# El Corazón

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# EL CORAZÓN STUDIO

The University of Arizona
College of Architecture, Planning and Landscape Architecture

# ACKNOWLEDGEMENTS

For the past twenty years we have been fortunate enough to have had the opportunity to develop and implement interdisciplinary design and planning studios in an array of cultural and environmental contexts. This fall semester, Pima County gave us the opportunity to participate in a wonderful project here in Tucson along the Santa Cruz river corridor. The site north of Grant Rd. and south of Ina Rd., presented our design team an array of critical environmental and social issues with which to contend, i.e., uncontrolled growth, economic stagnation, transportation inefficiencies, a dearth of healthy natural habitat and recreational opportunities, environmental degradation, as well as diminishing sense of place. Consequently, the overarching intent of this project focused on the development of a sustainable urban living prototype for Tucson. A prototype that approaches sustainability across an array of dimensions: economic, environmental, cultural, aesthetic, and functional. Our master plan strives to encourage intelligent nodal development along the Santa Cruz river corridor in which dense, walkable mixed-use nodes are combined with strategically placed conservation easements that preserve, revitalize and interconnect the many unrealized/underutilized natural, cultural and economic amenities existing throughout the area.

This was a formative experience for us all, and without the kindness, support and insightful expertise of the following individuals this project truly could not have been. Once again many thanks go to:

Chuck Huckelberry, Pima County Administrator;
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Suzanne Shields, Director, Regional Flood Control District;
Rafael Payan, Director, Natural Resources/Parks and Recreation;
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# INTRODUCTION

This introductory chapter contains a brief overview of the City of Tucson, including it's history, urban character, and socio-cultural complexion. These constituents all provide the basis to form a general understanding of the broader context, and then lead into a description of the project site and past proposals. This area of study, a stretch of land along the Santa Cruz River, serves as a gateway to the city and a connection to Tucson's natural environment. The proposed plan functions on a variety of systems to bring vision and innovation to what we see as Tucson's imminent eco/urban renaissance.

# City of Tucson

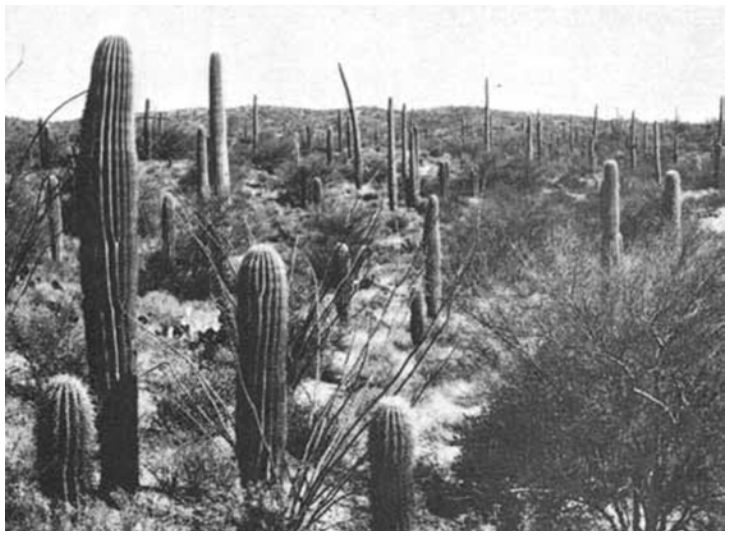
The City of Tucson is one of the oldest constantly inhabited areas in the Southwest and the majority of North America. The native Hohokam Indians lived here for over 4,000 years before the Spanish missionaries and soldiers arrived in the 1600s. After their arrival the Spanish established Missions and Presidios throughout the Tucson Valley, building what gives Tucson its unique identity, the San Augustin Presidion and the Mission San Xavier del Bac.

On August 20, 1776 Tucson was officially founded, in 1854 Tucson became part of the United States, after parts of Mexico were annexed to the United States. It wasn't until the South Pacific Railroad arrived in the 1880s that Tucson began to grow as a multicultural hub, adopting cultures from both the neighboring Mexican and the established Tohono O'odham communities that resided in the area. Even the name Tucson was derived from a combination of both Spanish name meaning city, and the Tohono O'odham name meaning at the base of the black hill.

Currently, Tucson, is the second largest City in Arizona, located only 108 miles southeast of phoenix and 60 miles north of the U.S. – Mexico border. It is considered a metropolitan city with more than 1 million inhabitants, of which 50,000 are either employees or students at the University of Arizona, founded in 1885.

Tucson's is warm and sunny on average of 350 days a year, its climate is ideal for outdoor recreation. Even during the winter the average temperatures rarely go below 64 degree Fahrenheit. It is surrounded by five mountain ranges in what is called the Sonoran Desert valley at an elevation of 2,389 feet above sea level.

# History



In 1775, Tucson was formally founded. The city has gained a reputation from being called the "Old Pueblo" because of the adobe precedents, and the "presidio" borders that have established its history.

Over the years, Tucson has grown in size, going from a farming community to a Spanish outpost, to a frontier town, to bustling railroad hub, to today's second largest city in Arizona, after Phoenix.

Paleo-Indians first inhabited the area more than 12000 years ago, during this time the Santa Cruz River was extensively farmed. They constructed irrigation canals to grow their crops of corn, beans, as well as hunting and gathering the surrounding area. It was also during this era that pottery was first introduced as a way to cook and store food, most notable for their pottery were the Hohokam people, who are direct descendants of the initial Paleo-Indians that populated the area.

The Santa Cruz River Valley was later inhabited by Jesuit missionaries, who later constructed the Mission San Xavier del Bac in 1700. The Spanish that inhabited the area constructed a walled fortress, the Presidio San Agustin de Tucson in 1775.

When Mexico gained independence from Spain in 1821, Tucson became part of the Mexican state of Sonora after 1830. It wasn't until the Gadsden Purchase of 1853 that Tucson became part of the United States of America.

In 1861, after the civil war began, Arizona militia conquered the southern New Mexico territory, establishing a confederate Arizona Territory. This area included Tucson as its capital. Arizona remained part of the New Mexico territory until 1863, when the Arizona Organic Act was passed, which reshaped the Arizona Territory to what we see today. It was during this time that Tucson established the University of Arizona and became an important commercial and railroad center.

# Urban Design

Within the greater context of the Sonoran Desert, urban design in arid climates, such as Tucson, necessitates extra consideration given to energy conservation, landscaping, and water use. Urban development in the desert should provide shade in the summer, embrace the winter sun and use native, drought-tolerant plants. While local building traditions have provided practical solutions and helped establish the character of the region, advancements in technology provide the opportunity to offer new and innovative responses to the environment. Therefore, by designing with natural systems in mind and incorporating sustainable building practices into the urban fabric, we will promote conservation and healthy environments that will endure over time. Design needs to respond to the context of the city itself, including its unique neighborhoods and key destinations, thereby emphasizing and further defining the character of Tucson.

The planning and design of this site gives special attention to size, scale, and orientation of buildings, as well as circulation and landscaping, in relation to surrounding areas. Well-designed buildings, streetscapes, landscapes, public art, open spaces, and mountain views will create an archetypal urban environment. Promoting and encouraging excellence in design and development will create a framework for future development and ultimately improve livability and quality of life for all Tucsonans. (Urban Design In Tucson Pamphlet, Department of Urban Planning & Design)

# Sociocultural


Tucsonians are typically very active people; those who relish being outdoors and trying new things. The city boasts many festivals, concerts, and sporting events year round, many of which are sponsored or supported by the University of Arizona. The area is popular for bird watching and open air markets, and has many parks ranging in activities from dog parks to model airplane flying.

Pima County residents range in ethnicity and income levels. The majority of residences on site are high-income, with homes in the south and central portions ranging from middle to low income. The primary residents on site are Caucasian and Hispanic, and in general, these areas have fewer inhabitants per acre than other areas of the city.

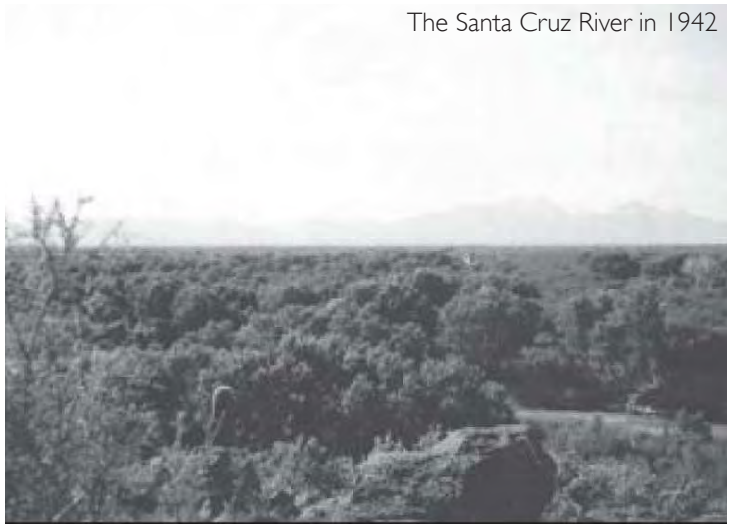
# Santa Cruz River

The Santa Cruz River is located in Southeastern Arizona. It flows south into Mexico, then re-enters and loops through Nothern Sonora, Mexico. The River flows in a Northly direction through the mission sites of Tumacacori and San Xavier Del Bac to Tucson. The River then continues northward to the Gila River, and Eventually joins the Colorado River. In Tucson, the river travels North for 44 miles, mostly parrallel to the Interstate-10, joining up with the Rillito River channel as well as the Canada Del Oro at the confluence in North Tucson. The Santa Cruz River contains stretches of perennial natural river flow, containing important riparian and grassland habitats through the assistance of two wastewater treatment plants.

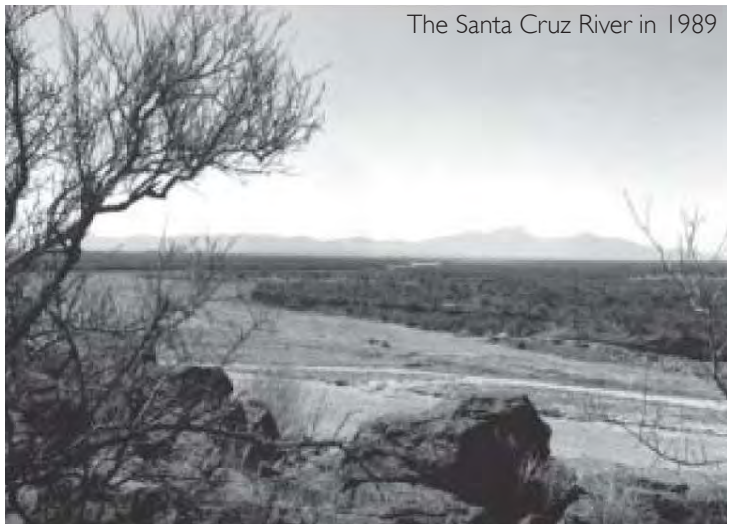
Today, the springs and cienegas are dry and the river flows through downtown Tucson only during storms. This is primarily due to heavy groundwater pumping systems. Until the late ninteenth century, the Santa Cruz River was an active watercourse which served the agricultural needs of its population. Throughout the years, a combination of groundwater extraction and drought in the late nineteenth century led to the decline of the river's flow. Historic canal systems and irrigation canal networks which had been destroyed by floods have been unearthed along the Santa Cruz in recent years.

Wildlife uses the Santa Cruz watershed to migrate through woody riparian vegetation like the Cottonwoods and Willows that populate the corridor. The Santa Cruz River is an important flyway for birds and bats due to the rivers north-south orientation. The river's lush vegetation allows for subtropical species to extend their ranges north from Mexico through Arizona.

The Santa Cruz River in 1942




The Santa Cruz River in 1989

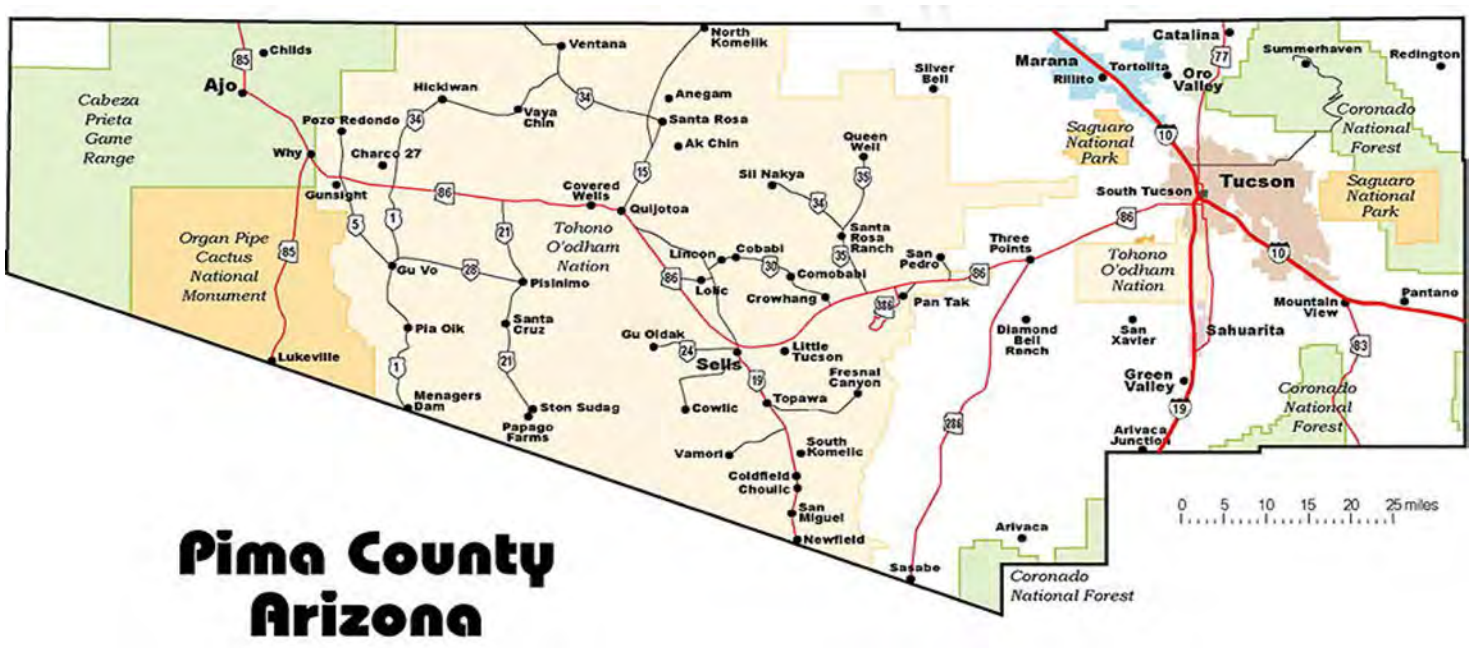


# Pima County

Pima County consists of the southernmost region of the state of Arizona, which includes Tucson, Oro valley, Marana, Sahurita, South Tucson, Green Valley, Sells, and Ajo. The majority of the population resides in Tucson, making it the second largest city in Arizona. The name Pima is derived from the native Pima Indians, who inhabited the area along with the Tohono O'odham Nation.

Pima County has a rich history and many amenities including the San Xavier Indian reservation, the Pascua Yaqui Indian Reservation, the organ pipe cactus national monument, ironwood forest national monument, and the Saguaro National Park. In 1853, Pima County became a permanent county in Arizona, today making it one of the four original counties in Arizona after the Gadsden Purchase from Mexico.

Pima County is a unique place, which encompasses the areas between the Rocky Mountains and the Sonoran deserts, where a diversity of flora, and fauna thrive. The area of the Santa Cruz river valley is one of the longest inhabited areas in North America,. It also has a wealth of pre-Colombian archeology, the historical De Anza Trails, and many active Native American cultures. In addition, Pima County has a diverse bird population, with many species found nowhere else in the United States.



# Corazón Tres Rios Del Norte

TUCSON, ARIZONA

This precedent project by Pima Co. provided us with a starting point in the development of our comprehensive master plan for El Corazón. It was intended to provide a master plan for this area of Tucson that would provide multifaceted benefits to the community/city by proposing strategies that would encompass the restoration of some of the natural riparian environment, provide protection from damage caused by erosion where the three rivers meet, provide opportunities for groundwater recharge, and create active recreation areas to be utilized year round.

Main areas of this precedent project included:

Flood Control
- Soil cement bank protection and grade control structures
- Sunset Bridge that is RTA funded connecting Silverbell and River road

Ecosystem Restoration
- Provide enhanced recharge and restoration of native vegetation on 250+ acres.
- 100 acres of mesquite bosque
- 25 acres of hydroriparian habitat

Trails and Passive Recreation
- A trail system incorporating the DeAnza National Historic Trail, connecting Santa Cruz River park with the Rillito and Canada Del Oro River parks and trail systems.
- Birding sites
- Regional Trailheads
- Bike routes & Mountain bike trailheads

Groundwater Recharge

Recreation
- Regional Visitor Centers
- Entertainment Amphitheater
- Model Airplane Park
- Regional Dog Competition Facitility
- ATV/Mountain Bike Center
- Skateboard Facilities

CONCEPTUAL PLAN


CORAZÓN TRES RIOS DEL NORTE

## COLUMBUS PARK CONCEPTUAL PLAN


CORAZÓN TRES RIOS DEL NORTE

## SUNSET LAKE CONCEPTUAL PLAN


CORAZÓN TRES RIOS DEL NORTE

## PERSPECTIVE VIEWS

SUNSET LAKE PERSPECTIVE

# Intent of Project

Arizona's Santa Cruz River has faced many challenges and disturbances in the past 100 years as a combination of human error and natural catastrophe led to a decline in its environmental health. The intent of this current project is to rehabilitate the river and adjacent areas by designing and implementing strategies that operate on a variety of levels. This approach works on a range of scales benefiting both the environment and its people by creating eco-responsive areas of rich culture. Expansion of the Interstate 10 has divided Tucson creating a barrier between the two sides of the highway resulting in limited connectivity. This plan seeks to reconnect the separated sides and enhance access through transportation hubs, greenways, and trails. The addition of mixed use development encourages people to inhabit the site, creating a social center for activities and festivals which in turn will stimulate local businesses. Aesthetically, the plan integrates a natural and urban aesthetic creating a symbiotic relationship between the two. Greenways serve as protected corridors for both human and wildlife circulation to and from both natural and developed areas. Ultimately the Santa Cruz Master Plan revitalizes a disturbed riparian corridor while also creating a sustainable urban living prototype in the arid southwest.

# INFLUENCES

# ENVIRONMENTAL

## CASE STUDIES
## LITERATURE REVIEW

# Sustainable Ecotourism

Ecotourism is ecologically sustainable tourism with a primary focus on experiencing natural areas that foster environmental and cultural understanding, appreciation, and conservation.

- Promote sustainable development by establishing a durable productive base that allows local inhabitants and ecotourism service providers to enjoy rising standards of living.
- Has the ability to educate tourists and locals alike in the cultural and natural significance of an area
- Incorporate the social dimensions of productive organization and environmental conservation.

## DESIGN IMPLICATIONS

Conservation
Offering market-linked long-term solutions, ecotourism provides effective economic incentives for conserving and enhancing bio-cultural diversity and helps protect the natural and cultural heritage of our beautiful planet.

Communities
By increasing local capacity building and employment opportunities, ecotourism is an effective vehicle for empowering local communities around the world to fight against poverty and to achieve sustainable development.

Interpretation
With an emphasis on enriching personal experiences and environmental awareness through interpretation, ecotourism promotes greater understanding and appreciation for nature, local society, and culture.

# Quarry Botanical Garden

SHANG HAI, CHINA

Quarry Garden is located at the center of Shanghai's Chen Mountain Botanical Gardens, covering an area of 4.26 hectares (10.53 acres). Chen Mountain is isolated within the botanical gardens and is nearly 70 meters (229.7 feet) high. Unfortunately, the appearance of the Quarry Garden became significantly diminished in the 20th Century due to heavy quarrying.

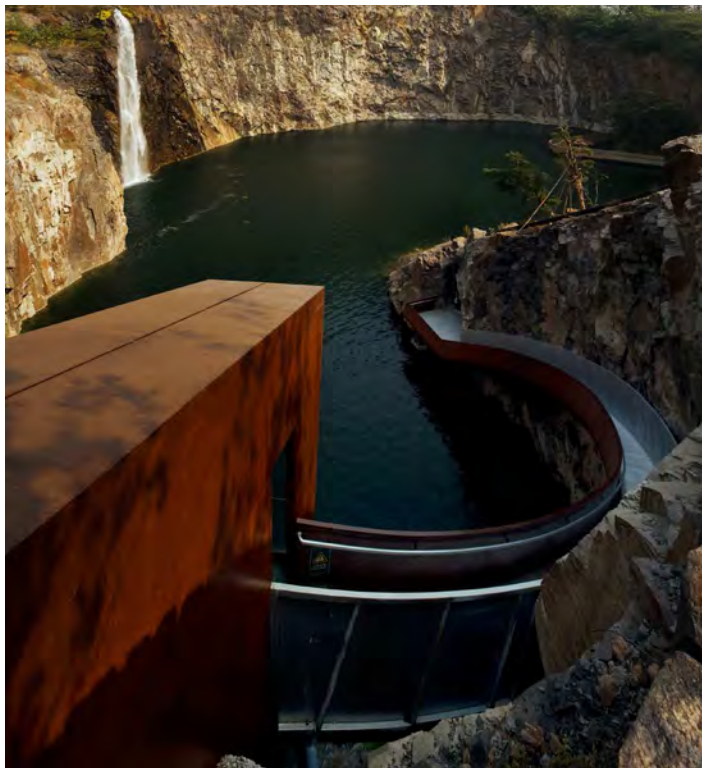
Since the deep pool has been affected by the rampway for transporting stones, the rock wall on its south side is much more spacious for transport.

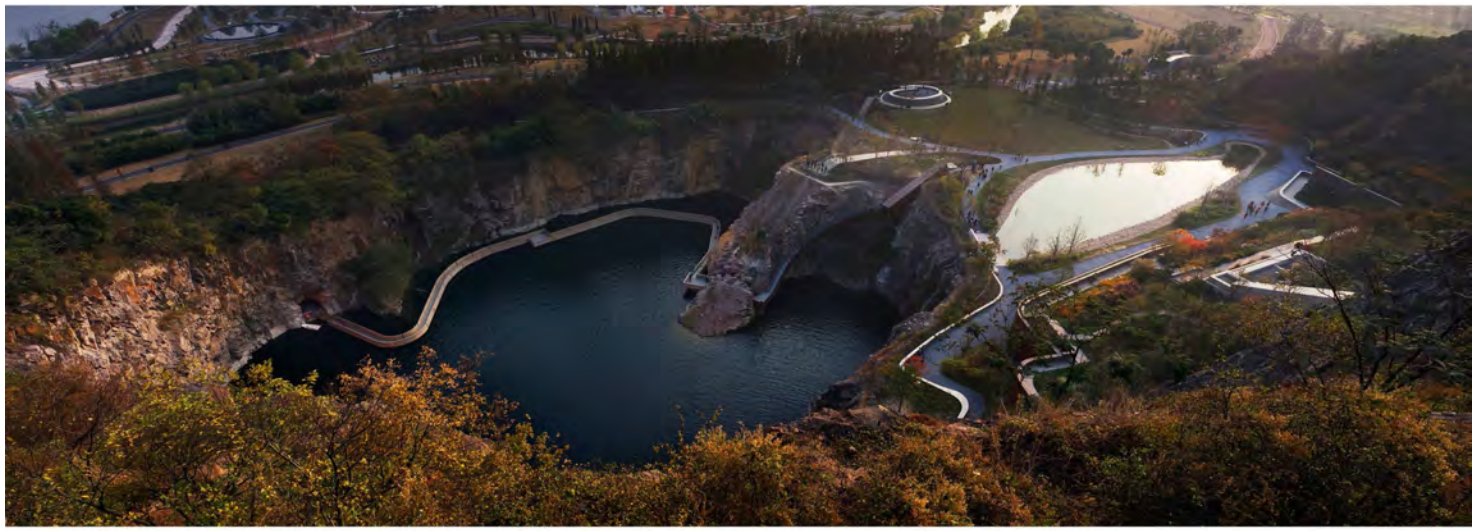
Renovated from an abandoned quarry yard, Quarry Garden has become a new landmark for Shanghai. Its capabilities are fully based on ecological restoration and cultural reconstruction strategies.

Once dangerous and abandoned, the old quarry site has since been built into an attractive tourist resort for visitors seeking out a natural landscape. Visitors also are able to learn more about quarrying and its effects on the environment.
The challenges of reconstructing a resort into such a dramatic space has become a feature of this project.

## DESIGN IMPLICATIONS

- Reconstructing the surface configuration of the water edge enriches the ecological community
- Improving the spatial sequence through the site and pits opens up the area for sightseeing, allowing for more socialization among guests
- Reconstructing the area as a resort allows funding in an area that had been abandoned
- Aesthetically, the reconstruction of the site and creation of a resort adds appeal to a once depleted quarry





# Calgary

CANADA

Calgary is a huge tourist center for winter sports and eco-tourism themed visits. Thanks to the many so-called "smart growth" city plans, the city ranks on the number 5 most livable cities in the world according to the Economist Intelligence Unit. The creation of sustainable communities is very important and within these plans, a few important points include:

- Reducing the dependency on vehicles by creating pathways, sidewalks, and circulation that encourage people to move around using public transportation
- The development of truly healthy communities by promoting social inclusion through creating shared areas within the city (parks, smart housing communities, special retirement centers, etc.)
- Fostering economic well being and creating jobs for citizens through local economic endeavors
- The enhancement and protection of natural areas by creating attractive green spaces using advanced landscape designs

## DESIGN IMPLICATIONS

- Design using an environmental, functional, and aesthetic approach to create and promote ecotourism along the Santa Cruz Wash
- Create many circulation paths for different users and encourage public transportation
- Development healthy and sustainable communities that promote social gathering and appreciation of culture
- Reestablish riparian corridors and wetland areas that protect natural spaces and improve water quality

# Solar Energy

Agriculture was an early adopter for remote applications using solar energy. Using solar energy for agriculture is still cost effective today, but in the last decade agriculture has seen the number of grid connected systems and the average size of solar systems increase. System sizes range from 5 watts to 1 Megawatt (MW).

### Benefits of Solar Energy Use

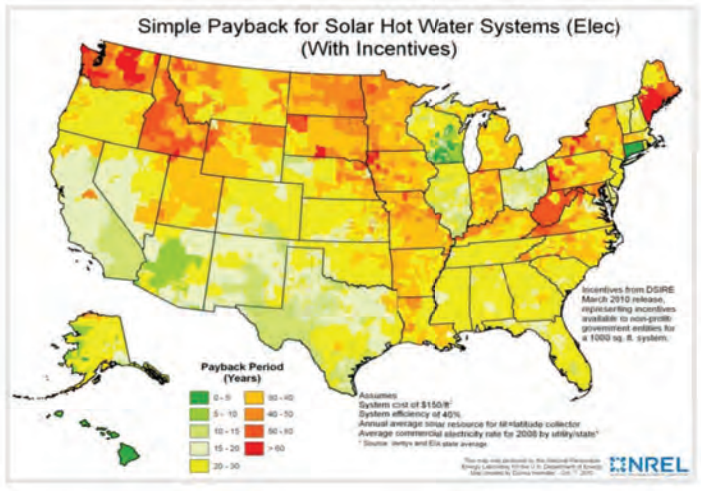
- Offers an opportunity to stabilize energy costs
- Decreases pollution and greenhouse gas
- Delays the need for electric grid infrastructure improvements
- Solar energy has low maintenance costs (and the fuel is free once the higher initial cost of the system is recovered through subsidies and energy savings.)

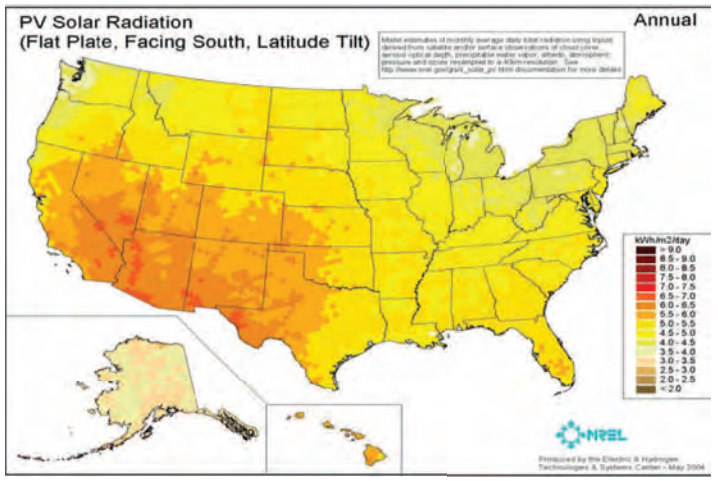
### Types of Solar Systems

- Solar electric (PV Systems)
- Solar Heating

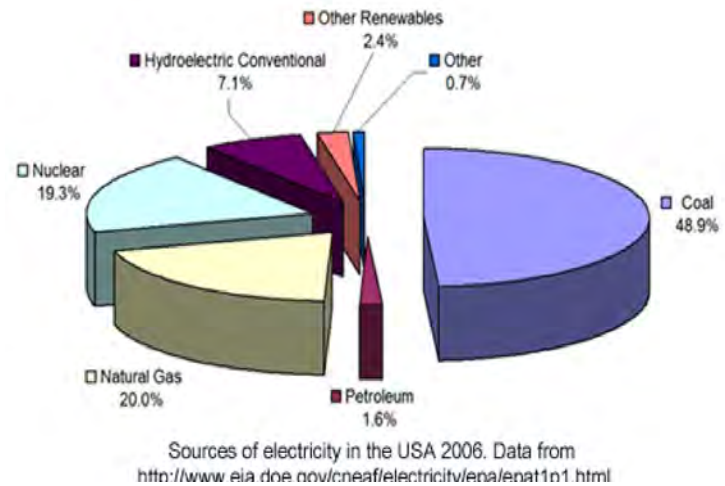
### DESIGN IMPLICATIONS

- Urban agriculture areas on site could greatly benefit from a PV solar system in place to help with irrigation, at the same time making a more environmentally conscious decision for the site as a whole
- If implemented, the solar heating on site could potentially warm and cool nearby commercial areas as well as homes
- Solar heating and electric on site would be more maintenance friendly and a cheaper alternative to current consumption trends
- Habitat would be minimally displaced if solar panels were integrated on site, particularly in barren or disturbed areas
- As the top left figure indicates, the payback for adding solar panels to the site is relatively quick, and the solar panels would be constantly utilized due to the high number of sunny days in Tucson annually

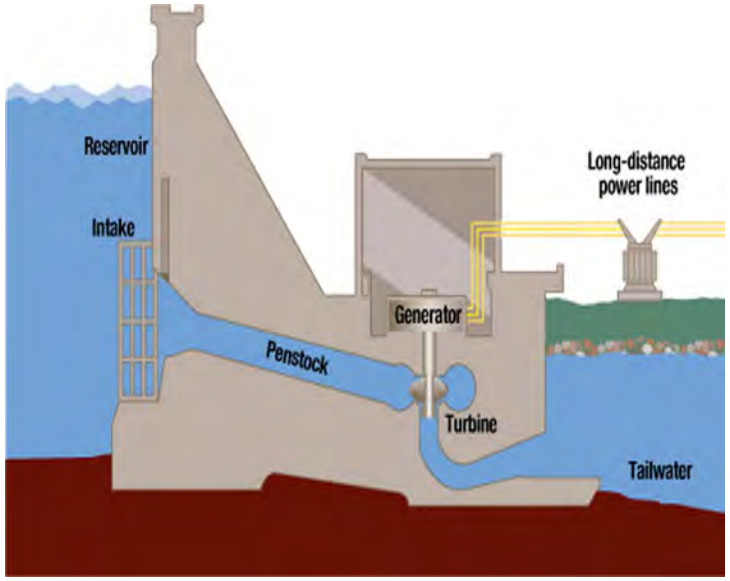



# Hydroelectric Power



Sources of electricity in the USA 2006. Data from http://www.eia.doe.gov/cneaf/electricity/epa/epat1p1.html




## Hydroelectric Power for the Nation

Although most energy in the US is produced by fossil fuels and nuclear power plants, hydroelectricity is still important to the nation. Approximately 7 percent of total power in the US is produced by hydroelectric plants. Nowadays, huge power generators are placed inside dams. Water flowing through the dams spin turbine blades which are connected to generators. Power is produced and sent to homes and businesses.

### Advantages

- Minimal pollution (no fossil fuels burned)
- Hydropower plays a major role in reducing greenhouse gas emissions
- Relatively low operations and maintenance costs
- Water is renewable (rainwater)

### Disadvantages

- High investment costs
- Hydrology dependent (precipitation)
- In some cases, inundation of land and wildlife habitat
- In some cases, changes in reservoir and stream water quality

## DESIGN IMPLICATIONS

Although this is an unlikely scenario for Tucson, the Santa Cruz River on our site may be able to provide a source for "localized" hydroelectric power if channeled correctly.

- If hydroelectric power is utilized on site, it could power homes and commerical areas
- If hydroelectricity is implemented around the Santa Cruz, the plant could be highlighted through design. The plant could be located around tourism activities and/or around educational facilities
- Careful planning would have to go into minimally disturbing existing habitat and avoiding human displacement if hydro electricity was implemented

# Brownfield Redevelopment

Brownfield sites are abandoned lands or underused industrial and commercial facilities available for re-use. The land may be contaminated by low concentrations of hazardous waste or pollution, but has the potential to be re-used once it is cleaned up properly.

Typical contaminants and common issues to be cleaned:

- Hydrocarbon spillage
- Solvents
- Pesticides
- Lead
- Tributyltins
- Asbestos

## DESIGN IMPLICATIONS

- Clean-up costs are fully tax-deductible in the year they are incurred (Brownfields Tax Incentive Program)
- Improve property value
- Making neighborhoods more desirable
- May bring more development back into the surrounding community where project is located
- Helps to moderate urban sprawl
- Reduces air pollution in the area
- Cleanup of contamination makes the environment safer with the remediation of those harmful contaminants
- Cleanup and remediation removes harmful chemicals/contaminants from posing a threat to the ecology of the area
- Ensures previously used land is fully utilized, and avoids using undisturbed land, thereby protecting or preserving the existing natural ecosystems

*Before*

*After*

# Mining Reclamation

Today, surface-mining can alter landforms through mining operations and subsequent attempts of reclamation, thus increasing land suitability for development. However, "made land" is typically composed of deep soil and rock fills. Such fills undergo long-term settlement under their own weight. Subsurface-mining operations can also affect surface structures by causing land subsidence.

A critical factor affecting suitability of reclaimed mines for building construction is surface stability. Over time almost all reclaimed mines will be subject to some settlement, or consolidation. Although it can damage utility connections, a uniform ground settlement of 2 inches or less will generally cause little or no damage to most building types.

## DESIGN IMPLICATIONS

- The presence of large mining pits creates both an opportunity and constraint
- Special considerations need to me made in order to building on and within the area
- Soil needs to be stabilized
- Building within the area can affect subsurface water levels.

# Atlantic Station

MID-TOWN ATLANTA, GEORGIA

Atlantic Station is a mixed-use neighborhood development on the NW edge of Midtown Atlanta, Georgia. It was first planned in the mid-1990s and officially opened in 2005.

Atlantic Station's 138 acres are located on the former brownfield site of the Atlantic Steel Mill. The Project was developed to help mitigate urban sprawl and reduce air pollution around the area.

The Proposed Beltline Transit/Greenway is to pass within a few miles of the development.

The project received the EPA's 2004 Phoenix Award as Best National Brownfield Redevelopment. It has also received the Sierra Clubs 2005 America's Best New Development Project.

## DESIGN IMPLICATIONS

- Helps to moderate urban sprawl
- Improves property value of the area
- Reduces health problems in surrounding areas
- Restores and supports plant and animal life habitats/ecosystems

# Gasworks Park

SEATTLE, WASHINGTON

Gasworks Park is a 19 Acre Public Park located in Seattle, Washington. It is the former site of the Seattle Gas Light Company gasification plant. It contains historic remnants of the sole remaining coal gasification plant in the United States.

The plant operated from 1906-1956, but was subsequently bought by the City of Seattle for park purposes in 1962. The park was originally designed by Richard Haag and opened in 1975.

A great design element is based around the pieces of the old plant that are incorporated into the park.

EPA and Washington State Department of Ecology did another cleaning in the 1980s with more improved techniques and technology. Gasworks Park has been used as a resource for numerous movies/films.

## DESIGN IMPLICATIONS

- Helps to moderate urban sprawl
- Added design elements that provide an aesthetic value to the park
- Saving money by not tearing down segments of the old plant
- Reduce air pollution of area
- Improves property value of the area
- Reduce health problems in surrounding areas
- Restores and supports plant and animal life habitats/ecosystems

# Urban Agriculture

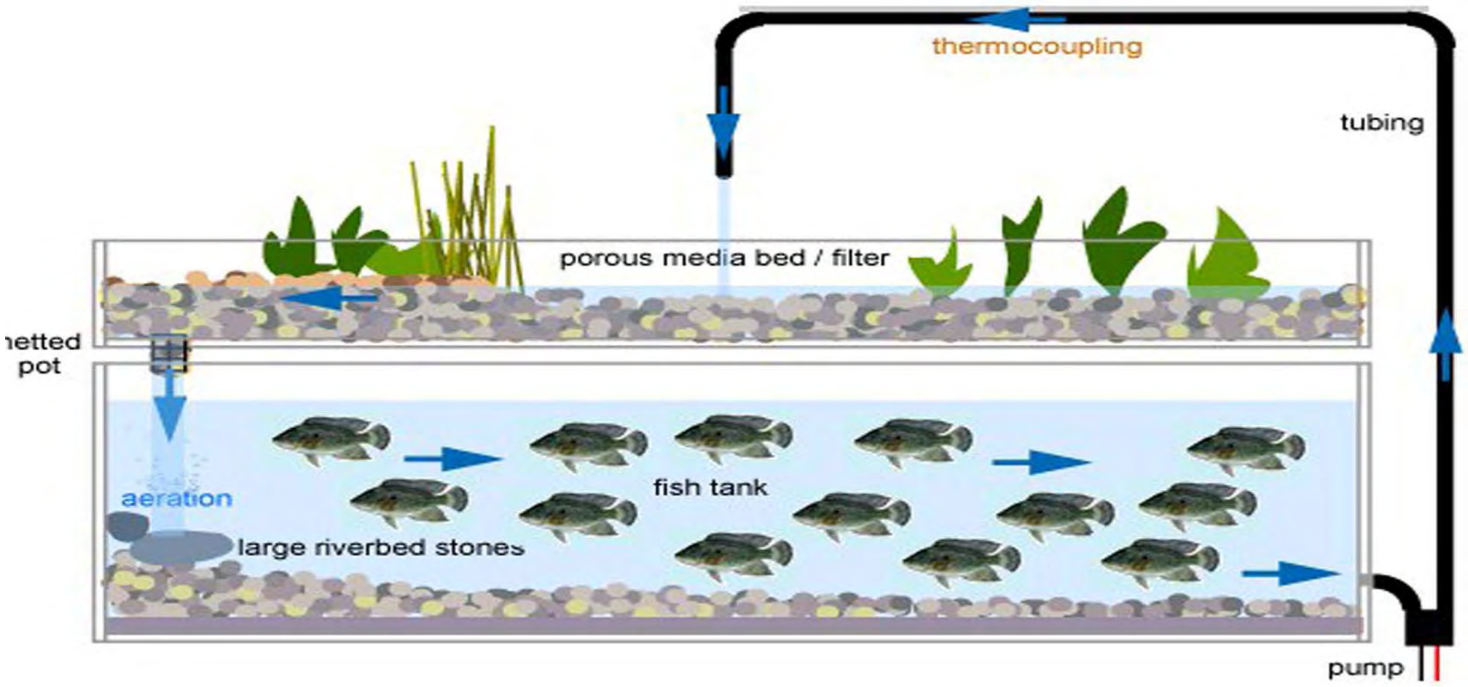
To ensure that investment in urban agriculture was a lasting, productive and indelible part of the urban landscape, the Urban Design Lab sought to quantify the costs and benefits, as well as the impact of urban agriculture on food security. The Lab researched the implications of stormwater runoff use and management. Research was done to understand the effects of sewage overflow mitigation with an emphasis on the most polluted waterways. The Urban Lab was also interested in seeing if urban agriculture could, and to what extent, reduce the urban heat island effect.

## DESIGN IMPLICATIONS

Urban agriculture can play a critical role in productive green urban infrastructure. There is significant potential for urban agriculture to provide critical environmental services to the city through stormwater mitigation, soil remediation, and energy use reduction.

Urban agriculture can influence community development. The benefits are not just limited to food production because urban agriculture empowers the community, promotes public health and environmental justice. Urban agriculture is a tool to transform unused or neglected space as a public resource, providing opportunity for social interaction and strengthening community ties.

# Aquaponics




Aquaponic systems are recirculating aquaculture systems that incorporate the production of plants without soil. Recirculating systems are designed to raise large quantities of fish in relatively small volumes of water by treating the water to remove toxic waste products and then reusing it. In the process of reusing the water many times, non-toxic nutrients and organic matter accumulate. These metabolic by-products are channeled into secondary crops that have economic value or in some way benefit the primary fish production system.

Plants grow rapidly with dissolved nutrients that are excreted directly by fish or generated from the microbial breakdown of fish wastes. Systems that grow additional crops by utilizing by-productions from the production of the primary species are referred to as integrated systems. This integrated systems forms the basis of an aquaponic system.

The main ingredients for plants growth are Carbon, Oxygen and Hydrogen from water and carbon dioxide gas. Research has shown that enriching the air in a closed greenhouse with carbon dioxide dramatically increased crop yields. Unfortunately generating carbon dioxide artificially is energy intensive and expensive.

## DESIGN IMPLICATIONS

- Hydroponics need water and expensive nutrients. Although talapia are being successfully raised in Phoenix, more research will be needed to understand its potential relevance in Tucson. Aquaponics closed systems use little water in comparison and supplies its own nutrients. Furthermore, it develops vegetables and fish similtaneously.
- Both require less land and, by their very methods, are organic.

# Chicago City Hall

CHICAGO, ILLINOIS

Chicago wants to feed its urban poor in Chicago seeing it as strengthening its food security, protecting the environment, and mitigating the effects of climate.

Chicago is the densest city in the US with a population of 2.9 million (metro: 9.7 million) and a poverty rate of 20.5%. Many of the urban poor face food insecurity - either they cannot afford to eat or they often eat cheap fast food which is high in fat and sugar.

By developing urban agriculture, the city poor could cultivate their own vegetables to eat and sell. Due to the federal government's support of green roofs as a means to reduce the effects of climate change, the city of Chicago is promoting green roofs because they reduce heating and cooling costs and can feed the poor.

Chicago's model of financial incentives and public education can be replicated by other cities to achieve the environmental benefits of green roofs. Perhaps in the future the two goals of urban agriculture in Chicago, increased food security for the poor and climate change mitigation, can be encouragement to other cities

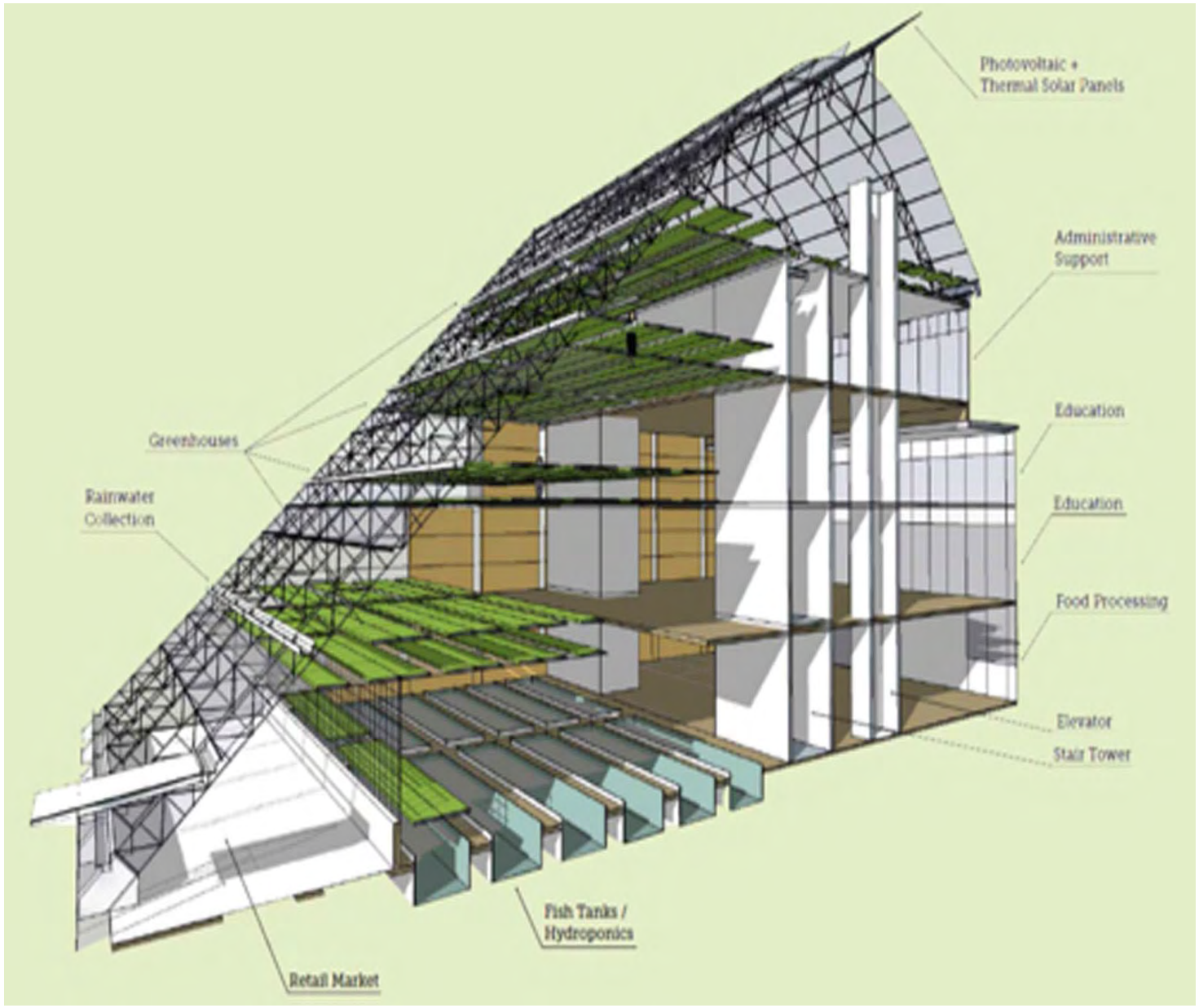
Green roofs lessen the heat island effect. Temperatures atop the green-roofed City Hall are typically 25 to 80 degrees cooler than the adjacent county office building (which has a black tar roof).

