



Reclaim
THE RIVER;
Enliven
THE BANKS

El Rio District Area Plan:
A Vision for Buckeye's El
Rio District and the Gila
River



Acknowledgments

City Council

Jackie A. Meck, Mayor

Tony Youngker, City Council District 1

Jeanine Guy, City Council District 2

Michelle Hess, City Council District 3

Patrick Hagestad, City Council District 4

Craig Heustis, Vice Mayor, City Council District 5

Eric Orsborn, City Council District 6

Planning & Zoning Commission

Carol Kempiak, Chairperson

Thomas Marcinko, Vice Chairperson

Jesse Knight, Commissioner

Preston Hundley, Commissioner

Clayton Bedoya, Commissioner

Reverend Gregory Clemmons, Commissioner

Charles Trulliger, Commissioner

Ted Burton, Commissioner (Alternate)

Deanna Kupcik, Commissioner (Alternate)

Martin DiBello, Commissioner (Alternate)

John Pringle, Commissioner (Alternate)

Nick Hudec, Commissioner (Alternate)

A very special thank you goes to the many dedicated Buckeye property owners whose contributions, support and long term commitment to the prosperity and health of the Gila River in Buckeye helped in the creation of this document.

For information on the El Rio District Area Plan, please go to:

www.buckeyeaz.gov/gila-river-projects

Or Contact

City of Buckeye Planning Department

530 East Monroe Avenue

Buckeye, AZ 85326

623-349-6000

Project Team



Adam Copeland, Project Manager



Kevin Kugler, AICP, Project Principal

Matt Klyszeiko, AICP, Project Manager

Evan Fisher, Project Planner



Roland Wass, PhD, P.E., Mitigation Manager

Brendan Fox, P.E., Mitigation



Scot Schlund, P.E., Lead Project Engineer

Ailen Lynch, Project Engineer



Jay Hicks, ASLA, PLA, Lead Landscape Designer

Brandon Sobiech, Landscape Designer



Tim Wade, Lead ILF Manager



Table of Contents

Acknowledgments	i
Project Primer	
Project Primer	2
Introduction	2
Purpose of the Plan.....	2
Regional Context.....	3
The River Setting.....	3
Study Area.....	4
Creating This Vision Plan.....	5
Relationship to Companion Documents for this Vision Plan.....	5
Communication and Community Engagement.....	6
What Exists Today	
Existing Plans & Studies	9
General Plan.....	9
Development Code.....	9
El Rio Watercourse Master Plan.....	10
City of Buckeye Parks and Recreation Master Plan.....	10
El Rio Design Guidelines & Planning Standards	10
Buckeye Town Lake Feasibility Study	10
UCLA City LAB /ASU Graduate Design Studio.....	10
Existing Land Use & Development Pattern.....	11
Land Ownership	11
Development Pattern.....	11
Comparative Scale	12
Environmental Features.....	13
Gila River	13
Existing Wildlife & Priority Habitat Areas	14
Salt Cedars & Other Vegetative Communities	14
Open Water Bodies	14
Water Quality	14
Fred J. Weiler Green Belt.....	15
Floodway/Floodplain.....	15
Localized Drainage.....	15
Existing Connectivity	16
Roadways & Gateways	16
State Route 30.....	16
Walking & Biking.....	16

A Vision for the Future

Community Structure.....	18
Urban Sections a Planning Continuum.....	18
Land Use Character Types	19
Evaluating The Options	22
Preferred Land Use Character Plan	23

Area Plan for the El Rio District

The El Rio District	26
Claim.....	26
Integrate	26
Activate.....	26
Concept Plan	27
Major Features of the Concept Plan	30

How We Get it Done

Implementation	36
Restore the River.....	36
Preservation of High Quality Habitat.....	36
Restoration/Creation of High Quality Habitat.....	37
Enhancement of Low Quality Habitat	37
Salt Cedar Eradication and Long Term Management	38
Site Specific Restoration Projects	39
In Lieu Fee Program	40
Next Steps for the ILF Program	41
Coordination with FCDMC on Lower Gila River Projects and Permitting Activities.....	42
Sand and Gravel Reclamation Guidelines.....	42
Enliven the Banks.....	43
El Rio District.....	43
Flood Protection.....	43
Annexation of the El Rio District.....	43
Gila River Gateway Lake and Trail Connectivity	43
Fourth Street and El Rio District Roadways.....	44
State Route 30.....	44
Infrastructure Funding & Investment Choices.....	44
Plan Adoption and Amendment	44

