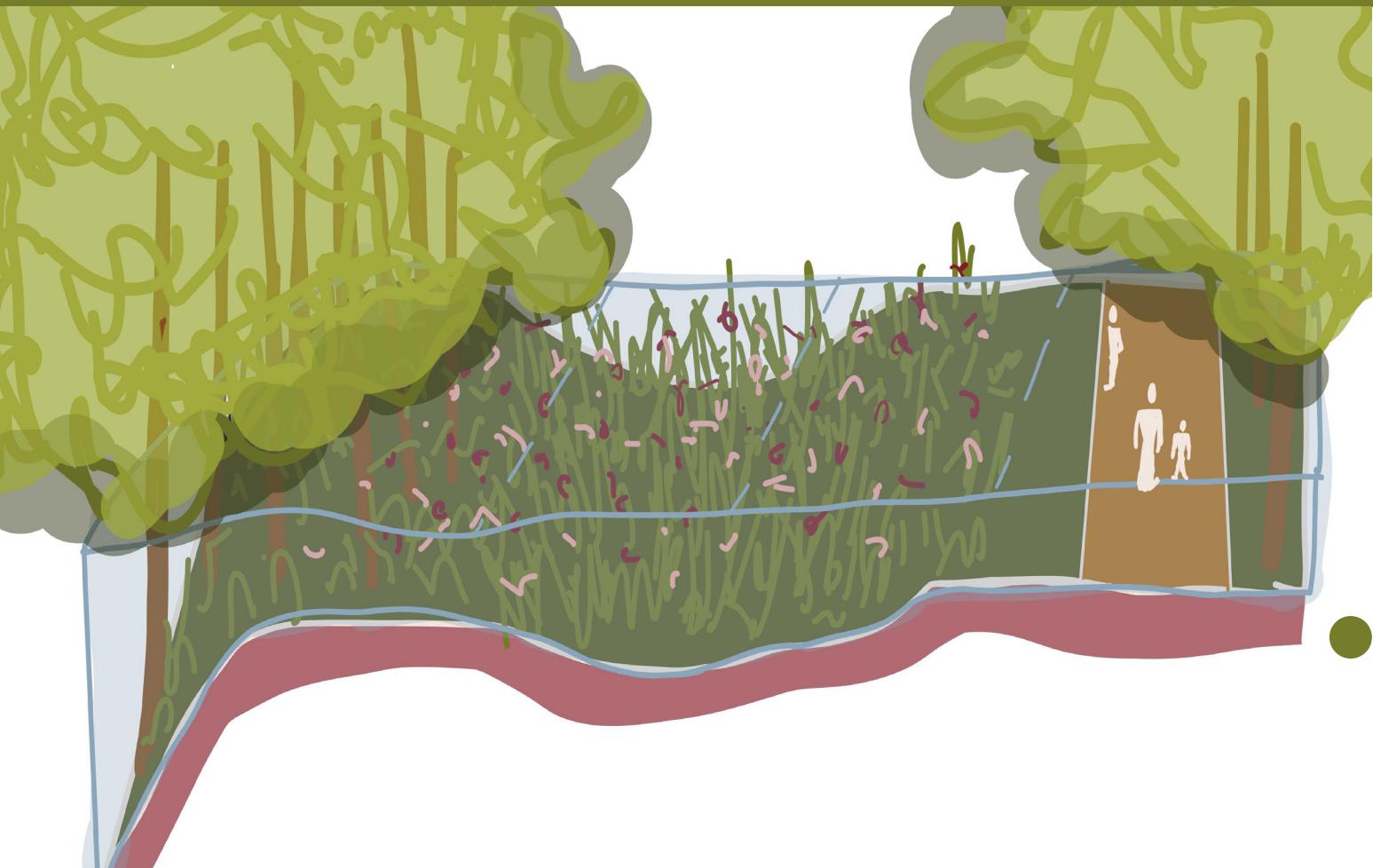
Diagrammatic Sections



This section shows the camping ground in correlation to the 100 year floodplain. Working with existing topography and adding bioswales around these areas will help mitigate the water runoff on the site.



These Site Sections Highlight the use of terracing and bioswales for water detention throughout the site. This helps prevent immediate flooding during storms and allows visitors time to pack up and leave before the river exceeds its bank in severe situations.



Wakarusa River Camp and Kayak



By keeping the tower structure existing on site, we are able to create a central gathering space for community or individual events. Surrounding it with pergolas, grills, and campfire rings creates a space that can be used for both day and night activities.

Livening up the entrance makes it much more exciting and inviting to pull drivers off the road. By adding more vegetation and new signage this new entrance is sure to attract many new visitors. Moving the main parking space to the Southeastern corner of the site takes it out of the 100 year floodplain, and creates a buffer between the busy and dangerous intersection between the railroad and Main Street.

River Access Vision



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