## DESIGN IMPLICATIONS

- Ability to feed the urban poor with effective urban agriculture
- People can cultivate their own vegetables to eat and to sell
- Economic benefits of local food growth
- Mitigation of climate effects
- Green roofs can lessen the heat island effect
- Reduction of heating and cooling costs
- Public education about urban agriculture

# Urban Aquaponics

MILWAUKEE, WISCONSIN




Milwaukee embraced urban farming and aquaponics as a means of creating jobs, feeding its urban poor and transforming abandoned factories and urban lots.

Working from a report prepared by IBM called "Smart Cities Feed Themselves," who chose Milwaukee as one of the 24 "high-potential" cities around the world to receive their expertise at no cost to improve their quality of life.

Milwaukee has been identified as a "food desert" because its poverty level is so high, supermarkets will not operate there. Consequently, residents did not have access to affordable fruit and vegetables which caused both short and long term problems.

The IBM team recommended that Milwaukee investigate aquaponics as a farming methods, which is particularly relevant as water scarcity increases. An aquaponics farm can employ 40 to 50 people but there are auxilliary businesses attached that can provide extra employment.

## DESIGN IMPLICATIONS

- Aquaponics could potentially benefit the site along the Santa Cruz and could be an added component of Urban Agriculture
- Education about this process could be integrated in the site
- Environmental benefits can be gained by placing farms next to vehicular circulation because Aquaponics thrive on carbon dioxide and release oxygen back into the atmosphere
- Integrating Aquaponics and parking garages - placing the plants around the edges greens the outside walls, supplies light to the plants and lets them feed off the emissions of the vehicles driving around the parking garage.

# Manzo Elementary School

TUCSON, ARIZONA

### Education

Manzo School has created a place that should be a model for how a school can educate and transform their students while serving the neighborhood. The school transformed the back green area into a vegetable garden with chickens, a composting area, and a greenhouse for hydroponic farming, including fish farming. The students are involved in every phase of the project, from planning, to building, to implementation, including on weekends.

### Strategies

- Kitchen waste is composted
- Cisterns to catch and supply water
- Chickens, eggs are sold to neighbors
- Talapia fish - sold to neighbors
- Seasonal vegetables sold to neighbors

### Community Gardens

A popular model takes back vacant land to be worked on by the community. Vacant land usually lowers land values of surrounding properties whereas a community garden raises property values for everyone, including the lease holder.

Once only found in poorer urban neighborhoods, community gardens have made a comeback in middle and upper-class neighborhoods as the organic and local food movements gained steam. The gardens have also moved from being an opportunistic infrastructure taking advantage of empty lots, to a designed and specific type of landscape.

### DESIGN IMPLICATIONS

- Community gardens bind a community together and can create many socio-cultural activities
- Urban agriculture can be practiced at many levels of investment: from the individual feeding his own family to large commercial outlets. Local produce reduces food costs, ensures food security and creates jobs

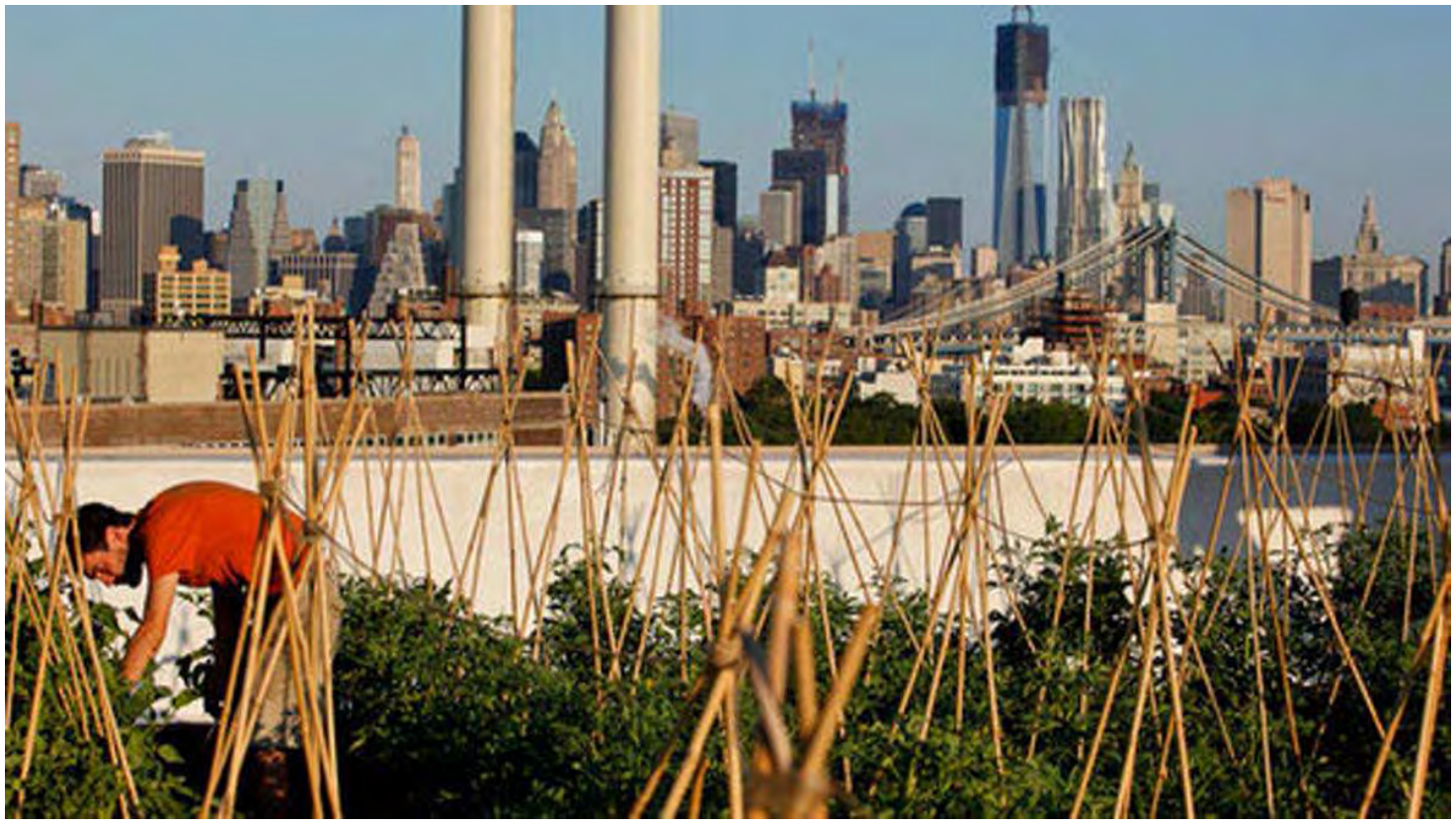
# 221 Action Program on Urban Agriculture

BEIJING, CHINA

The fast growth of Beijing has brought new challenges for the city which is facing arable land and water shortages. One of the ways the city is trying to improve conditions for its inhabitants is to develop a layered urban agriculture program including a multi-functional recreational agriculture program.

The city has:

- Integrated the program into long-term socioeconomic strategic development and land use planning
- Implemented a comprehensive urban agricultural policy with a budget for investments.
- Established the Beijing Recreational Agricultural Association which assists entrepreneurs and urban producers in creating agritourism facilities, develops guidelines and standards for agritourism areas, and monitors their application
- Organized urban agriculture festivals, exhibitions, and certifications



There a two types of recreational agriculture being promoted. The first is where visitors can pick their own fruit, or catch their own fish, and sometimes it is tied into lodgings and cooking facilities. The second concerns agritourism parks and villages with high level resorts. This type of holiday is increasingly appealing to urban dwellers.

In 2007 alone, 26 million guests enjoyed the agri-parks and resorts.

## DESIGN IMPLICATIONS

Recreational Agri-Farms offer an opportunity to strengthen Tucson's tourist industry, especially if the farm specializes and creates as unique draw. Such as heritage plants and vegetables tied to Tucson's former Native American and Spanish residents. The recreational agri-farms can link with educational and volunteer programs that create an income base.

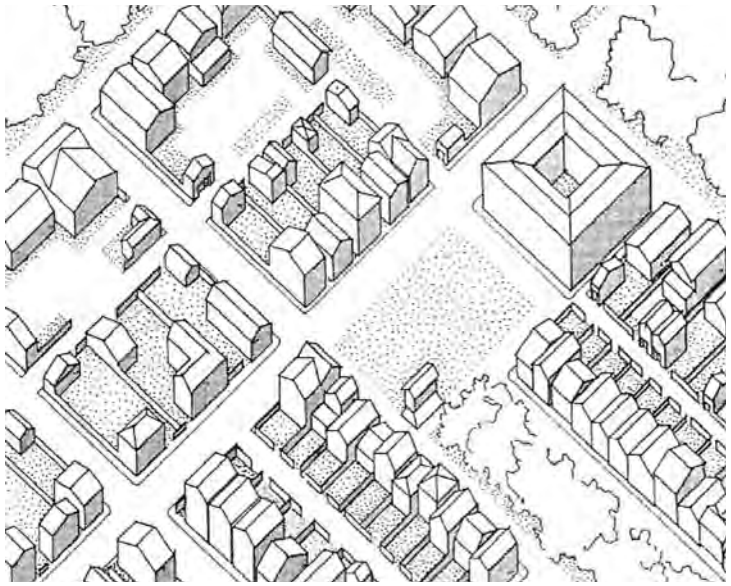
# URBAN DESIGN

## CASE STUDIES
## LITERATURE REVIEW

# New Urbanism

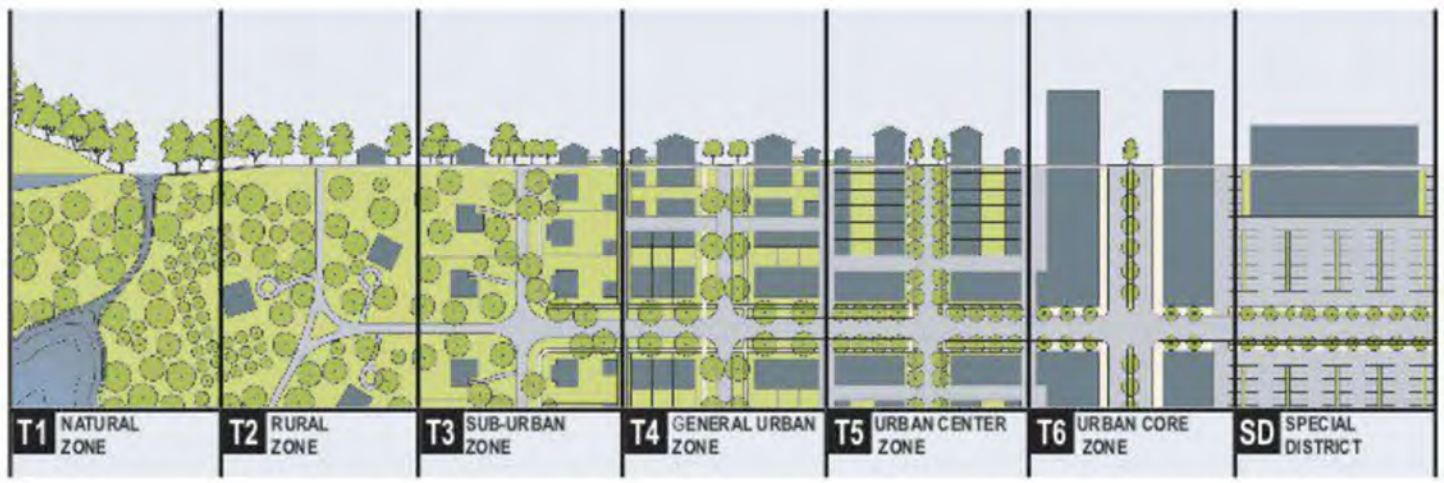
*"Only when humans are again permitted to build authentic urbanism — those cities, towns, and villages that nurture us by their comforts and delights — will we cease the despoiling of Nature by escaping to sprawl"*
-Andres Duany.

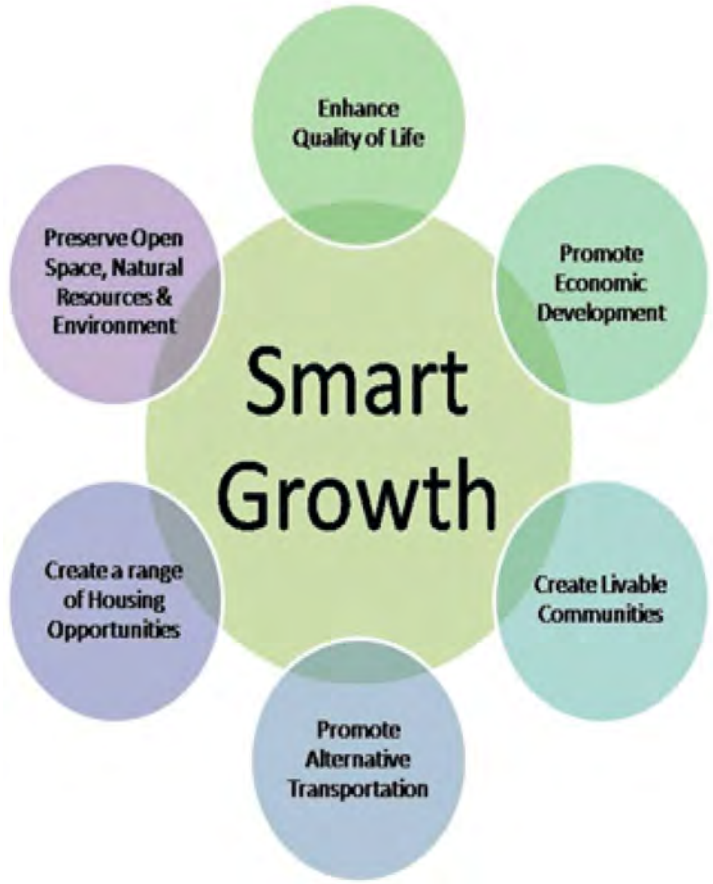
New Urbanism is an architectural and planning movement that advocates for design strategies based on traditional urban forms to counteract the current model of sprawl and the decline of the city. Its above principles encourage the rebuilding of cities, towns, and neighborhoods. One core concept is the idea of the Transect.- a transition from rural to urban. It outlines a framework for defining the types of streets, buildings, and public spaces consistent with the rural, suburban, and urban character of different zones, and a comprehensive neighborhood structure.

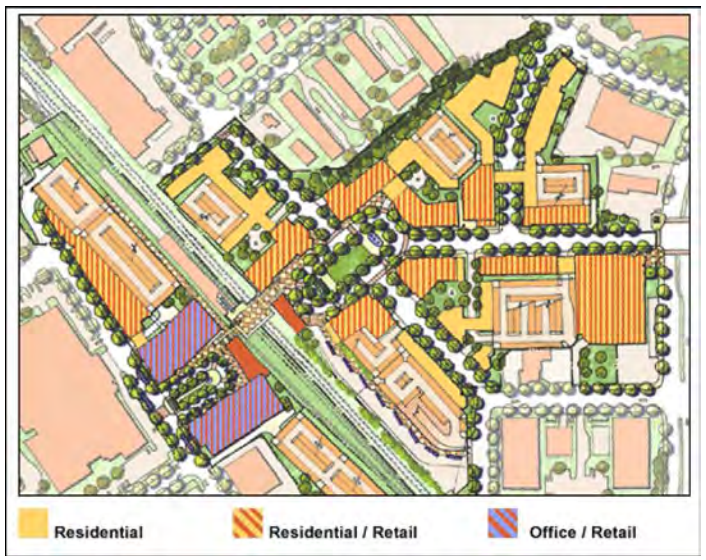


## DESIGN IMPLICATIONS

- *Walkability* - pedestrian friendly street design
- *Connectivity* - interconnected street grid and quality pedestrian network
- *Mixed-Use + Diversity* - mix of shops, homes, and people
- *Mixed Housing* - range of types, sizes, and prices
- *Quality of Architecture* - beauty, aesthetics, human comfort, and creating a sense of place
- *Traditional Neighborhood Structure* - discernible center and edge
- *Increased Density* - more buildings and places of interest closer together for ease of walking
- *Smart Transportation* - high quality trains, public transportation, and encouraging walking as daily transportation
- *Sustainabilty* - minimizing environmental impact of development
- *Quality of Life* - the sum of all of the above




# Smart Growth

Design, economics, environment, health, housing, transportation, and community quality of life are all affected by development decisions.

### Principles Of Smart Growth

- *Create a Range of Housing Opportunities and Choices* - quality housing for people of all income levels
- *Create Walkable Neighborhoods* - creating a desirable place to live, work, learn, worship, and play
- *Encourage Community and Stakeholder Collaboration* - responding to a community's own sense of how and where it wants to grow
- *Foster Distinctive, Attractive Communities with a Strong Sense of Place* - encouraging a vision and creating standards for development and construction with both architectural beauty and distinctiveness
- *Make Developmental Decisions Predictable, Fair, and Cost Effective* - a city must be embraced by the private sector
- *Mix Land Uses* - putting uses in close proximity to each other, providing alternatives to driving, such as walking or biking
- *Preserve Open Space, Farmland, Natural Beauty and Critical Environmental Areas* - "open space", natural areas both in and surrounding the city
- *Provide a Variety of Transportation Choices* - alleviating traffic congestion and increasing the availability of high quality transit service
- *Strenghten and Direct Development Towards Existing Communities* - places already served by infrastructure, utilizing the area's existing resources
- *Take Advantage of Compact Building Design* - an alternative to conventional, land consumptive development

### DESIGN IMPLICATIONS

- Create new neighborhoods and maintain existing ones
- Foster design that encourages social, civic, and physical activity
- Protect the environment while bringing economic growth
- Create more choices

New Urbanism/Smart Growth

# Orenco Station

PORTLAND, OREGON

Orenco Station is a transit-oriented community of 1,800 homes, a town center, office, retail and nearby employment on just over 200 acres in the town of Hillsboro, west of Portland, Oregon. Extending out from the light rail and town center is a grid of walkable, tree-lined streets and parks, featuring cottages, condominiums and row-homes - all varying in both price and size.

### Features

- Mixed-use town centers
- Live/work communities
- MAX Light Rail System
- Pedestrian spin of walkable streets
- Sequence of open space - "string of pearls"

### DESIGN IMPLICATIONS

- Pedestrian friendly street design and walkable neighborhoods
- Mix of shops, homes, and people throughout the town
- Range of types, sizes, and prices of different housing options
- Architecture that envokes aesthetics, human comfort, and creating a sense of place
- Discernible town center and edge
- Increased density
- High quality trains, public transportation, and encouraging walking as daily transportation
- Emphasize sustainabilty


# Highlands' Garden Village

DENVER, COLORADO


Highlands' Garden Village is a compact, mixed-use, urban infill community built on the site of an abandoned amusement park near downtown Denver. The site was abandoned in 1994 when the Elitch Gardens Amusement Park moved to a larger location near lower downtown Denver. The developer took advantage of the site's urban location and natural and historic amenities to build a compact neighborhood that provides housing, office, retail, parks, and entertainment.

- The community offers a wide range of housing choices - some affordable options
- Intensity and variety of land uses that blend into the adjacent neighborhoods
- Density gradient with sidewalks and roadways that connect the different usages
- Community gathering spaces - renovation of historic Elitch Theater
- Commercial and cultural spaces are oriented around plazas and gardens

## DESIGN IMPLICATIONS

- Mixes land uses together
- Compact building design - environmentally specific
- Multiple range of housing choices - including low income housing
- Walkable paths and neighborhoods - places for people and bikes
- Preservation of open spaces and riparian zones
- Using existing infrastructure
- Range of transportation choices - car, bus, bike
- Community participation in design and maintenance

# Copenhagen Cycling

COPENHAGEN, DENMARK

Cycling in Copenhagen is an important means of transportation and a dominating feature of the city-scape. The city offers a variety of favorable cycling conditions — dense urban proximities, short distances and flat terrain — along with an extensive and well-designed system of bike lanes. Every day 745,000 miles are cycled in Copenhagen, with 36% of all citizens commuting to work, school or university by bicycle.

- More people commute by bicycle in greater Copenhagen, than cycle to work in the entire United States.
- Bicycle infrastructure currently includes curb segregated cycle tracks, street cycle lanes and off street green bicycle routes running through parks and other green areas.
- Where roadside parking is available cycle tracks (bike lanes) runs on the inside of the row of parked cars, between parking and the sidewalk, essentially using parked cars as a separation barrier between bicycles and vehicle traffic.
- Bicycles has been admitted on the city's S-train network to facilitate mixed-mode commuting.
- The current system is considered one of the first examples of modern bike share systems - serving tourists and casual users.

## DESIGN IMPLICATIONS

Biking is the most energy efficient and sustainable way for people to travel and commute within an urban fabric. Tucson already has a large biking community. By encouraging bikers through safe, easy, and efficient routes, we can foster a culture and a community of bikers within the city - and ultimately, the site along the Santa Cruz.

Within the site, much can be learned from the organization of the cycle tracks - its hierarchy on the street and the way it moves from city to suburban areas. Bike sharing can be adopted on this site to encourage tourists, travelers and visitors to bike rather than drive.

# Public Bike Share

HANGZHOU, CHINA

- Largest Bike Share Program in the World
- 60,600 bicycles
- 2,416 stations
- Use bikes to get to destination or public transportation

## DESIGN IMPLICATIONS

Public bike sharing programs provide affordable and sometimes free access to bicycles for short distance trips around the city and provide an alternative for motorize public transport in select areas. The use of bikes reduces traffic congestion, noise, and air pollution. Bike sharing can connect people with public transit within a mile radius.

It alleviates the problem of personal bicycle ownership:

- Loss from theft or vandalism
- Lack of parking or storage
- Lack of maintenance knowledge

Types:

- Unregulated: Users are to leave bike unlocked in a public area (at a station) once reaching desired destination.
- Deposit: A small cash deposit releases the bike from a locked terminal and can only be retrieved by returning it to another station.

# King County Metro

KING COUNTY, WASHINGTON

King County Metro is the public transit authority of King County, Washington.

- It has operated 1,443 buses on 223 routes.
- Metro Transit provides both local and region transit service connections.
- The city network, descended from converted streetcar routes, is arranged in a hub-and-spoke pattern centered on downtown Seattle, with lesser amounts of crosstown service.
- Metro operates peak-hour commuter routes serving park and rides that use 244.5 miles of the region's network of HOV lanes.
- From 1973 to 2012, downtown Seattle had a "Free-Ride" area - a zero-fare zone.
- Transit centers act as regional hubs that are served by many bus routes - some providing a park-and-ride lot.
- Early experimenter with Transit Signal Priority - a system extending green lights for buses to pass through.

Types of bus routes: (largest bus-only fleet in the country)

- Electric Trolleybus
- Diesel-electric Hybrids
- Traditional Diesel
- RapidRide (Express Bus)

## DESIGN IMPLICATIONS

Because the Metro provides many different alternatives, it is an interesting case study to apply to the site along the Santa Cruz. Multiple transportation types can be applied and used together to create a better system of bringing people to the site, as well as moving them through.

Providing transportation hubs can encourage a center of commerce and people can orient themselves around it.



# TransMilenio

BOGOTA, COLOMBIA

Transmilenio is a Bus Rapid Transit (BRT) system that served the city of Bogota, Colombia.

- It is an efficient, modern mass transportation system that carries 1.3 million people per day.
- Transmilenio consists of many interconnecting BRT lines that connect many raised stations in the center of a main avenue.
- Usually 4 lanes are dedicated to the BRT near each station and down to 2 lanes on large stretches of road.
- There are both local and express busses.
- Customers pay at the station with smart paycard - to ease travel and efficiency.
- Busses and stations are at the same height, allowing easy accessibility for those who are handicapped.
- Each bus has the capacity to carry up to 160 people.
- An additional 410 regular buses, known as "feeders" transport users from certain important stations to many different locations outside of the main route. Theses busses operate without dedicated lanes and there is no additional fare to use the feeder buses.
- Users can choose to cycle all the way or connect up with the BRT - leaving their bikes in secure parking facilities at any main interchange.

## DESIGN IMPLICATIONS

Even though this system is too large in scale compared to our immediate site, it could be applied to the greater city of Tucson - and beyond through Pima County.

The efficiency and successes of this system can teach lessons that can be applied in Tucson. Bogota has provided for both bus transportation and biking. By providing bike parking and storage, it encourages people to bike to the transit stop and then hop of the bus from there. Both are energy efficient and sustainable.

# Mixed Use

### Layout
Mixed-use developments should create an inviting and attractive destination for local residents and region wide users. Buildings and spaces between buildings should be designed and oriented to create safe, pleasant, and active environments.

### Circulation
The project's circulation system should promote efficient movement of vehicles in a clear and well-defined manner that minimizes conflicts with pedestrians and bicycles. Pedestrian users should find that public spaces and gathering places are clearly identified and easy to access and locate.

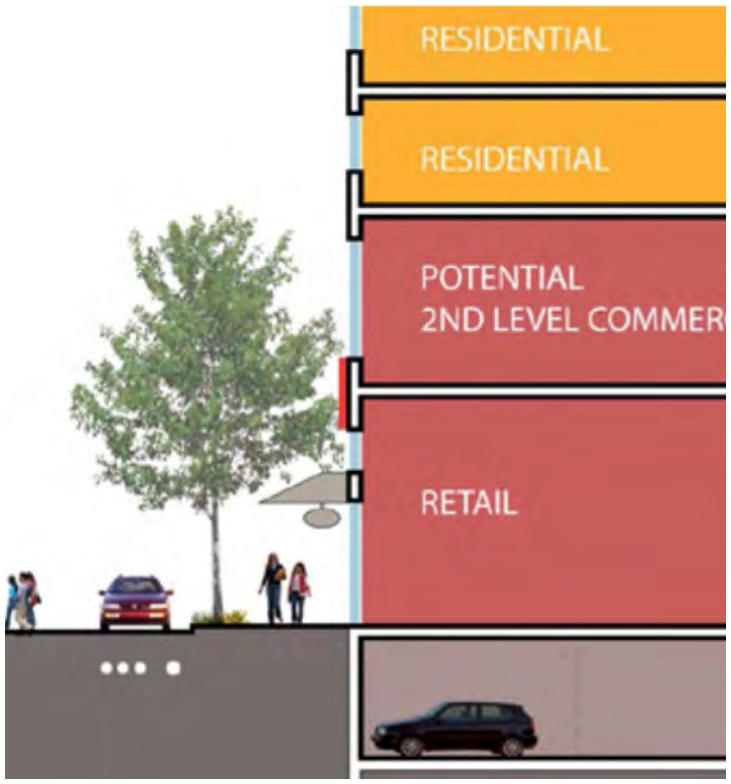
### Landscaping
Landscaped areas should be used to frame and soften structures, to define site functions, to enhance the quality of the environment, and to screen undesirable views. Landscaping should work with buildings and surroundings to make a positive contribution to the aesthetics and function of both the specific site and the area.

### Signage
Visitors and residents should be able to locate and identify major attributes of the development through a unified signage concept.

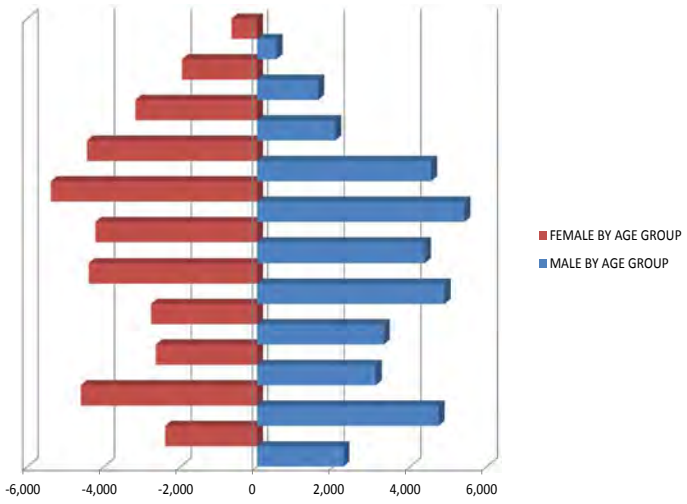
### Safety
Visitors and residents should find that the development provides the best possible design to protect their personal safety and safety of their property.

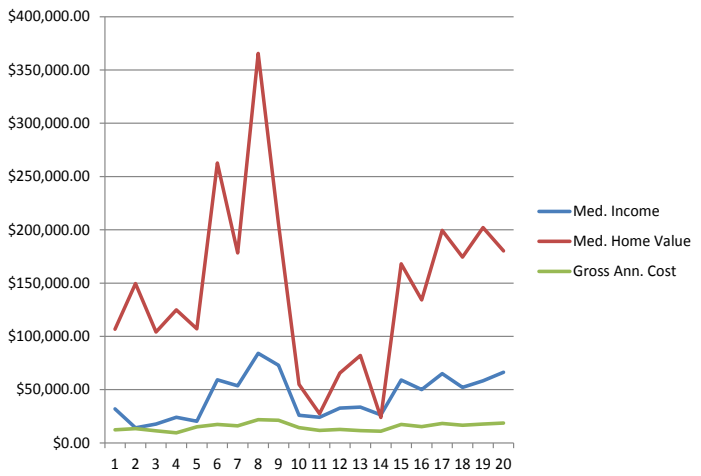
### DESIGN IMPLICATIONS

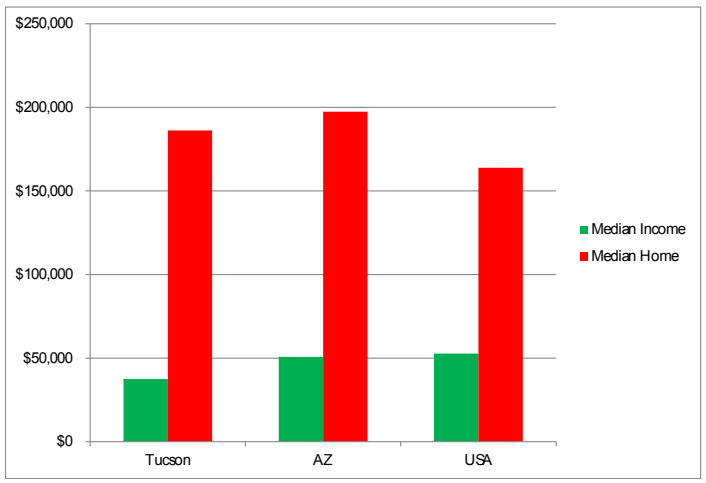
- Walkability
- Connectivity
- Civic Sites
- Mix of Land Uses
- Diverse Housing types
- Environmental Sensitivity
- Transit Oriented Development

# Affordable Housing




Shelter is a continual need in a local community, and in the global context, and much of the population has a severe lack of proper shelter, and some of what is provided causes severe health risks. Meeting this need is a requirement for sustainable developments along with the other requirements of livelihood including food, housing, safe drinking water, and healthcare / access to health services However, affordable housing has become increasingly rare due to the rise of mortgages and rents, inversely to a liveable wage, (which has remained stagnant through recent years). In addition, the homes provided have increased in square footage while the size of family unit has decreased; in some cases the home size has increased by 30%. This has created a culture of symbolic consumption in place of meeting the need. Nonetheless, shelter is a basic human right; what may be argued is what shelter is needed and what house is wanted?

DESIGN IMPLICATIONS

Sustainable housing is a form of affordable housing that also incorporates environmentally friendly and community based practices. It attempts to reduce the negative impact that homes can have on the environment through choosing better building materials and environmental design.

- Must satisfy the current needs without neglecting the resources for future generations.
- Seeks economic, social and environmental equilibrium.
- High-performance structures, reduce negative impacts on the surrounding ecology and improve health.
- Comprehensive and holistic focus of design, construction, maintenance, and adaptive or disposal.

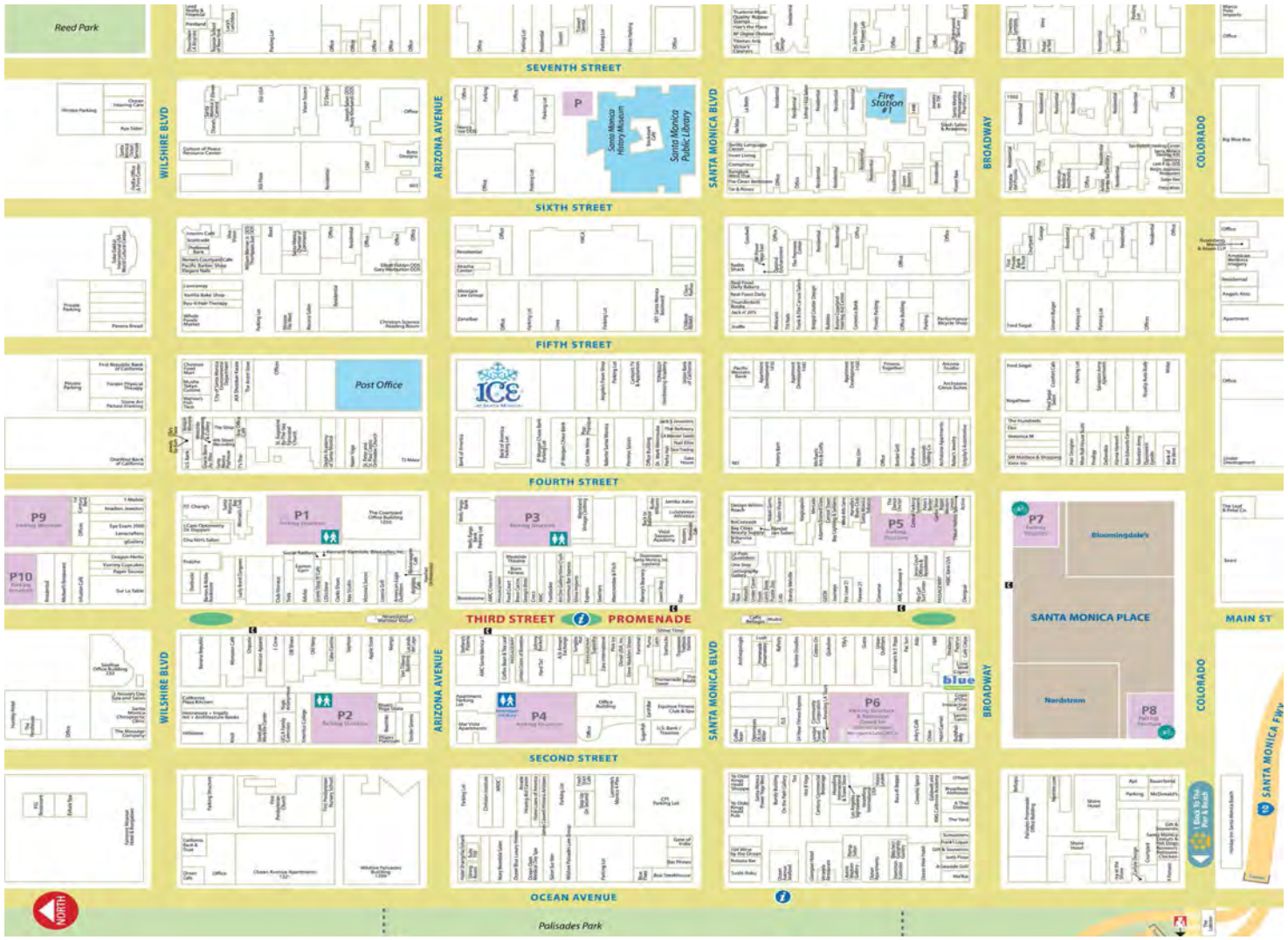
# Third Street Promenade

SANTA MONICA, CALIFORNIA

The Third Street Promenade is an upscale shopping, dining, and entertainment complex in the downtown area of Santa Monica, California. The layout of the Promenade consists of three blocks which are connected by a pedestrian only road that is highly active with shoppers and live performances. Parking garages have been placed strategically to create connections from one block to the other and minimize car traffic.

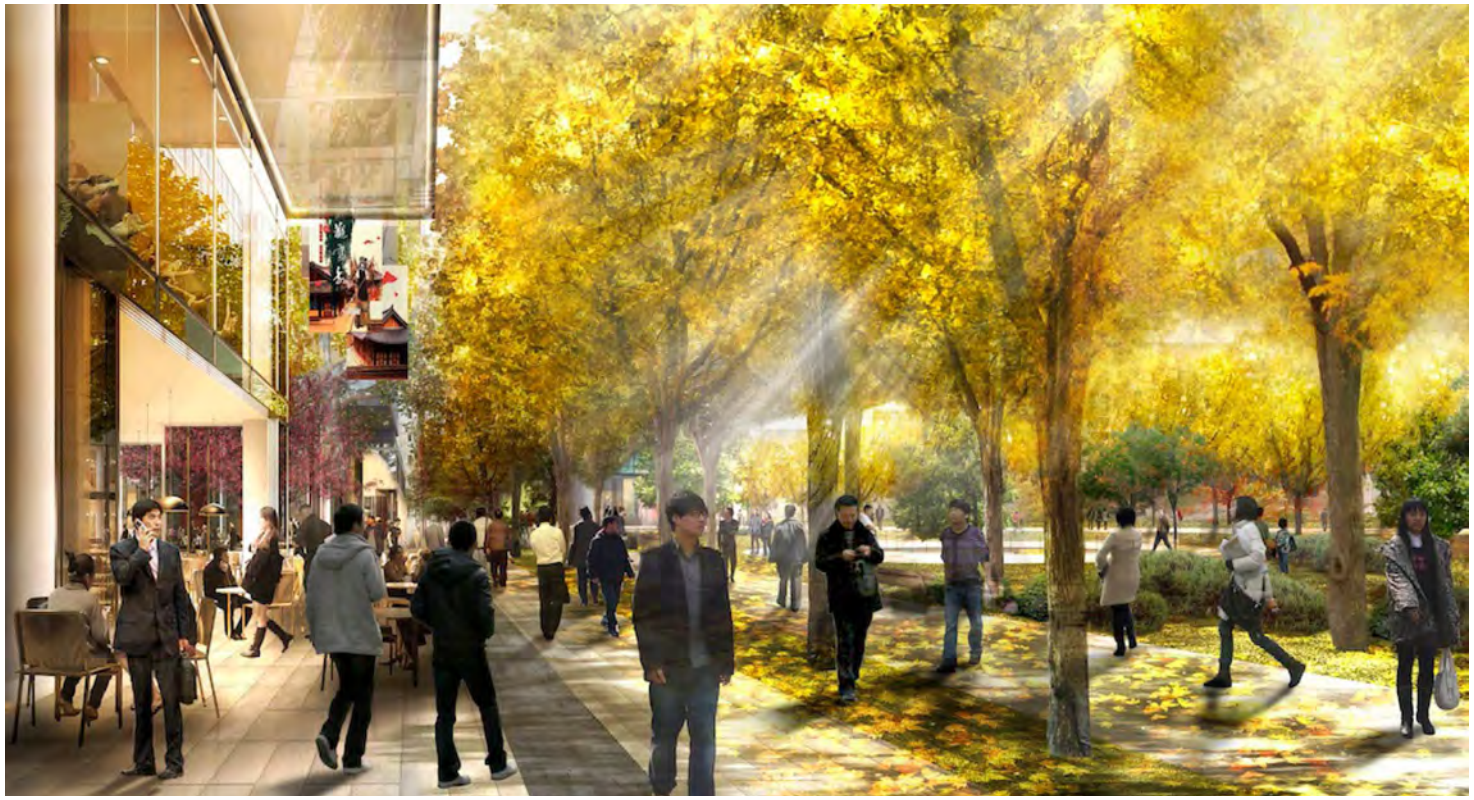
## DESIGN IMPLICATIONS

- Diverse activities from stores, restaurants and entertainment attract many people to this street
- Partly shaded street which minimizes heat island effect on the street and attract urban wildlife
- Strategic location of parking lots minimizes congestion and wide sidewalks / streets allows for large flows of people
- Many interaction areas throughout the promenade allow people to interact and create dialogue
- High use of glass allows pedestrians to observe through the walls into the shops to create connections

# Hongqiao Vantone SunnyWorld Centre

Shanghai Hongqiao CBD, China



**Project Type Mixed Use:**
Offices, Exhibition, Commercial
**Site Area:** 302,000 sqft
**Designed by:** Foster & Partners

The new four-hectare public park will be home to a mixed-use community and will include efficient, flexible office buildings that will border the linear green-space, oriented to minimize solar gains and overall views of the surrounding area.

These will be animated at ground level by shops, restaurants and a variety of new civic spaces. The structural arrangement will be laid out as triangular fingers, intersecting to create visual connections between ground level and the offices above. Slender floor plates will be incorporated encouraging sustainable design in the city maximizing daylight and natural ventilation, while also providing a solution which can be easily adapted to future changes.

The park culminates in a landmark building. Its scale responding to its location as the 'end point' of the development in relation to the canal and city quarter beyond.

## DESIGN IMPLICATIONS

- Central recreational spine that connects the entire site
- Public Spaces at lower levels and private spaces at higher levels
- Have an attraction on both sides of the central connection
- Push development to the site's edge and open up the core of the site for recreational purposes with appropriate shading

# Auburn Court

CAMBRIDGE, MASSACHUSETTS

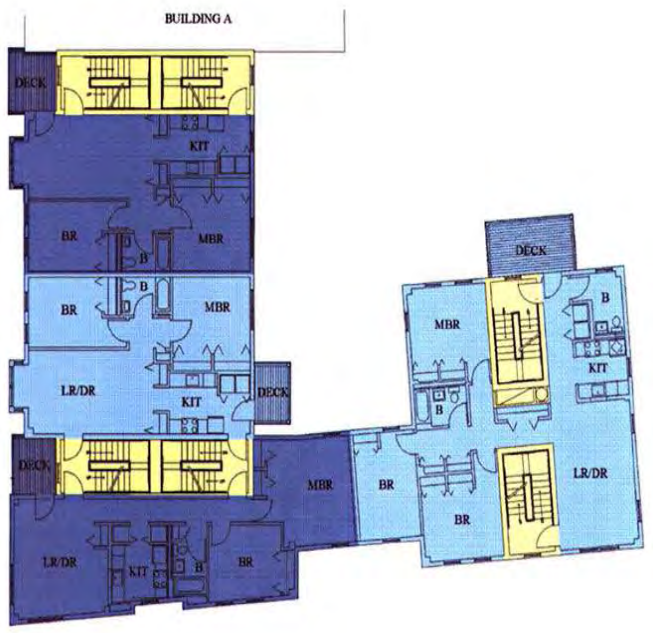
Brownfield redevelopment atop what was a marshland, then filled in to become an industrial site, abandoned, and left vacant for decades. MIT sought proposals to develop a technology, R&D park with nearby residences for students, graduates, and young professionals.

- Total 136 units build with 50% of units held for those who make less than 50% of the area median income.
- Varied living units: 3, 2, and 1 bedroom homes dispersed among flats and duplexes. (Mixed-Residence Develop)
- Public/private partnership between MIT and Forest City Enterprises

## DESIGN IMPLICATIONS

Affordable housing is not only a cost to the residence gross income, but negatively effects the social, body, and emotional health of the inhabitants.

- Affordable but quality housing is necessary for the overall health of the residences.
- Proper quality materials prevent moisture, mold growth, allergies, etc.
- Dispersed Low-Income within Medium to High-Income, or Mixed-Income high density provides better education for poor children.
- Housing effects education of children by location and emotional stability


# Colorado Court

SANTA MONICA, CALIFORNIA


L..os Angeles faces the same challenges - a severe lack of affordable housing. The wait list increased by 25% and the housing authority is meeting only 8% of the need. The median income is $19,000 less than what is required to purchase a median value home.

- Advance solar photovoltaic and natural gas supply majority of energy, and water is heated through a heat recovery system.
- Phase I has (44) 375 square foot energy efficient units meeting 30-40% Area Median Income (AMI).
- $385/month; utilities included.

How much shelter creates a home and how much home creates excessive consumption.

- Shelter is a basic right along with food, safe drinking water, and access to healthcare.
- Home sizes that provides shelter without exhausting resources or being oversized thereby causing unaffordable mortgages.
- Home size has increased 30% while family sizes have decreased.
- Avoid "weak sustainalbity", or the offset of benefits by the net costs.
- Use "strong sustainabilty" where nature and man-made capital are complimentary and maintained

DESIGN IMPLICATIONS

- Use current and innovative technologies to offset the increasing utility expenses.
- Provide affordable dwelling square-footage; not more than necessary.
- Provide housing for those whose incomes are less and far-less than the median income for the area.

# Blocks

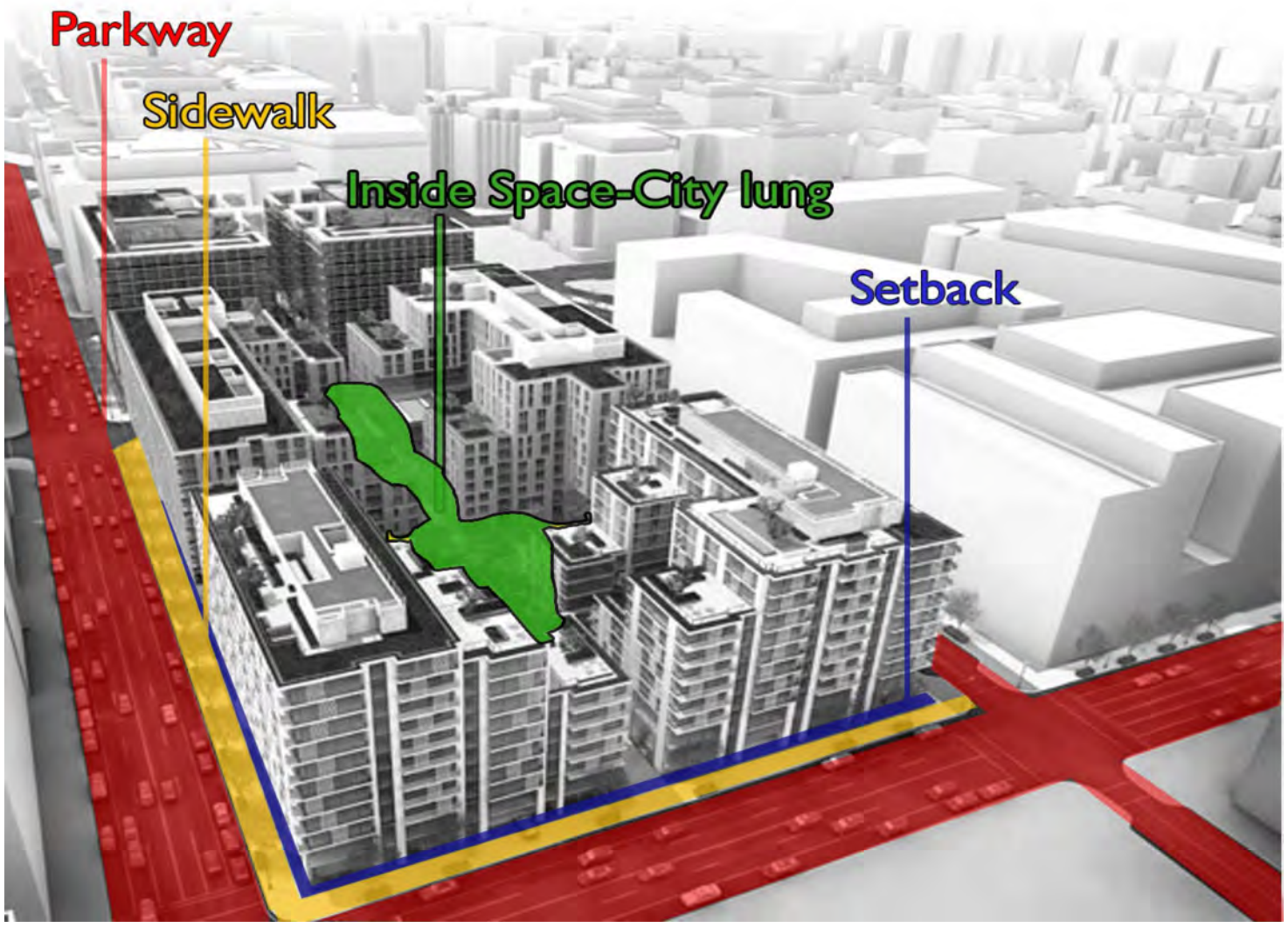
**What is a Block?**
A block is defined as a tract of land bounded by streets, or a combination of streets and public parks, cemeteries, railroad right of way, shorelines of waterways, or boundary lines of municipalities.