Figure 9: Current Land Ownership	11
Figure 10: Current Development Pattern.....	11
Figure 11: Percent of Land Ownership	11
Figure 12: Comparative Scale.....	12
Figure 13: Environmental Features.....	13
Figure 14: Proliferation of Salt Cedar.....	14
Figure 15: Buckeye Fire, 2005	14
Figure 16: Open Water Bodies	14
Figure 17: Watson Drainage System.....	15
Figure 18: Fred J. Weiler Greenbelt	15
Figure 19: FCDMC Floodplain Delineation.....	15
Figure 20: Connectivity to the Lake.....	16
Figure 21: Community Structure	18
Figure 22: Planning Relationship to the River	18
Figure 23: Preferred Land Use Plan	24
Figure 24: El Rio District Limits	26
Figure 25: El Rio District, Development Strategy.....	26
Figure 26: El Rio District, Concept Plan	27
Figure 27: El Rio District - Conceptual Rendering, North	28
Figure 28: El Rio District - Conceptual Rendering, South.....	29
Figure 29: Conceptual Levee Alignment	30
Figure 30: Conceptual Levee Design	30
Figure 31: Gila River Gateway Concept Plan.....	31
Figure 32: Fourth Street Alignment	32
Figure 33: 4th Street Cross Sections	32
Figure 34: SR-30 Conceptual Alignment	33
Figure 35: ILF Areas	34
Figure 36: HUC 4 Watersheds with AGFD Wildlife Areas.....	34
Figure 37: Areas of High Quality Habitat Preservation	36
Figure 38: Areas of Restoration/Creation of High Quality Habitat	37
Figure 39: Environment of Low Quality Habitat	38
Figure 40: Proposed ecosystem restoration project of the SR 85 Bridge.....	39
Figure 41: Areas of Restoration/Creation of High Quality Habitat	40
Figure 42: Arlington Wildlife Area.....	41
Figure 43: Current Land Ownership with ILF Boundaries.....	41

List of Figures

Figure 1: Gila River Corridor.....	2
Figure 2: Regional Context	3
Figure 3: Gila River Watershed	3
Figure 4: Study Area	4
Figure 5: Vision Plan Components.....	5
Figure 6: Preferences & Challenges Community Feedback.....	6
Figure 7: Existing General Plan.....	9
Figure 8: Existing Zoning Districts.....	9

List of Tables

Table 1: Land Use Character Matrix.....	21
Table 2: Restoration Project at SR85 Bridge and the Gila River, AZ	40

List of Appendices

Appendix A: Sand and Gravel Reclamation Guidelines
Appendix B: Gila River Restoration Plan Technical Memorandum
Appendix C: Grants and Funding Table



PROJECT

PRIMER

In recognition of the desire to “Reclaim the River; Enliven the Banks”, this Vision Plan is established as the tool to facilitate change within and along the Gila River.

Project Primer

Introduction

The Gila River corridor is one of Buckeye's most recognizable landmarks, but is at the same time one of the best kept secrets in the West Valley! Buckeye has a long-standing tradition of honoring the history of the Gila River and the future prosperity of Buckeye will closely be linked to the preservation, recreation and economic development benefits emanating from it's banks. The City of Buckeye understands the importance of embracing the history of the Gila River and recognizes the incredible opportunity to undertake this Vision Plan to create a community-inspired, unified vision for the Gila River and adjacent properties in the City of Buckeye.

Purpose of the Plan

Simply put, the primary focus of **Reclaim the River; Enliven the Banks: El Rio District Area Plan, A Vision for Buckeye's El Rio District and the Gila River** is one of the first attempts to support the implementation of the original "El Rio Vision" from 1999. This original "call to action" to preserve and revitalize the irreplaceable natural resources of the Gila River. This plan will also progress the implementation of the El Rio Watercourse Master Plan by returning the Gila River to its natural condition by maintaining, enhancing and mitigating flood elements that help create a linkage between riparian habitats and multi-use facilities and functions along the north bank of the Gila River in Buckeye. This will be achieved by preserving and maximizing the existing assets of the river and leverage those assets through collaborative partnerships to enhance the recreation and economic development potential of lands adjacent to the river.

With and through the City of Buckeye and partnering jurisdictions of Avondale, Goodyear and the FCDMC, long-

standing passion and commitment to restoring the Gila River, this Vision Plan (along with other supplemental planning documents) establishes a Vision for a world-class recreation and ecosystem destination for Buckeye residents and visitors alike.

More specifically, this Vision Plan seeks to achieve the following objectives:

1. Preserve and restore existing pristine natural habitat areas in the Gila River in Buckeye;
2. Compliment those preservation efforts with appropriately designed recreational opportunities that take advantage of open water bodies and an interconnected trail system; and
3. Establish a vision for supporting land uses along the north bank of the Gila River that celebrate the river to become a premier destination place in Buckeye.

There are a myriad of complexities and facets to such a broad undertaking of this type. *The Reclaim the River; Enliven the Banks: El Rio District Area, A Vision Plan for Buckeye's El Rio District and the Gila River* contains a series of planning efforts that individually serve a purpose, but collectively come together to achieve the overall plan objectives outlined above. A brief summary of some of the key tasks undertaken to achieve each plan objective include:

Preserve and restore existing pristine natural habitat areas in the Gila River in Buckeye.

Preservation and restoration of the ecosystem - Identify high quality habitats suitable for the Yuma Clapper Rail, Southwestern Willow Flycatcher and the Yellow Billed Cuckoo which are the primary special-status species that have been documented to occur or have

potential to occur in the planning area. Identify areas for salt cedar removal and long term management.