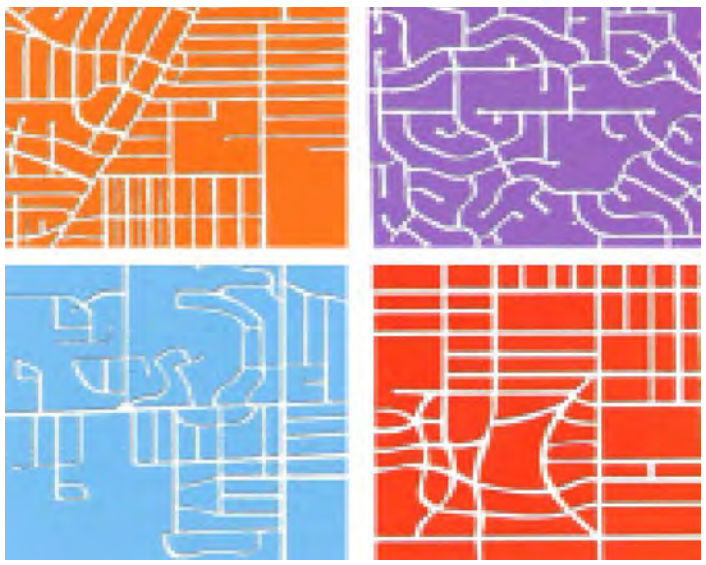
**The Urban Block**
The urban block is the basic unit of neighborhood building. Blocks have an outside and an inside. The block defines the public space of the street with its building facades( and garden walls or fences) and holds the private realm of the houses and yards within it.

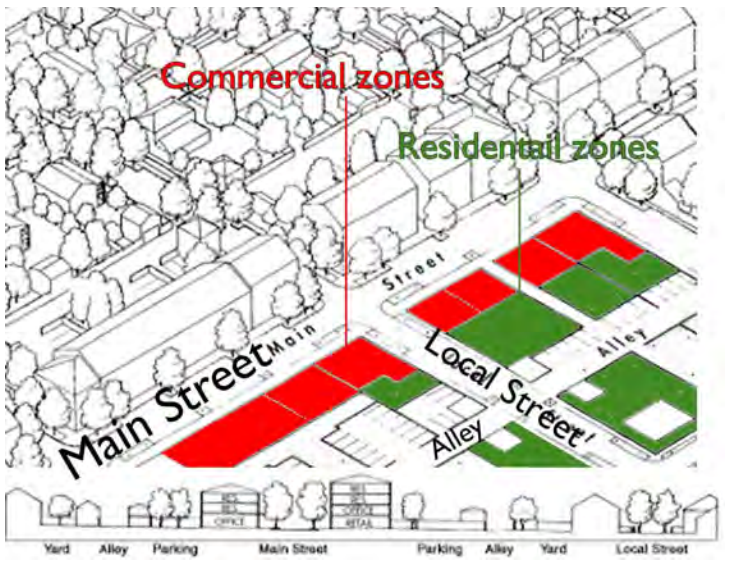
**Size and Structure**
Square, Rectangular, or Irregular. At perimeter, each block is divided into Parkway, Sidewalk, and Setback..

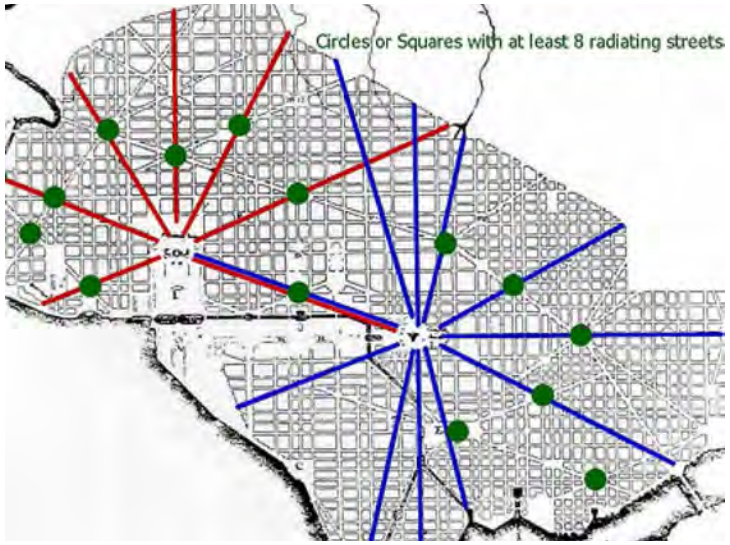
**Street and Alley**
There are three types of streets, main street, local street alley, which encompass and divide each block,

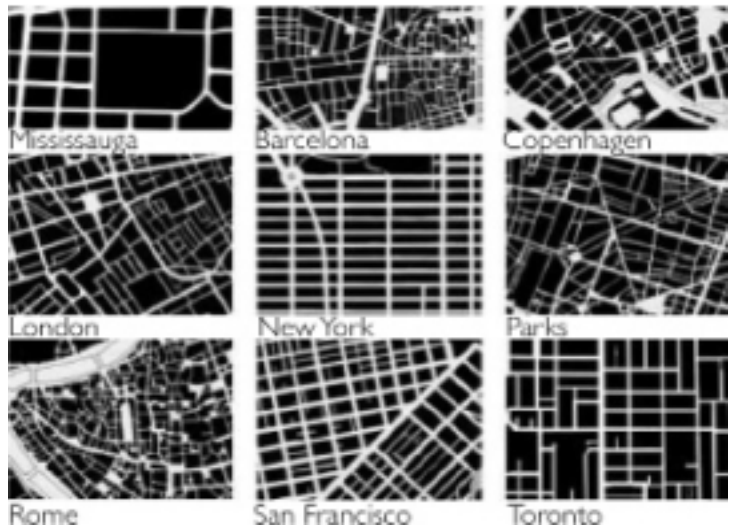
It is important to place main-street buildings (more intensive uses in general) close to the main street and not overlooking less intensive uses at the rear lot line. This breathing room allows a less intensive use, such as a single-family house, to sit just around the corner from a much more intensive street. Changes in land use should be made within blocks, at the alley or rear lot line—never along streets.








### Grid

Street networks with frequent connections ease traffic congestion by providing a choice of paths for any trip, yet slow cars by requiring frequent stops (this is very fuel inefficient). Pedestrian, and bike movement is easier because traffic is slower. Networks with intersections at regular intervals create a sense of scale and order not evident in typical subdivisions. Most American cities are laid out with 1/16 mile by 1/8 mile grids. Major streets are usually at 1/4, 1/2, or 1 mile intervals. Some exceptions: Midtown Manhattan (in New York City) has a 1/10 mile by 1/5 mile grid.

### Connection & Walkability

Blocks longer than 400' should be broken up with pedestrian pass-throughs between buildings.Start with pedestrian orientation – most important thing to make a functional mixed-use development neighborhood.

Mid-block pedestrian pass throughs should be designed so they cannot be enclosed or locked. The pedestrian passthrough should be used to connect separate buildings, or link customer parking to the front of buildings

Radial streets – efficient for pedestrians – make trip to center of community shorter. Powerful contrast to local streets, adding civic presence, grandeur rarely found in suburbs. Reinforce clarity, identity of the center.

# South Waterfront Street District Plan

PORTLAND, OREGON

### Block Size

Small square and rectangular blocks. Provide block faces of no less than 200 feet and no greater than 500 feet. Block dimensions promote a walkable and accessible pedestrian environment while creating developable parcels.

### Entry Features

Identify the transition from one place to another and are placed at the three gateways implementing public art, lighting, identity elements and landscape into these nodes.

### East-West Streets

Frequent east-west streets create view corridors and pedestrian access to the River and Willamette Greenway, also providing local access to parking facilities, residenes and businesses.

### North-South Access Street

Creates a special place in the District and fosters a sense of neighborhood that binds the community together and to the River.

### Connectivity

Use paving, street furnishings and color in seasonal landscape plantings to define places and streets in the District.

### DESIGN IMPLICATIONS

- Small block system promote walkability throughout the different programs
- Strong theme of residential and commercial on the south end, educational center, a recreational park, central node of mixed use, and resort preservation hub on the north end
- Establish main points of entry for our site
- The east and west streets and paths can be feeding people into the site
- Creating a connection to the river through an urban greenway system of street basins that collects water
- The north and south streets and trails can bind the programs together

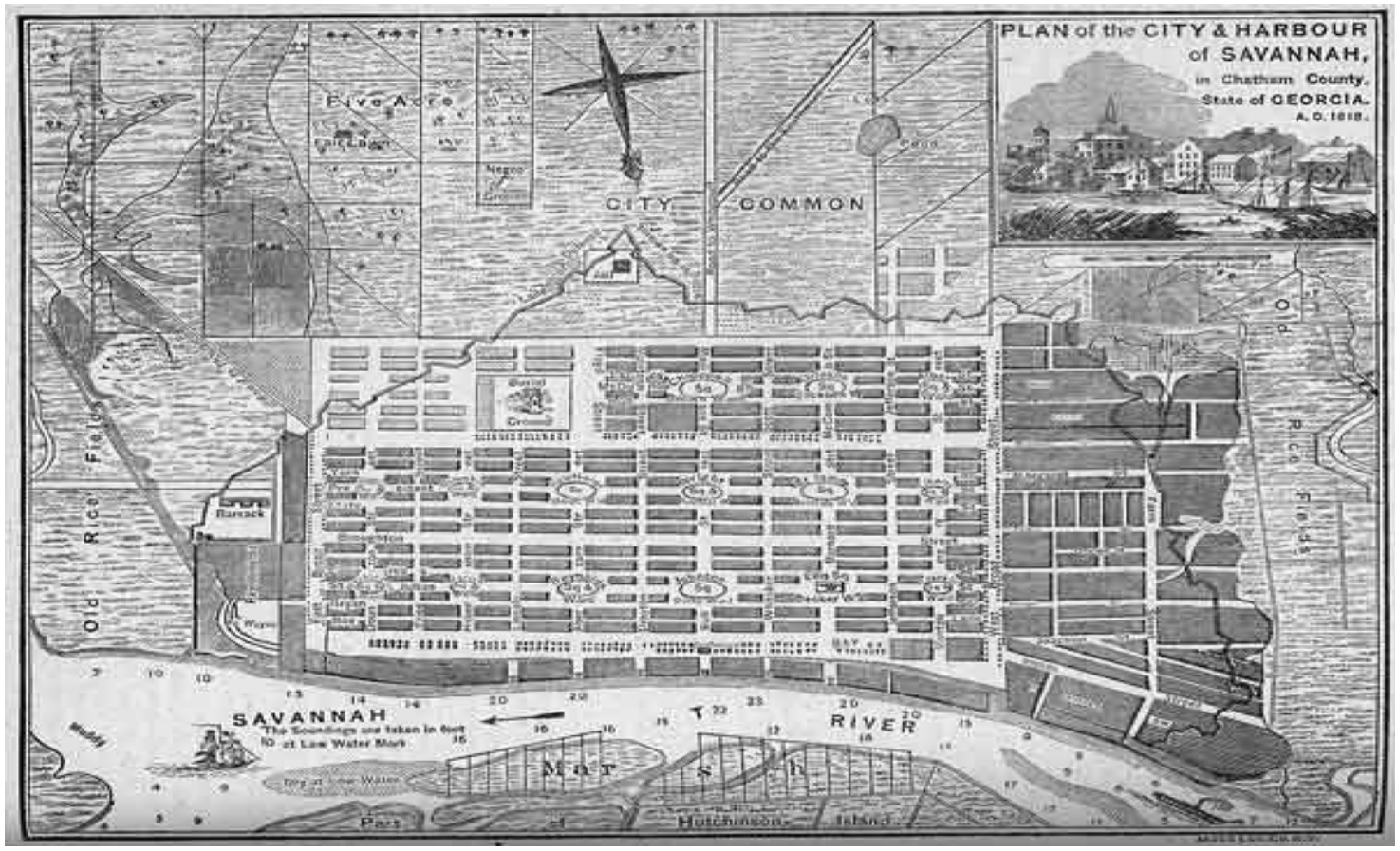

# Squares of Savannah

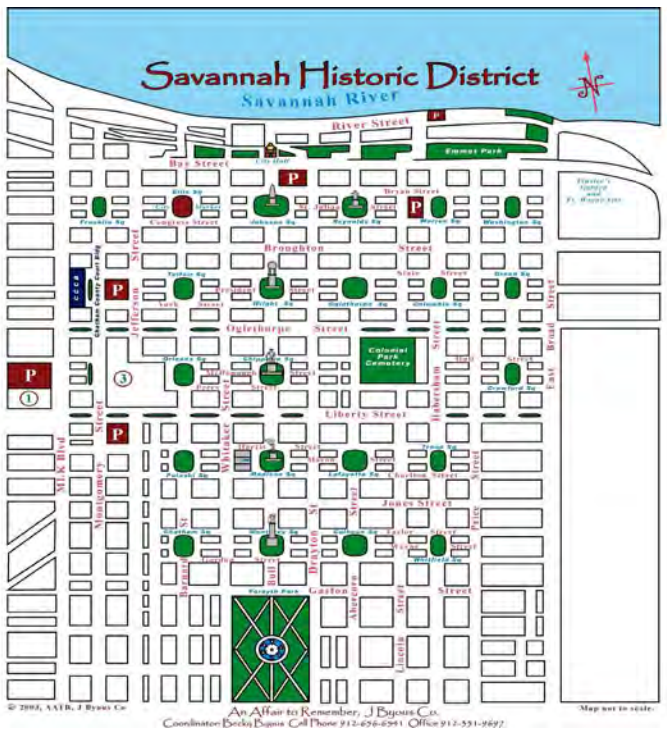
SAVANNAH, GEORGIA

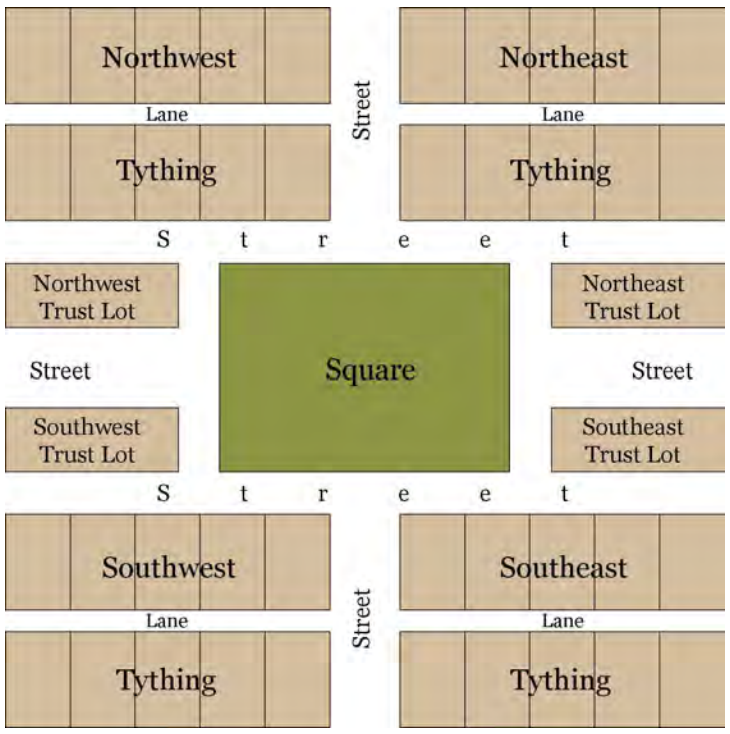
Small rectangular blocks - are included primarily as a point of reference, because it has much smaller blocks. It offers a rare example of two types of blocks designed for different purposes-on for residential and the other for public use.

All of the squares measure approximately 200 feet from north to south, but they vary east to west from approximately 100 to 300 feet. Typically, each square is intersected north-south and east-west by wide, two-way streets. They are bounded to the west and east by the south- and north-bound lanes of the intersecting north-south street, and to the north and south by smaller one-way streets running east-to-west and west-to-east, respectively. As a result, traffic flows one way—counterclockwise - around the squares, which functions much like traffic circles.

All of the squares are a part of Savannah's historic district and fall within an area of less than one half square mile. The five squares along Bull Street—Monterey, Madison, Chippewa, Wright, and Johnson—were intended to be grand monument spaces and have been called Savannah's "Crown Jewels." Many of the other squares were designed more simply as commons or parks, although most serve as memorials

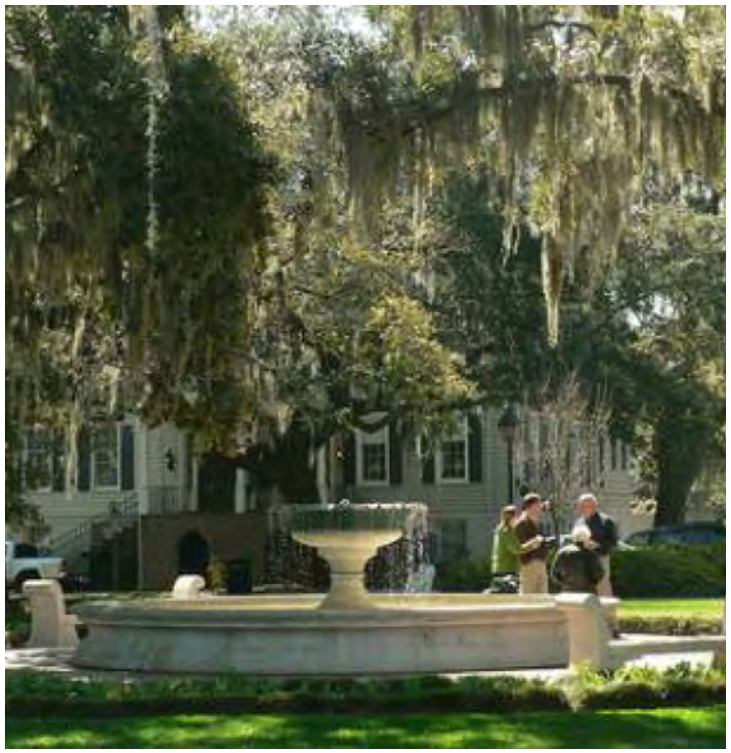



## DESIGN IMPLICATIONS

- Reduce the street size
- One way street system for a trolley and pedestrian bike path system going north and south along the Santa Cruz River
- The east and west streets can be two way streets that allow access from adjacent communities
- Squares establish gathering spaces and destination points - centered in each node
- The streets create a hide and reveal feeling for a pedestrian
- Larger or smaller squares depending on the function



# Waterfront Revitalization

There are seven definitive elements used in waterfront planning:

- Determine land and water use
- Create a unique built environment, where its image is attractive and memorable to visitors
- Provide recreation for everyone.
- Physical, visual, and interpretive access
- Create pedestrian links across arterial auto streets to reconnect the waterfront with the downtown
- Historic buildings, places and events are opportunities to conserve the area's heritage
- Safeguard existing healthy environmental resources, and restore degraded ones

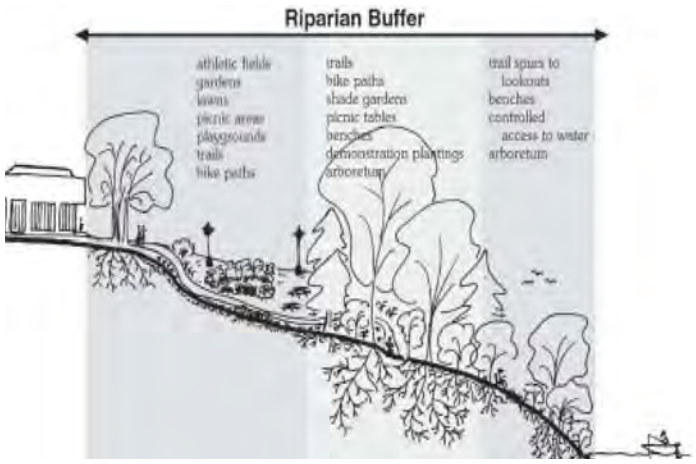
## DESIGN IMPLICATIONS

### Ecological Principles

- Preserve natural river features and functions
- Ecological goals and economic development goals are mutually beneficial
- Protect and restore natural river features and functions

### Design Principles:

- Buffer sensitive natural areas (100 ft)
- Use nonstructural alternatives to manage water resources
- Reduce hardscapes
- Manage stormwater on site and use nonstructural approaches



NO
FISHING

# Confluence Park

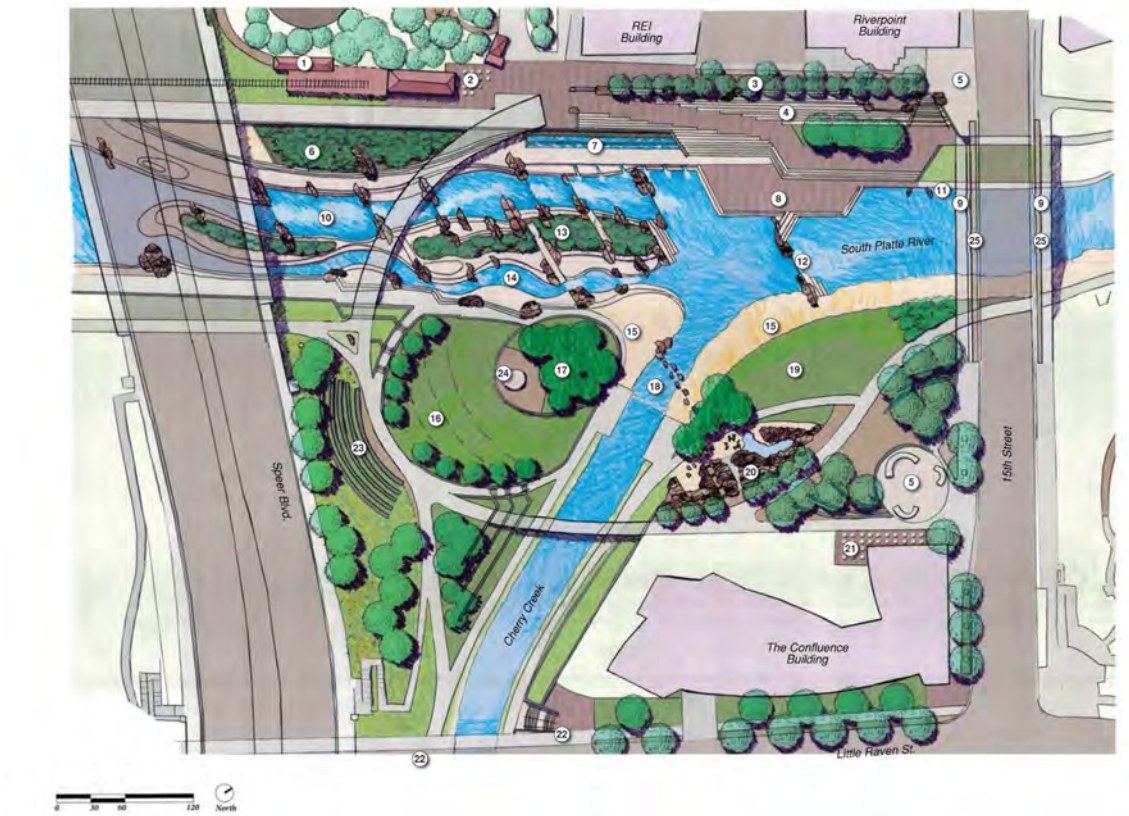
DENVER, COLORADO

Confluence Park is Denver's birthplace, where the discovery of gold in 1858 led to the founding of Denver. Located where the South Platte River and Cherry Creek meet, Confluence Park is a place where many people bike, walk, and gather in an urban environment to enjoy the great Colorado outdoors.

## DESIGN IMPLICATIONS

- Engage nearby business redevelopment areas and look for ways for park improvements
- Create gathering places that provide food, outdoor cafe seating, public restrooms, rentals, storage and related support facilities
- Provide environmental, entertainment, and educational programming
- Treat on-site stormwater runoff to remove pollutants before entering the river
- Create wetland edges or other biological treatments of in-stream river flows
- Increase awareness of regional water issues by providing public access to the water
- Create river crossings that serve multiple purposes and become part of the river experience
- Create signature gateway elements such as a feature bridge, pedestrian promenade, and gathering places along the river
- Perform historical analysis of site and incorporate culturally significant findings into the design.
- Strike a balance between urban and natural river edge conditions
- Improve opportunities to get to the river's edge
- Use existing site elements such as materials, infrastructure, and natural resources to enhance identity

## Draft Master Plan: *The Park Loop*




Key:

1. Trolley Storage/Parks Storage
2. Cafe/Ticket Booth, Restrooms, & Outdoor Dining
3. Pedestrian Promenade and Overlook
4. River Event Viewing Terrace
5. Entry Plaza
6. Biofiltration Area
7. River Fed Water Feature
8. River Terrace/Amphitheater
9. Pedestrian Bridges Adjacent to 15th St.
10. Spring-time 'Big Wave' Course
11. Riverside Trail/Access
12. Signature Freestyle Feature
13. Island Viewing Terraces & Improved Habitat
14. Slalom/Recreational Course
15. "Beach" Edge
16. Gathering Area/Amphitheater
17. Oasis/Cottonwood Grove
18. Low-flow Crossing
19. River Lawn
20. Adventure Play Area & Splash Play
21. Outdoor Cafe
22. Access from Little Raven St.
23. Speer Terrace
24. River Stage
25. Planters


Plaza
River-Fed Water Feature
Kayak Access
Whitewater
Island Viewing Terrace
Tubing
Trail

# San Antonio River Walk

SAN ANTONIO, TEXAS

*"The San Antonio River Walk curves through the grid of city streets in a loop off of the main channel. This lively pedestrian system is lined with busy cafes, shops and hotels, set in a lushly planted, closely confined space. it's a redevelopment paradise."*

The San Antonio River Walk also known as Paseo del Río is a 2.5 mile long network of walkways along the banks of the San Antonio River, one story beneath the streets of Downtown San Antonio, Texas. Lined by bars, shops and restaurants, the River Walk is an important part of the city's urban fabric and a popular tourist attraction.

## DESIGN IMPLICATIONS

- Rejuvenated existing properties along the river encouraging job growth and an increased tax base for the city, the county and area schools
- Small businesses and restaurants, shops, and coffee houses to chain restaurants and hotels
- Pathways interface with other systems as much as possible
- Linkages to cultural landmarks
- Countless festivals, shows, fairs, and activities showcasing the culture of the area
- Stacked pieces of limestone used to create small dams, or weirs, in order to prevent erosion of the river bottom
- Reintroduced native trees, grasses and plant life along the river's edge
- Designated wildlife habitat areas boosting ecosystems and river functions
- The pedestrian street winding and looping under bridges as two parallel sidewalks lined with restaurants and shops, connecting major amenities
- Lush landscapes, quaint pathways, tinkling waterfalls, quiet pools, outdoor art and relaxing outdoor patios evoke the renowned public spaces of Europe
- Spectacular lighting reflecting off the river providing a valuable aesthetic for evening enjoyment



BARBEQUE
COUNTY
LINE

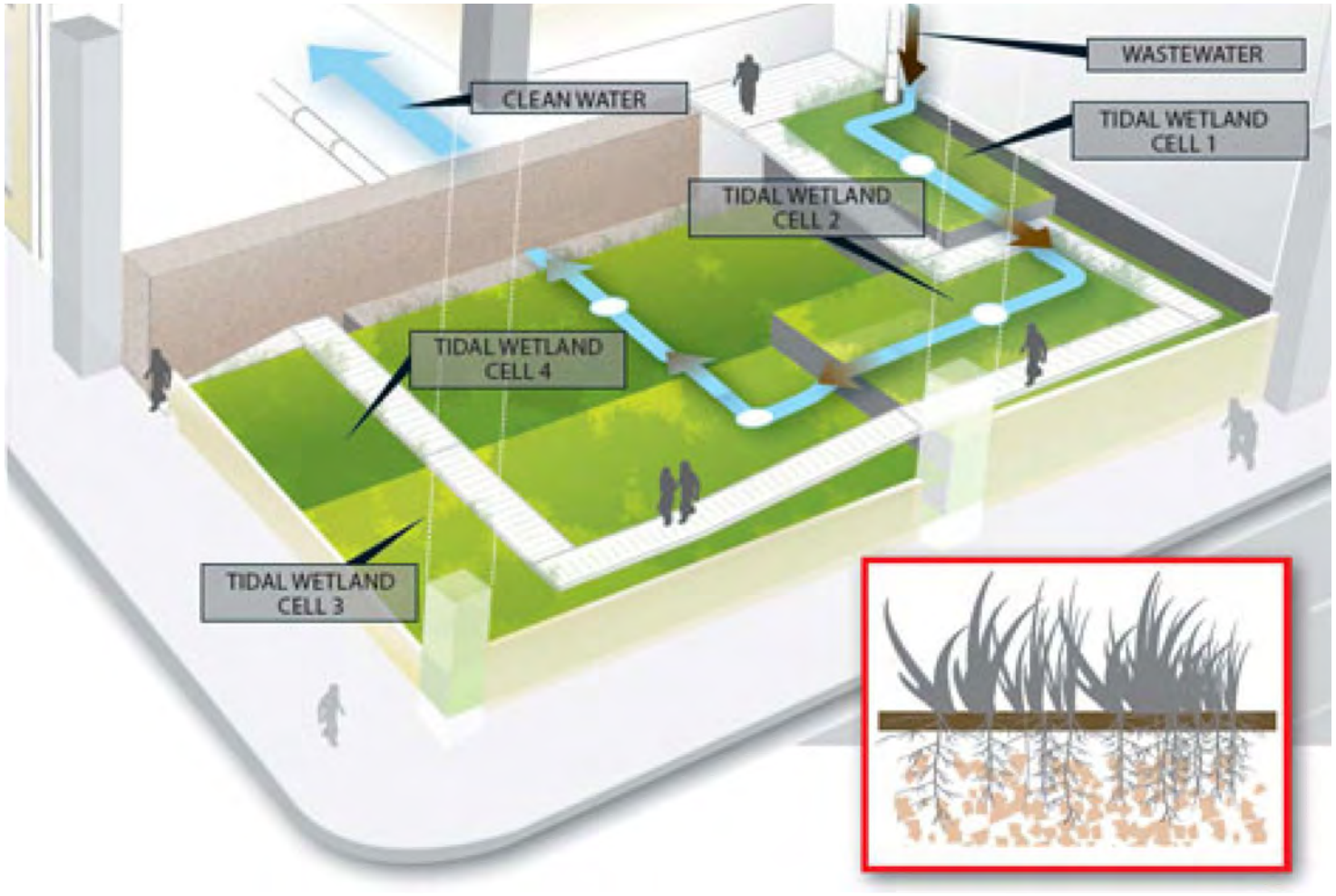
# HYDROLOGY

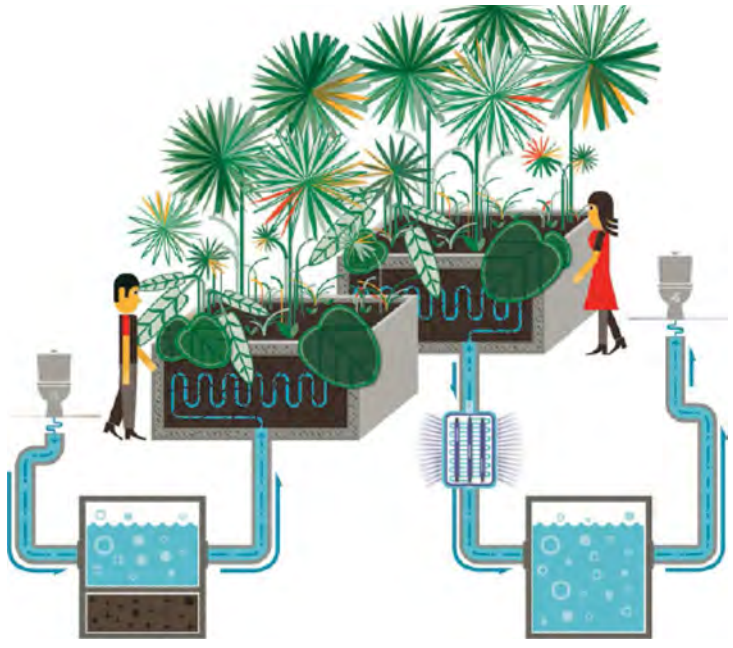
## CASE STUDIES
## LITERATURE REVIEW

# Living Machine

The Living Machine is a systematic process that mimics the natural effect of wetlands by combining engineering with plants and beneficial bacteria to treat and reuse wastewater.

- A series of wetland basins are filled with a specific type of gravel that allows the development of micro-systems to help purify the water
- The basins are systematically filled and drained to mimic the natural effect of the wetlands in nature
- The natural cycle of organisms allow either more to be added or omitted to the project without changing or disrupting the ecosystem. In this complex system the Living Machine relies on photosynthetic plants and algae to oxygenate the water and help promote the growth of species diversity. Snails and fish further filter sludge and allow the user to diagnose toxins through the behavior of the species inhabiting the ecosystem. The system can be implemented in any climate indoor and outdoor
- The use of screens, bio-filters, plumbing, rocks, pumps and other mechanical devices help to filtrate the wastewater that is introduced in to the system.
- In a "fixed film ecology," a hydroponic system is filled with solid aggregate or gravel to allow for a wider variety of bio-film to grow. This bio-film allows denser and more diverse ecosystems to flourish and in turn help purify the wastewater effectively.



## DESIGN IMPLICATIONS

The Living Machine can be used to treat both domestic wastewater on a smaller scale as well as community and commercial wastewater on a larger scale.

- The system is specifically designed for the scale of the project to handle the amount of water in the area
- A well designed system will require little to no maintenance, however, a manager is required to assure that the biological system is working correctly as well as to ensure the biological changes will promote the ecosystem to self regulate
- Since the Living Machine mimics the process of the natural coastal wetland, it is a more natural way to reclaim water
- Implementing the Living Machine into our project will have many benefits, most obviously it will save potable water. Since we live in a desert environment, we should be more sensitive about the amount of water we consume
- Grey-water, or reclaimed water is actually better for vegetation, because grey-water usually contains nitrogen and phosphorus, plants usually grew better
- Reducing the amount of grey-water we put back into our sewer or septic systems, will reduce the chances of any containments contaminating our local streams
- Reclaiming water will also save us money, reducing the amount of water we consume will help us reduce our impact on the environment

# Port of Portland Headquarters

PORTLAND, OREGON

The Port of Portland Headquarters is a 200,000 sq.ft. state of the art building that is sustainable, cost effective, aesthetically pleasing, and provides advanced wastewater treatment for reuse. The Implementation of the "Living Machine" allowed the designers to meet their demanding criteria.

The Living Machine became a central feature in the lobby and along the exterior of the building. The system uses a secondary and tertiary wastewater treatment strategy, starting with six wetland basin flow cells and one vertical flow cell, the final stage uses an ultraviolet disinfectant as well as chlorine to finally clean the water for later use.

The building has reduced water use by 75%, integrating interior and exterior green spaces for public use. The building has over 500 employees and produces a high quality water that is then reused for toilets water as well as to supply the buildings cooling towers.

## DESIGN IMPLICATIONS

- The building incorporated the Living Machine System into the lobby areas and the exterior spaces, this system allowed the building to reclaim wastewater by treating the majority of it on-site. The microorganisms and plants cleansed the water enough to be used as toilet water and the cooling tower, and an irrigation system that feeds the plants in the lobby.
- The building also has an eco-roof garden with a reflective membrane roof, day lighted offices, energy efficient lighting, geothermal heating system, and Rain water harvesting
- Designing buildings similar to this in terms of infrastructure will give Tucson the opportunity to create a culture that is environmentally friendly, and sensitive to our eco-system
- The Living Machine
- Rain Water Harvesting
- Geothermal Heating and Cooling

# San Francisco Public Utilities Commission

SAN FRANCISCO, CALIFORNIA

The San Francisco Public Utilities Commission is a 277,500 sq.ft. facility that provides power, drinking water and wastewater services to the people of San Francisco. During the design phase the design team incorporated green technology that could work with the urban environment of San Francisco as well as provide a long term cost savings measure. Ultimately they incorporated solar panels, wind turbines and a Living Machine to help reduce their carbon foot print on the environment.

The San Francisco Public Utilities Commission's ultimate design integrates the building lobby, walkway, and sidewalk which all function as living machines; purifying all the wastewater the building produces through a series of basins. The final stage of the living machine includes both an ultraviolet light and chlorine strategy that will produce clean water that can later be used for toilet flushing as well as exterior irrigation.

Ultimately the building will save approximately 750,000 gallons of water per year as well as providing 900,000 gallons of non-potable water for off-site use. In addition the exterior foliage will provide and attractive and inviting area for the employees and community members to enjoy.

## DESIGN IMPLICATIONS

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- Provided the community an example - saving the planet and saving the taxpayers money.
- The Living Machine allowed the building to save 750,000 gallons of water per year as well as providing 900,000 gallons of non-potable water for off-site use
- If we implement some of these strategies into our design, our buildings will also be successful at creating landmarks, and examples for the community to follow. As well, as creating buildings that are sensitive to our desert climate, giving us a way to reduce our carbon footprint, save water and energy in these trying times

# Flood Control

Some methods of general flood control include planting vegetation to retain extra water, terracing hillsides to slow flow downhill, and the construction of floodways.

Other techniques include the construction of levees, lakes, dams, reservoirs or retention ponds.

**Retention Basin**

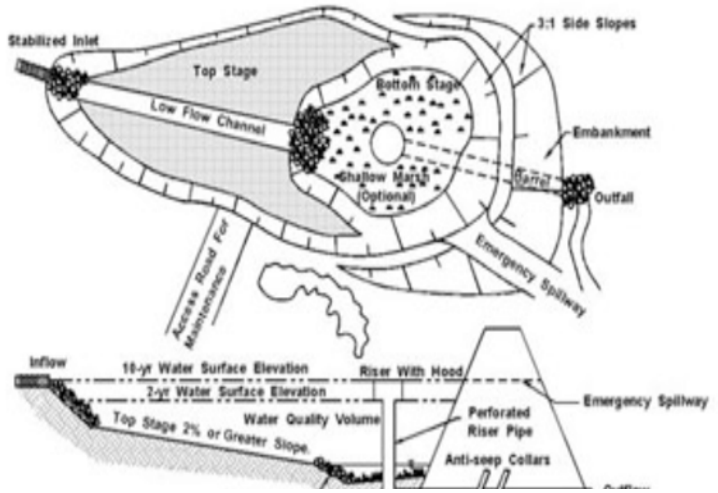
- Used for water quality improvement, groundwater recharge, flood protection, aesthetic improvement or any combination of these
- Artificial lake with vegetation around the perimeter, and includes a permanent pool of water in its design
- These structures are often designed to blend into neighborhoods and viewed as an amenity

**Detention Basin**

- Functions by allowing large flows of water to enter but limits the outflow by having a small opening at the lowest point of the structure
- Typically built during the construction of development projects including residential subdivisions or shopping centers
- The ponds help manage the excess runoff generated by newly constructed impervious surfaces such as roads, parking lots and rooftops
- Extended dry detention basin

**Overflow/Bypass Channels**

- A region of land or a man-made structure that is designed to convey excess flood waters from a river or stream in order to reduce the risk of flooding on the river near a city
- When not being used to convey water, flood bypasses are sometimes used for agricultural or environmental purposes
- The land is often owned by a public authority and then leased to farmers or ranchers, who in turn plant crops or herd livestock that feed off the flood plain




### Constructed Wetlands

- Because wetlands are heavily vegetated, they serve as a natural filter for urban runoff
- They also help to slow the flow of water to the receiving waters and replenish groundwater
- Constructed wetlands have many advantages as an urban BMP, including pollutant removal, longevity, adaptability, and wildlife potential

### Check Dam

- Small dam, temporary or permanent, built across a minor channel, swale, bioswale, or drainage ditch
- Reduces erosion and gullying in the channel and allow sediments and pollutants to settle. They also lower the speed of water flow during storm events. Check dams can be built with logs, stone, or sandbags

### Floodgates

- Adjustable gates used to control water flow in flood barriers, reservoir, river, stream, or levee systems
- In the case of flood bypass systems, floodgates are used to lower the water levels in a main river or canal channels by allowing more water to flow into a flood bypass or detention basin when the main river or canal is approaching a flood stage

## DESIGN IMPLICATIONS

- Basins can serve as multi-programmatic features providing recreational, environmental, and aesthetic interest
- Overlfow/Bypass channels provide an environmental benefit and an opportunity for an interactive water experience
- Constructed wetlands serve as an urban respite in developed areas
- Check dams can create connectivity between opposite sides of a water course.
- Floodgates can be decorated to emphasize a place's sociocultural character

# Arroyo Chico Multi-Use Project

TUCSON, ARIZONA

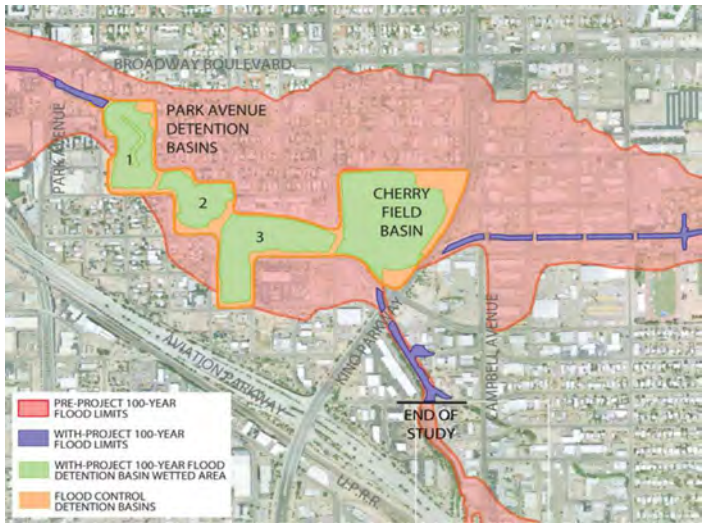
A Multi-phase flood control, environmental restoration and recreation project. The Arroyo Chico and its tributaries drain a 11.4 square mile watershed which is fully developed and contains a mix of residential, commercial and industrial areas.

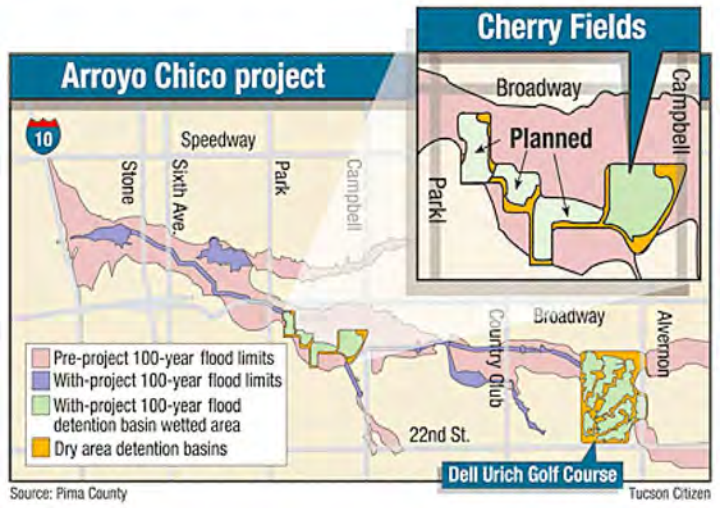
The capacities of the open channel/culvert sections are generally inadequate to convey the peak flows caused by intense thunderstorm events, resulting in frequent and severe flooding of residential, commercial and industrial areas along the entire length of the arroyo.

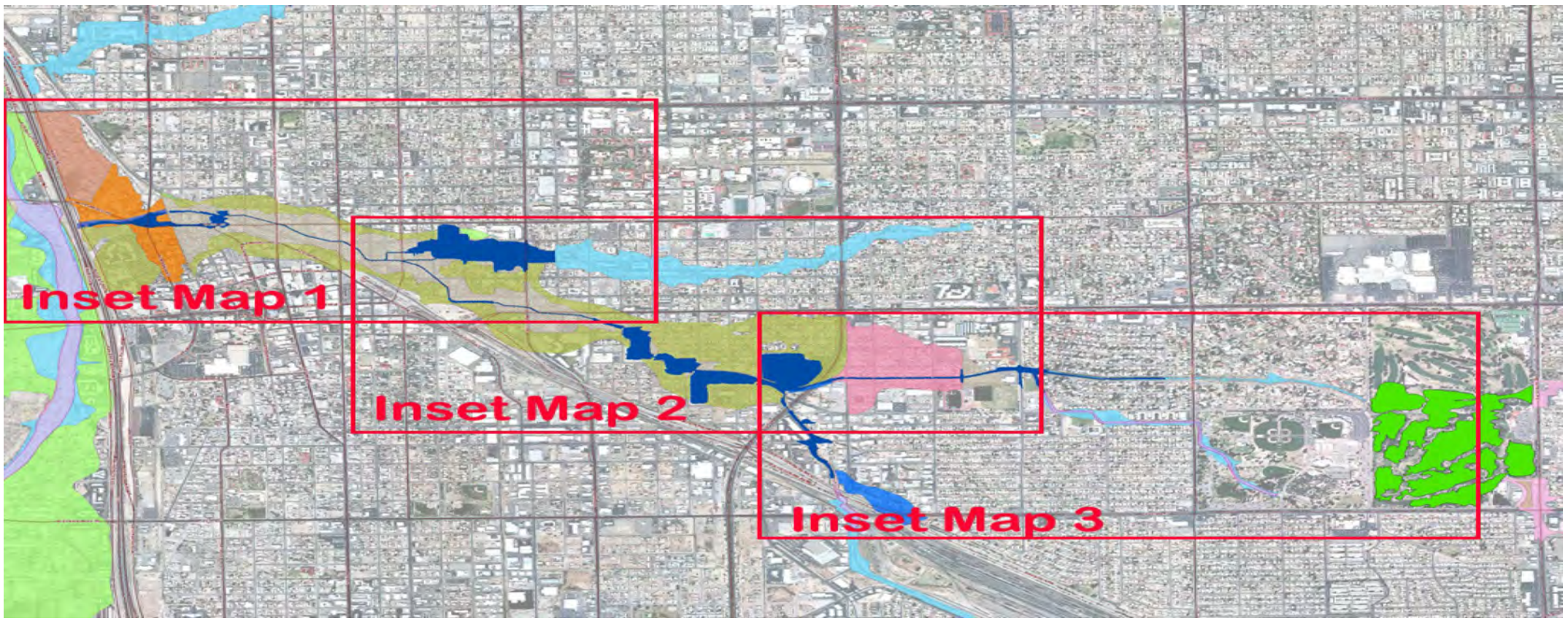
This project controls flood waters while providing a series of other benefits and amenities for the community.