Establish a Mitigation Bank - Preserve and restore high quality habitats in the Gila River through the establishment of a mitigation bank, or In- Lieu Fee (ILF) program. Utilizing the expertise and resources of the Arizona Game & Fish Department, the ILF program establishes an instrument by which "mitigation credits" associated with Section 404 of the Clean Water Act can be bought and sold to create a revenue stream for the restoration and long term maintenance of quality riparian habitat in the Gila River in Buckeye. The Buckeye ILF program created through this Vision Plan has the potential to be the broadest and most successful ILF program of its kind in the state of Arizona.

Regulatory Permitting Strategy and Application - Based upon the specific



Yuma Clapper Rail
Henry McLin - aziba.org



Yellow-billed Cuckoo
Dan-Pancamo - aziba.org



Southwestern Willow Flycatcher
nrms.usda.gov

ILF program needs, develop a regulatory permitting approach that meets project partner objectives for aquatic habitat restoration, establishment, and enhancement activities that also work in concert with regional Flood Control District of Maricopa County flood control objectives for the Gila River.

Compliment those preservation efforts with appropriately designed recreational opportunities that take advantage of open water bodies and an interconnected trail system.

Sand and Gravel Reclamation Guidelines - Collaborate with the mining industry to develop sand and gravel mining guidelines that maximize their short term business objectives while recognizing that there are continued financial, social and recreational benefits that can be achieved after mining is completed.

Create world-class recreation and eco-tourism opportunities - Plan for a system of active and passive recreation opportunities on open water bodies and open spaces that are inter-connected through a series of non-motorized trails and paths.

Establish a vision for supporting land uses along the north bank of the Gila River that will celebrate the river to become a premier destination place in Buckeye.

El Rio District - through stakeholder and community input, develop a series of land use scenarios that are vetted by the City to identify one El Rio District land use plan that embraces the Gila River, links to downtown Buckeye and enhances economic development opportunities to "enliven the banks."