## DESIGN IMPLICATIONS

- A strong connection should exist between the water course and its natural flood plain with limited or no residential, commercial and industrial structures
- Controlled transit of water movement in urban areas based on a network of culverts, floodways, and basins eliminates downstream flooding and repairs degraded environments
- Detention basins can be designed as multi-use programmatic elements such as recreation fields and natural preserves





Inset Map 1
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# Qunli Stormwater Park

CHINA

### Wetlands Problem

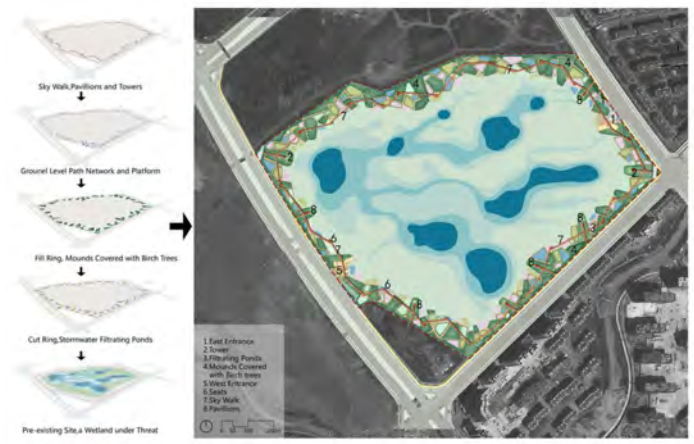
Contemporary cities are not resilient when faced with inundations of surface water, and wetlands in cities are quickly diminishing. Architecture can play a key role in addressing this problem. This project demonstrates a stormwater park that acts as a green sponge, cleansing and storing urban stormwater, and it can be integrated with other ecosystem services including the protection of native habitats, aquifer recharge, recreational use, and aesthetic experience, in all these ways fostering urban development.

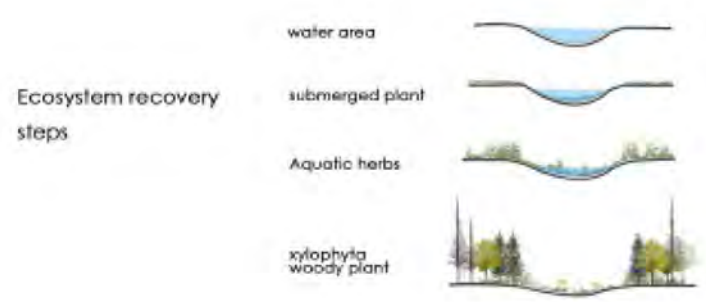
### A Green Sponge for a Water-Resilient City

Going beyond the original task of preserving the wetland, the landscape architect proposed to transform the area into an urban stormwater park that will provide multiple ecosystems services, and will collect, cleanse, and store stormwater and infiltrate it into the aquifer, protect and recover the native habitats, provide a public space for recreational use and an aesthetic experience, as well as foster urban development.

### DESIGN IMPLICATIONS

The completely transformed site performs many functions, including collecting, cleansing, and storing stormwater, and recharging underground aquifers. The pre-existing wetland habitat has been restored and native biodiversity preserved. This is a good example for designers. This park is not only a popular urban amenity, but has also been upgraded to a National Urban Wetland Park because of its improvement to ecological and biological conditions.




# Qian'an Sanlihe River Ecological Corridor

CHINA

In this modern city, the river has become badly polluted by sewage and waste products resulting from the continuous industrial development and urban population growth. With the depletion of regional water sources, some rivers saw a significant decline in water quality. The Sanlihe River in particular became dried up with its channel blocked by waste. The life source of the city became festered with sores of the urban body, and the hearts of local residents aches for its conditions.

The landscape architect proposed to transform the area into an urban stormwater park that will provide multiple ecosystems services, and will collect, cleanse, and store stormwater and infiltrate it into the aquifer, protect and recover the native habitats, provide a public space for recreational use and aesthetics experience.

## DESIGN IMPLICATIONS

The concrete river bank is the result of industrial development. People can calculate the speed or quantity of the water.

Therefore, the bank becomes a container.

- Separate dirty water; just let clean water and rain water come into the river
- Change the concrete river bank to a rock river bank
- Local aquatic plants can grow and develop by themselves annually

# WILDLIFE

## CASE STUDIES
## LITERATURE REVIEW

# Urban Wildlife

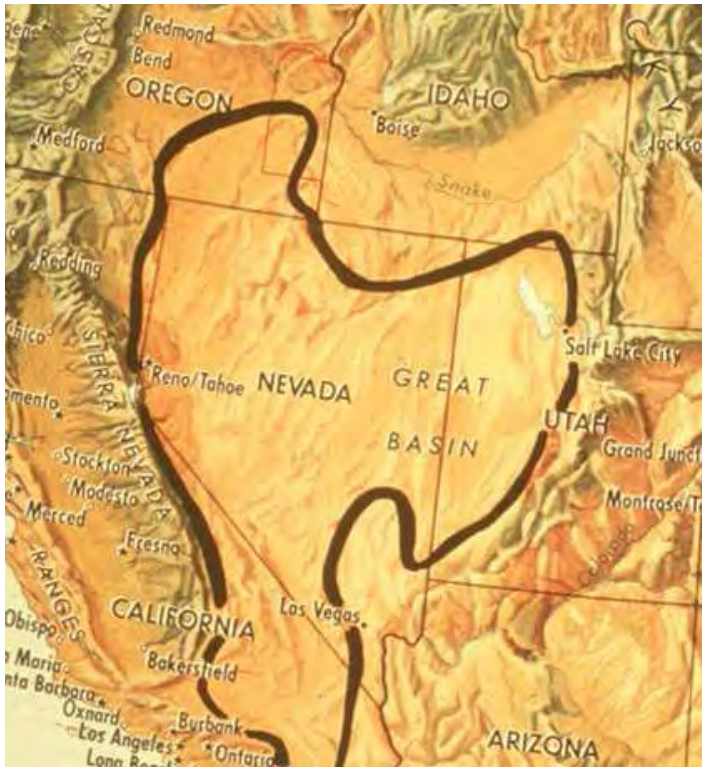
Extensive research has been done on the impacts of urbanization on native avifauna in a wide range of habitats. Increasing evidence shows that the impacts of urban development on avian diversity depends on four main factors:

1. Landscape context
2. Surrounding human population
3. Scale of examination
4. Gradients present

Loss of habitat is the primary cause of reduced bird diversity in urban environments. The loss of vegetation leads to limited nesting and foraging habitats. Reduced native predators may slightly reduce loss of avian population in urban environments.

In arid regions increase in urbanization could also mean an increase in overall vegetation in terms of abundance and structure. Studies have shown that in arid environments, the presence of native vegetation in areas of urbanization, as well as the maintenance of natural riparian areas help maintain high native avian richness.

The information provided stresses the importance of riparian zones as prime habitat for birds. The influences of roads and major pathways also informs us that circulation routes and the edges of built environments can serve as avian habitat. Green roofs and small parks or community gardens also attract wildlife to the city, where the planted diversity of vegetation, increases bird species and abundance.





## DESIGN IMPLICATIONS

Native plant species promotes native wildlife.

- Increase vegetation along circulation routes along major walkways to increase bird nesting sites.
- Introduce green roofs to increase the amount of overall vegetation abundance and species on site.
- Provide areas of restoration and preservation to act as bird sanctuaries as well as prime bird-watching areas.
- Extend and connect current bird habitats to increase the number of patches in the site to increase habitat options for birds.
- Include aesthetically pleasing areas for viewing of wildlife, as an economic leverage to help further preserve disturbed areas as well as supporting the bird tourism industry.

# Sweetwater Wetlands

TUCSON, ARIZONA

The Sweetwater Wetlands is a water treatment facility, that also serves as an urban wildlife habitat, and an outdoor classroom located in the western portion of Tucson..

- The water treatment facility is one of the most important facets of the City's Reclaimed Water System. This reclaimed wastewater is recovered by extraction wells during periods of high water demand and distributed for reuse in Tucson's golf courses, parks, schools and other large turf irrigation areas.
- As an urban wildlife habitat, the Sweetwater Wetlands is a tranquil park where visitors can view native wildlife in an urban setting. This water-rich stream side riparian zone supports a huge variety of wildlife
- As an outdoor classroom, the Sweetwater Wetlands provide an environmental educational experience in a natural laboratory setting for teaching ecology and water resource management. The wetlands helps establish and enhance the wildlife population in harmony with Tucson's urban environment.

## DESIGN IMPLICATIONS

The Sweetwater Wetlands are crucial for providing reclaimed wastewater for many places within Tucson, but it is also crucial for preserving a very rare environment within the Sonoran Desert. Education is also a key component within this park, as this park provides many environmental variables within the park that can be researched and observed.

- The park demonstrates how a wastewater treatment facility and a preserved wetland habitat can successfully coexist within an urban setting.
- The park also demonstrates how an existing wetland habitat can be used simultaneously for recreation and for education purposes with minimal conflict.


# Wetlands Park

LAS VEGAS, NEVADA


The Wetlands Park and Preserve is a 130- acre park located within Las Vegas and boasts two miles of walking trails, as well as graveled secondary trails that are ADA compliant. The Wetlands Park is popular among hikers, bicyclists, and bird watchers, and also provide equestrian trails.

- The Nature Center includes a 35,000 square-foot interpretive center for visitors and a shaded entry plaza, boardwalks and viewing platforms
- A new interpretive center and classrooms are also currently under construction
- Trail heads provide arrival points to the Park and signage to assist Park orientation

The Nature Preserve is the first step in implementing a larger plan for the Clark County Wetlands Park, which will enhance wetlands habitat, restore the larger wetlands environment, and provide recreation and educational opportunities for the Las Vegas area.

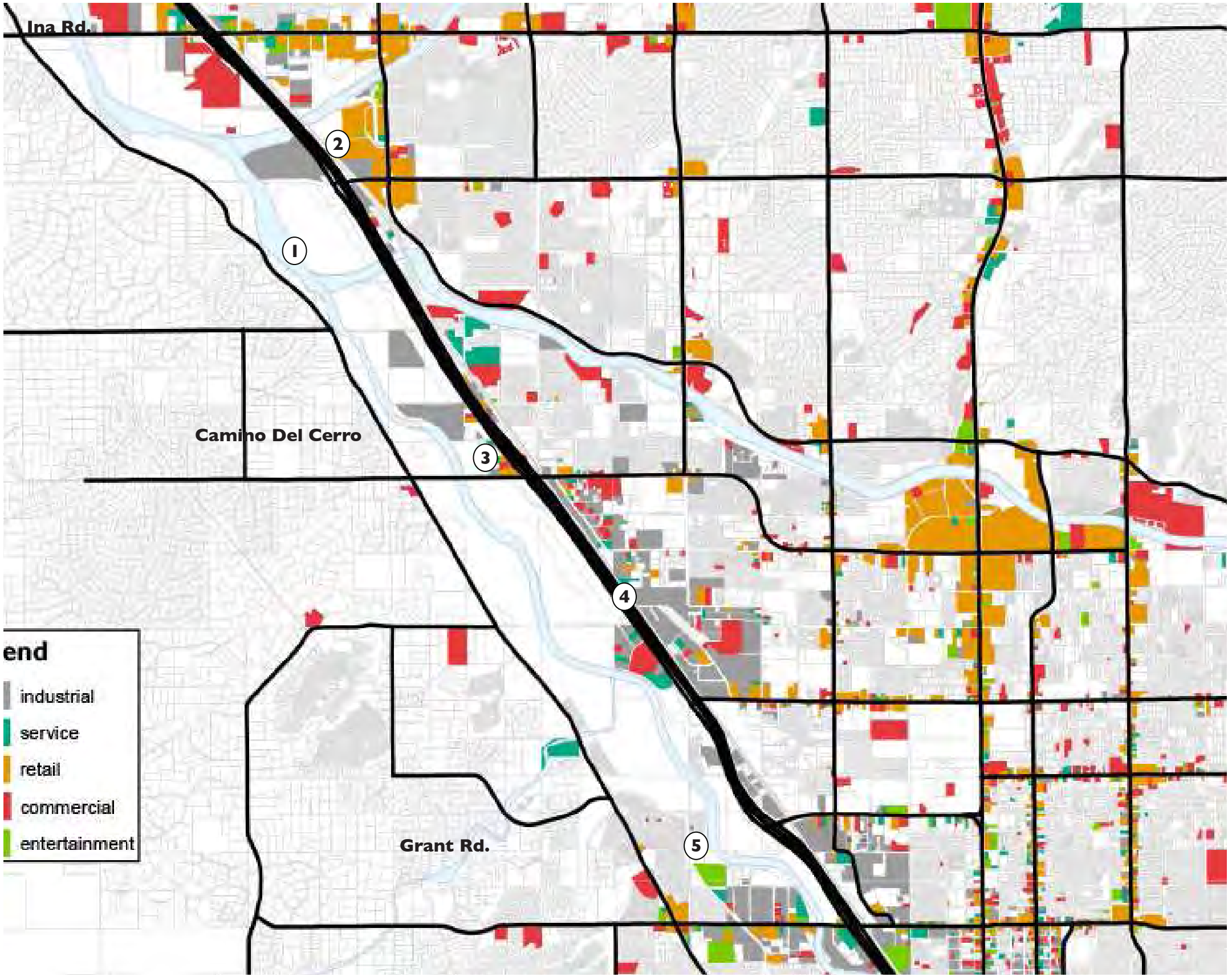
## DESIGN IMPLICATIONS

Besides the obvious recreational benefits that the park provides, it also offers an array of educational benefits for visitors:

- The terrain next to Wetlands Park also makes an excellent outdoor classroom for geology and paleontology
- The Park offers habitat to most of Southern Nevada's wildlife, including threatened or endangered species, and it presents a living laboratory for the study of desert plant communities
- The Visitor and Education Center's program spaces, exhibit hall, auditorium and classrooms support concentrated field study in the Preserve. Here subjects can be examined closely, particularly the benefit wash restoration has on water quality and preserving wildlife

# SITE ANALYSIS

# Land Use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entertainment


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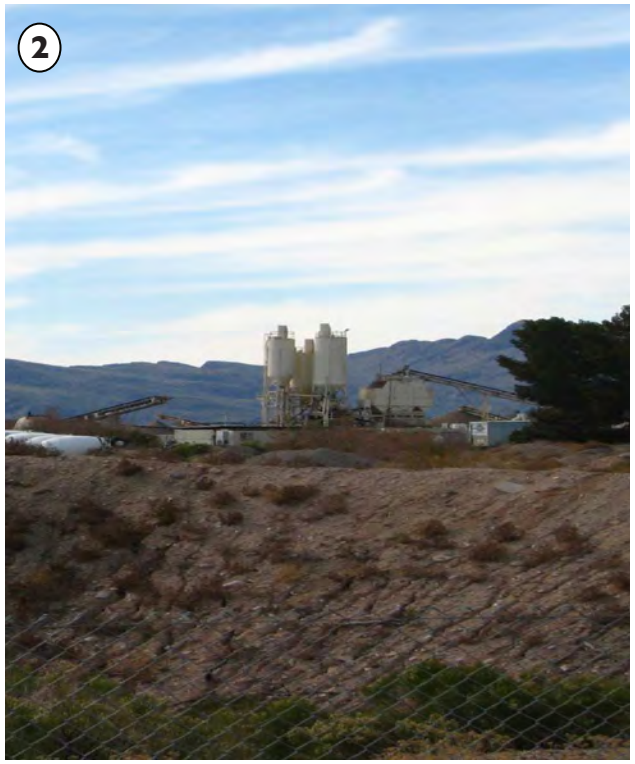
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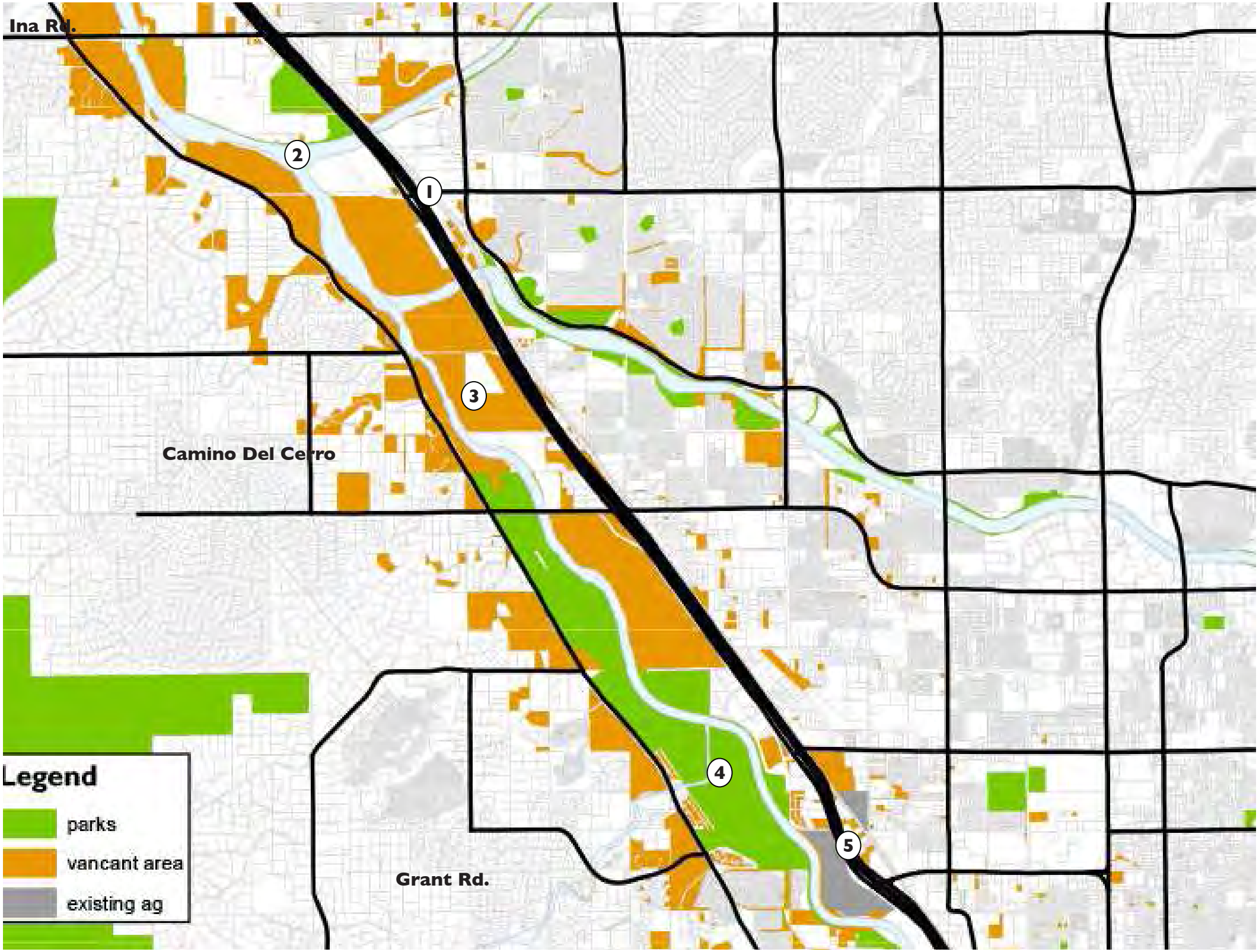
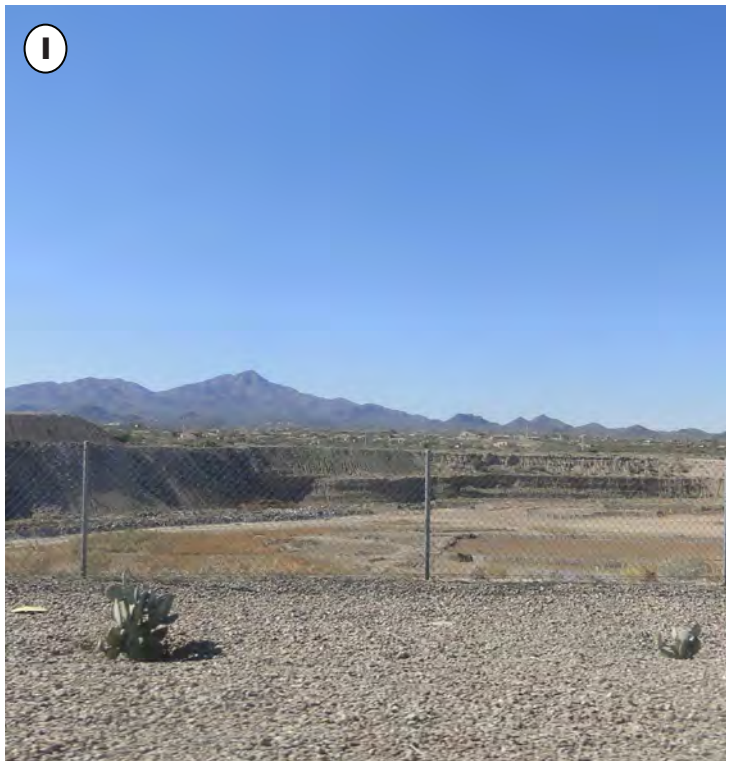
SAFEWAY

# Layout & Open Space




1

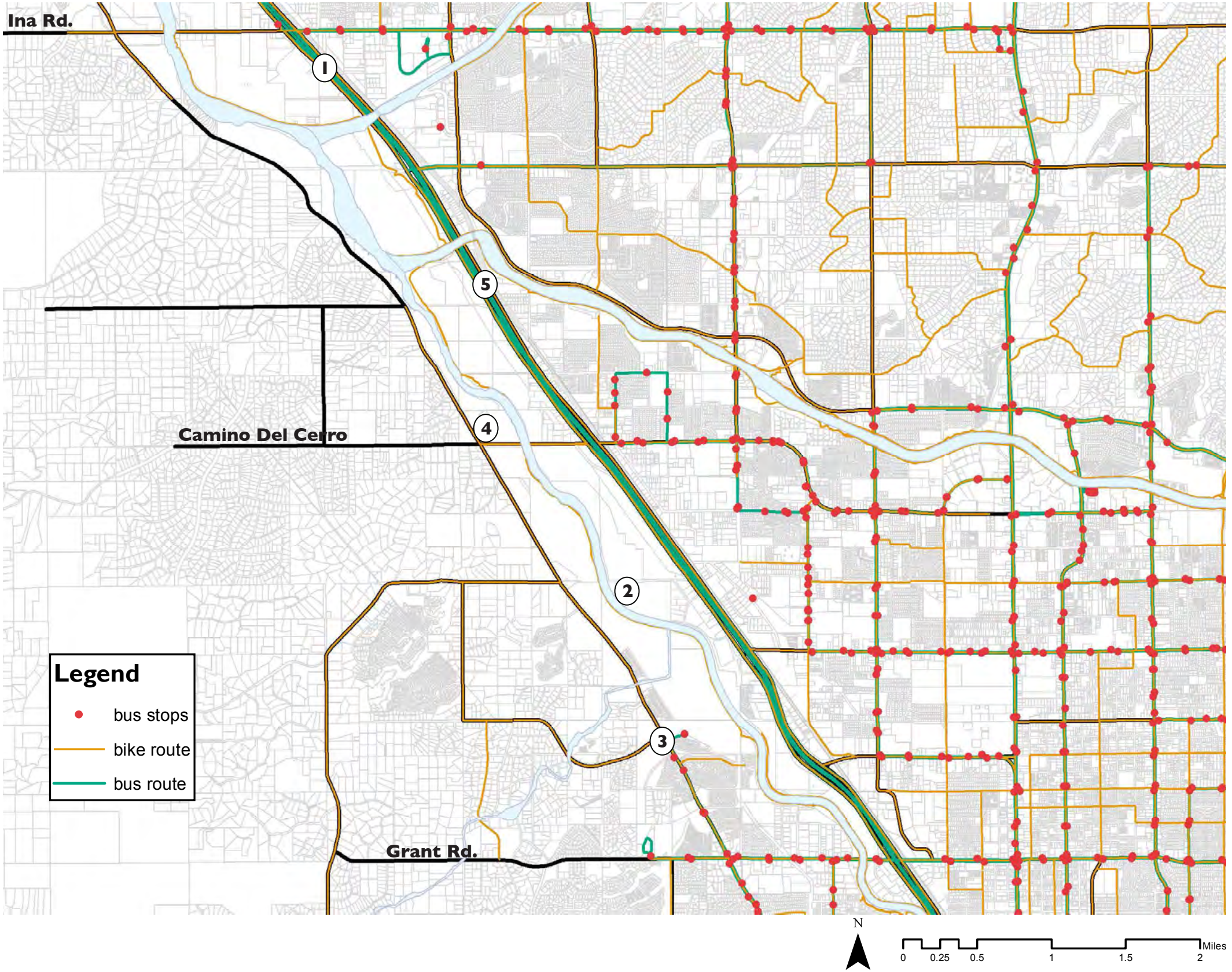

2


3


4


5

# Circulation

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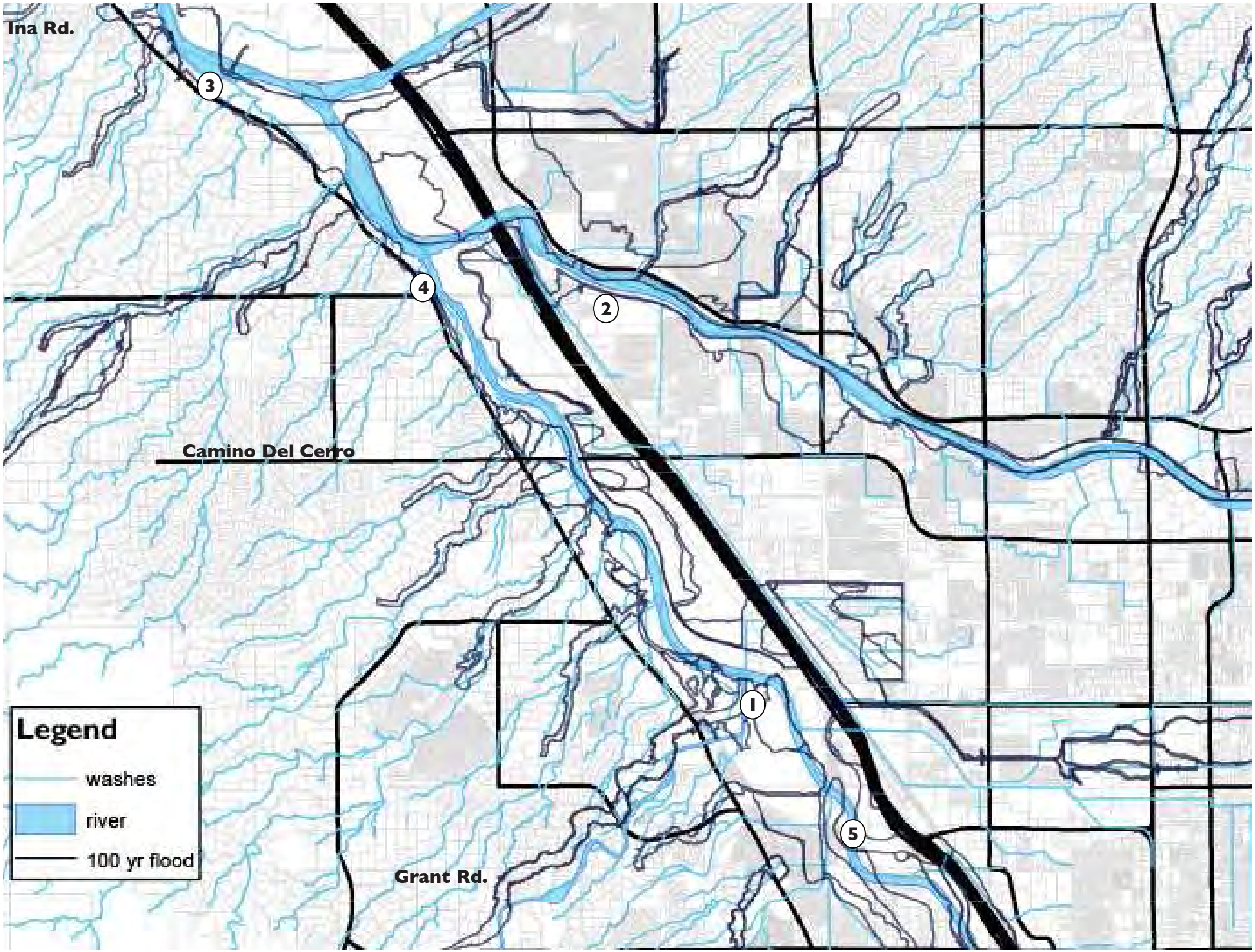
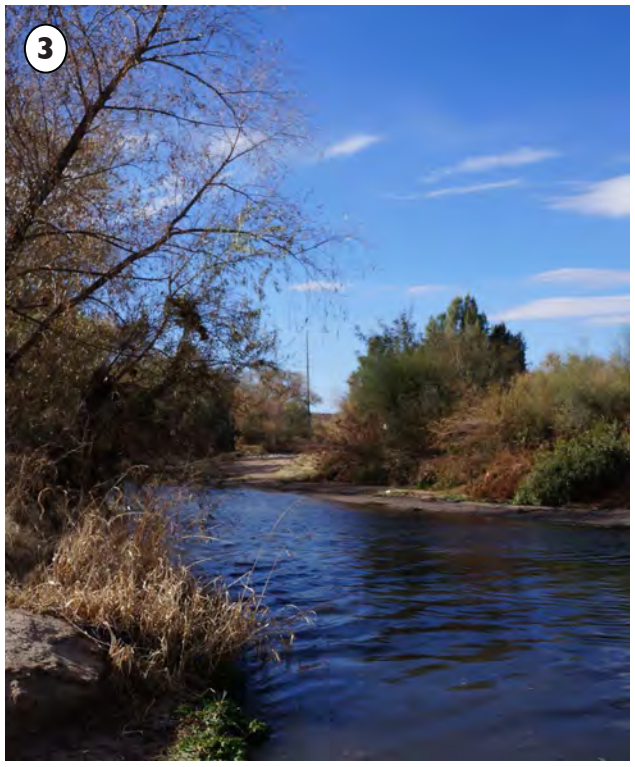
# Water Flow


Ina Rd.
3
4
2
Camino Del Cerro
1
5
Grant Rd.
Legend
washes
river
100 yr flood
N
0
0.25
0.5
1
1.5
2
Miles


1


2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4


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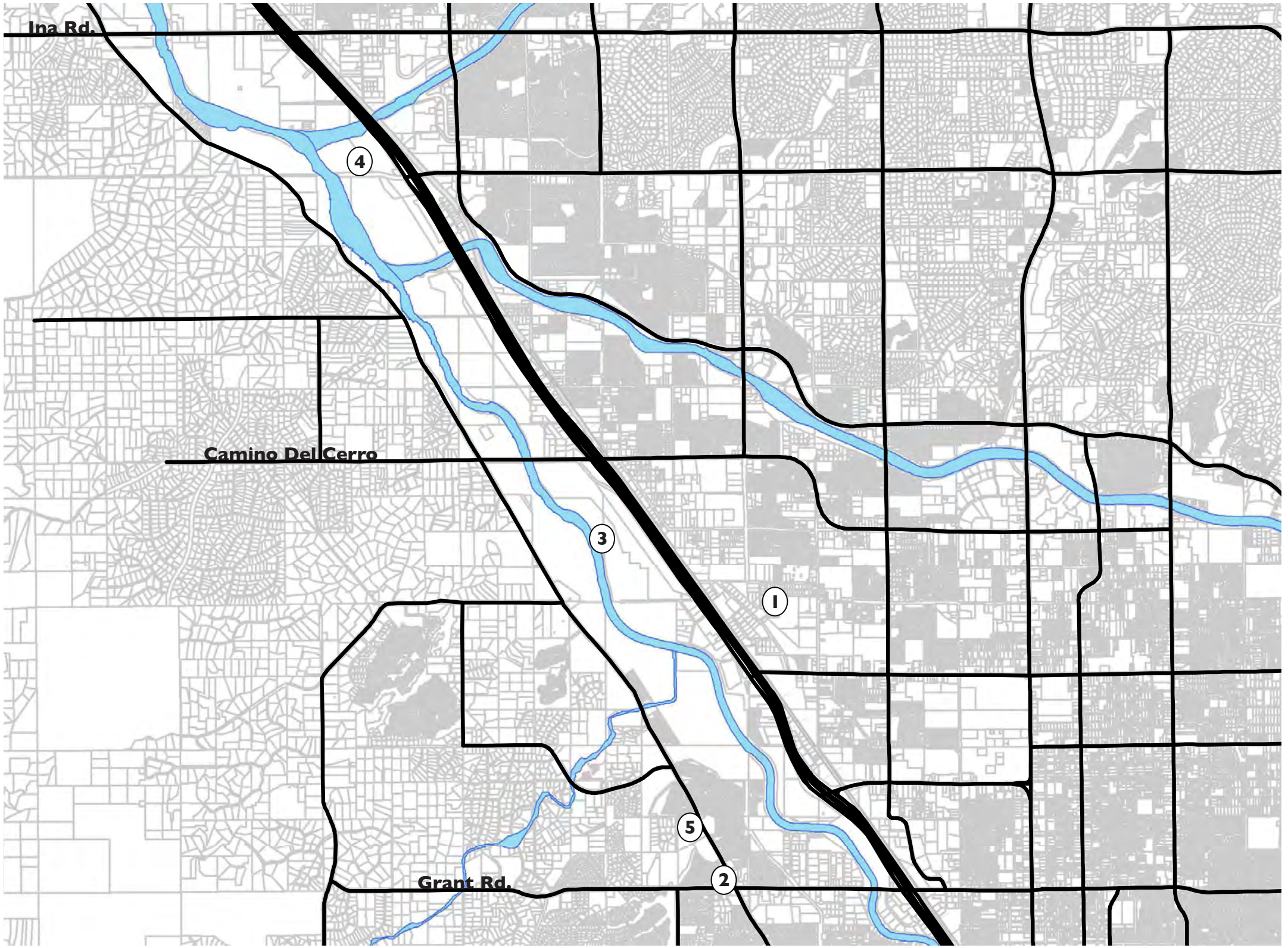
# Building Conditions

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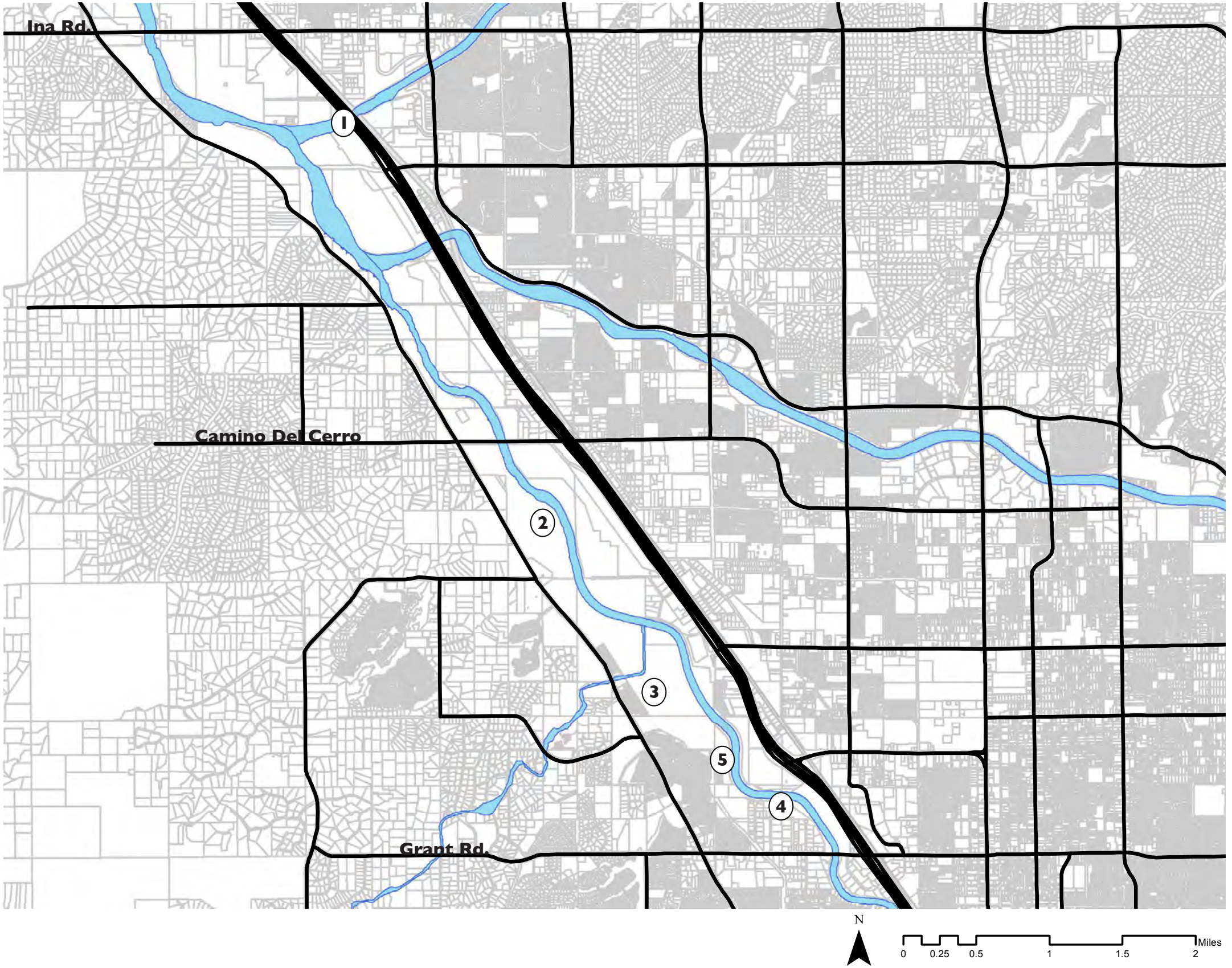
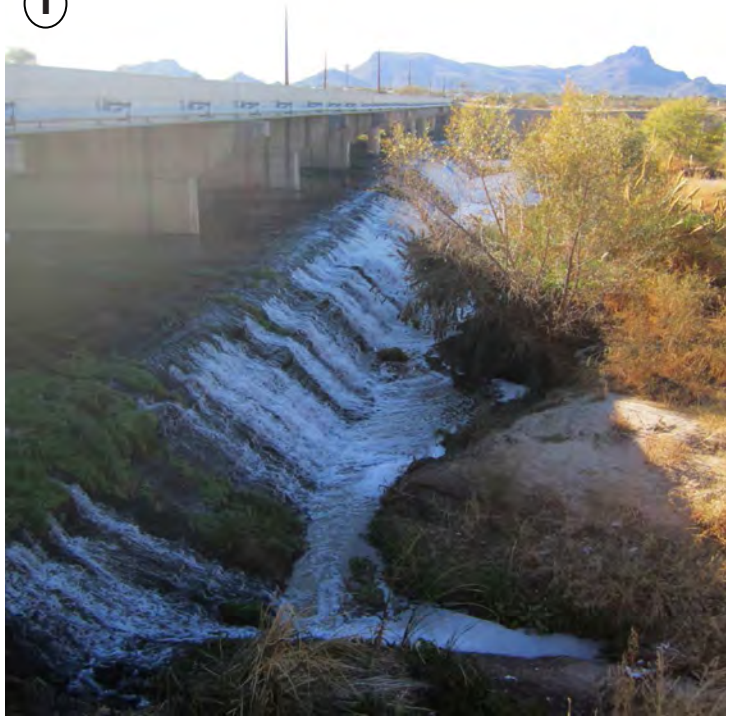
# View Sheds




1

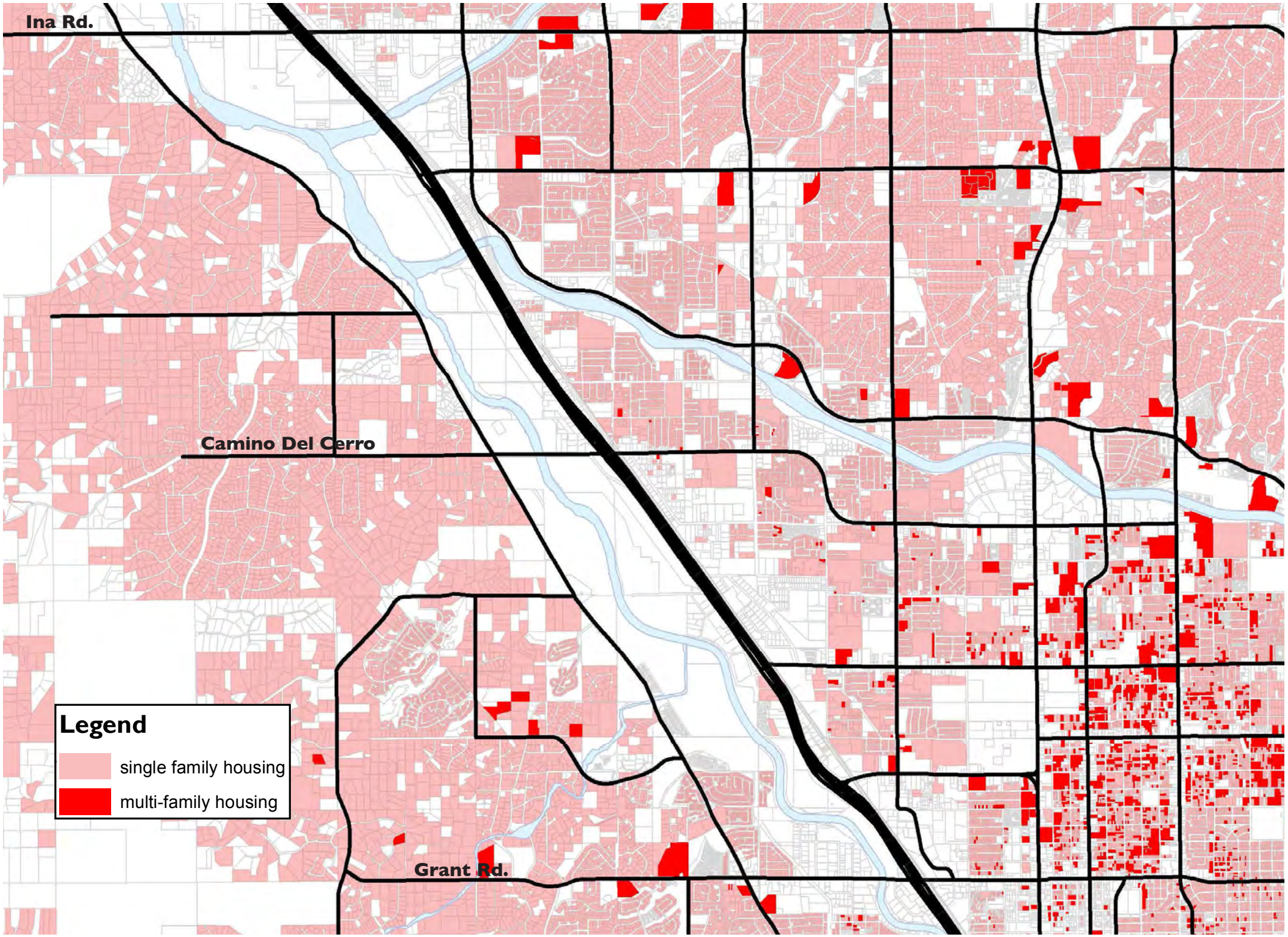

2


3

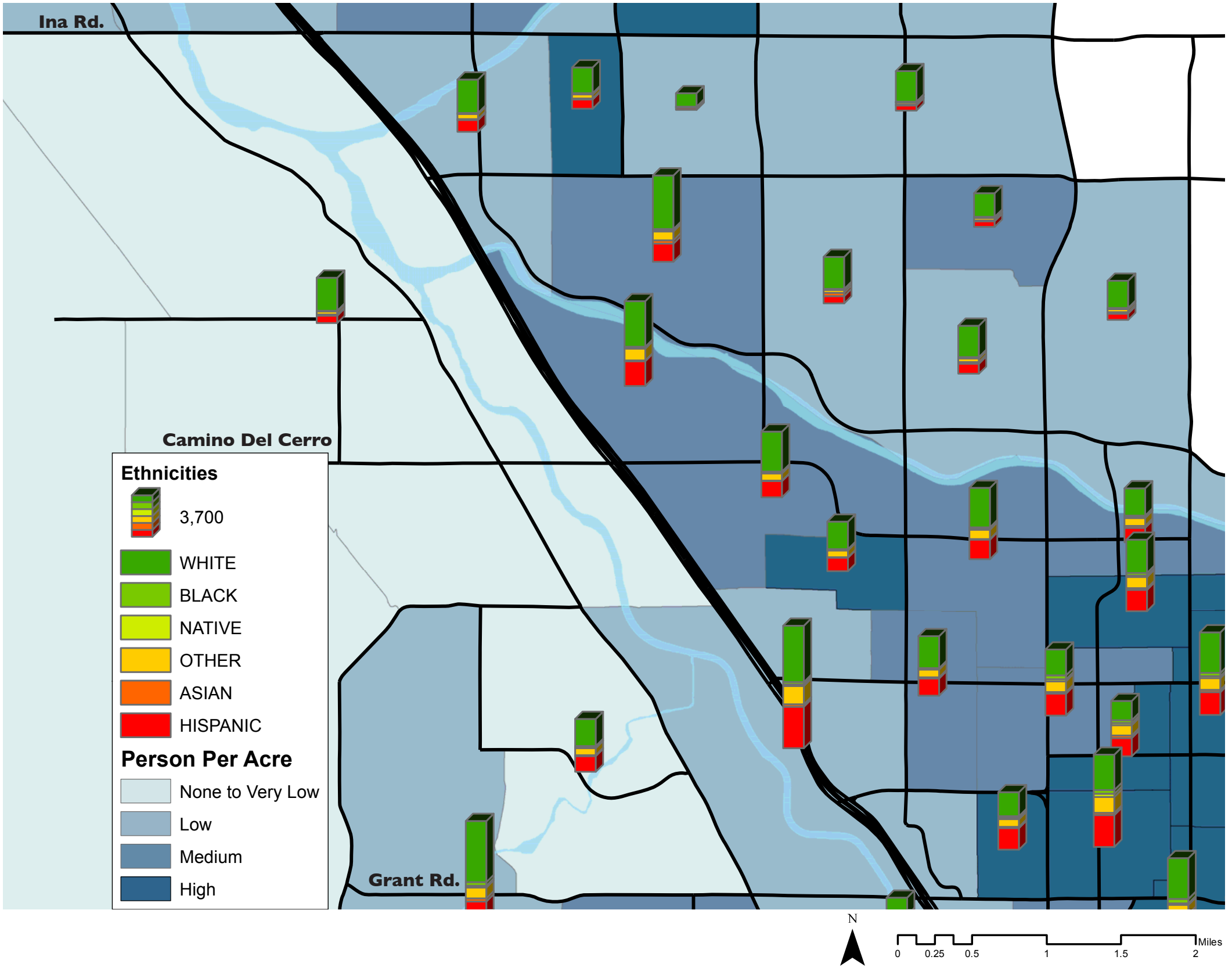

4


5

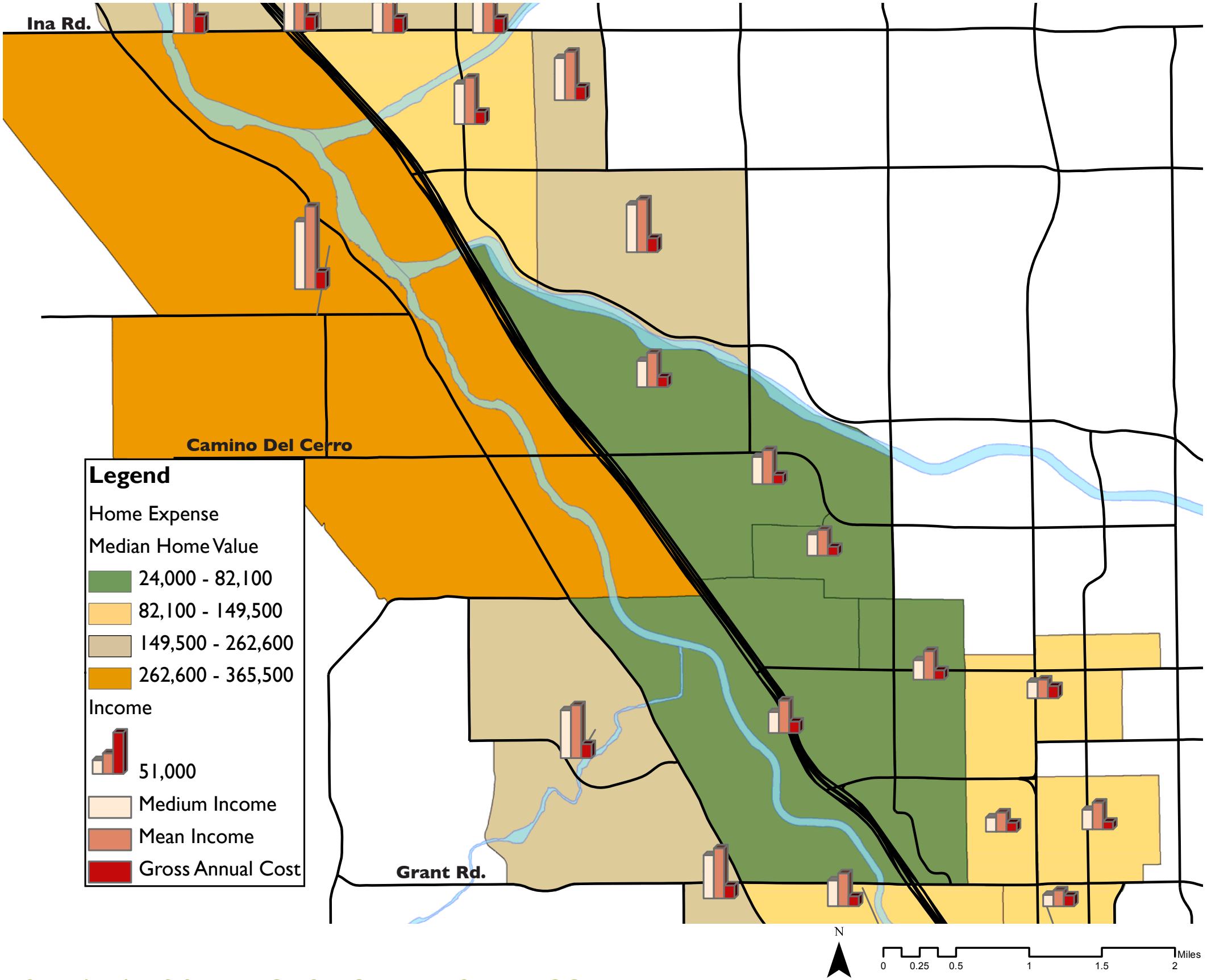
# Residential



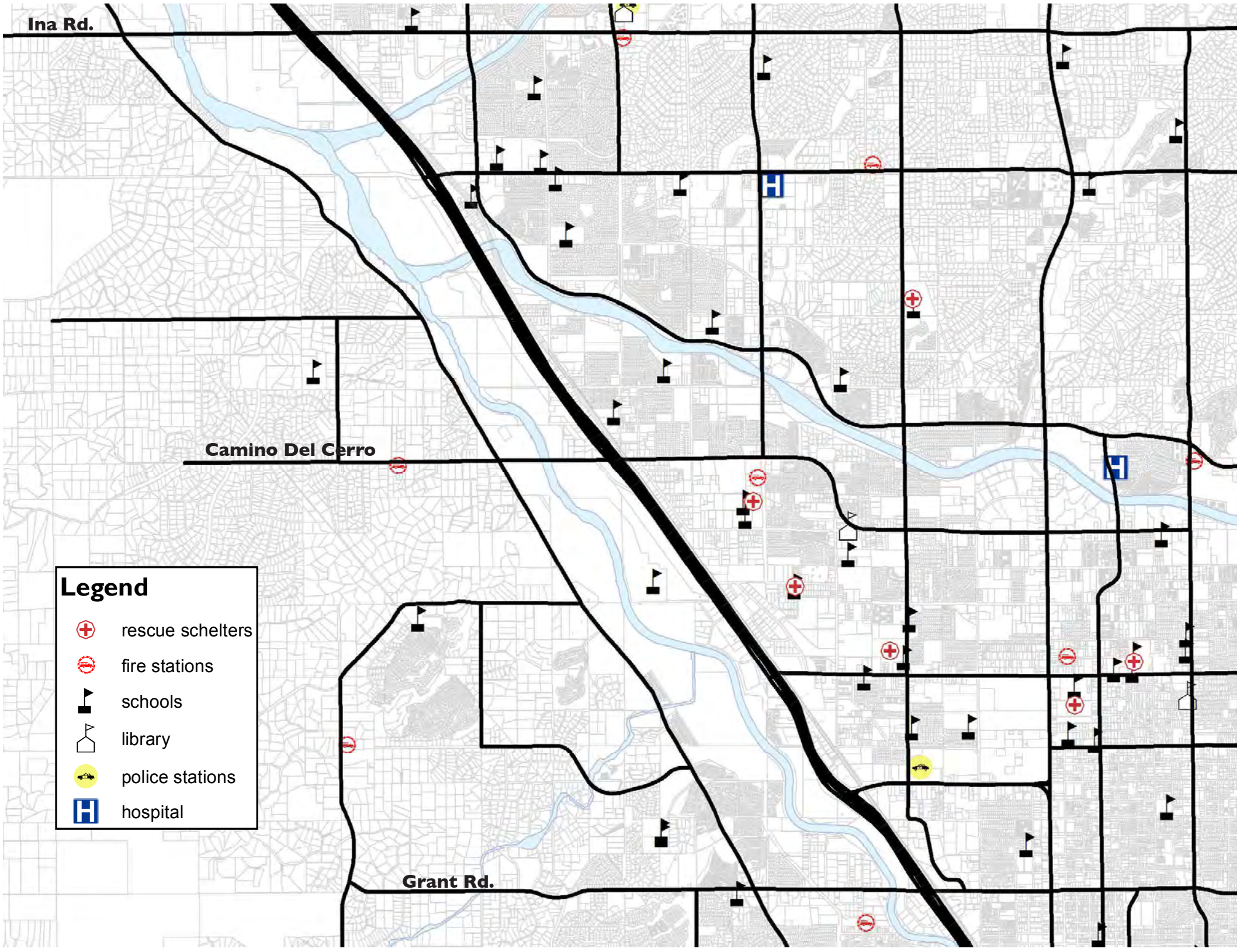
# Density & Ethnicity



# House Expense & Income



# Amenities


Ina Rd.
Camino Del Cerro
Grant Rd.
Legend
rescue schelters
fire stations
schools
library
police stations
hospital
N
0
0.25
0.5
1
1.5
2
Miles

# DESIGN

# El Corazón Master Plan

ECONOMIC

- Attempts to locate employment centers near residences by proposing new mixed use nodal development as well as repurpossing existing buildings into mixed-use development.
- To provide unique opportunities for new light industries along with other businesses to provide cross interests. and walkable employment opportunities
- Use eco-tourism and nature enthusiasts to create employment and bring funds into the site.
- Bring athletes from out of state to reside and train within Tucson near the sports complex.

ENVIRONMENTAL

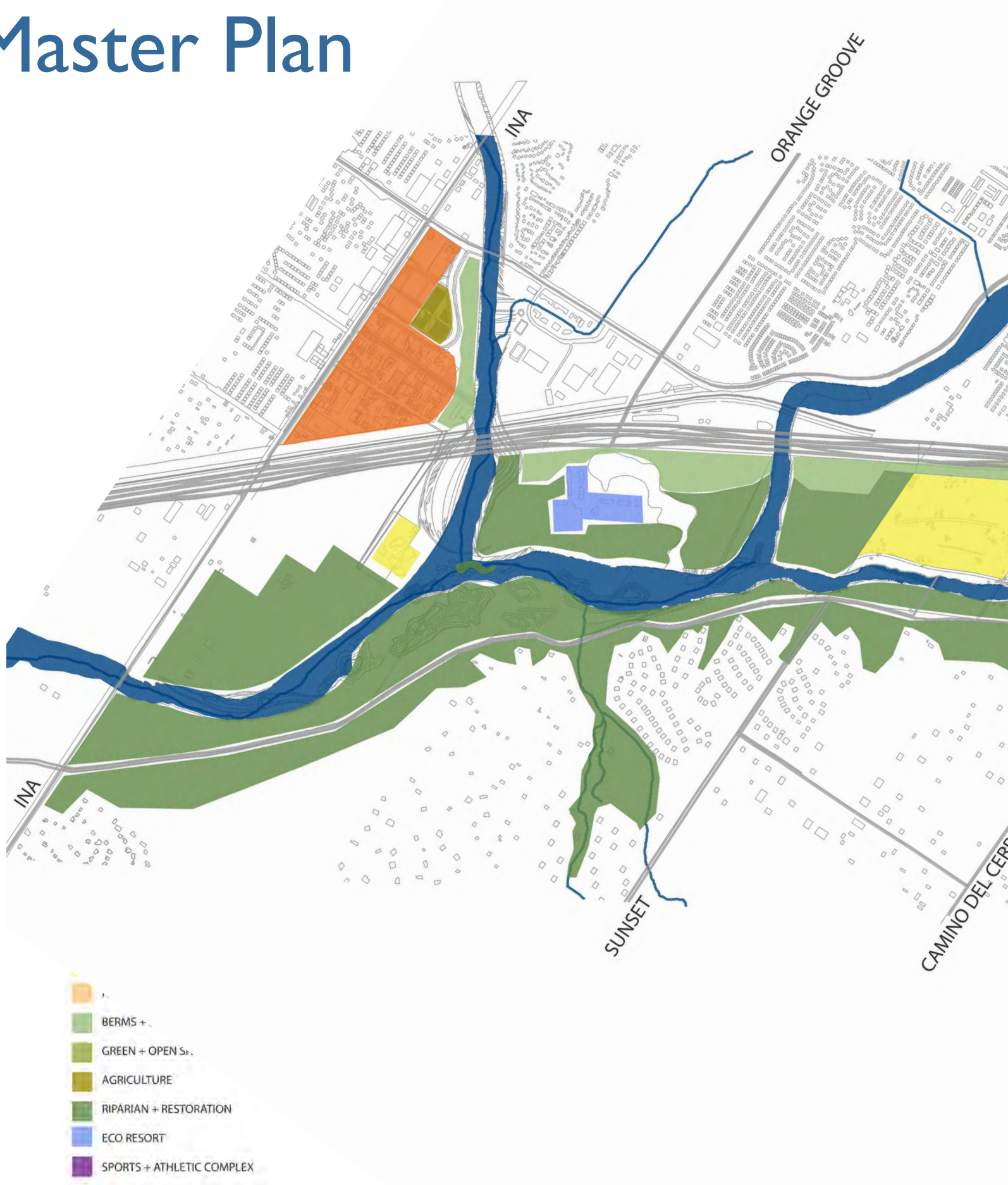
- Attempts to repair the riparian habitats along Silverbell and within the Santa Cruz River.
- Select xeriscape and drought tolerant vegetation to create the greenways and greenroofs.
- Decrease water consumption, and increase grey and rainwater capture for irrigation.
- Re-adaption of Roger Waster Water Treatment Facility into industrial algae farm and research park.

CULTURAL

- Improve street activities and park life.
- Taps into youth and young adult demographics with activities in cycling and active-sports complex.
- Provides inter-disciplinary education center between University of Arizona Agriculture and the existing industries.
- Express existing and historic cultural resources, such as the agricultural canals and archaeological sites.
- Express Tucson as an athletic center by providing access for "extreme" human-powered sports.

FUNCTIONAL

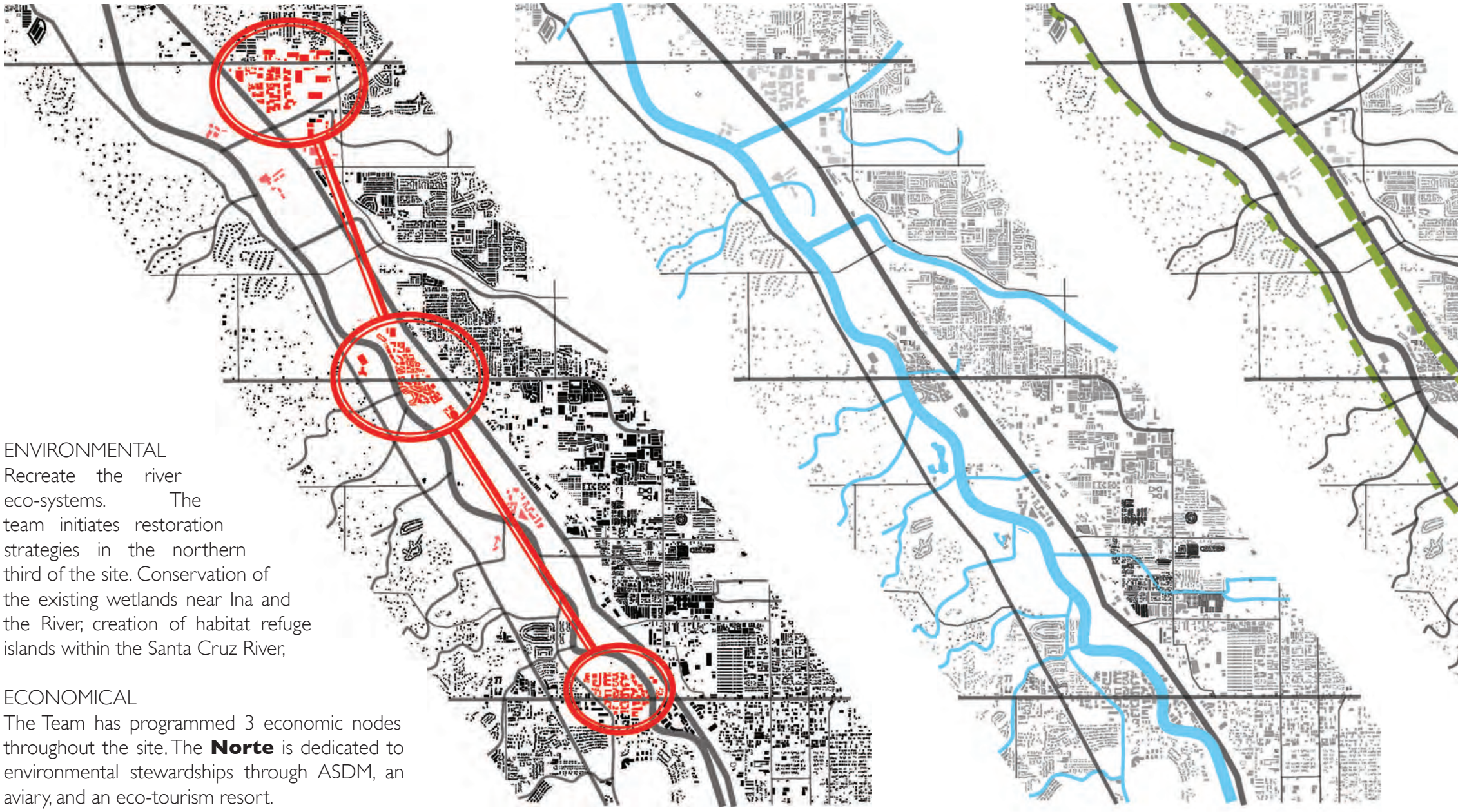
- Streets are dieted. Parking is pushed to access streets and parking structures. Main streets are designed as Greenways with pedestrian and bicycle dominant.
- Street width allows for surface, parallel parking providing "side-friction" to visual cause motor vehicle speed decrease.
- Provide multi-modal priority to decrease automobile reliance and improve walkable, bikable routes, and nodes of interest.
- Nodes of interest provide variability throughout the site by offering varying uses from ecological interests, sports complexes, agricultural fields and farmers markets, and mixed-use communities.




RUTHRAUFF
PRINCE
SWEETWATER
GRANT

# Design Strategies

ORDERING SYSTEMS



ENVIRONMENTAL

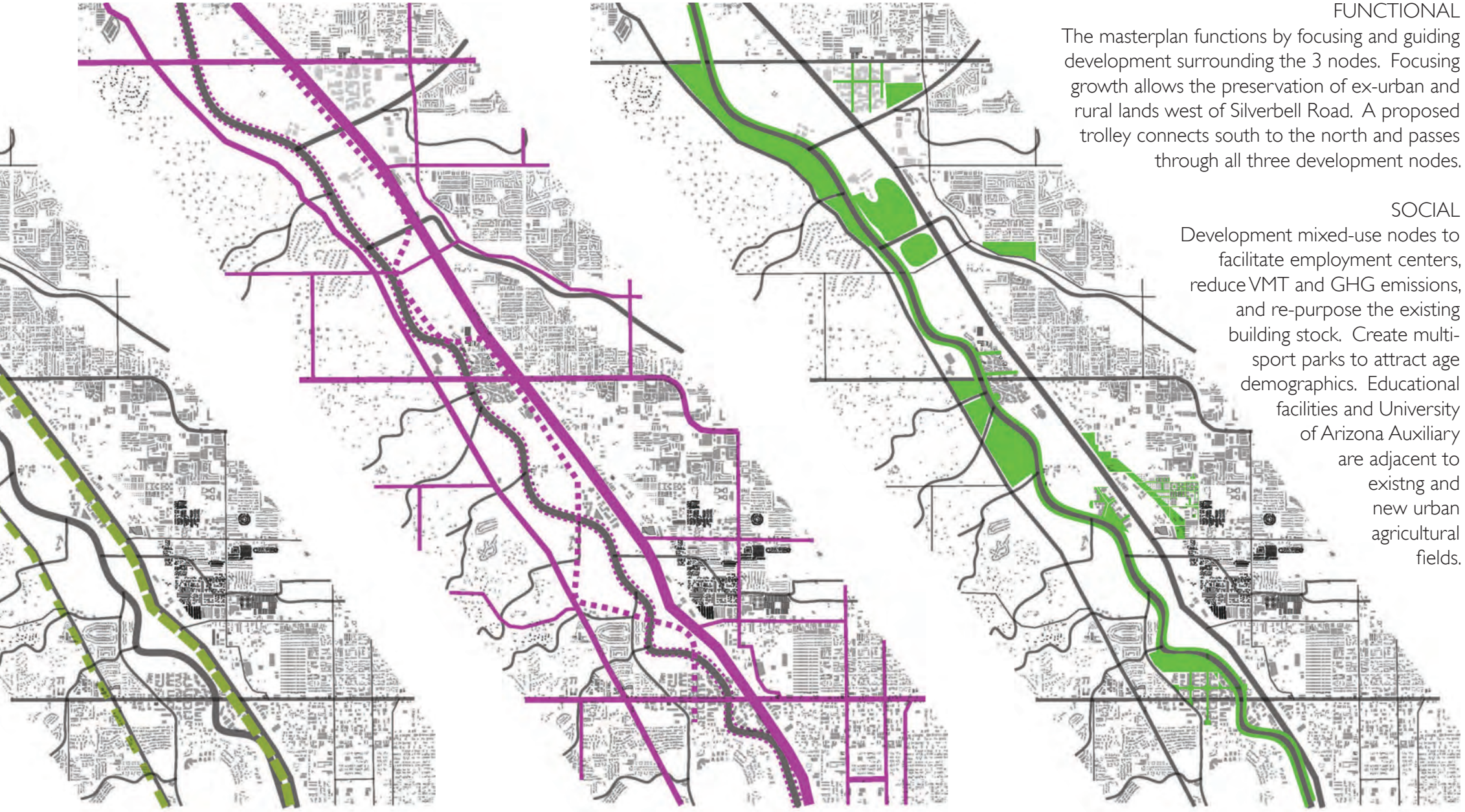
Recreate the river eco-systems. The team initiates restoration strategies in the northern third of the site. Conservation of the existing wetlands near Ina and the River, creation of habitat refuge islands within the Santa Cruz River,

ECONOMICAL

The Team has programmed 3 economic nodes throughout the site. The **Norte** is dedicated to environmental stewardships through ASDM, an aviary, and an eco-tourism resort.

The **Central** node is dedicated to athletics and a sports complete with an athletic village, an outdoor amphitheater integrated along the river edge increasing scenic views, and mixed-use development to provide accessory retail, restaurants, and residences.

The **Sur** increases the existing commercial and retail within the area by integrating residential infill within the commercial districts.

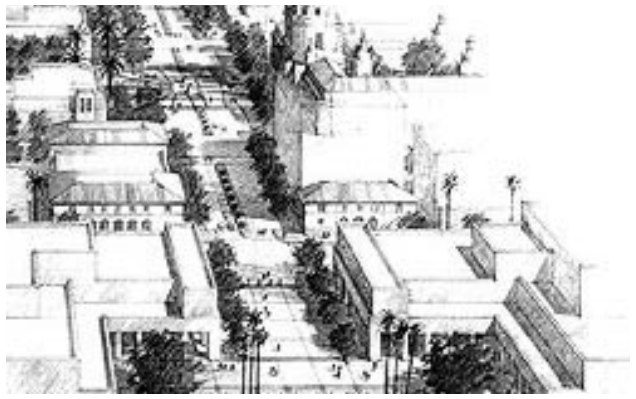


FUNCTIONAL

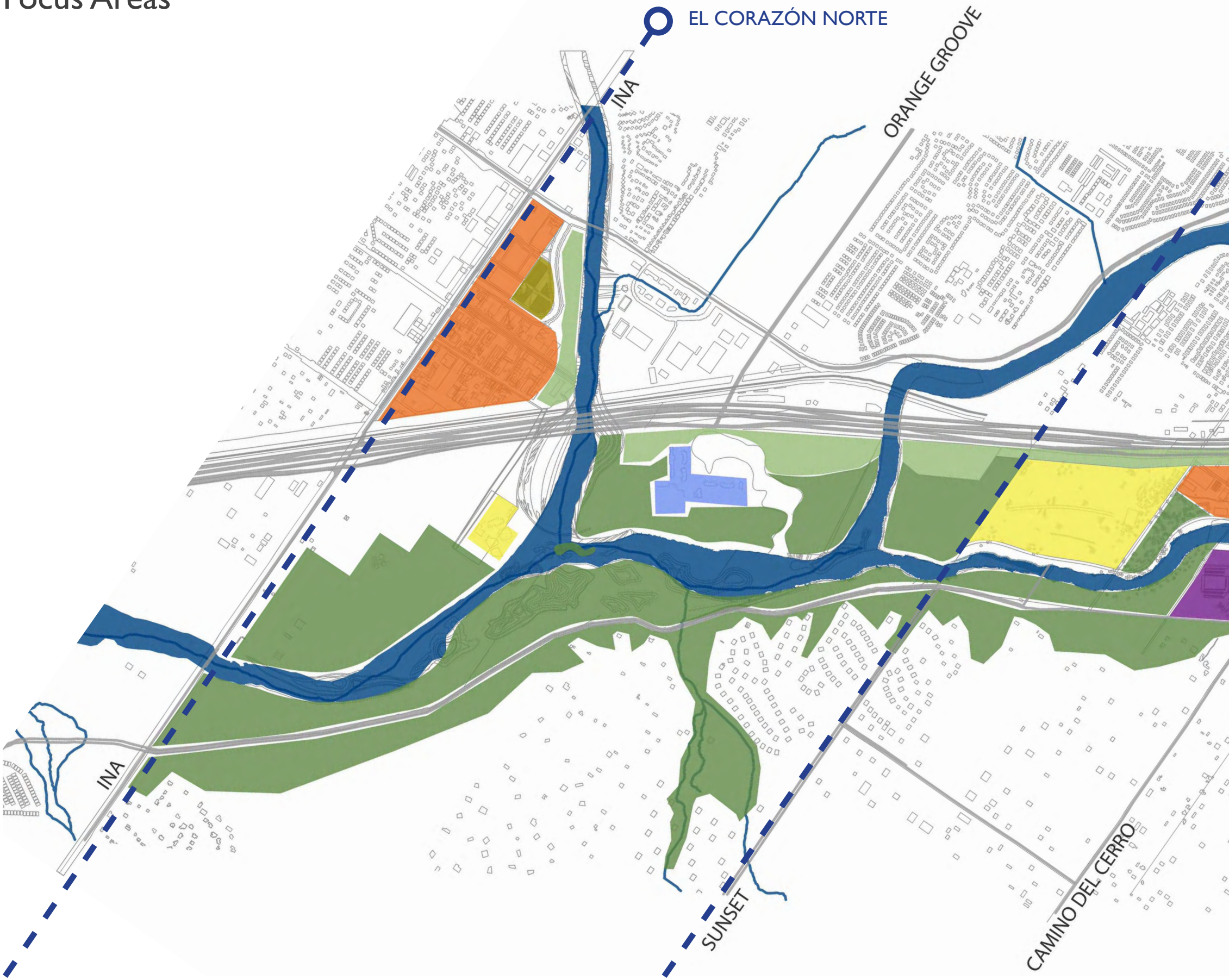
The masterplan functions by focusing and guiding development surrounding the 3 nodes. Focusing growth allows the preservation of ex-urban and rural lands west of Silverbell Road. A proposed trolley connects south to the north and passes through all three development nodes.

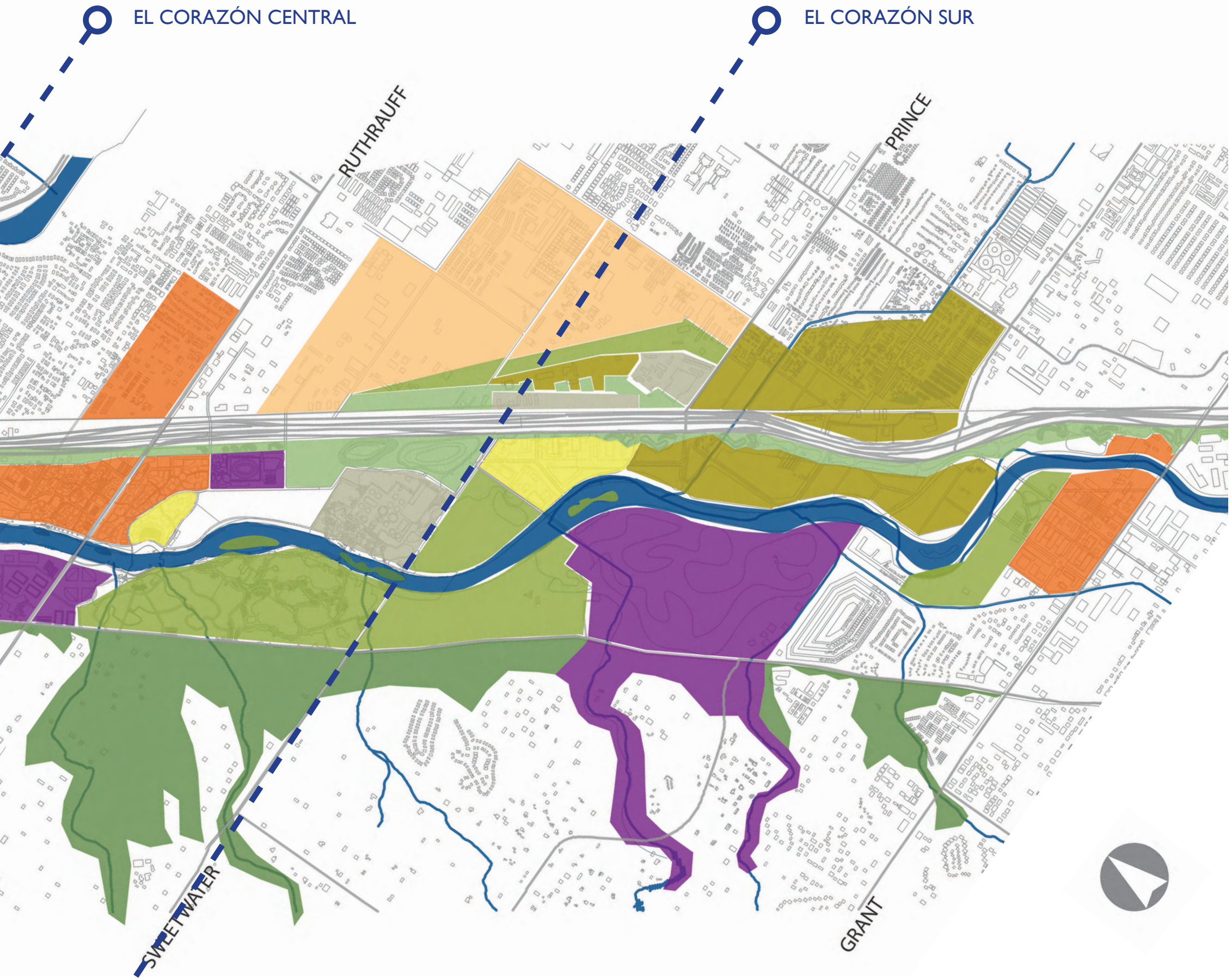
SOCIAL

Development mixed-use nodes to facilitate employment centers, reduce VMT and GHG emissions, and re-purpose the existing building stock. Create multi-sport parks to attract age demographics. Educational facilities and University of Arizona Auxiliary are adjacent to existng and new urban agricultural fields.

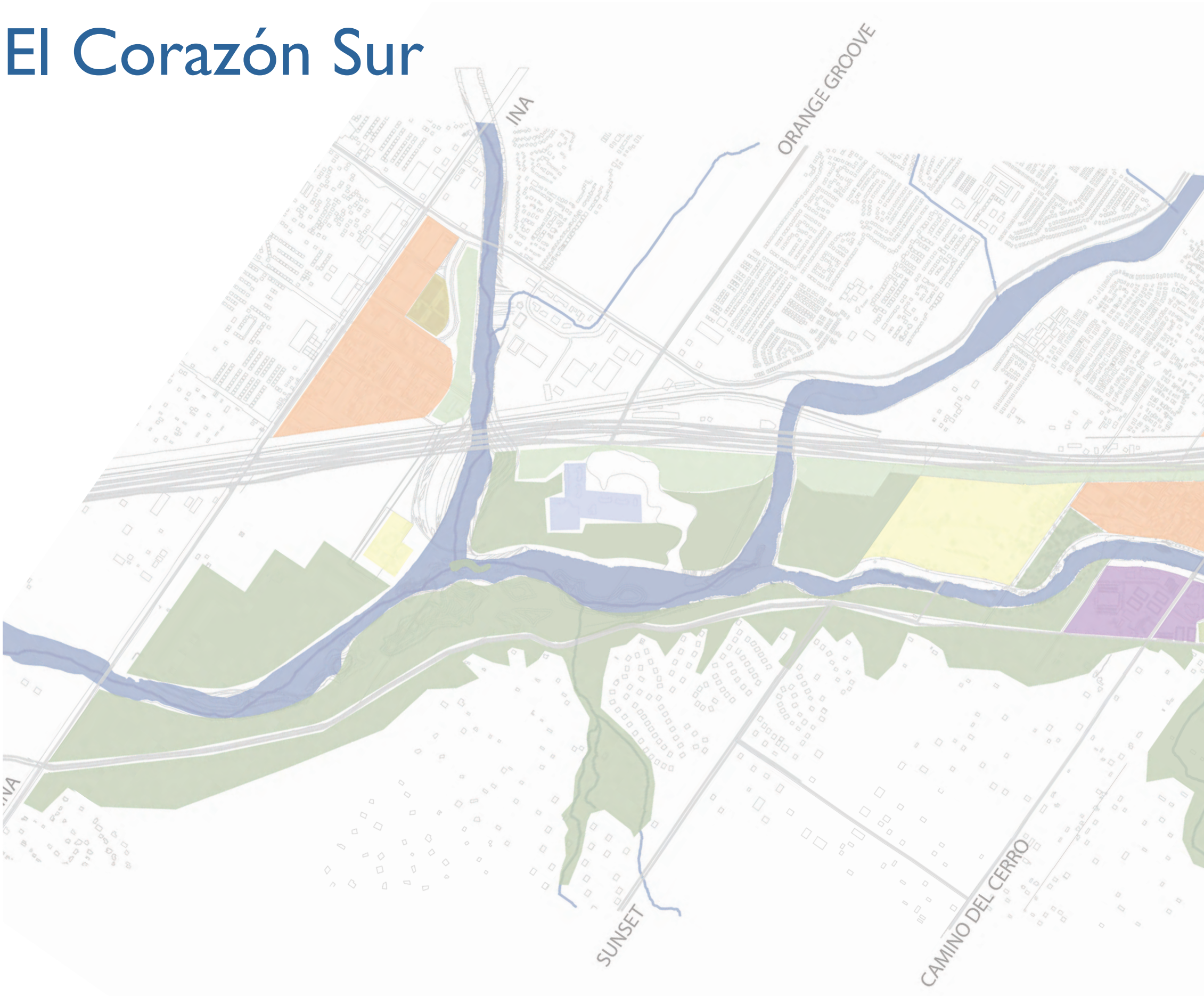


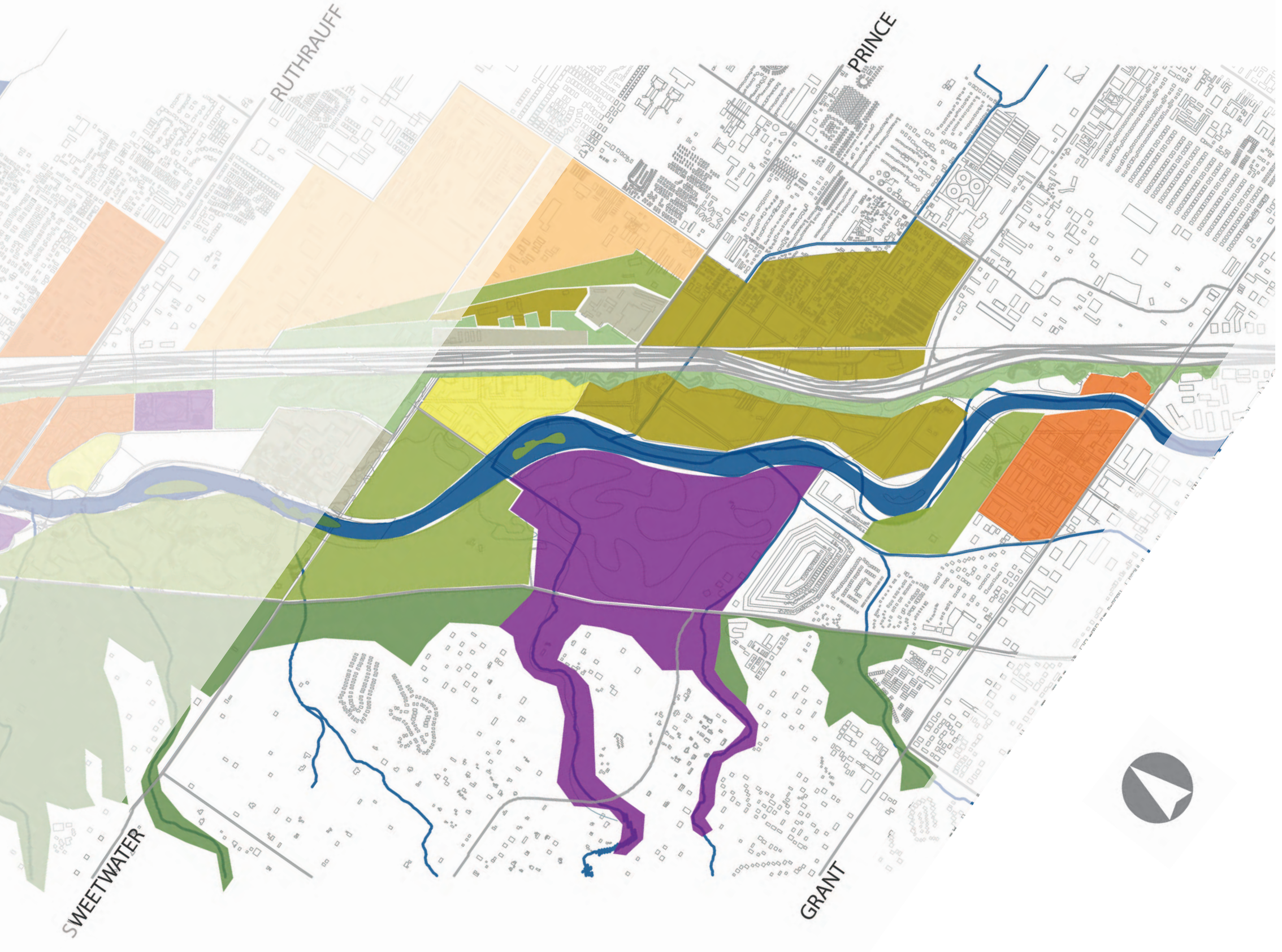
# Focus Areas


EL CORAZÓN NORTE
INA
ORANGE GROOVE
INA
SUNSET
CAMINO DEL CERRO

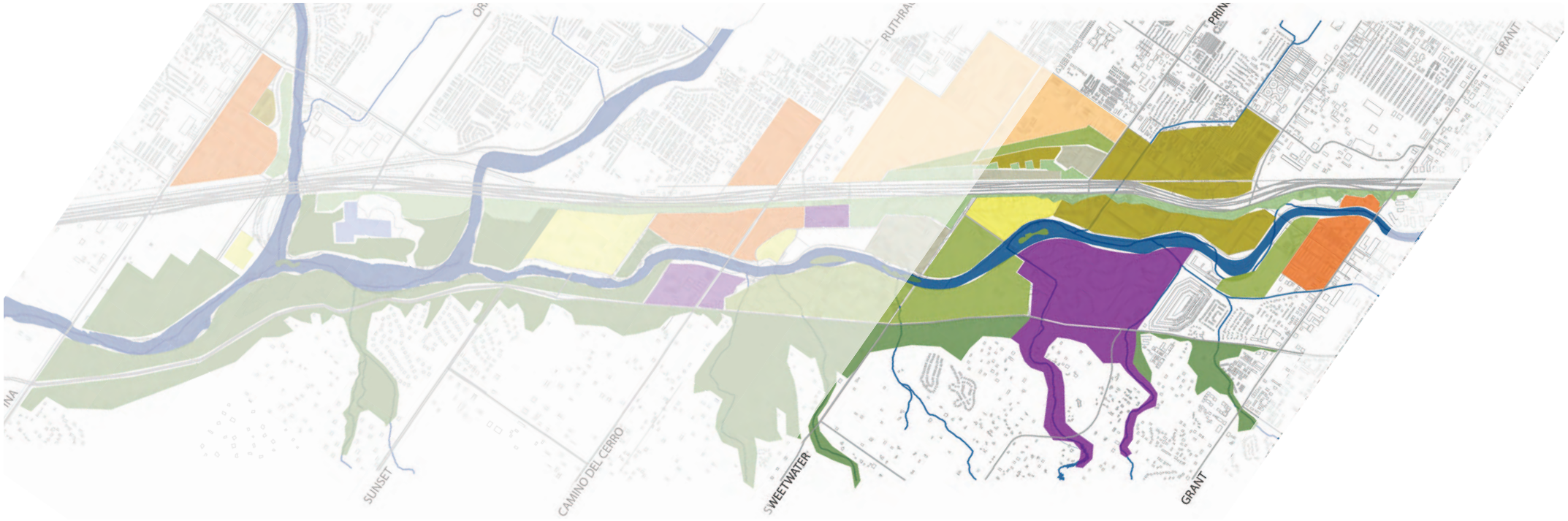

EL CORAZÓN CENTRAL
EL CORAZÓN SUR
RUTHRAUFF
PRINCE
SWEETWATER
GRANT

# El Corazón Sur



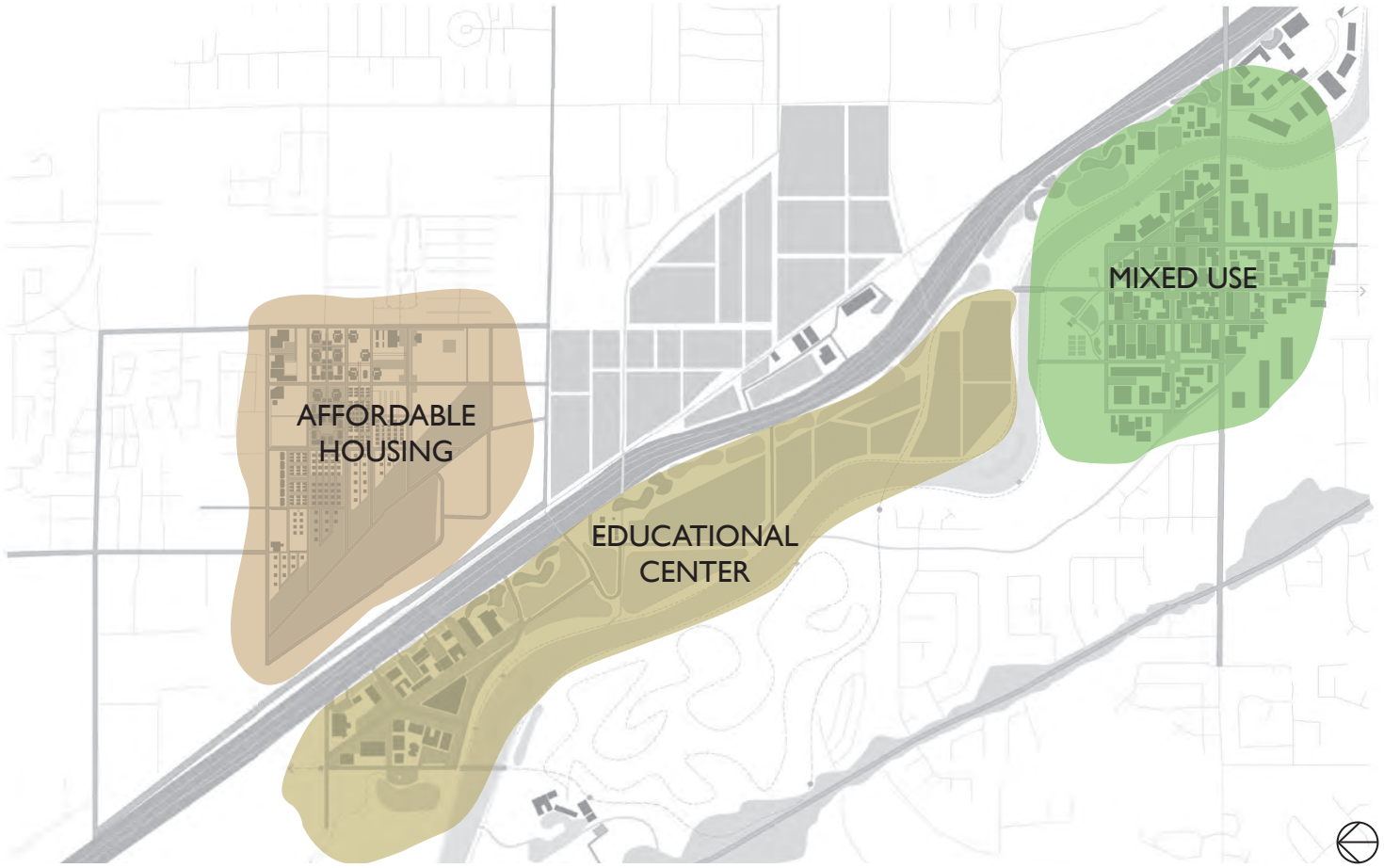

RUTHRAUFF
PRINCE
SWEETWATER
GRANT

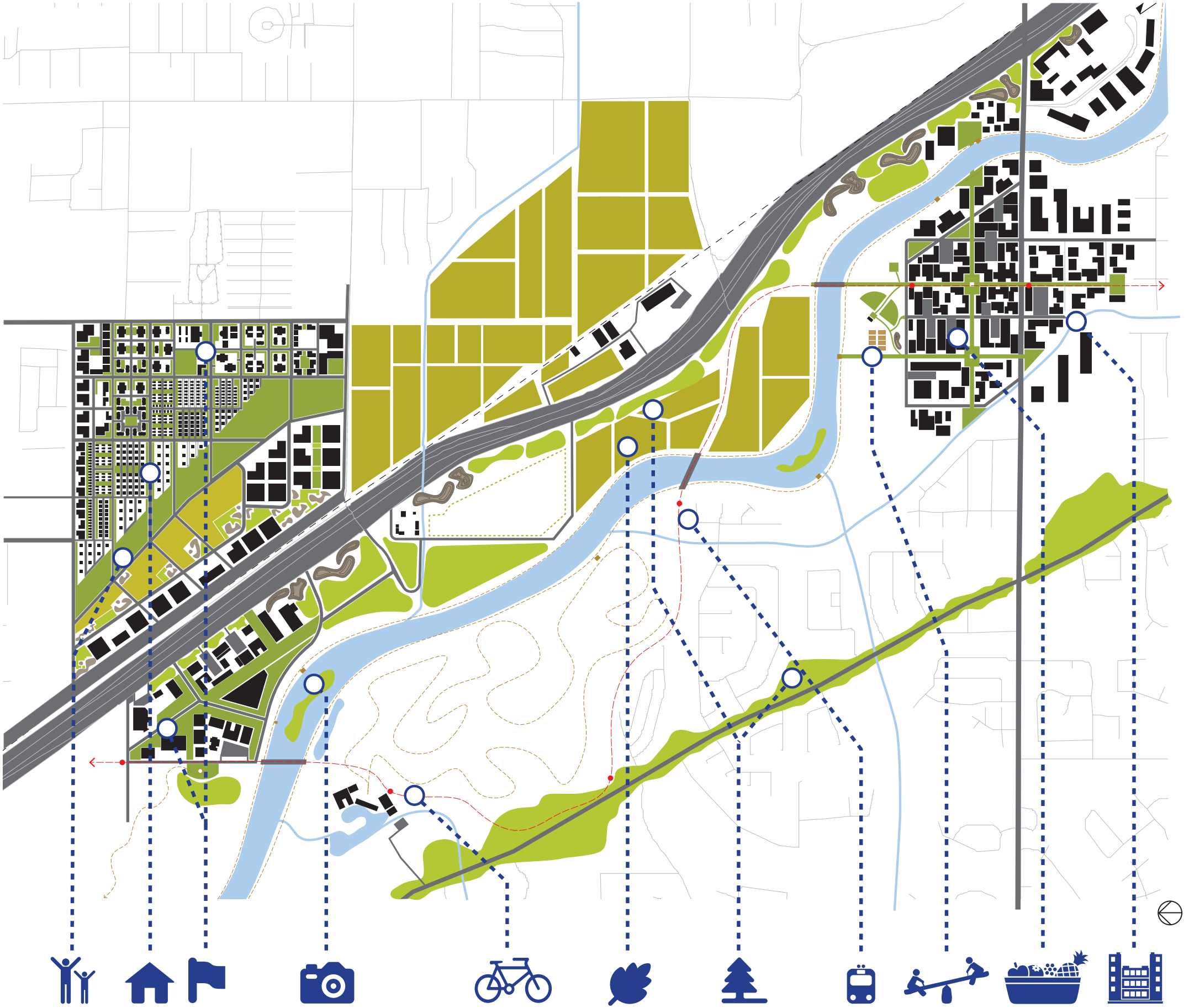
# El Corazón Sur




The southern focus area deals with a different urban fabric and context than the other two sites. Near Grant road, there is an existing light industrial zone, with one to two story buildings and low density.