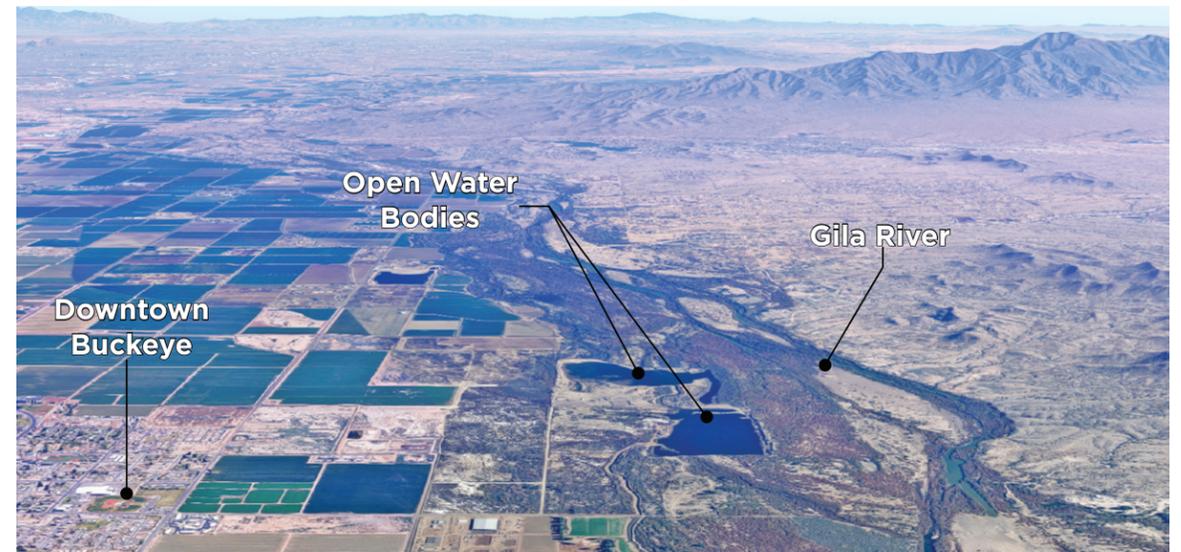


Figure 1: Gila River Corridor

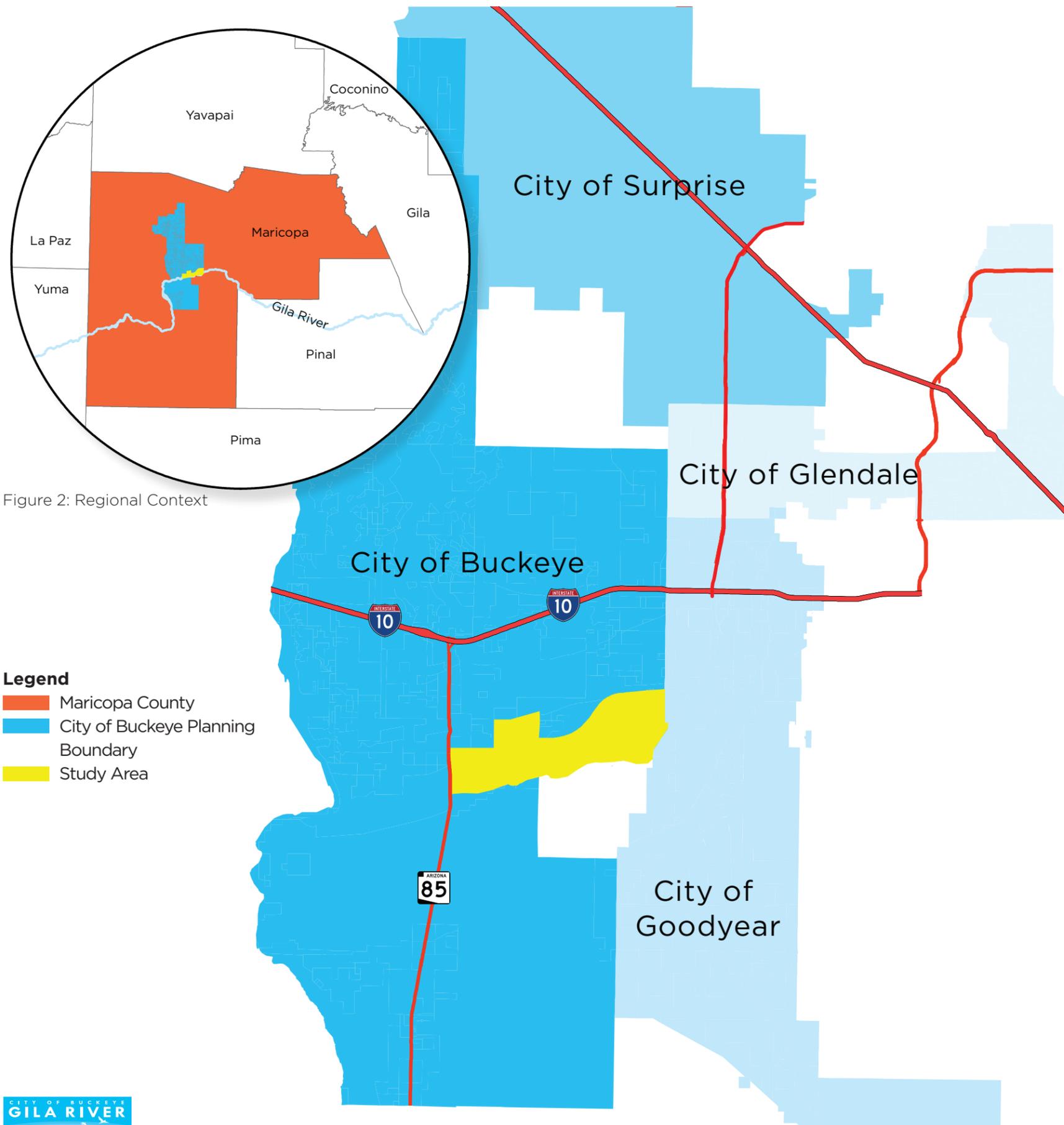


Figure 2: Regional Context

Regional Context

The River Setting

The Watershed. The Gila River is the second largest river in the State of Arizona, second only to the Colorado River. The Gila River is approximately 649 miles in length and has an enormous contributing drainage area of approximately 46,000 square miles that extends throughout Arizona, portions of New Mexico and the Republic of Mexico. There are a number of large tributaries that contribute flows to the Gila River including the Salt, Verde, San Pedro, Agua Fria, and Santa Cruz Rivers, as well as other large washes such as Waterman Wash located near the Goodyear/Buckeye border.

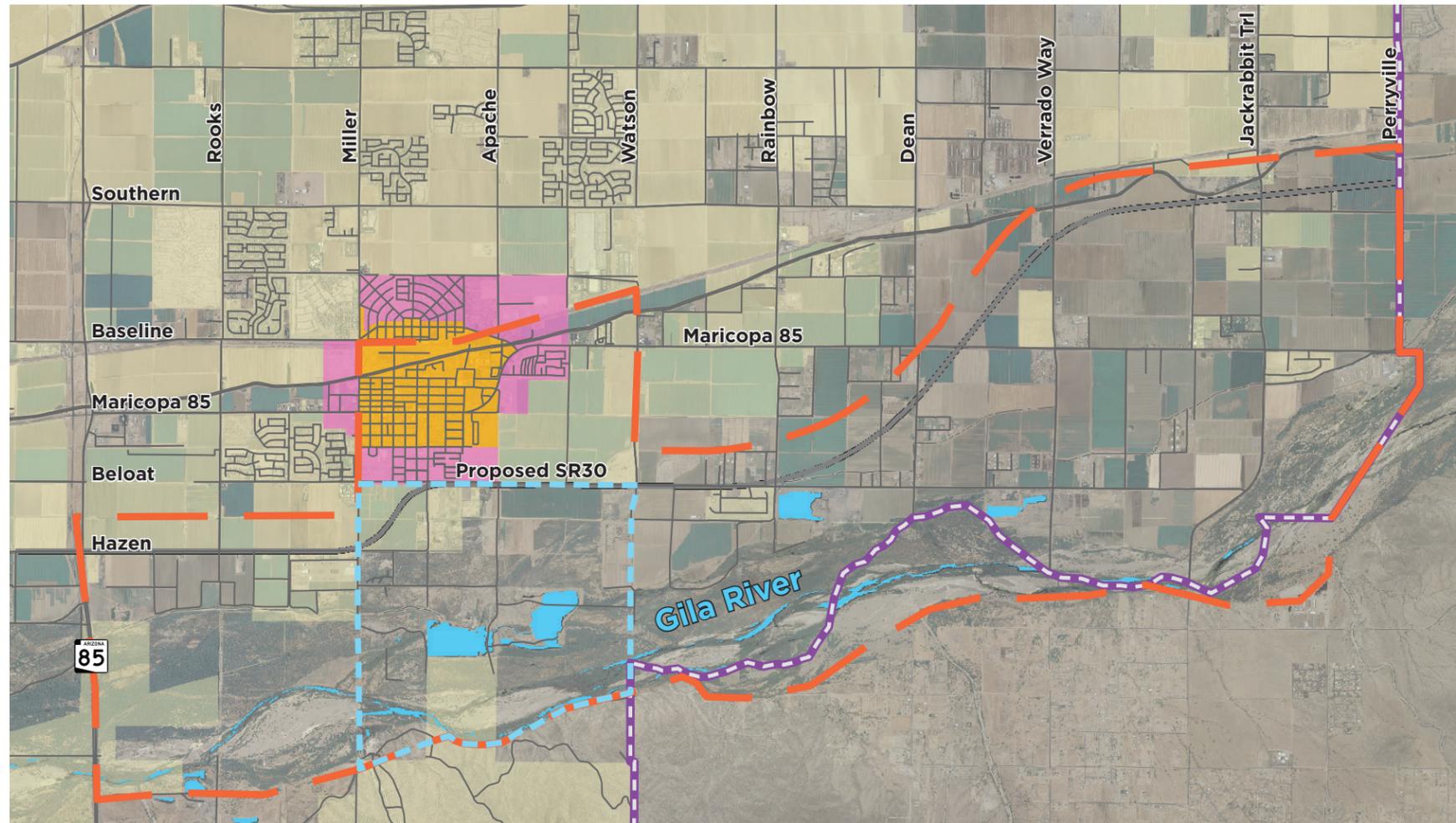
and unmaintained trails and off-road vehicle tracks providing access to hikers, fisherman and bird watchers and other recreation enthusiasts. Most notably, the Base and Meridian Wildlife Area, managed by the Arizona Game and Fish Department is located 15 miles upstream in Avondale.

In Buckeye. Within the Buckeye reach of the Gila River, agricultural return flows in combination with a shallow groundwater table and wastewater effluent supplied from the City of Phoenix 91st Avenue treatment facility provide sufficient, year round water supply to support a diverse vegetative community and several unique species of wildlife. The Gila River segment through Buckeye is an alluvial channel; with multiple channels, bars and/or islands with the position of the channels and bars changing over with time. Several open bodies of water are present. Some are located along the streamline of the river, while others are the result of sand and gravel mining activities in the river.



Figure 3: Gila River Watershed

In Maricopa County. The Gila River is unique among watercourses in Maricopa County. A shallow groundwater table and water resource inflows from agricultural and industrial users and the City of Phoenix's 91st Avenue Wastewater Treatment Plant/Tres Rios facilities provide for a diverse natural environment of high scenic quality. This section of the Gila River has no dams although there are several important irrigation intakes and outfalls. There are also no developed recreation areas, but there is a loose network of maintained



Legend

- City of Buckeye Planning Boundary
- Study Area
- El Rio District Area Plan

- City of Buckeye City Limits
- City of Buckeye Downtown Area
- City of Buckeye Extended Downtown Area
- Open Water

Figure 4: Study Area

Study Area

As Figure 4 illustrates, the Study Area is centrally focused along the Gila River in Buckeye for approximately nine (9) miles from Perryville Road to the east and the State Route 85 bridge to the west. The southern boundary closely aligns with the south bank of the Gila River and the north boundary varies from one to two miles north of the Gila River. All-together, the Study Area consists of approximately 23 square miles. Portions of the study area are currently within the Buckeye city limits, with the majority of the study area located in Maricopa County, but within Buckeye’s municipal planning area boundary.

The El Rio District is a 3.5 square mile central feature of the overall Study Area. The El Rio District Area Plan established by this document consists of the most strategically significant areas of the overall project which is generally located south of the existing Buckeye downtown, bounded by the Gila River to the south and Watson and Miller Roads to the east and west respectively.

Today exists two large open bodies of water along the northern bank of the Gila River that serve as the cornerstone by which the El Rio District Area Plan creates an integrated mixture of public spaces, restaurants, shopping, employment activities and urban neighborhoods that complement and support the restoration and preservation goals for the Gila River.

The El Rio District Area Plan does not include downtown Buckeye, but does seek to leverage the existing opportunities and constraints of downtown Buckeye to identify complimentary surrounding land uses (that may also lead to revitalization opportunities for downtown Buckeye in some instances) as well as vehicular and non-vehicular gateways to link downtown to the El Rio District and Gila River.

Creating This Vision Plan

This Vision Plan is broad in scope and stakeholder interest. There are numerous interconnected facets that can only be successful with the efforts of many project partners, stakeholders and project team members with technical expertise.