- Densify Huachuca Drive to create new live-work-play community.
- Main pedestrian greenway where the new trolley line will run through
- Bringing mixed use development to the river and to the bike route
- New Action Sports Camp Serving a different demographic with skateboarders, BMXers, rollerbladers, and mountain bikers with practice and competition facilities.
- New affordable housing development introducing a variety of housing typologies and densities - combining office, retail, affordable housing and commercial districts
- New educational center for University of Arizona College of Agriculture and Life Sciences
- Greenways and the new trolley line connect all programmed elements within the southern focus area in El Corazon, as well as connecting it to programs to the north.





# Design Strategies

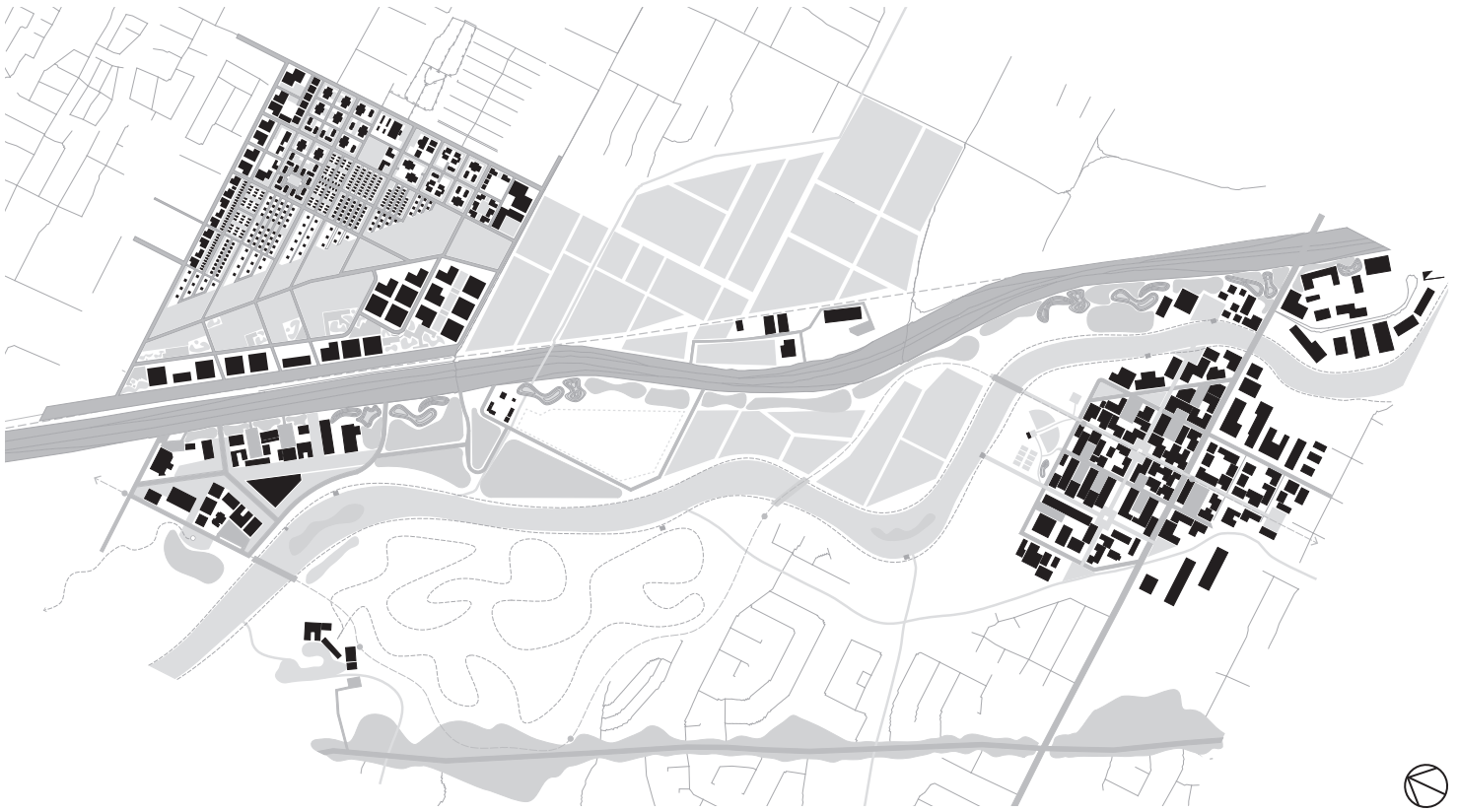
EL CORAZÓN SUR

## Circulation

- Utilizing existing infrastructure
- Connections to I-10, Grant Rd, & Silverbell Rd
- Incorporating a new Trolley line that connects all existing and new development - with the potential to connect the trolley to the new Modern Streetcar Downtown
- Expanding and connecting both sides of the Santa Cruz River to the existing Tucson regional Pedestrin and Bike "Loop".

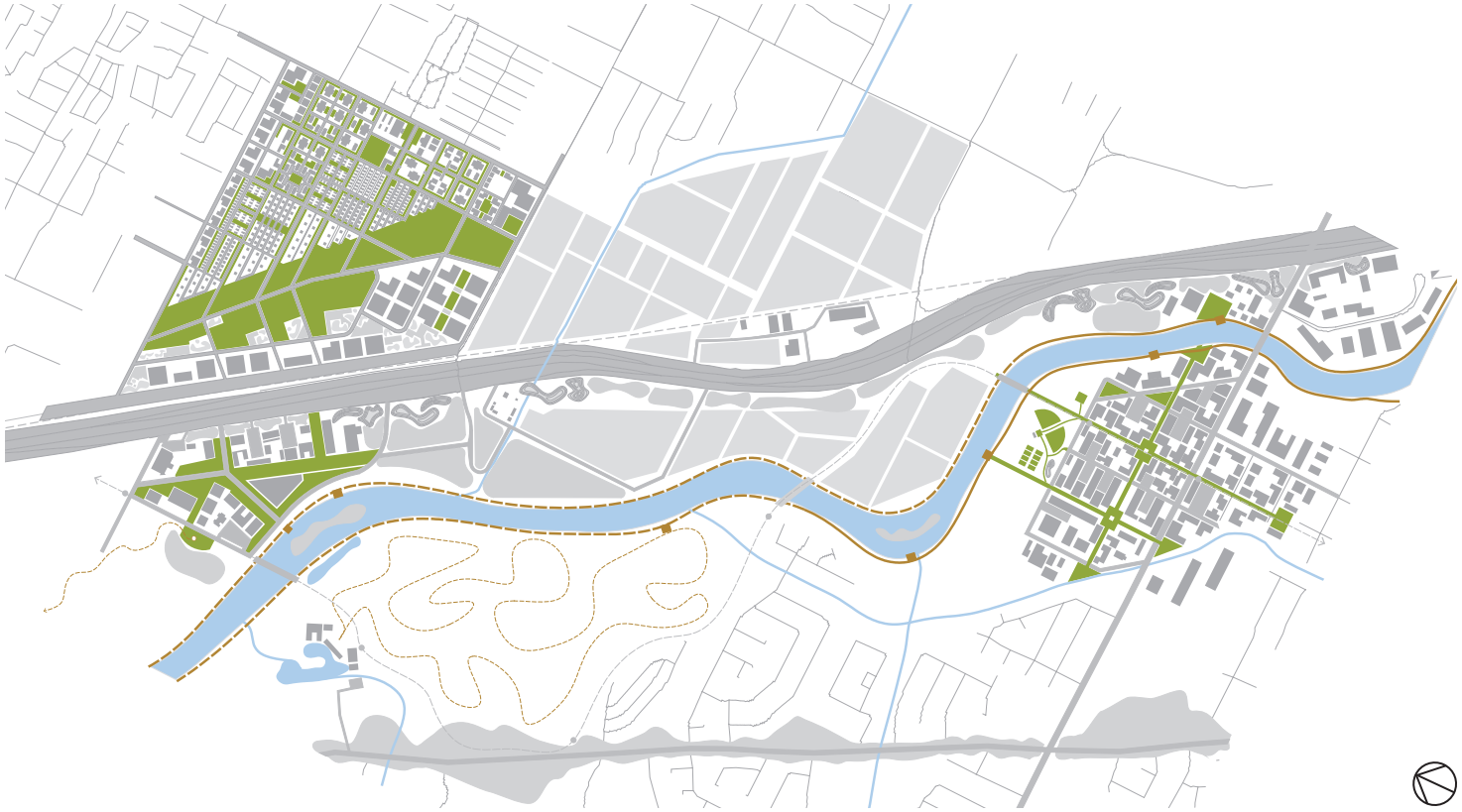
## Built Form

- New construction and repurposing existing buildings
- New uses to old buildings in both the southern mixed use development, as well as the new Educational Center to the north
- Demolition of existing trailer parks - replaced with new affordable housing and a more dense civic center



## Edge Conditions

- I-10 was a great design challenge
- Planting orchards - pecan, fruit trees, etc - including the creation of grassy berms both to dampen the noise from the freeway, as well and to block the I-10 visually from the rest of the site
- Maintaining and enhancing the plantings around Silverbell to be light and desert specific



## Greenways & River Circulation

- Specific greenway strategy to create a pedestrian friendly environmental zone
- Greenways bring people down to the river
- Circulation paths on both sides of the river
- Observation towers and raised platforms placed near the river at specific places for views and rest

# Mixed Use

EL CORAZÓN SUR

The mixed-use redevelopment in the southern third of the site, repurposes existing structures and infill to enclose greenways for the transit route, pedestrians and cyclists, and separates automobiles onto dedicated streets and parking lots. The mixed-use joins the river on the east, shaded walkways provided shaded access for walkers and bikers to the river from the main plaza, storefronts face the main routes to provide visual interest, and increase retail and commercial attraction.

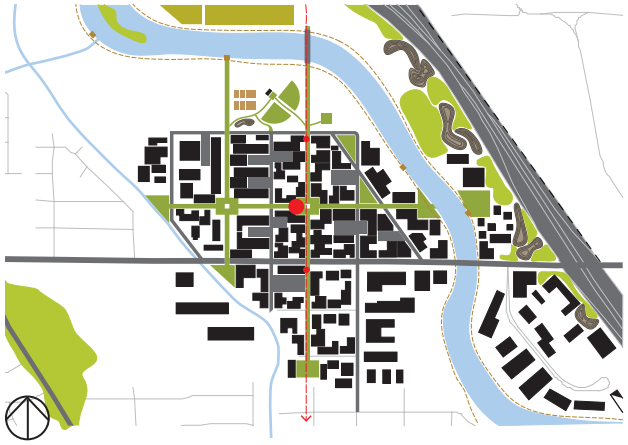
The Santa Cruz River adjacent to the site becomes a strong riparian restoration park, integrated into the current "Loop", using this pedestrian and cyclist attraction to bring residences and visitors from Grant Road and the mixed-use redevelopment, north to the Action Sports Camp and continues north to the Sports Village, Eco-Resort, and ASDM and aviary.

- Connections to the river by transit and greenways.
- Separation of pedestrians and vehicular traffic.
- Repurpose and infill existing structures.


community park
main square
mixed use buildings
ards
proposed parking

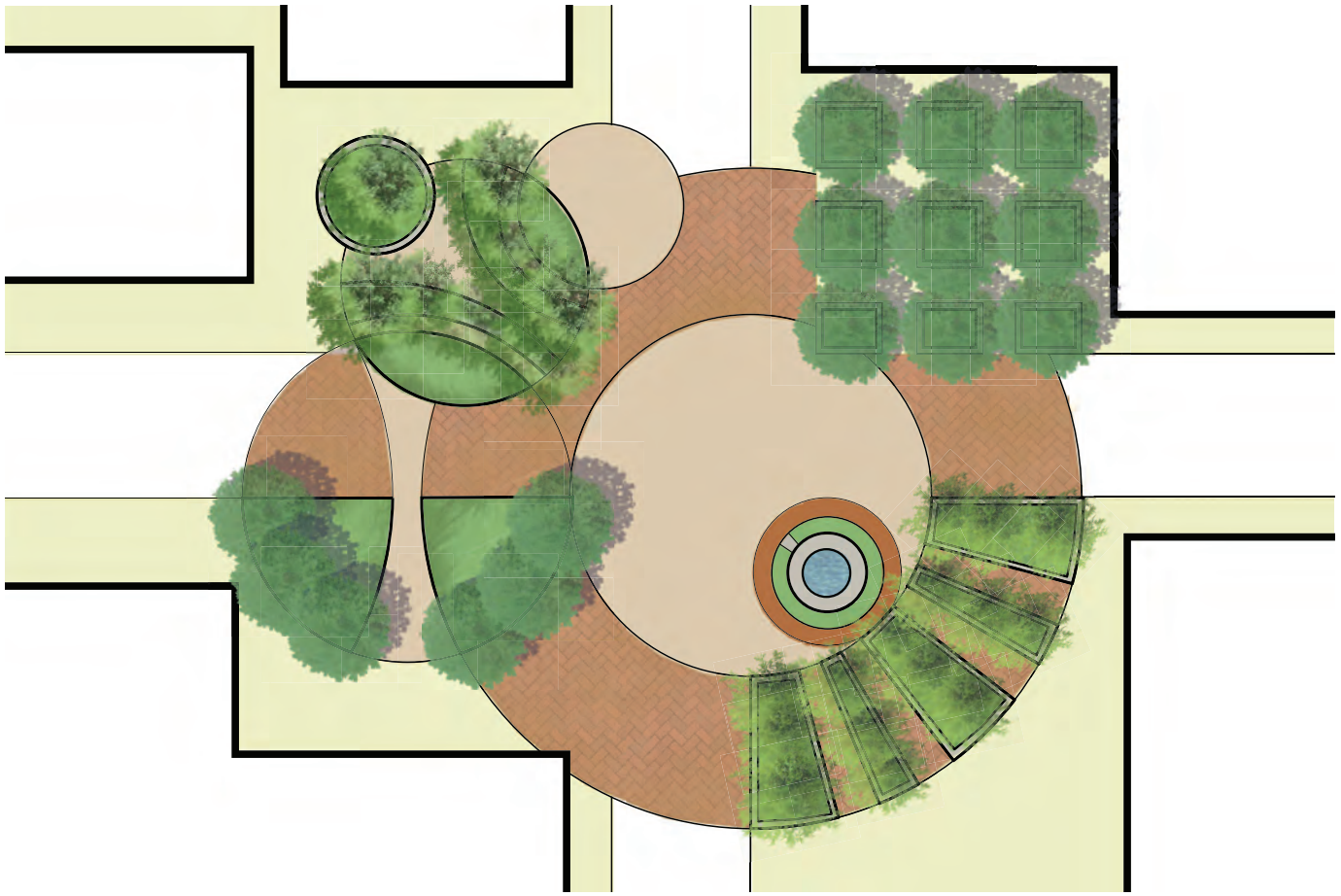
# Main Square

EL CORAZÓN SUR



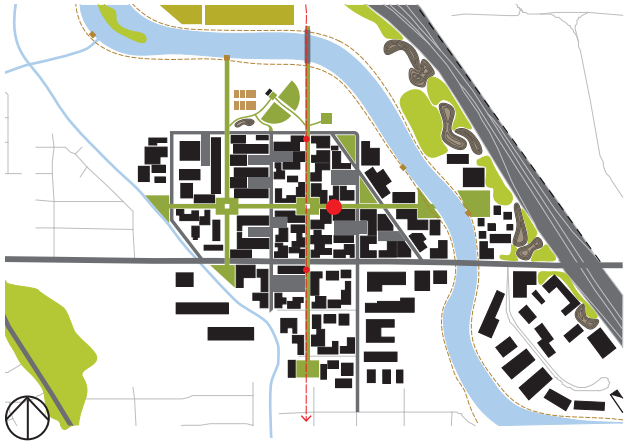
The mix-use development is located on the southern part of the site serving as a threshold to the entire site. The main square is placed in the heart of the proposed mix-use development serving as a node for the intersection of the greenways and the trolley stop. The square is surrounded by commercial shops to help keep the square active throughout the day. The purpose of having a mix-use development is having the ability to live, work, and play in a relative short distance.

- Greenway plaza with shaded areas
- Pavement changes enhance the threshold
- Strategic trolley stop
- Retail opportunities surround space



# Pedestrian Greenway

EL CORAZÓN SUR



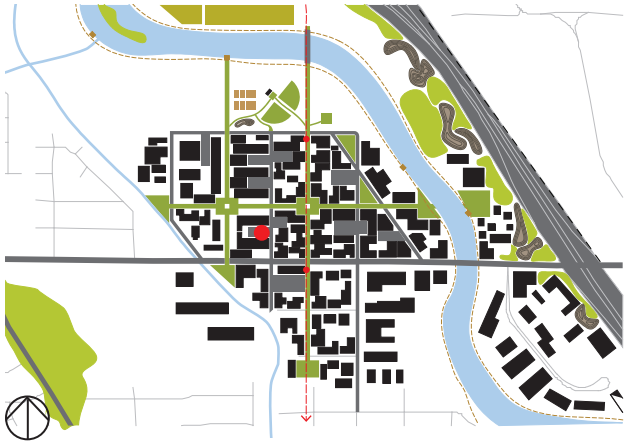
The greenway system is an organizing system located on the southern end of the mixed use development. The greenways create an environment that is inviting for its users and provides mixed use pedestrian paths that are highly vegetated and reduce the carbon footprint with main squares at intersections to serve as plaza spaces.

- Reduce urban heat island through the use of different paving strategies, native plants, berms, basins and tree canopies in the ground plane.
- Redesign the urban fabric by retrofitting the light industrial and commercial buildings
- Improve social interaction by creating pedestrian only greenways within the urban fabric


JACQUE

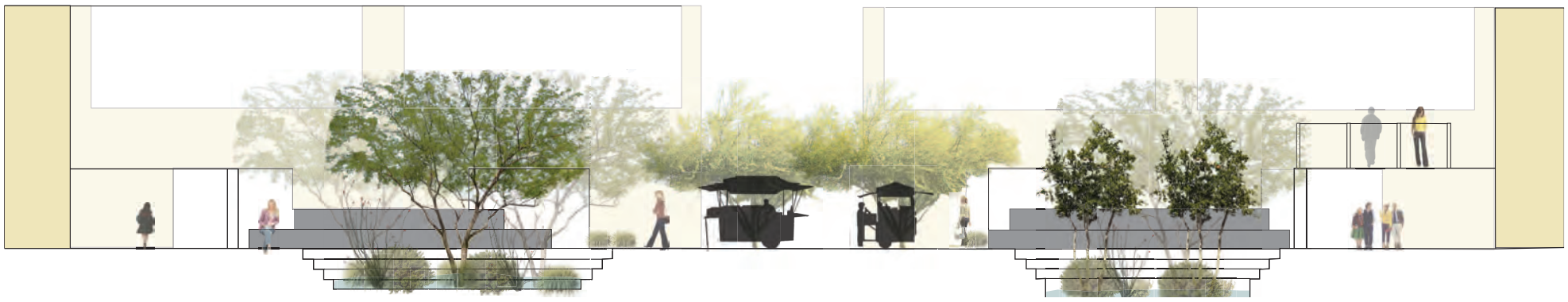
# Mixed Use

EL CORAZÓN SUR



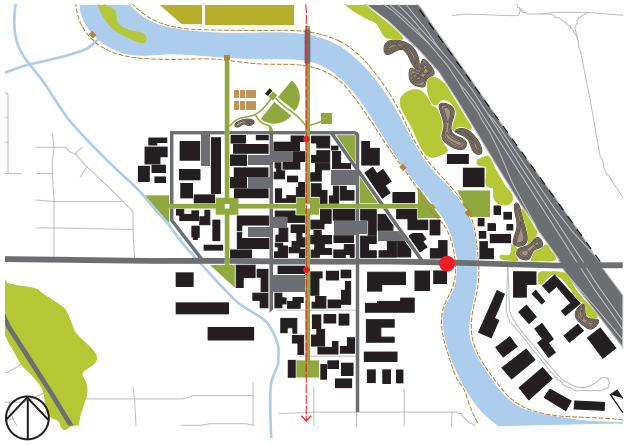
The Farmers' Market located in the new urban fabric on the south side is a new addition that will house and distribute local goods from the large agriculture fields grown in the northern part of the El Corazon Sur focus area. This farmers' market provides an opportunity for community members from adjacent neighborhoods to come together, sell, and buy local goods in a comfortable setting and enjoy the environment.

- Retrofit existing warehouse storage units to provide store units for vendors and local farmers job opportunities
- A major hub to sell local goods for the neighboring communities and the greater Tucson area
- Provides community space that is comfortable for vendors and visitors year round by providing shade with natural vegetation and walkways with overhangs.
- Control urban runoff by collecting the storm water in basins throughout the gathering plaza space that will eventually be purified through bioswales and recharged into the Santa Cruz.
- The greenway paving system is incorporated throughout the plaza space to direct visitors, and provide a sense of connectivity and wayfinding throughout the urban fabric.



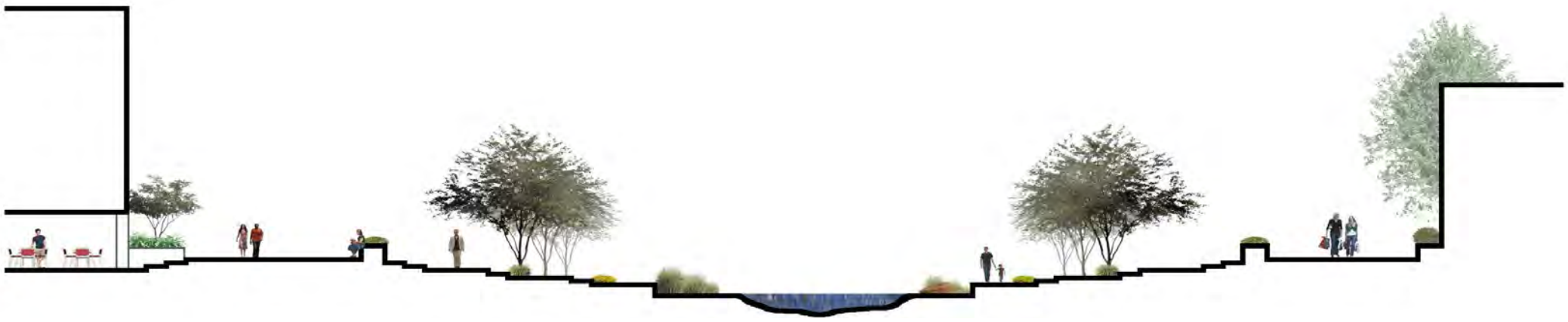
# Waterfront

## EL CORAZÓN SUR



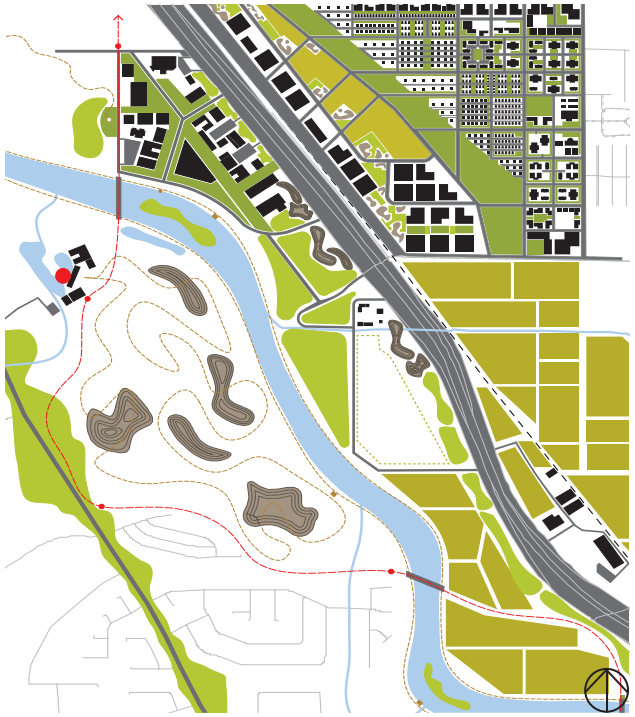
Introducing reclaimed water to the Santa Cruz River at 22nd Street through the 10,000 acre feet/year City/County mutual accord, could provide opportunities for urban and environmental growth to all sites south of Sweetwater Water Treatment Plant. On the south end of the site this can be seen by the addition of a Tucson River Walk, straddled by active riverfront hotels and commercial properties. Terraces along the river edge allow pedestrians access to the newly flowing Santa Cruz River and restored riparian habitat. Views of downtown Tucson and the Tucson mountains will be framed within different areas along the River Walk.

- Restoration of the Santa Cruz River and riparian habitat north of 22nd Street
- Stimulating social opportunities with hotels and commercial properties
- Flood control with use of terraces
- Improvements to existing bike paths and river edges



# Action Sports Camp

EL CORAZÓN SUR

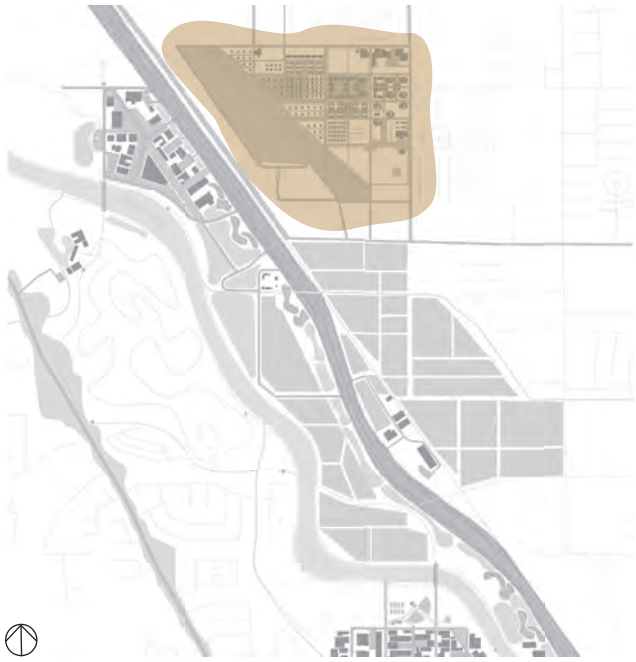


The action sports camp will provide a unique opportunity to serve a diverse demographic on the southern end of the site. Skateboarders, BMXers, rollerbladers, and mountain bikers will all be able to find something that appeals to their individual needs to practice and compete within the state of the art facilities on site. During off hours the site will continue to attract visitors who wish to dine on the water's edge at the camp's restaurant.

- Action sports facilities for practice and competition
- Facilities are open to the public, as well as overnight guests for extended stay
- Connectivity to trails west of Silverbell Road
- Reestablish native habitat over existing Silverbell Golf Course
- Provide opportunities for Tucson's youth to socialize and grow in a safe environment


# Affordable Housing

EL CORAZÓN SUR



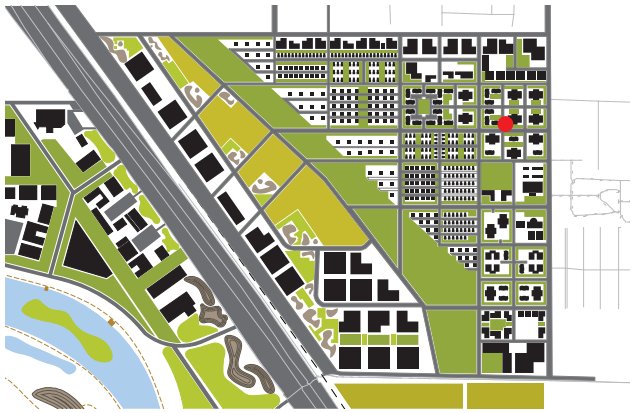
Affordable housing is always a concern in large scale urban planning and revitalization projects. Also, the need for pedestrian and bicycle friendly greenways that create interconnected neighborhoods. must be considered. El Corazon presents a precedent study to introduce a variety of housing typologies and densities, combined with office, retail, and commercial districts. Moreover, the existing industrial complexes parallel to the interstate are retained and enhanced through integration into the agricultural fields, bosques, and earthen berms. This redevelopment removes dilapidated mobile home parks with the guarantee that the residences are relocated to new, affordable, sustainable, energy efficient, and safe dwellings. These dwellings are located near the commercial and office districts, with mixed-use options to provide employment opportunities within walking or cycling distances.

- Housing typologies: single-family (4 & 8 RAC), shared wall row-house, and mixed-use with residential atop
- Less than ¼ mile to businesses.
- Education and civic district within walkable distances.
- Dense in use and multi-use block layout


single-family res.
office & admin.
high-den.: mixed-use
parking structure
biome-landscape
playfields
k - 12 school
bioswales

# Affordable Housing

EL CORAZÓN SUR



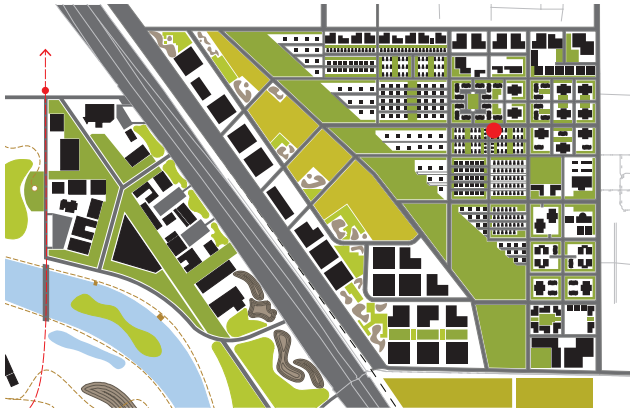
Mixed-Use Districts:

The combination of small retail, grocery, and commercial businesses near residences provides the opportunity to reside in live-work units, or live within walking or biking distances. This reduces the requirement to drive to employment centers, reduces GHG emissions and VMT; thus decreasing the expense of owning and operating a vehicle. A surplus of income allows a family's funds to be spent on health, education and other opportunities that are social betterments.

- Commercial and retail on 1st floor.
- Emphasis on greenways and street facades.
- Available dwelling units above retail to provide residences with options.

# Affordable Housing

EL CORAZÓN SUR

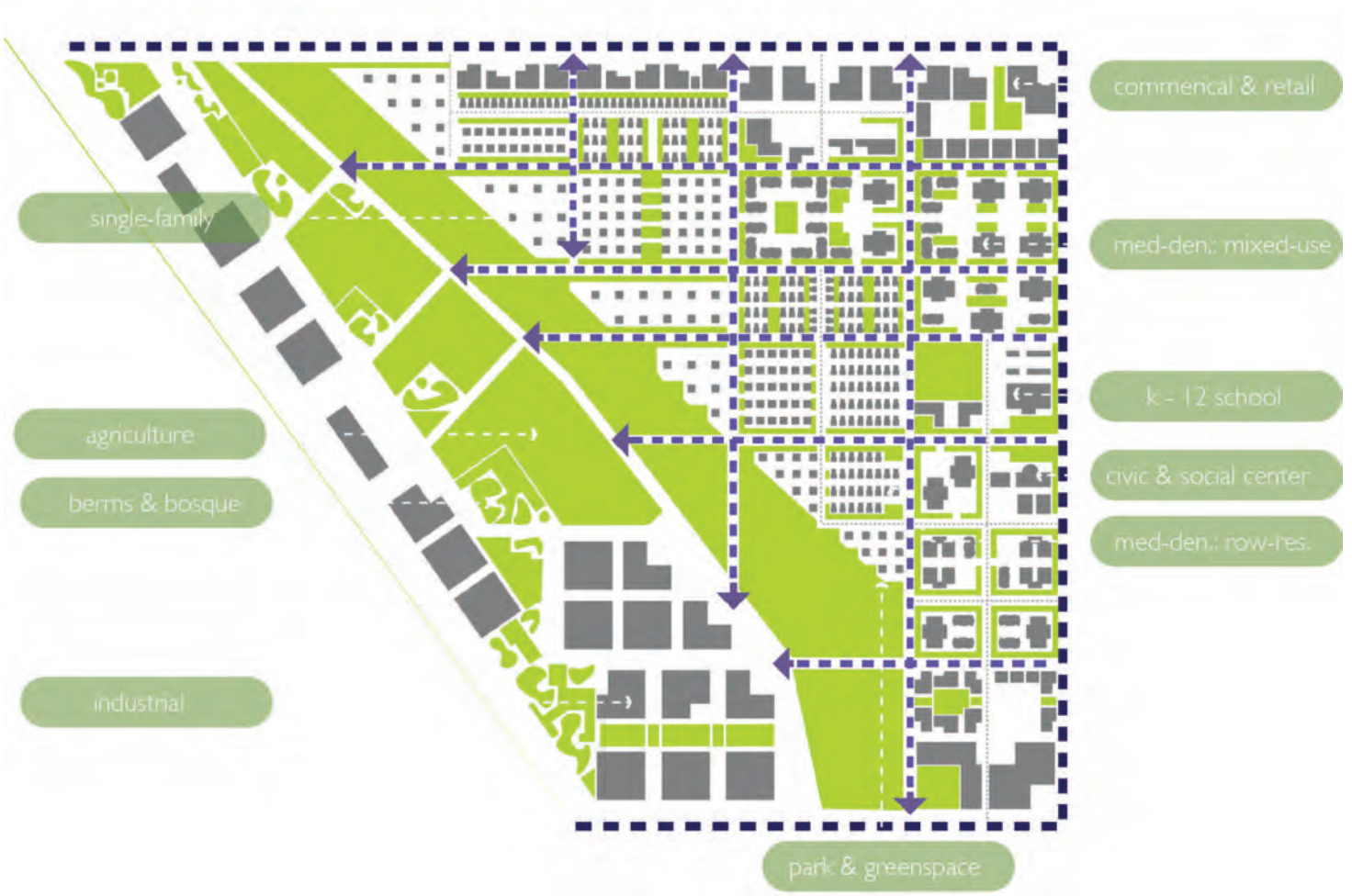


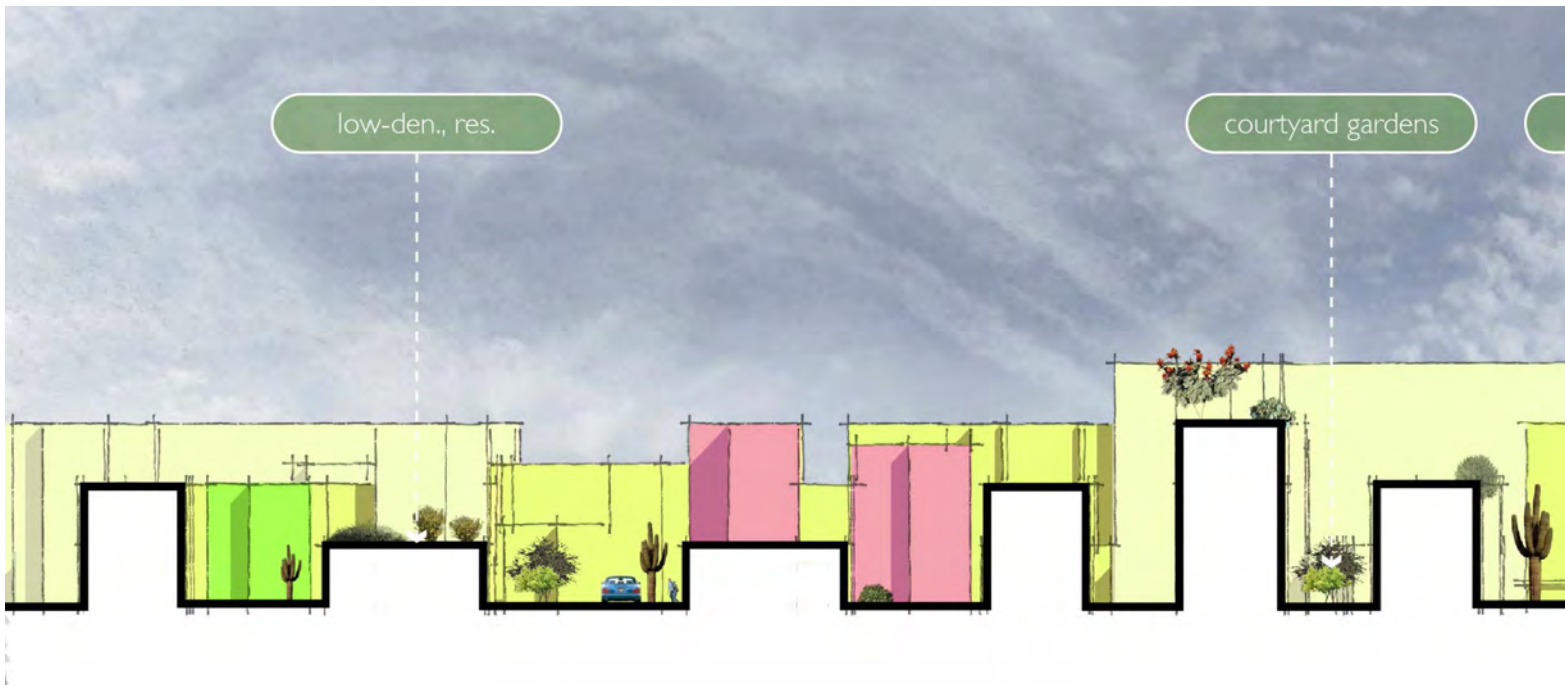
Med-High Density Housing:

The population is expected to increase by 50,000 by 2050 just within the square-mile census tracts surrounding the site. Where will the new and existing residences be located? It is possible to increase density without sacrificing social and community values. Conservation of open space, parks, and riparian habitats are more feasible with mived use and stacked dwelling units. Greenways lining the streets and extending through block interiors create living exterior space for pedestrians and businesses. The dense residences conserve resources and energy, and grey and rain water is allocated for irrigation and bioswales. The automobile is not discouraged but placed in parking structures off of the main streets, on-street parking is allowed for residents.

- Reclaimed water and stormwater runoff bioswales improve green infrastructures.
- Pedestrain and cyclist dominated streets.
- Shaded streets through native trees and shrubs.

The section shows the gradient of high-density residential mixed-use on the east to single family homes on the west. Alternating Solar PV and water-heating panels with greenroofs offset energy consumption and GHG emissions, and provide supplemental park space above street level.

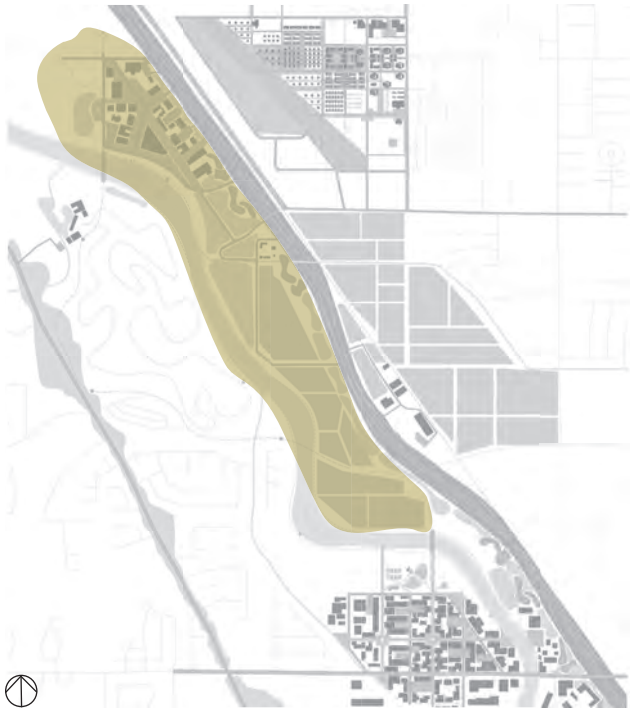



inc. side-friction
med-den., row.h.
greenways
high-den., mixed-use

# Educational Center

EL CORAZÓN SUR



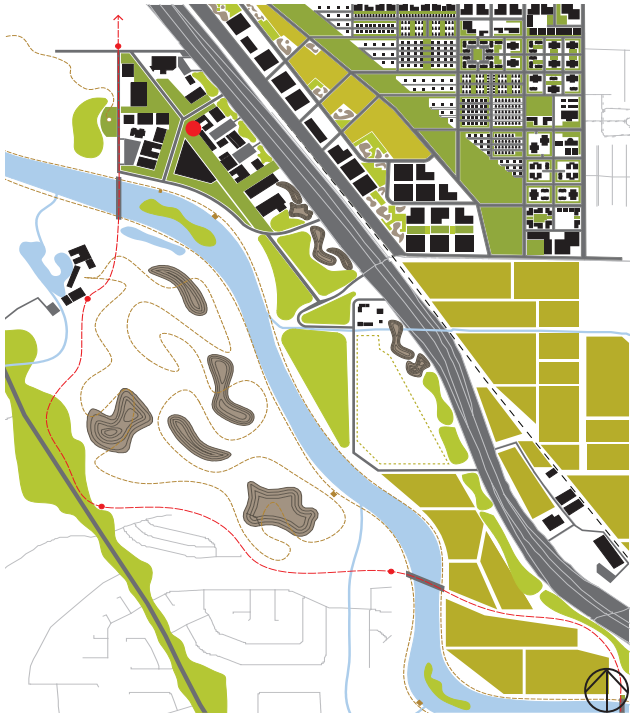

The educational center near Sweetwater Drive is a new home for the University of Arizona College of Agriculture & Life Sciences. The campus is located in an existing commercial and light industrial zone - adapting select existing roads for pedestrian greenspaces and a campus mall, adding new buildings for a more dense urban campus. This concept utilizes the existing and updated agricultural fields for production and learning.

- Open green spaces for meeting and learning - also connecting to the river through raised platforms
- Community learning spaces
- Agriculture fields and new greenhouses as learning facilities and public land for commercial growing
- Open space for University farm land - housing a variety of livestock
- Orchards as both roadway remediation and entry sequencing into the new campus
- New trolley line stops just north of the campus allowing students, faculty and community members easy access to the campus as well as connections to other zones on the site
- Connection to Sweetwater Water Treatment Facility and Algea Farm for research, learning and community engagement


entry orchards
connection to bike path
pedestrian only greenway
ng buildings = new campus
points of observation
new construction

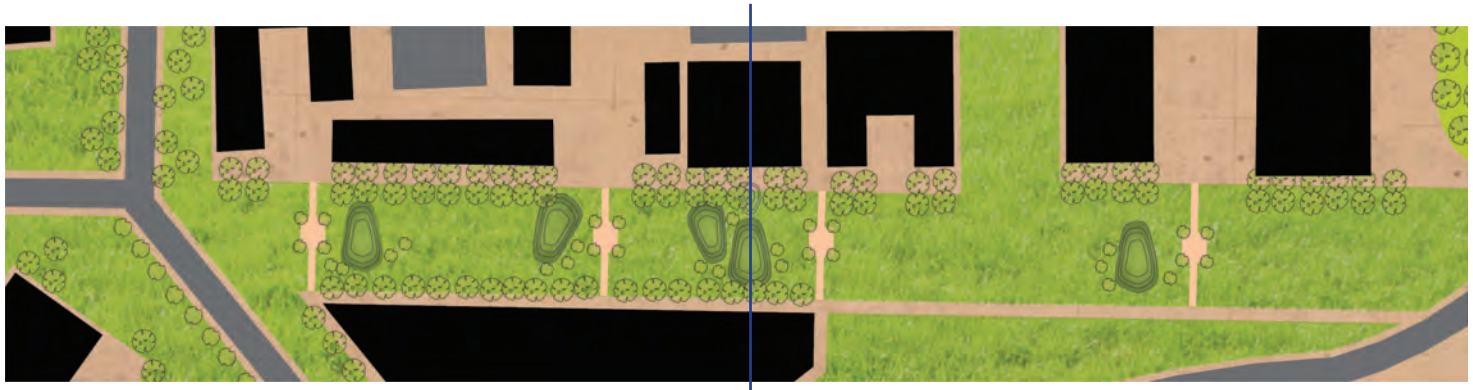
# Educational Center

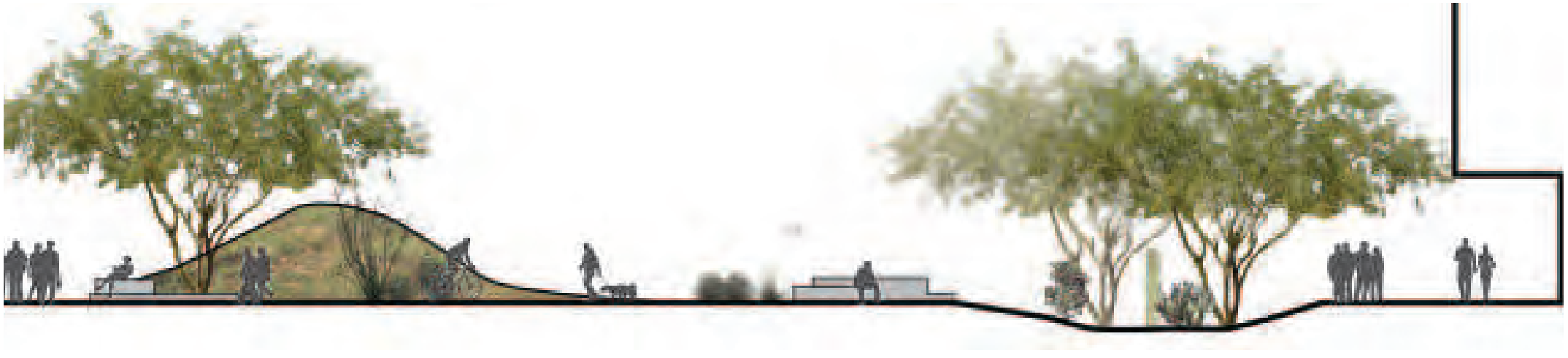
EL CORAZÓN SUR



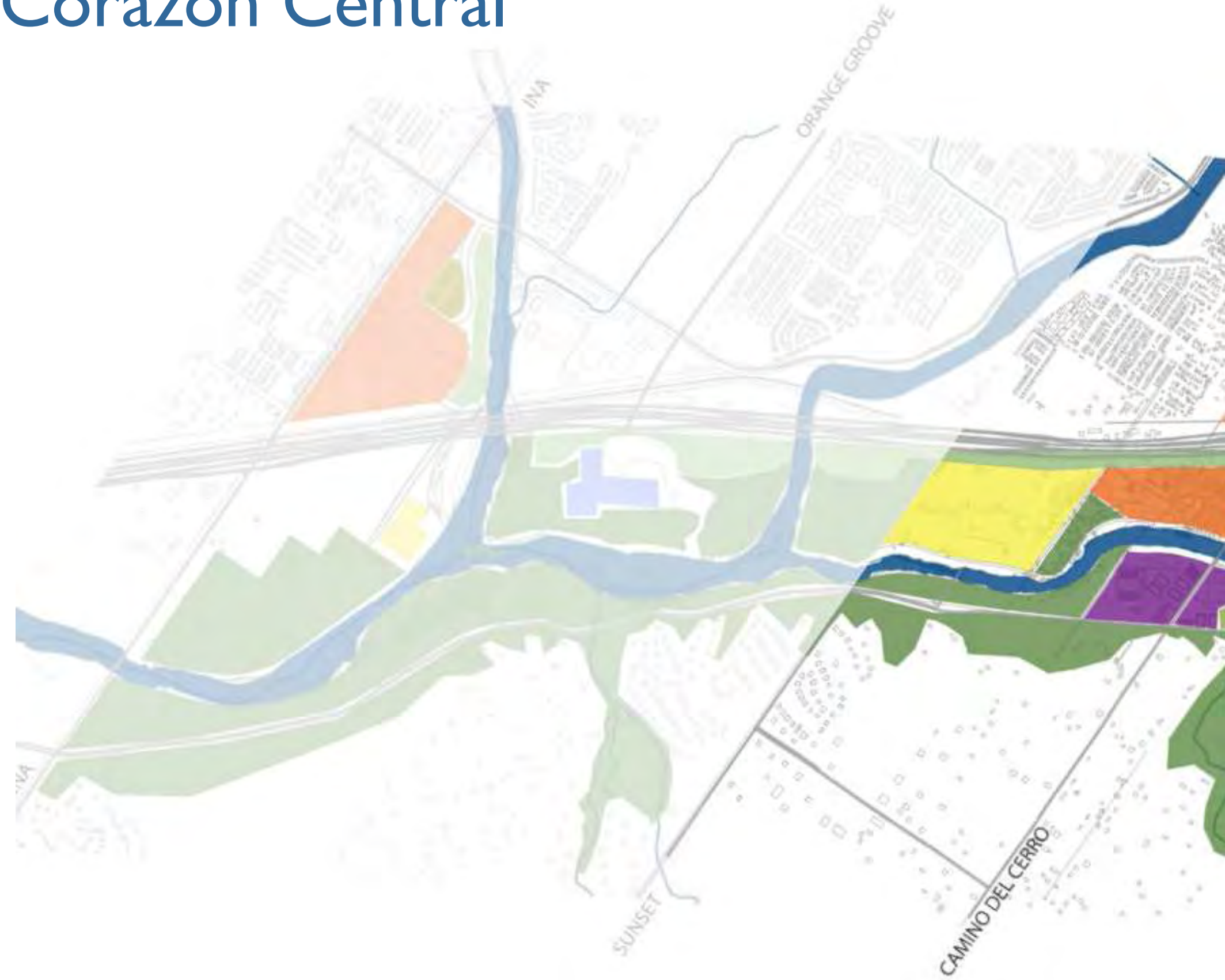
One of the central concepts to the educational center is its adaptive reuse of existing commercial and light industrial buildings. Buildings can be stripped of their exterior facades and repurposed. materials will hint at the University of Arizona's brick heritage - but also use smart and energy efficient materials.