The creation of this plan began with the foresight of Buckeye City Council in providing the initial vision and support to undertake the development of this far-reaching plan. Tremendous input and support from Buckeye residents, property owners, board members and other interested parties attending community meetings and workshops was also instrumental in defining Buckeye's desires for this vision document.

Relationship to Companion Documents for this Vision Plan

As previously noted, there are numerous tasks that individually serve a purpose, but collectively come together to define the overall inspiration, plan objectives and actionable implementation measures to achieve plan success. In order to achieve Buckeye's vision for the study area there are supportive planning tasks that were conducted as important components of this project. These are:

Sand and Gravel Reclamation Guidelines

Many of the existing open water bodies (lakes) along the Gila River in Buckeye were created by sand and gravel mining operations. These lakes are a hallmark feature of the future planning concepts presented in this Vision Plan. Many operators are permitted to mine for years into the future and new additional operators will likely be permitted based

on the Gila River's alluvial channel characteristics and availability of aggregate materials. It is the goal of the City to ensure that future growth and sand & gravel mining are managed affectively so that the City maintains a balance between development, the environment and the quality of life in Buckeye.

Ironically, in the Buckeye El Rio District collaboration with existing and future sand and gravel operators also provides an excellent opportunity to reclaim these mined areas and establish potential lakes and associated recreational opportunities within the Gila River.

The Sand & Gravel Reclamation Guidelines (please See Appendix A for a complete reference) are intended to serve as a tool to aid the process of reclamation so as to develop more creative and productive approaches to establishing a desired end condition - open water body lakes for recreational uses. *Chapter IV - Plan for the Future - offers additional discussion on how the Sand & Gravel reclamation Guidelines are intended to support the opportunities to activate the Gila River.*

In Lieu Fee Program

There are numerous parcels of land suited for development in Buckeye (and statewide) that are impacted by jurisdictional designated washes under Section 404 of the Clean Water Act. As Buckeye experiences increased development activity, there is potential to negatively impact environmental resources, including losses to wildlife habitat associated with 404 washes and/or wetlands.

The City of Buckeye recognizes the potential to mitigate the encroachment of 404 designated washes, and importantly at the same time develop a tool and funding mechanism to protect and enhance priority habitat and manage invasive salt cedars in the Gila River. The opportunity to create an In Lieu Fee (ILF) compensatory mitigation program was born and is actively being developed through this Vision Plan process.

The Arizona Game and Fish Department played a critical role on the project team in the conception, plan formulation and implementation of the Buckeye ILF program. Close collaboration and coordination with the FCDMC in the evaluation of flood hazard mitigation and vegetative management techniques for the Gila River in Buckeye, Avondale, Goodyear and Maricopa County were valuable in ensuring that Buckeye's approach to long term management and establishment of ILF areas were in concert with the District's approach and intentions for the Gila River in the region. *Chapter IV - Plan for the Future - provides additional discussion on how the Buckeye ILF program plays an instrumental role in achieving many of the Vision Plan objectives.*

Sand & Gravel Guidelines

In Lieu Fee Program

Communication & Community Engagement

Vision Plan

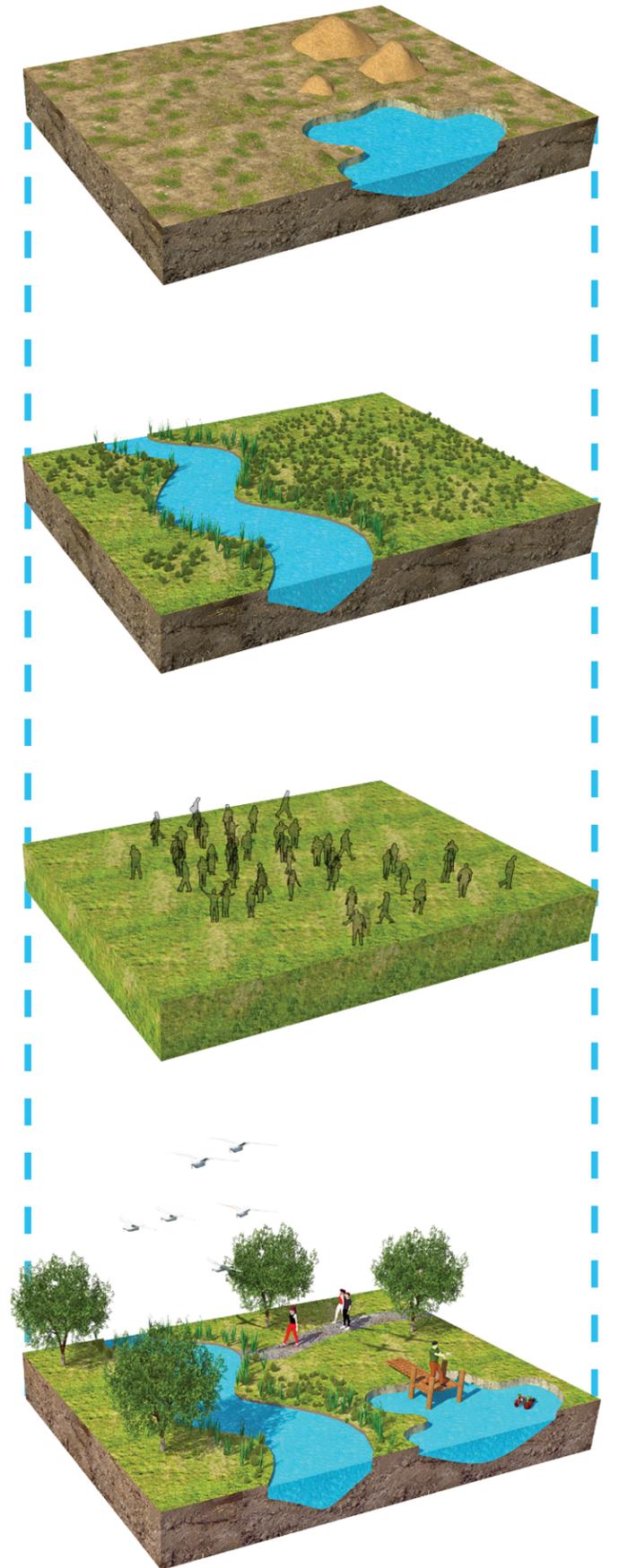


Figure 5: Vision Plan Components

Communication and Community Engagement

The City of Buckeye has long been committed to engaging the public and project stakeholders in order to:

- Enhance and broaden project awareness
- Promote an understanding of purpose and need for this Vision Plan project and process
- Provide ample opportunities for residents and stakeholders to provide input during the study process,
- Seek anecdotal input from the residents and other stakeholders to aid the study team in identifying opportunities and constraints as well as plan possibilities

The public and stakeholder input that went into creating: *“Reclaim the River; Enliven the Banks: El Rio District Area Plan, A Vision for Buckeye’s El Rio District and the Gila River”* was timely and instrumental in providing the project team input and guidance at key milestones over the course of the project.

Project Kick-off Meeting with Buckeye Staff – August 27, 2014

The objective of this meeting was to introduce Buckeye staff, from multiple departments, to the overall project tasks, schedule and expectations of them throughout the planning process. The meeting also focused on obtaining preliminary guidance from staff on matters that were important for the project team to consider over the course of the process. Considerations from staff included:

- Ensure this plan can go into action
- Implementation strategies are key to make things happen
- Out of this project, what can we get done quickly and place in our next funding cycle.
- Recognize what is important with this project to current city staff, residents, Commissions and City Council.
- Include strategies to secure ROW with SR30, including densities/intensity methodology
- AZ Rock Products key player in sand and gravel policy. Already ahead of the project.
- Usage of land prior to development
- Sand and gravel strategies needed for overburden usage, access, selling the industry on a vision.
- How can we make these areas Market Ready?

Sand and Gravel Operators Partnership Meeting – October 16, 2014

The purpose of this meeting was to introduce the project purpose and scope to various representatives of the Arizona Rock Products Association and current sand and gravel operators in Buckeye. Mayor Meck led the discussion that explored Buckeye’s desire to partner with existing sand and gravel operators in order to support their short term business needs and how they in turn can assist Buckeye in achieving their long term needs through the reclamation of mining facilities that can be utilized as recreation lakes within the Gila River.

Advisory Committee Kick off Summit – October 28, 2014

The Project Advisory Committee, consisting of a varied representation from Buckeye staff, City Council, Planning Commission, board members and stakeholders was instrumental in providing significant feedback and direction for this Vision Plan. This 4.5 hour meeting was spent conducting a series of roundtable discussions on the following topics:

1. What will the River Look Like?
2. Identify Priority Habitat/Ecosystem Preservation and Restoration Areas.
3. Open Water Bodies-Lake(s)
4. State Route 30 Corridor
5. Salt Cedar Removal
6. How Do We Get a Levee Built?

Each discussion topic was prompted with a series a predetermined questions and the discussions for each topic were robust and thought-provoking. The Advisory Committee was instrumental in identifying a vision, concepts, issues, opportunities and considerations for the project team to utilize and chart the direction for the project moving forward.

“For more than 25 years, I have been fighting an issue that sounds simple: remove salt cedar trees, replace them with natural vegetation and let the Gila River flow once again. As I have learned over the last two decades, this issue is anything but simple.” – Mayor Meck

Investment Choices/ Project Partners

Background

The City of Buckeye is preparing a Specific Area Plan that will enable the City to have a Council-approved vision, policy and design guidance defining the City’s preferred approach to restoring and planning desired land uses in and around the Gila River.

The City is also partnering with Arizona Game and Fish to create an In-Lieu Fee Fund. In-lieu fee sites will be preserved and/or restored lands owned or controlled by AZGF and will be funded by other projects (private sector interests in most cases) in the state who need to mitigate their actions. These locations consist of quality riparian habitat and can offer recreational opportunities and benefits to the public.

The City of Buckeye also owns 40 acres of property off Miller Road that could serve as a “gateway to the river” by creating public access, a trailhead, vehicle parking and other supporting amenities.

Improvements of flood protection facilities and recreation amenities will not happen overnight. In fact, there are a multitude of project types that will be constructed incrementally over several years, if not decades. Some improvements, like a levee will be expensive and require Federal funding participation. Other projects, like the construction of trailheads, trails, educational kiosks and certain passive and active recreation features will in many instances be implemented at the local level. Projects incorporating recreation amenities into former sand and gravel operations can only occur after the lifespan of the mining extraction has expired.