The main road will be closed off to traffic and will be repurposed into a campus mall and pedestrian greenway. Berms and dips will bring a visual interest to an uninviting and flat site. Trees will placed in double allay to shade pedestrians and students walking to class. All vegetation will be desert specific.



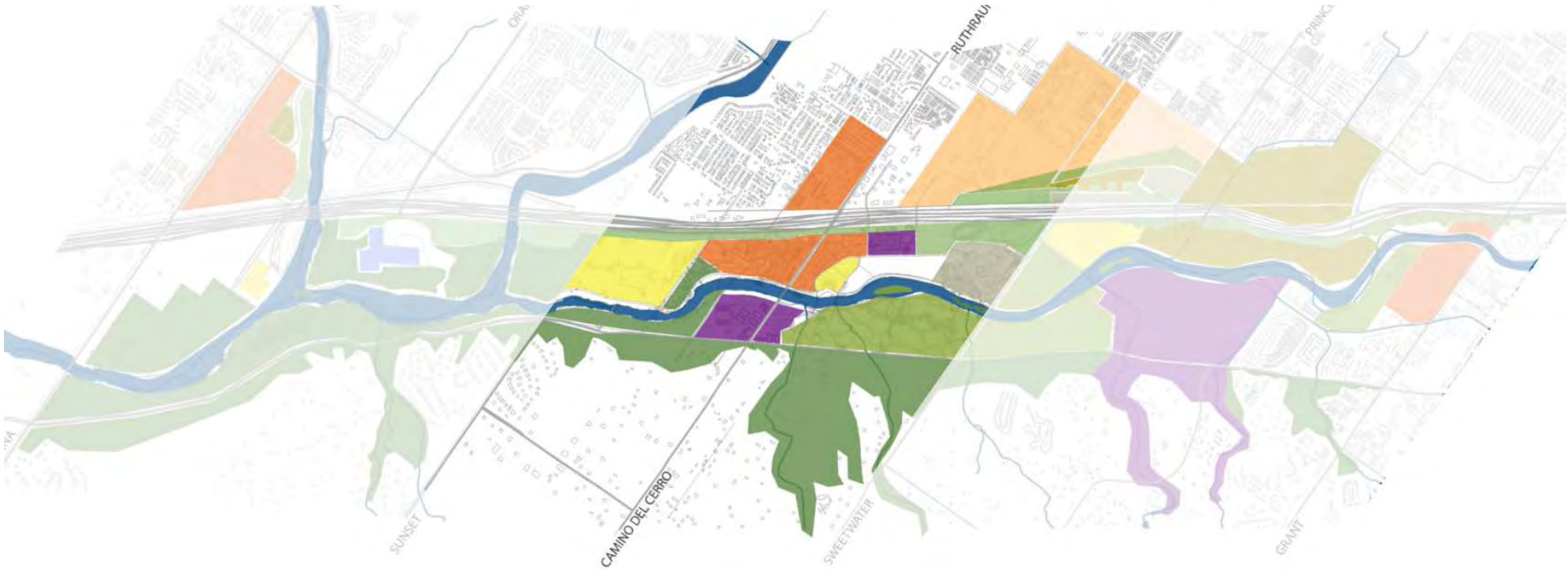


# El Corazón Central




RUTHRAUFF
FRANCE
SWEETWATER
GRANT

# El Corazón Central




El Corazón Central is developed around the central node of the site, anchored by El Camino del Cerro. Of the three areas, it is the highest density mixed use area with a high concentration of entertainment, restaurants and retail. The intent is to offer a fine balance among work, live and play. The program is oriented towards the pedestrian and cyclist, reaching out to the adjacent communities, and enhancing the quality of life by juxtaposing it's fabric with nature.

The main features are:

- Sweetwater Algae Farm and Research complex
- Outdoor Amphitheater
- Velodrome and Sports Village
- Recreational Center and Sports Fields
- Mix use high density communities
- Desert and Archeological Museum
- Historic Agricultural fields
- Riparian Corridor islands and parks threaded throughout.

# Design Strategies

EL CORAZÓN CENTRAL

## Environmental

The primary goal is to ensure the health and vitality of the river and riparian corridor that runs through the entire site. The river edges are protected and buffered from urban contact. Pedestrian bridges lightly traverse the islands and river, with human contact taking a more observatory role.

Rain harvesting, grey water and condensate from the built areas move through vegetated channels to the sunken pond and then replenish the river. The pond rises and falls depending upon the flow, and in intense rainfall, it can hold water back to release later.

The west side of Central is primarily native desert parkland and/or sports fields: all facilitating the free traffic of wildlife to the river.


## Economical

The main commercial node for the site is in Central. The program specifically reaches outside the site, drawing in people from adjacent areas for shopping, restaurants and entertainment.

The sports program provides much needed facilities in this largely, family oriented area of Tucson, while opening up the possibility of holding national competitions. The Velodrome, Athletes' Village and sports facilities are intended to reach all of Tucson and bring in tourist dollars. The intent is to establish Tucson's reputation as the cycling center of America. The outdoor amphitheater and parklands also provide family oriented entertainment and a needed venue for artistic performances.

Finally, the Algae and Aquaponics Farm and Research Center repurpose a soon to be vacant complex, create jobs and could be eligible for Federal funding and research partnerships.


## Functional

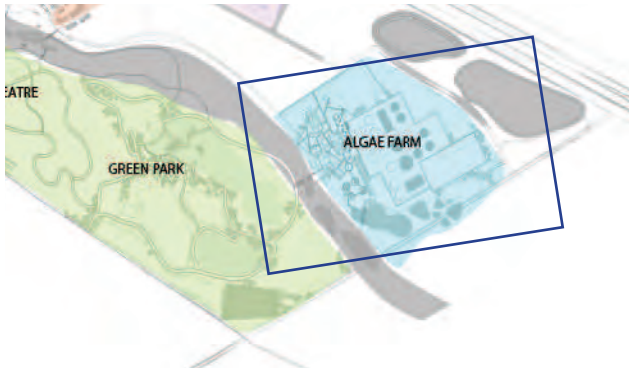
Central links north and south nodes in walkable distances. Large parking garages by the I-10 provide easy access from outside the site, and then encourage walking inside the site. The trolley line connects all three nodes, enhancing movement throughout and less dependence on the car.
Connected to the I-10 by Frontage road and exits on the east side, and Silverbell on the west, traversed by Sunset and El Camino del Cerro east/west, anywhere in Central is easily accessible and also connected to Tucson's public transport.


## Social

An invigorated river and riparian corridor laced with trailways, paths, and pedestrian bridges that connect parklands and outdoor entertainment areas will be a magnet to all residents of Tucson. Combined with a commercial hub of mixed use, Central will have something for everyone all within a concentrated area.
For the residents of Central, the walkable community has moved away from grid housing to an asymmetrical, organic form intersected by natural vegetation. This irregularity creates interesting spatial vignettes as a person moves through the streets. Balconies and mixed social floors promote meaningful interactions. Courtyards and public openings also promote social gathering. The Cinema Plaza can be closed off and be used for large public events.

# Algae Farm and Research Park

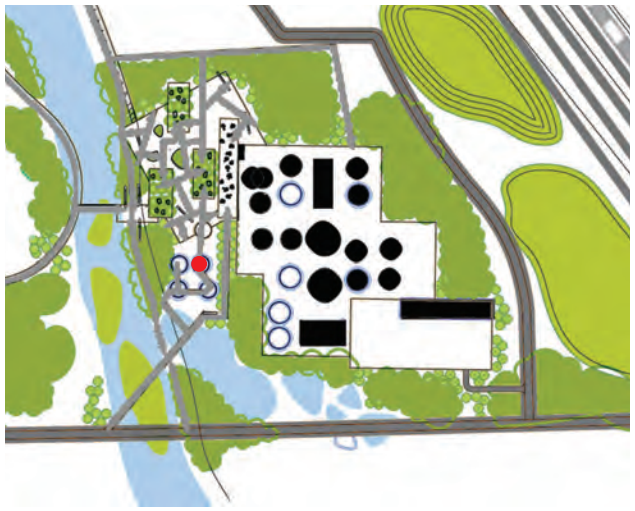
EL CORAZÓN CENTRAL




West of the river is Columbus Park containing recreational lakes where local fishing takes place. As they exist, the lakes seem isolated with a lack of communtiy interaction. We suggest the incorporation of pedestrain paths that surround the lake that both protect the edge environment, yet still allow visitors to engage with the river as well as the lakes. The east side of the river allows for social gathering through patio seating for vistiors to enjoy the view. Surrounding the Water Treatment Facility landscape, there is an algae aquaponics market, tree plaza, and outdoor café. The Islands serve as a connection between the two sides of the river, through the creation of an island park for wildlife.

# Algae Farm and Research Park

EL CORAZÓN CENTRAL



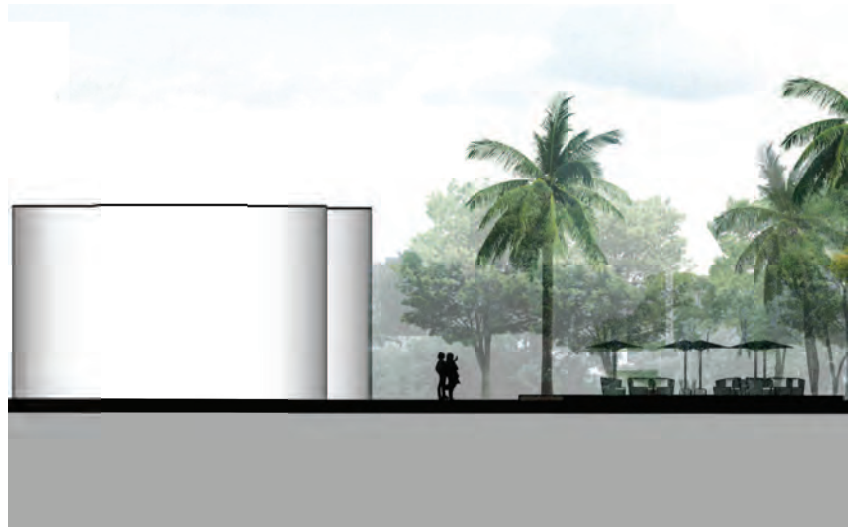
The existing Waste Water Treatment Facility has plans for moving to a different location. We suggest that the tanks be repurposed to become an aquaponics farms. They should be integrated into the natural environment by using parts of the existing wall structures of the tanks for planting. To compliment the aquaponics farm, gardens are placed within the tank structures. There is also a strong integration of elevated pedestrian paths that connect to each farm zone.

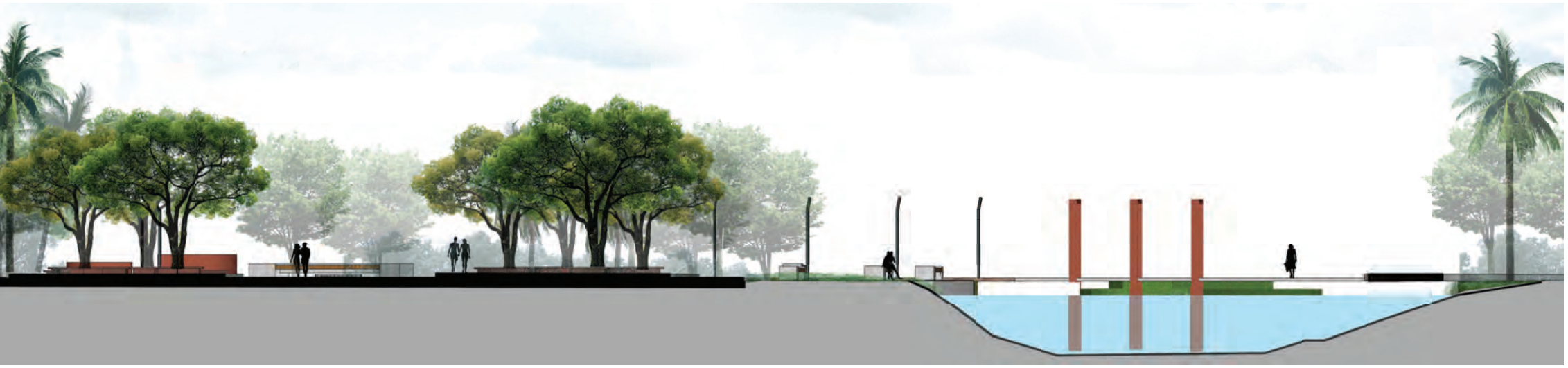
# Algae Farm and Research Park

EL CORAZÓN CENTRAL

This shaded plaza is a comfortable open area providing seating and an urban respite. There is an outdoor cafe and seating platform adjacent to the plaza.

This section shows a gradation of use density, as well as the interaction among different areas. The section is cut through the river, the plaza, outdoor cafe and the algae farm.





# The Athletic Village and Velodrome

EL CORAZÓN CENTRAL


Camino Del Cerro is the site's main transportation artery; this means it is where the heaviest traffic flows will occur. With that in mind all of the site's major amenities will directly or indirectly connect to Camino Del Cerro. Planning the flow and convergence patterns in this area are of the upmost importance.

One example of this involves the placement of a major venue like the velodrome. By positioning it to connect indirectly to Camino del Cerro and also providing additional access points to the velodrome, we can prevent many bottle necks and congestion hot spots before they occur. This helps prevent the interruption of Camino del Cerro's usual traffic patterns during high profile events that the velodrome may host.

Other features that are evident in the aerial are the relationships among the major vehicular traffic, pedestrian traffic and the river and how they relate to one another in this part of the site. The sunken garden/amphitheater is strategically located between the largest mixed used node in the site and the river to maximize its use by the locals and by those that visit the site. This arrangement also takes full advantage of the interactions between the site's pedestrian traffic, green spaces and the local shops and commercial amenities.


existing solar farm
santa cruz river
igh density mixed use

# The Athletic Village and Velodrome

EL CORAZÓN CENTRAL

'The village is an athletic utopia encompassing all an active person needs to perform at his/her very best. Along with the velodrome, which is geared toward the avid cycler, the facility allows for more than cycling events. This facility is flexible enough to accommodate other sports like roller derbies and other human-powered weeled events. This area can also act as a trail head to Tucson's "Loop", and it's recreational biker/ hiker user groups.

The village also houses:

- Restaurants
- Snack bars
- Cafes
- Retailers (geared towards the active person)
- Fully equipped gymnasiums
- Emergency health facility
- Multiple outdoor lounging areas
- Full service bicycle repair shops

The athlete village can also be a calm and accommodating place not only for the athlete but for the active person. The outdoor area is an ideal social gathering area, and also takes full advantage of the interactions among the site's pedestrian traffic, green spaces and the local shops and commercial amenities.



Indy Cycloplex
spleen
CAFE
Spleen café


300'

# Outdoor Amphitheatre and Park

EL CORAZÓN CENTRAL

This proposed outdoor amphitheater and park offer an array of social activities and environmental settings. The design considers human comfort as well as addresses critical flood control issues.

In this location, there are three islands that open up to the Santa Cruz river bank and provide beautiful views and strong connections between recreational amenities and the mixed use areas. Providing paths, trails, viewing platforms and social amenities, will allow people to safely experience the water's edge. Large tree canopies and an integration of native plantings throughout the amphitheater will provide a beautiful microclimate for the visitors. as well as a wonderful location for evening musical and theatrical performances.

# Outdoor Amphitheatre and Park

EL CORAZÓN CENTRAL

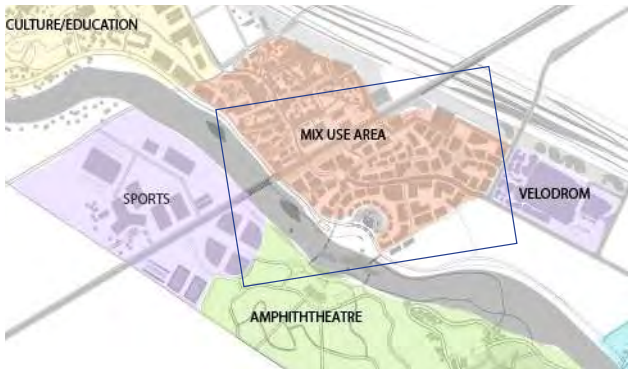
The rivers edge is accessible to pedestrians, cyclists, local, visitors, and other users of this natural resource. Public use of the outdoor amphitheatre and park is key to this areas revitalization. Paths, promenades, sidewalks, trails can allow continuous pedestrian access along it's length and both river edges.

The cross section on the left side shows the relationship between island, river front park and terraced amphitheater. It create new wetlands and riparian zones along with recreation, hiking and jogging trails.


10'
20'
30'
50'

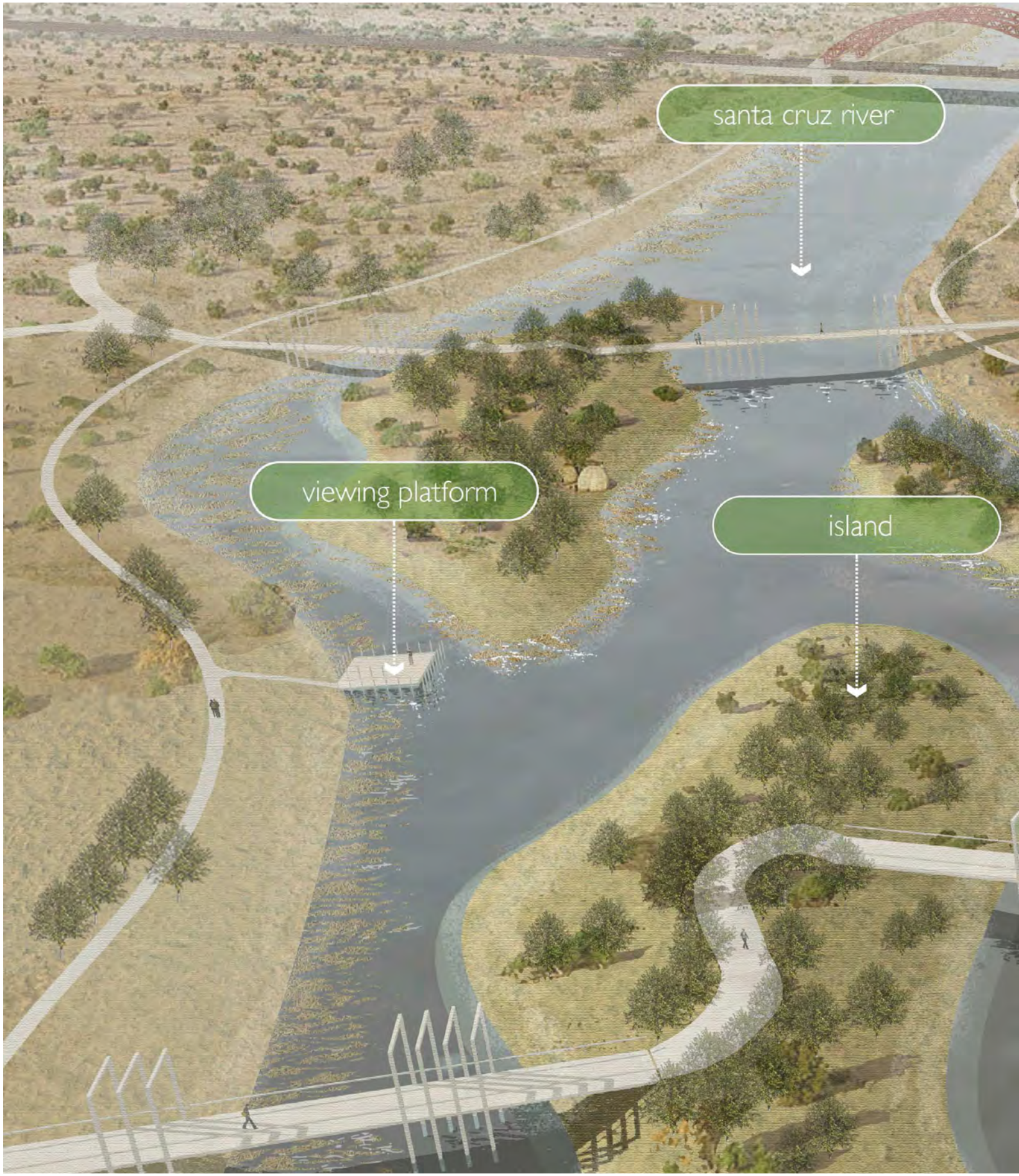
# Mixed Use High Density - South

EL CORAZÓN CENTRAL




This is a restored riparian area located in the center of the Santa Cruz River, and connected to the east and west portions of the site. In consideration of the current situation and circulatory needs, we decided to create corridor-like bridges to link east with west, and allow people to explore the entire site as well as enjoy river landscape views. In addition, we also created a pedestrian trail along the river, and sparsely distributed viewing platforms throughout.

An interesting feature of this design is the cluster of islands. Certain islands offer recreation, picnicing and camping opportunities; whereas others are focused on creating observable wildlife habitat.




mixed use buildings
trail
sunken garden
main road
foot bridge

# Mixed Use High Density - South

EL CORAZÓN CENTRAL

This sunken garden is inspired by its original site, which contains a large and deep pit. We decided to take advansage of its depth and scale, and developed a solution that introduces water into this pit forming a detention pond that collects and purifies urban runoff water sources before transferring these into the Santa Cruz.

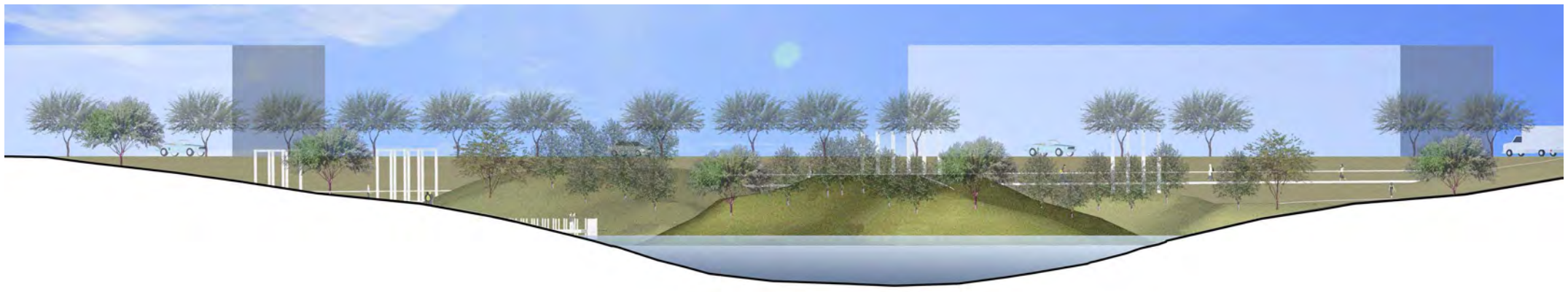
The many terraces transition visitors from the upper urban spaces down into the riparian zones along the Santa Cruz filled with canopies of native trees and wildlife. The bridge offers wonderful views of the terraces, the river and the clustered urban development to the north and the east.

# Mixed Use High Density - South

EL CORAZÓN CENTRAL

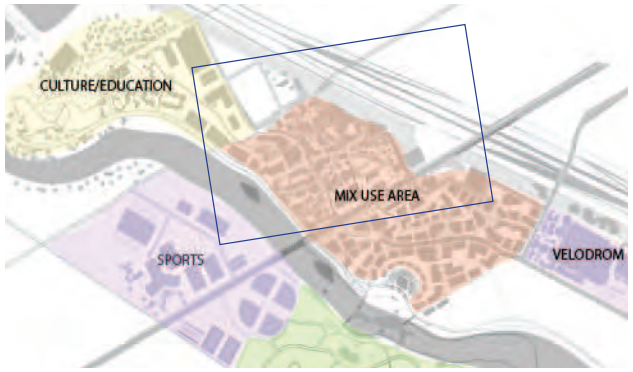
This perspective illustrates the relationship between bridge and islands. The bridge is regarded as an important role to connect urban mixed use areas with the more natural islands and river corridor. It transports people from east to west, from mixed use buildings to islands and on to the amphitheater.

In addition to the bridges, we also designed a main road for pedestrians and bicyclists as well as a riparian trail along the river. This allows visual access to the water from the viewing platform s above the river. The islands are conceived and situated with hydrological as well as view shed issues in mind.



# Mixed Use High Density - North

EL CORAZÓN CENTRAL




In a move away from automobile dependence, El Camino del Cerro North has been developed as a high density, walkable city center where all amenities are within walking distance. In anticipation of Tucson's growing population, the center has been planned as higher density, higher buildings and more social amenities.

- Higher density and walkability
- Environmentally and economically sustainable and focused on social amenities.

El Camino del Cerro North and South are serviced by a local trolly which runs through the entire site and links to other services including the projected Light Rail service.

Soccer, baseball, softball and football fields are much needed amenities for the families surrounding the site. By establishing them here with strong transit links, people can get to them easily and it brings people to the retail center. This is close to the World class Velodrome and atheletes village which firmly establishes Tucson as a bicycling center nationally and internationally.

El Camino del Cerro North is anchored by a central plaza which is situated at the mid point of the Promenade which leads to the river side cafes and riverside boardwalk. You can walk along the boardwalk to El Camino del Cerro South and the islands which are connected by footbridges.


archeology museum
school
pecan bosque
community park
mixed use buildings
cinema, entertainment
main plaza
proposed parking
the promenade
proposed parking
transit, trolley station

# Transit Stop and Path

EL CORAZÓN CENTRAL

The Transit stop is a main service center for the community. It links to the trolley service, bus and bike routes, It is a spatial threshold, a welcome center for new visitors and a community center.

A tree shaded path leads from the transit stop into the heart of El Camino del Cerro North.

A waterway and wooded area shield the center from the main road.

# The Boulevard

EL CORAZÓN CENTRAL

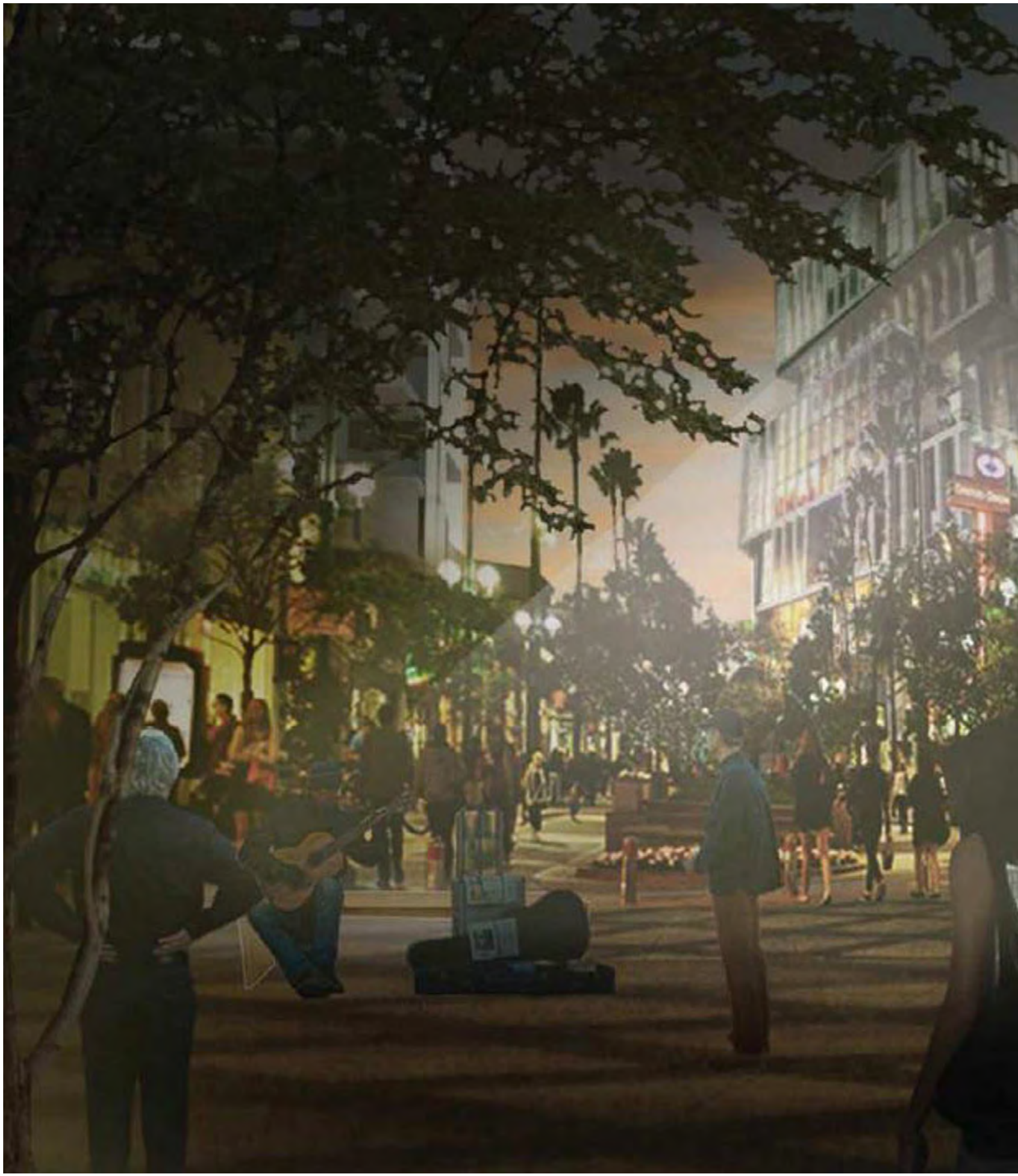
Mixed Use area where there are restaurants and shops along the broad, shaded pedestrian-only street. This boulevard runs along the river between El Camino North and South and connects to the pedestrian footbridge that bridges both sides of the river.

# The Plaza

EL CORAZÓN CENTRAL

The Plaza is the heart of Camino del Cerro North. It is the midpoint of the Promenade, a tree shaded pedestrian road that is flanked by shops and businesses. It is a gathering place for residents and visitors, as it is surrounded by restaurants, bars and the cinema complex.

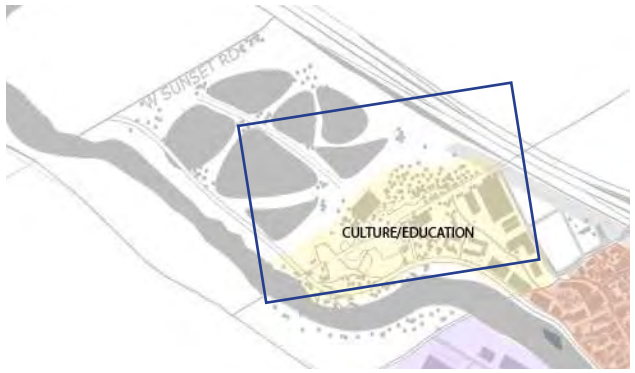
The buildings surrounding the Plaza are higher than other parts of the community and there is an equitable mix of condos, apartments for rent and affordable housing. All housing is within walking distance of a school and other needed services, as well as local park.




FROM THE PRODUCER OF ALICE IN WONDERLAND
SNOW WHITE & THE HUNTS
JUNE 1

# Archaeological Museum

EL CORAZÓN CENTRAL




The Archaeology Museum creates educational opportunities for the community to learn about Arizona's rich history and settlement patterns along the Santa Cruz river corridor. One goal of the museum is to revitalize the historic Hohokam river canals/channels, celebrating the cultural influence of the river. The agricultural aspect of the museum helps to support and benefit local food growth within the community. In conjunction with community building and the creation of new networks of growth, the museum provides a public resource along with an array of environmental services.


Camino Del Cerro North
(Central Urban Fabric)
Santa Cruz River
Desert Park

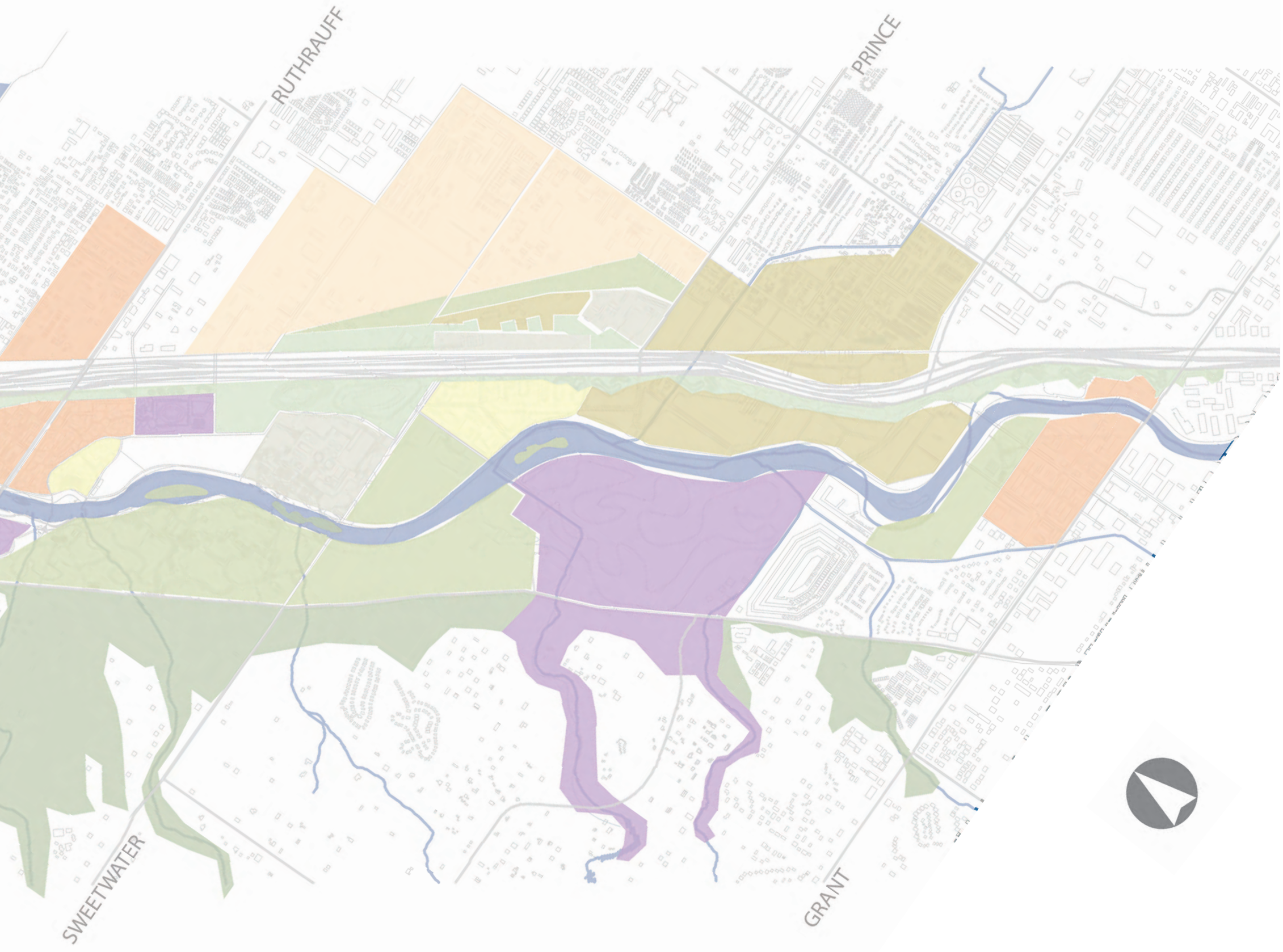
# Archaeological Museum

EL CORAZÓN CENTRAL

The desert park that travels along the river's curve supports and benefits the surrounding native habitat by creating a natural buffer to the urban fabric, as well as add more protection to the integrity of the river. This park will allow for visitors and residents to explore the river's edge in a responsible way. without over-trafficing fragile habitat.

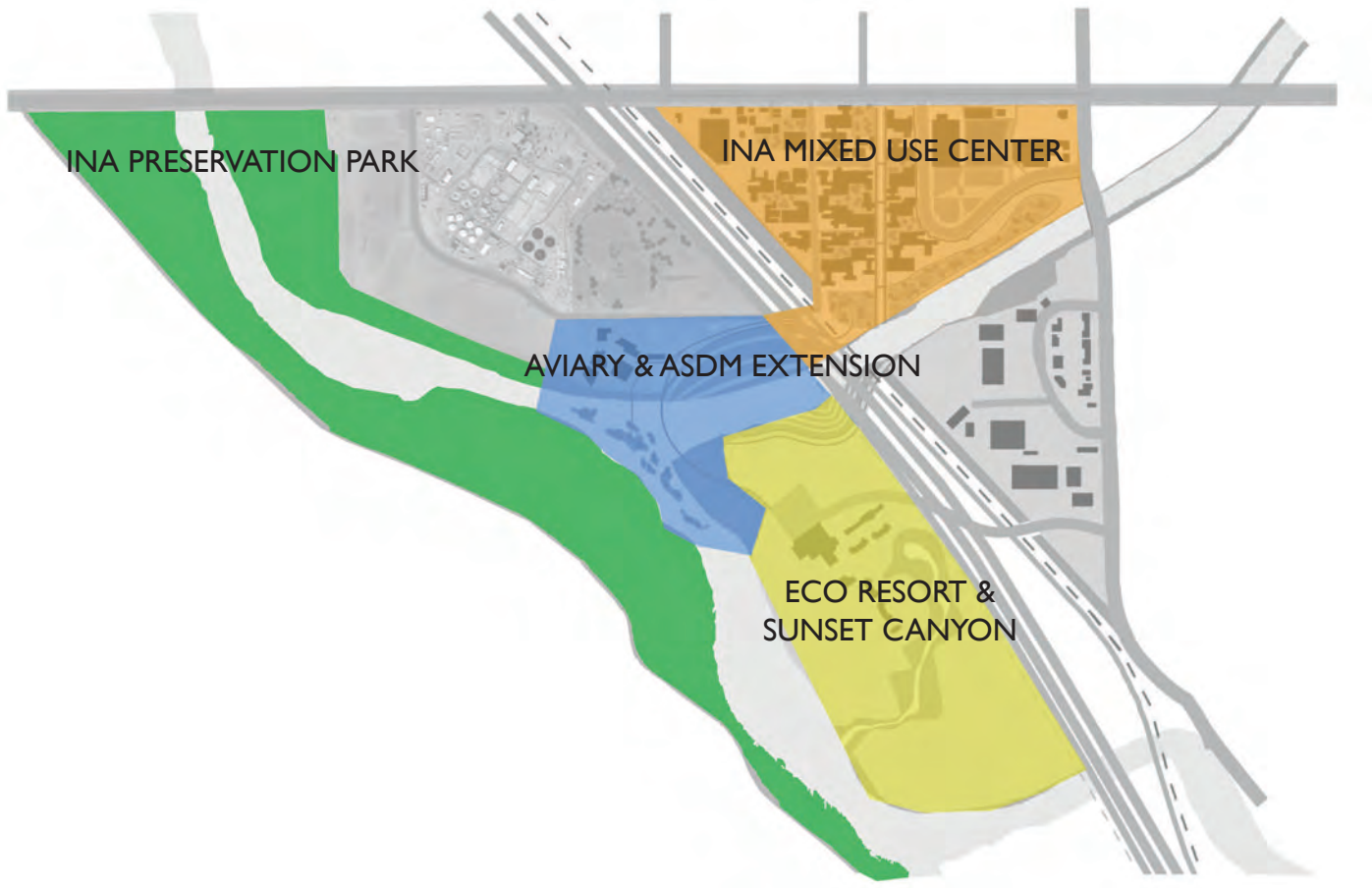

100'
50'
10'

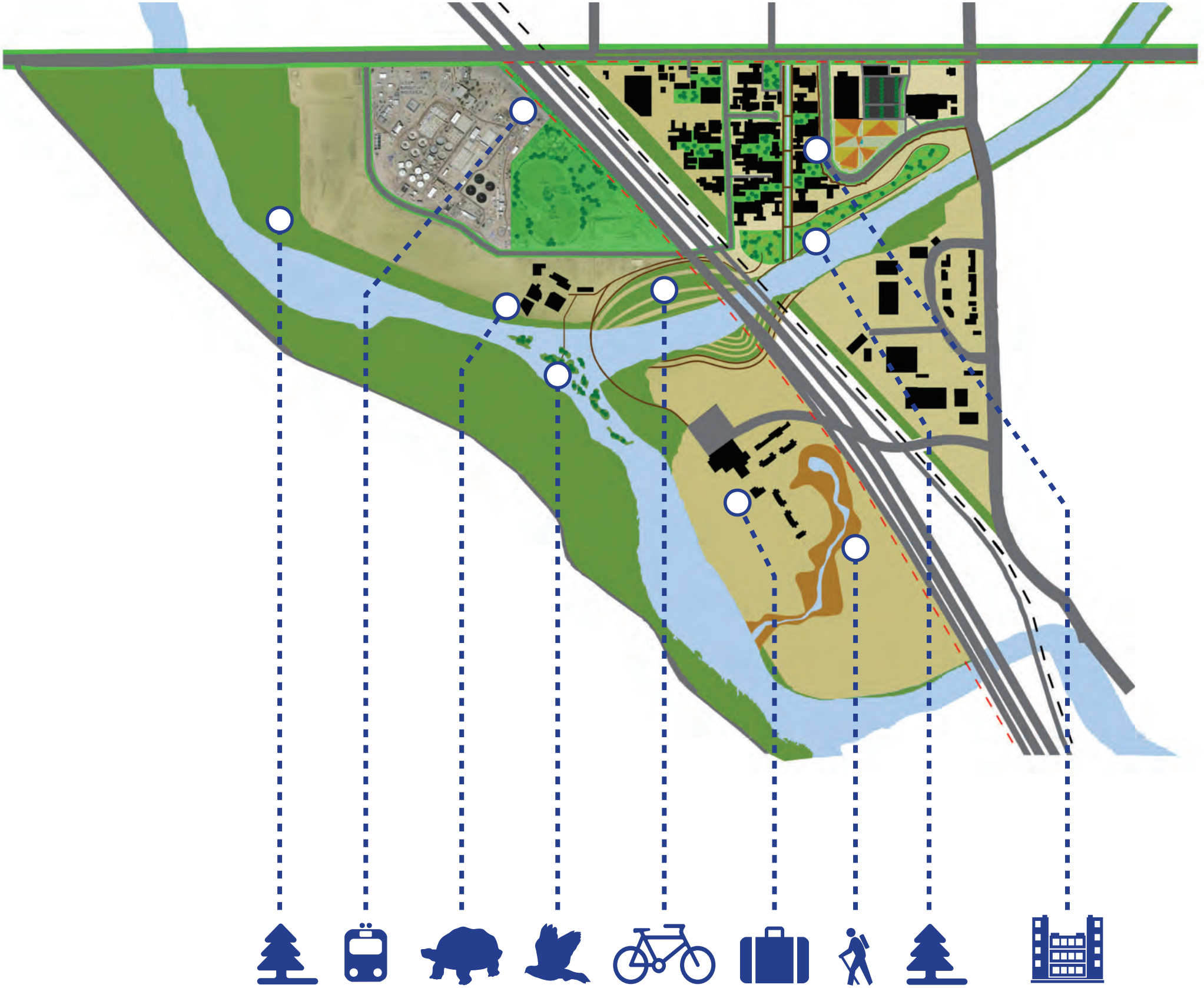
# El Corazón Norte


RUTHRAUFF
PRINCE
SWEETWATER
GRANT

# El Corazón Norte


The northern most focus area, El Corazón Norte is bordered by the Rillito River to the south and Ina Road to the north. The most distinguishing feature of this focus area is the proposed mixed use development, east of the Interstate in the existing commercial center. This urban development introduces strong connections to amenities west of the highway through greenways and a terraced underpass allowing for a significant increase in access and circulations for pedestrians, cyclists, and vehicles. The proposed trolley line runs adjacent to the Interstate on the west side, then crosses Ina Road into the urban core. El Corazón Norte also features an earthworks park with berms and micro basins serving as a natural urban respite for neighboring residents, business owners, and visitors. To the west of the Interstate, proposed amenities emphasize restored natural systems once characteristic of the site. Facilities that also enhance the natural character of the site include a recreational canyon, eco resort, aviary, extension of the Arizona Sonora Desert Museum (ASDM) and a preservation park.



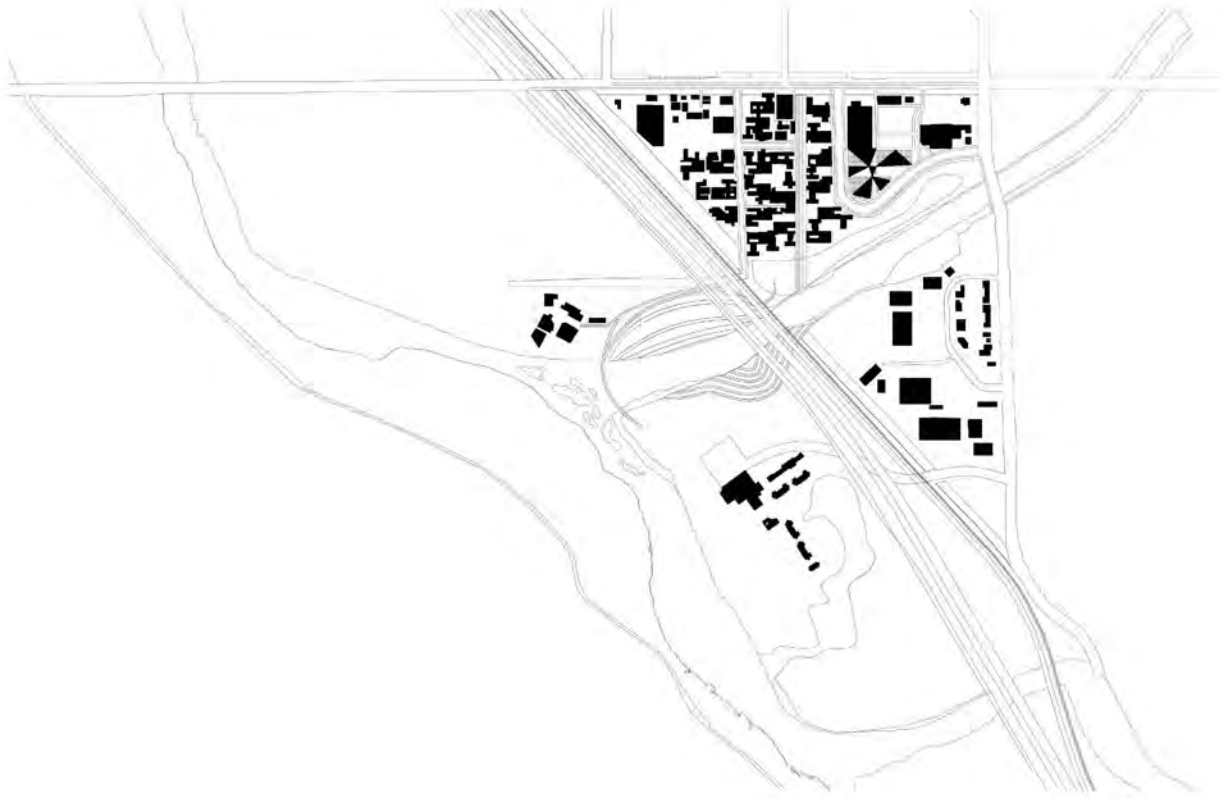


# Design Strategies

EL CORAZÓN NORTE

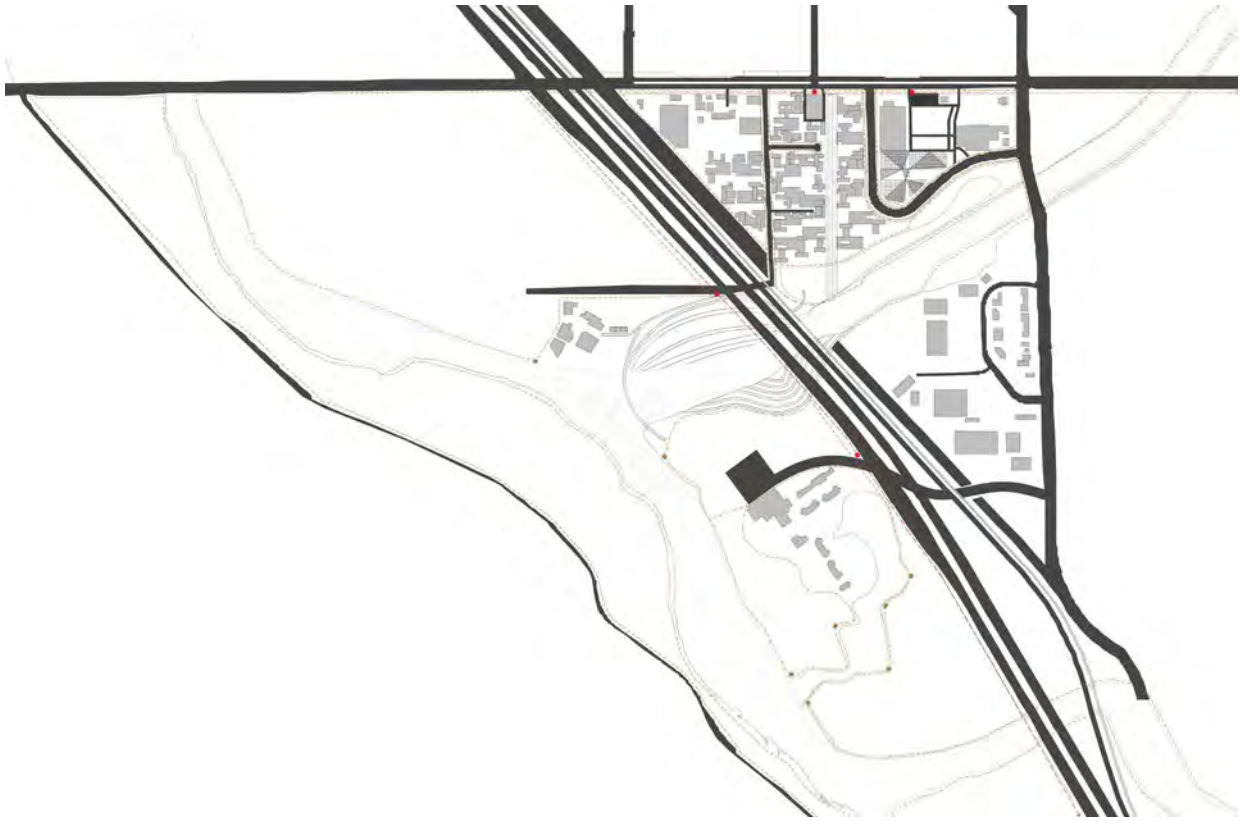
## Built Form

This Building Footprint Diagram illustrates the areas within the site in which existing and proposed buildings are located. The majority of built structures are located to the east of the Interstate, and are arranged in a dense urban cluster made up primarily of mixed use buildings. The vast natural area west of the Interstate is relatively undisturbed except for the Arizona Sonora Desert Museum Extension and Eco Resort surrounding the canyon.



## Hydrology & Greenways

This Hydrology and Greenway diagram illustrates where hydrology is located within the site as well as the greenways along the river corridor. The river is the main source of water, with smaller tributaries that flow into the Santa Cruz River. Rainwater and building condensate is collected along the terraced pedestrian areas and into a series of micro basins.



## Circulation

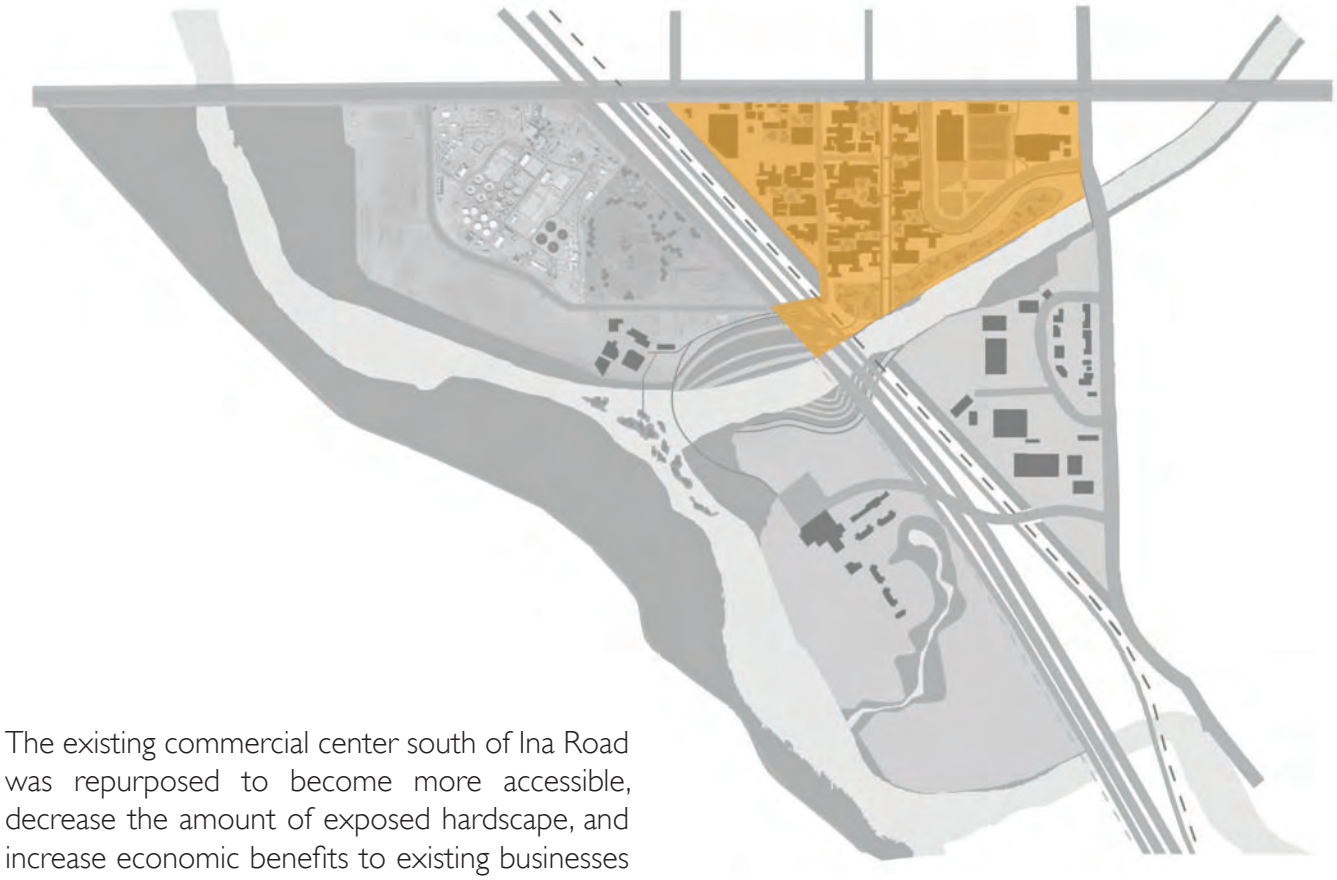
This Circulation diagram illustrates pedestrian and vehicular circulation throughout the site and highlights the strength of east-west movement. Existing and proposed roads, as well as parking is shown in black, red indicates transit locations, and tan represents bike routes with lookout stations. The site is meant to be accessible by various means, particularly in the dense urban node to the east.

## Restoration

This Restoration diagram illustrates the extent that each area will be restored and protected. The open spaces in lighter green have select protected measures to be implemented, and the areas in dark green are to be heavily protected. The areas directly adjacent to the river contain the most sensitive habitats, so extra measures will be taken to ensure their survival.

# Ina Mixed Use Center

EL CORAZÓN NORTE

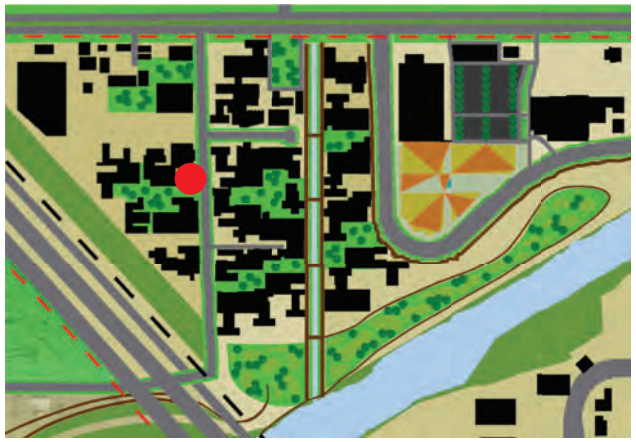


The existing commercial center south of Ina Road was repurposed to become more accessible, decrease the amount of exposed hardscape, and increase economic benefits to existing businesses through the creation of a dense, walkable urban fabric in which people have the opportunity to live, work, and play without the use of a vehicle. Buildings are terraced to create a comfortable human scale, oriented to be self-shaded, and cantilevered to create dynamic outdoor-indoor transition spaces. These green outdoor spaces also encourage east-west movement throughout the site. Urban agriculture fields are located just south of the Lowes Home Improvement Center covered by iconic desert tensile structures for controlled solar exposure, allowing for a wider variety of crops to be grown. A central greenway runs through the urban core serving as the primary pedestrian corridor leading to the earthworks park, just north of the Cañada del Oro Wash. To buffer the western buildings from the Interstate, a vegetated "ha-ha" wall is featured with large desert trees to decrease western exposure and provide a green aesthetic.


plaza/open space
greenway
urban agriculture
micro basins
earthworks park

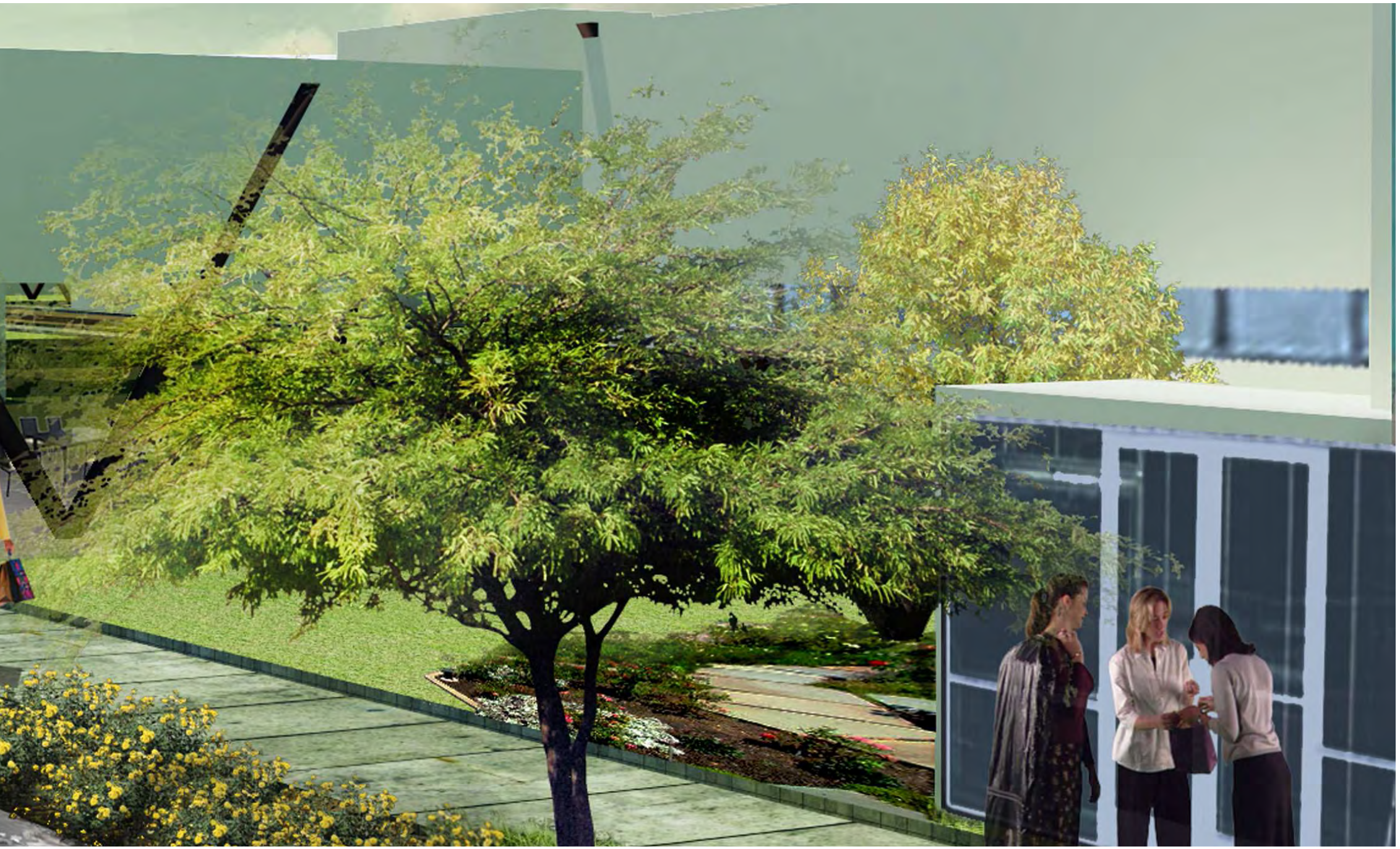
# Ina Mixed Use Center

EL CORAZÓN NORTE



Repurposing the existing commercial center just south of Ina Road and west of North Thornydale as a mixed use community will revitalize the area as a dense walkable urban node reaping economic benefits for existing and proposed businesses. This repurposed commercial center features abundant greenways for ease of pedestrian circulation throughout the urban fabric. These pathways run adjacent to shaded glass facades allowing people to look into shops and create visual connections. Pedestrian and vehicular circulation is separated by a generous vegetated buffer resulting in more walkable areas, shaded hardscape, and an increase in urban wildlife habitat. Connectivity and hierarchy of paths allows for one to be easily oriented within the site and creates strong connections to different amenities within and beyond the mixed use center.

| Designated Use | Square Footage | Total |
|---|---|---|
| Live Work Lofts | 62,500 | 25% |
| Commercial | 87,500 | 35% |
| Residential | 100,000 | 40% |
| Total_Building | 250,000 | - |
| Total_Lot | 372,438 (8.5 acres) | - |



# Ina Mixed Use Center

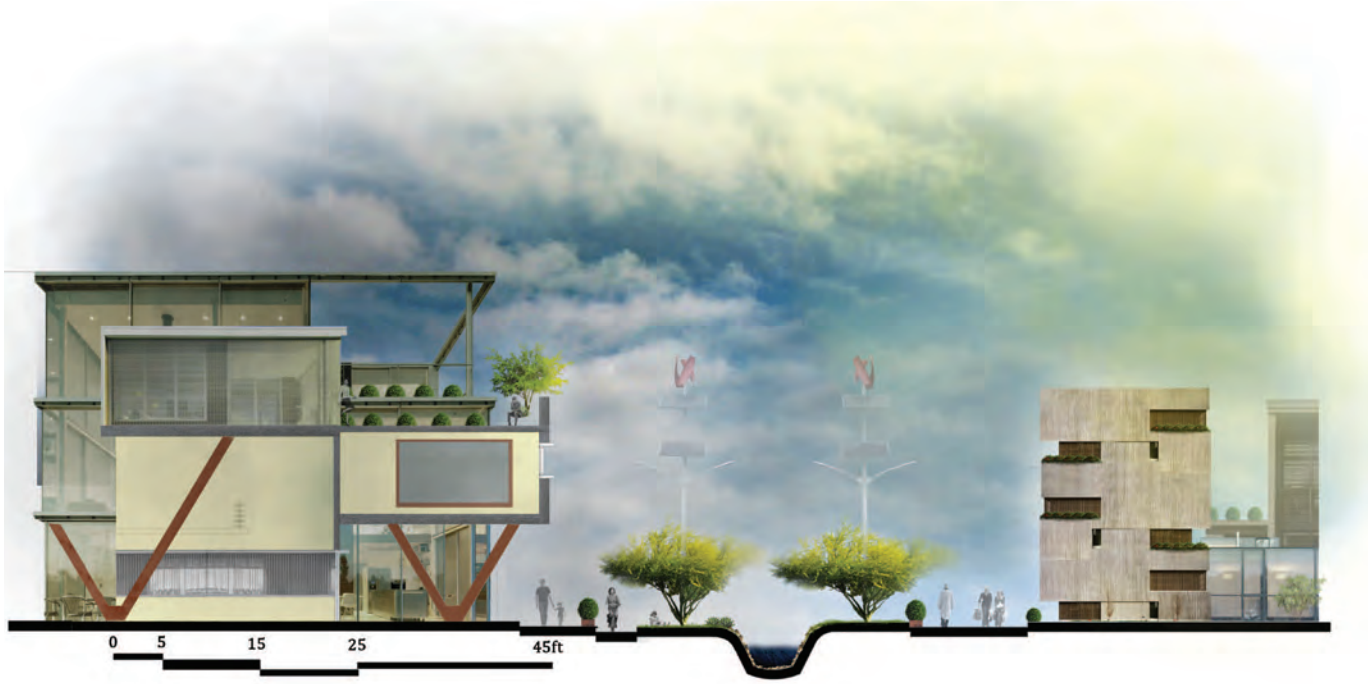
EL CORAZÓN NORTE

Plazas and open spaces integrated throughout, create stimulating social environments while buildings are oriented to create optimal thermal conditions throughout the year. These outdoor spaces feature ample seating and table space for residents, business patrons, and visitors. Shade is provided by trees and cantilevered buildings. These exterior spaces become an amenity especially to residents living within the mixed use community as it provides the opportunity for outdoor relaxation, physical activity, and social interaction.

# Ina Mixed Use Center

EL CORAZÓN NORTE

The primary pedestrian greenway transects the urban fabric bordered by store fronts and open spaces. This lush greenway runs north to south from Ina Road to the Cañada Del Oro Wash along an existing drainage structure which was reconstructed as an urban bio swale. This bio swale is supplemented by urban runoff from existing infrastructure and proposed building condensate sources to create a riparian influenced corridor within the urban core. Generous walkways on both sides of the bio swale are connected at crucial locations with bridges allowing for pedestrian and cyclist movement, as well as increased permeability into adjacent plazas promoting east-west circulation.




# Ina Mixed Use Center

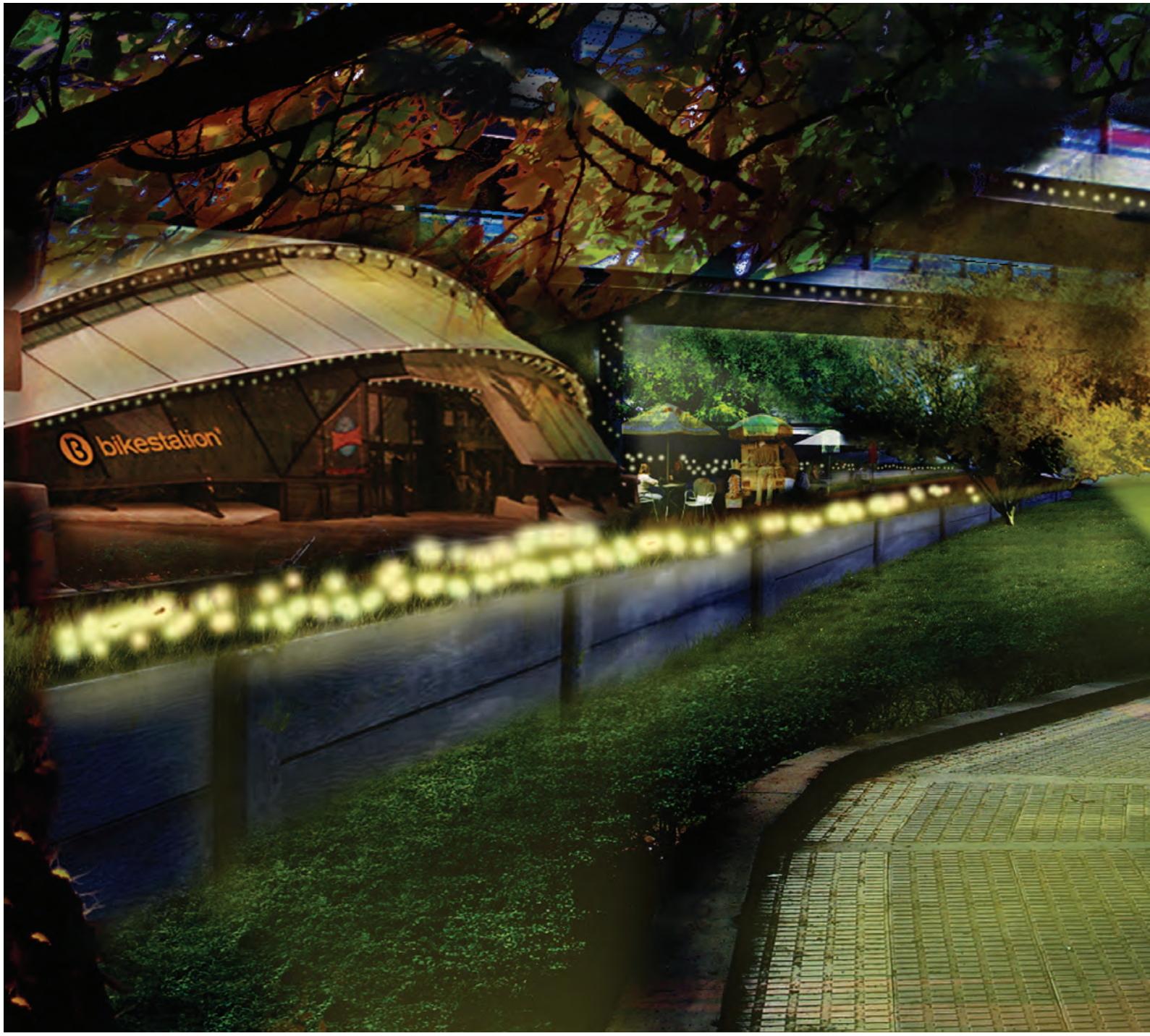
EL CORAZÓN NORTE

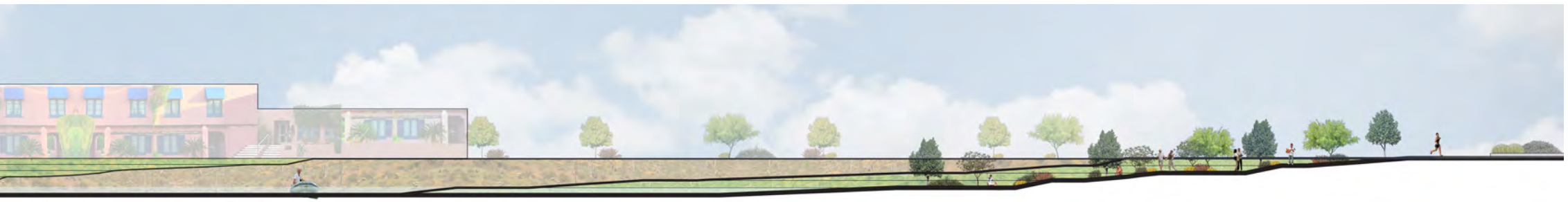
The earthworks park serves the mixed use community as a natural area of respite located just south of the urban core. Paths meander around shade-giving trees and exciting features such as basins, bio swales and berms. Lush basins and bio swales promote habitat richness while reinforcing a riparian aesthetic supplemented by urban runoff and building condensate. Berms planted with native Sonoran Desert grasses create natural thresholds and vertical interest while also acting as a screening mechanism.

# Ina Mixed Use Center

EL CORAZÓN NORTE

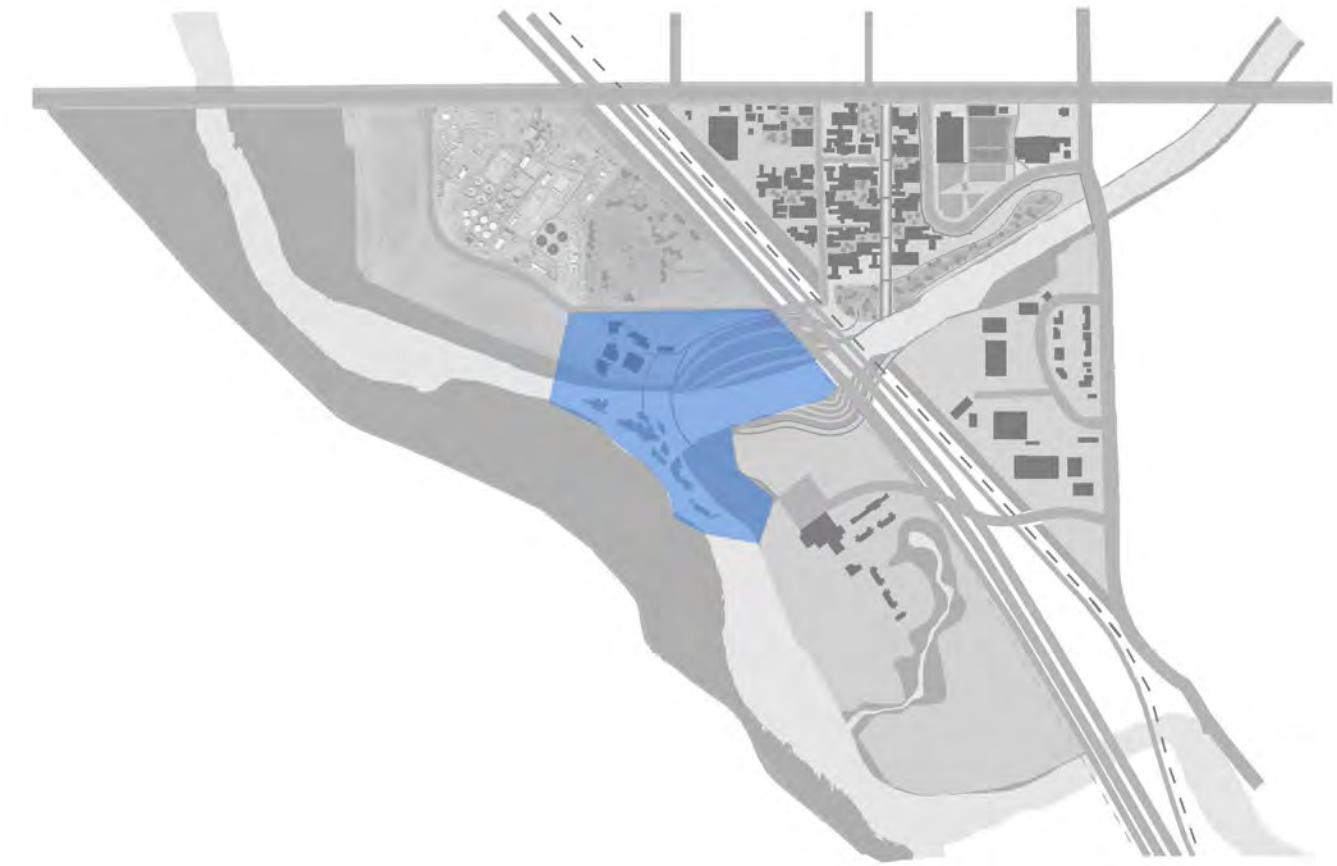
The terraced underpass runs adjacent to the Cañada Del Oro Wash and under the I-10, serving as a major artery for pedestrians and cyclists thereby creating a strong connection between both sides of the Interstate. Amenities along this underpass include a bike share, open space, and vendors. The terracing strategy allows for constant access during flood events as water infiltrates into lower levels first then slowly moves upstream to the Santa Cruz River confluence. Riparian vegetation and native grasses planted along the edges reinforce the stability of slopes and work to further slowdown water. The openness of this underpass lends itself to increased use during cool evenings while well-lit, well-trafficked pathways ensure the safety of visitors, particularly at night.



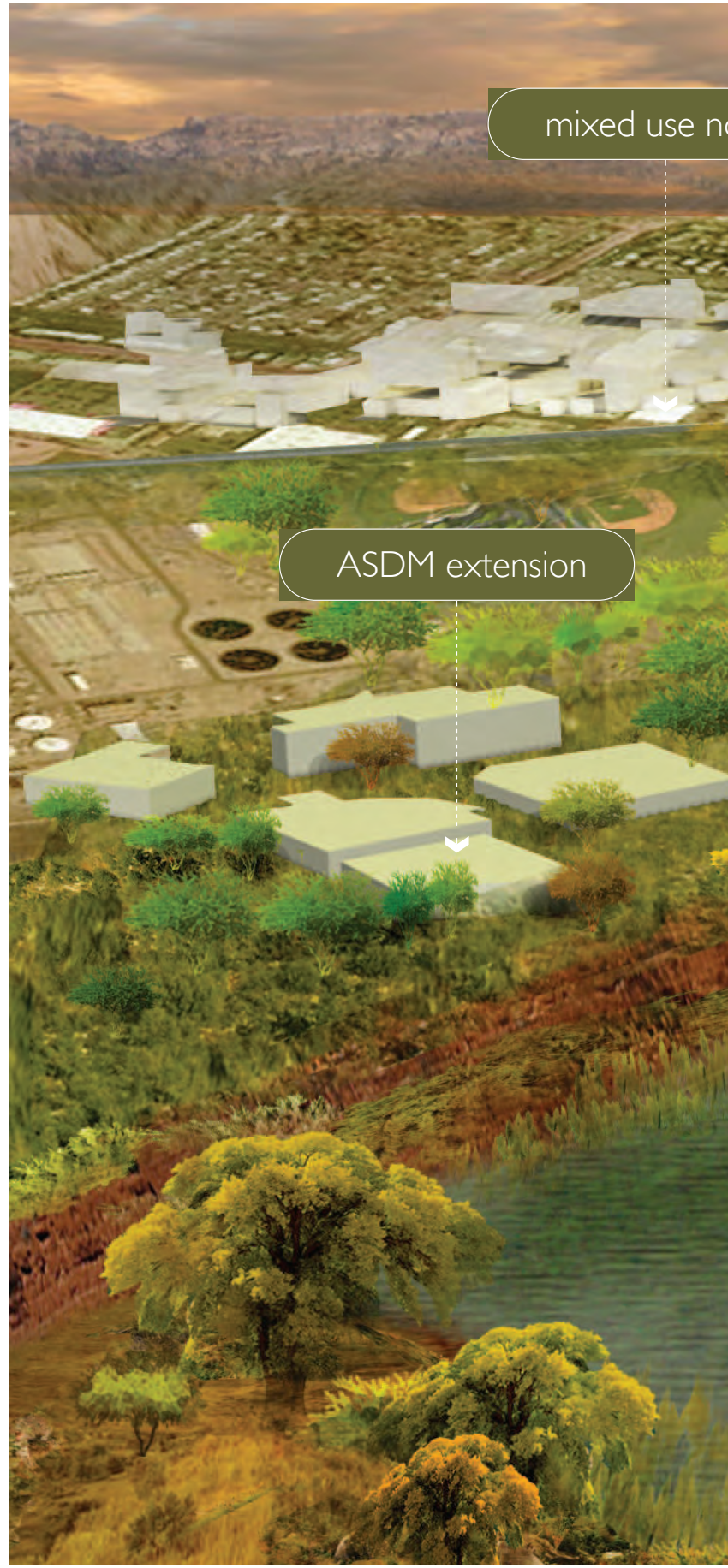



# Aviary and Arizona Sonoran Desert Museum Extension

EL CORAZÓN NORTE



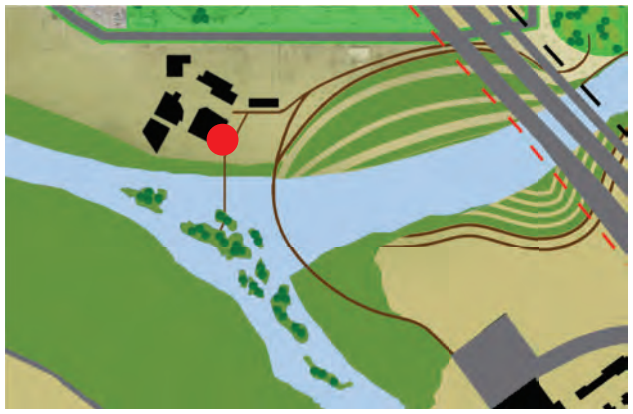
A proposed aviary, Arizona Sonora Desert Museum Extension, and eco resort are the main points of interest west of the Interstate. The introduction of small, lush islands increases biodiversity in the riparian environment. Connections to the islands designated for public use from the ASDM are made possible through exhilarating rope bridges. Themes of adventure and mystery are highlighted in the aviary through the use of dense riparian vegetation and elevated wildlife screens connected by wooden platforms winding through the tree canopy. Bird watching, hiking, and educational opportunities are the major activities that will draw people to this location.




ode
eco resort
constructed island

# Aviary & Arizona Sonoran Desert Museum Extension

EL CORAZÓN NORTE

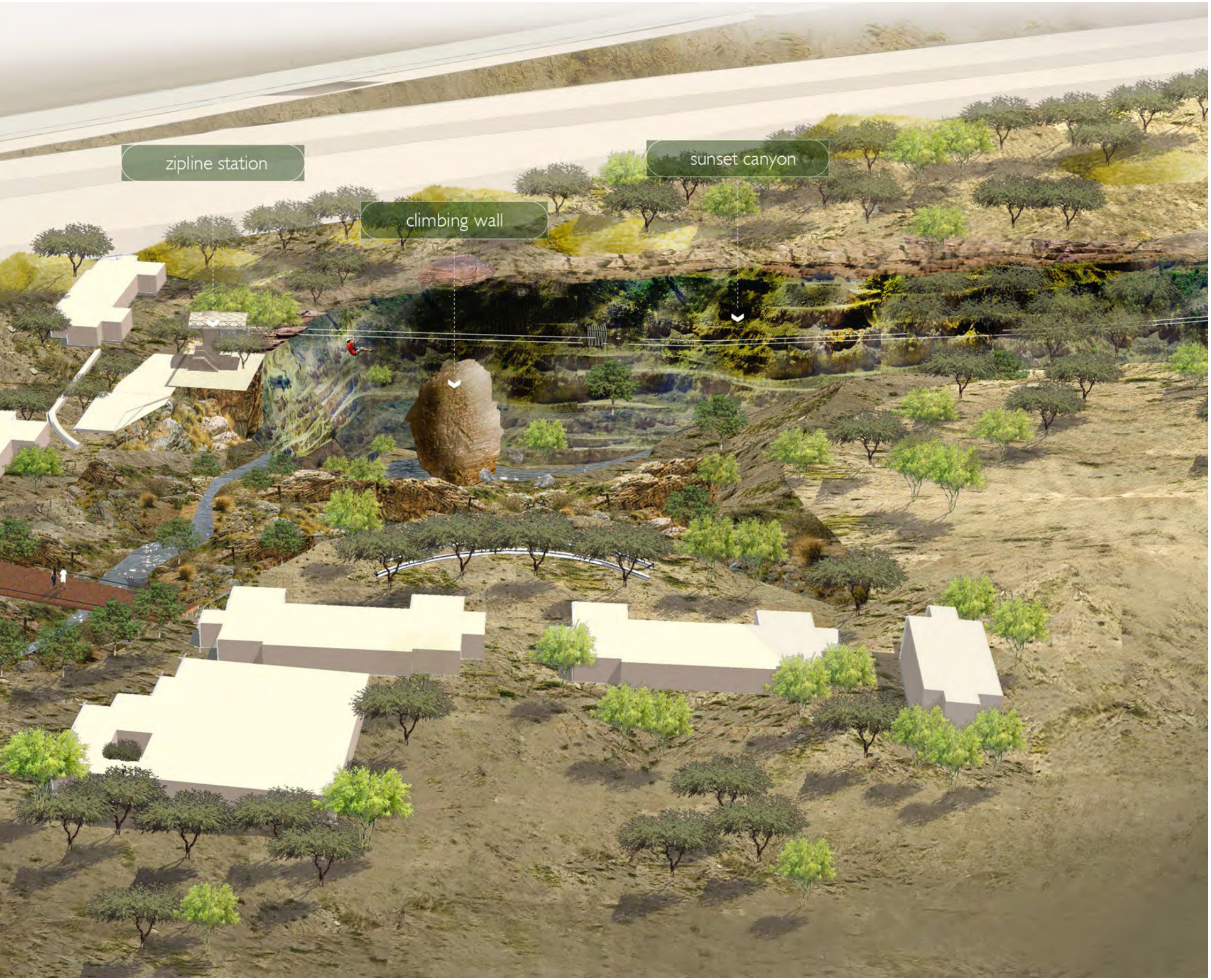


The aviary islands are comprised of nine separate islands where the Cañada Del Oro Wash meets the Santa Cruz River. These islands are accessible from the Arizona Sonora Desert Museum Extension. Each of the specific islands mimic a different biome through the use of different native vegetation to highlight all of the biomes found in Southern Arizona. The variety of vegetation attracts different species of birds - creating a theme for each of the islands as an attraction for birdwatchers. Several of the islands will be restricted from public use and have a stronger focus on restoration and research as a means of promoting preservation and restoration strategies north of Ina road as well.

# Eco Resort and Sunset Canyon

EL CORAZÓN NORTE

The purpose of the proposed eco resort is to showcase the culture, environment, and history of Tucson. The eco resort hugs the repurposed quarry/canyon's rim and allows visitors to experience and relax in a beautiful wild desert setting. Visitors to the resort can also enjoy the many recreational activities Sunset Canyon offers, such as hiking, biking, zip lining, and climbing. The canyon improves upon the condition and aesthetic of the existing quarry pits by providing not only activities for guests in a lovely setting, but the canyon will generate jobs as well as improve habitat for local species.


zipline station
climbing wall
sunset canyon

# Eco-Resort and Sunset Canyon

EL CORAZÓN NORTE

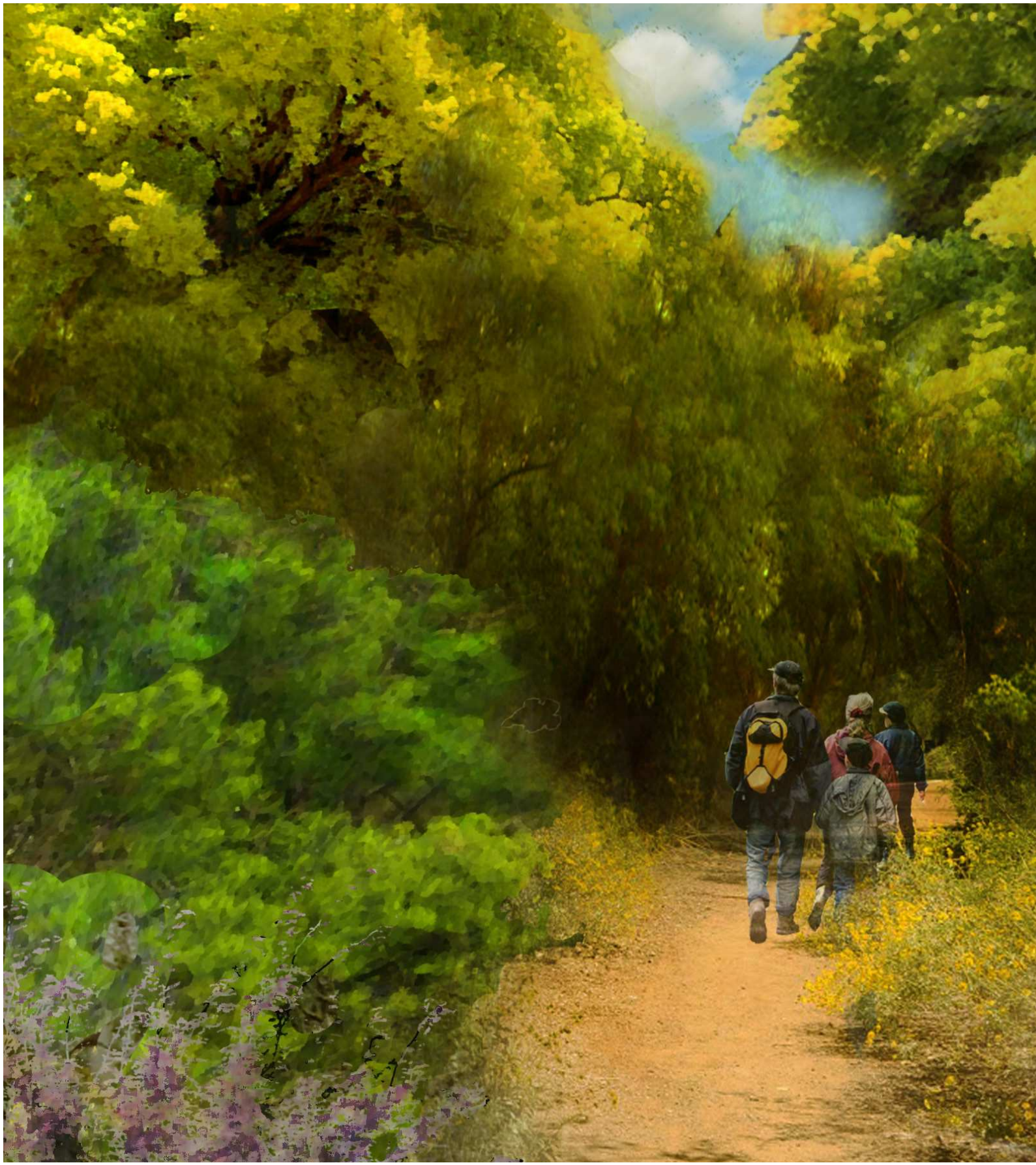
Sunset Canyon (the repurposed quarry) boasts a central free climb wall as well as an overhead zip line that glides through the entire length of the canyon. Numerous hiking and equestrian trails also exist both at the canyon base and along the rim. Bike trails also link the ASDM, aviary, eco resort and canyon together. Small concrete planters are built into the canyon walls in strategic locations for stability and erosion control.

The canyon section below shows the close proximity of the resort facilities to the canyon. The eco resort is strategically located near the Arizona Sonora Desert Museum Extension and open air aviary, and is very close to the canyon so that guests can partake in an array of recreational activities that the general area and canyon offer.

# Ina Preservation Park

EL CORAZÓN NORTE

Located between Silverbell Road and the Santa Cruz River is the Ina Preservation Park. This gorgeous riparian habitat will be the highlight of this public park. Grand cottonwood trees, dense reeds and natural grasses immerse the public in a dense riparian habitat reminiscent of a time when the Santa Cruz River featured this lush vegetation along the entire riverbed. Hiking, fishing, and picnicing are some of the major attractions of this location. Heavy restoration and preservation strategies will be used throughout this area of the site to prohibit any possible future disturbances to this already thriving riparian habitat. This park is also a great educational and recreational tool for adults and children alike, as well as stretching the restoration of the Santa Cruz southward.



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