Stakeholders were asked the following questions:

- 1) What financial resources is the City willing to consider for enhancement projects related to the Gila River? Which resources should we not consider?
- 2) There are some properties associated with the open water bodies (sand and gravel) currently held under private ownership that would need to be acquired to restore/protect of the unique aquatic and riparian resources and develop active and passive recreation opportunities. What incentives or financial mechanisms could be put in place to acquire these parcels from their current owners?
- 3) Specific to the City’s 40 acre property on Miller Road that could serve as a “gateway to the river”, what agencies/entities should the City seek for partnering opportunities?

Preferences

- Cater to all groups (1)
- Invite economic development players; entice them to invest (1)
- Bonds – sell the project to garner community support (1)
- Explore the creation of a “recreation district” to fund improvements (1)
- Encourage public-private partnerships (1)
- Partnerships with sand and gravel operators (1)
- In-lieu fee program with Arizona Game & Fish (1)
- State and Federal funding – fire suppression mitigation (1)
- Flood Control District of Maricopa County (1)
- Bonds to acquire properties (2)
- Public-private partnerships (2)
- Consider leasing agreements with land owners (2)
- Explore grant opportunities (2)
- BLM – recreation and public purpose lease (2)
- Review case studies from other projects (2)
- Consider land swaps (2)
- Multiple uses and multiple agencies including AZGF, FCDMC, Audubon Society, Sonoran Land Trust, local non-profits and sand and gravel operators (3)
- Partner with agencies for education (interpretive kiosks) (2)
- Buckeye Equestrian Center (3)
- Maricopa County Parks & Recreation Dept. (3)



Challenges

- New state legislation restricts the use of development impact fees (1)
- Discourage use of city’s general fund (1)
- Increase in taxes (1)
- Bonding (1)
- State and Federal funding; holding agencies accountable (1)
- IGAs with other agencies (1)
- User fees (1)
- Mitigation strategies for sand and gravel operators (2)
- Partnerships with non-profits (2)
- City purchase of properties (2)
- Friendly condemnation/donation (2)
- Bureaucracy of partnerships with federal government agencies (3)



River Restoration & Preservation

Background

Restoration and preservation priority locations are largely being determined through a technical review and inventory of suitable locations. When identifying priority preservation and restoration areas, there should be a focus on the following:

1. Preservation sites will be located where existing quality habitat exists including lands where low-impact restoration could be implemented.
2. Many potential sites are remote at this time, so public access should be considered where appropriate but also in select locations most desired by the community.
3. We are partnering with the Arizona Game and Fish Department to create “in-lieu fee sites” to be funded by other projects in the state who need to mitigate their actions. This is a large swath of lands through the reach with quality riparian habitat and will offer recreational opportunities and benefits to the public.
4. The existing 40 acre city property at Miller Road and adjoining ASDL lands should be evaluated for potential project types.
5. Attempt to create a linear system that also provides a “system connection” to remote areas.
6. A preliminary “swath” of open water and riparian areas on AZGF owned or managed lands are identified as potentially suitable ILF sites. There are a total of approximately 942 acres preliminarily identified.

Stakeholders were asked the following questions:

- 1) The City owns 40 acres at the end of Miller Rd which could serve as public access and a “gateway to the river”. What type of activities do you foresee taking place in the river around restored/rehabilitated areas?
- 2) What would public access from the existing north bank of the Gila River to the river channel look like and should access be limited or restricted in any areas?
- 3) Do you see the preservation and restoration areas (ILF areas) as needing public access beyond un-improved trails/trailheads?

Preferences

- Mountain biking (1)
- Stargazing (1)
- Amphitheater/seating area for educational opportunities and events (1)
- Hiking/running/bicycling (1)
- Horseback riding (1)
- Keep any building to the north; keep south end of property as park/open space (1)
- Audubon/natural activities (bird watching) (1)
- Limited access/signage (2)
- Stabilized trail surfaces (2)
- Limit access to one or two areas (2)
- Yuma Gateway Park (2)
- Paved parking leading to trailheads (2)
- Ensure ADA compliance in parking lot/access design (2)
- Consider boat ramp along eastern portion of corridor (2)
- Install bike racks at access points (2)
- Install restrooms and spasades (2)
- Need one continuous trail linking all activities in the river (3)
- Provide equestrian crossings into public lands (3)
- Access should be for passive type uses; not active uses (3)



Challenges

- Restrict hunting activities near access points (1)
- Concern with access through BLM land (2)
- Adequate amount of parking provided (2)
- Camping opportunities, but should separate from other uses (2)
- Proliferation of salt cedars and fire hazard limits opportunities (2)
- Do not provide too many access points so access is controlled and safe (2)
- The types of activities will determine the access (3)
- Design and prepare for drainage issues at access locations (3)



Figure 6: Preferences & Challenges Community Feedback



City Council/Planning Commission Project Workshop - April 14, 2015:

Members of the Buckeye City Council, Planning Commission and other board and commission representatives attended this very interactive work session. After presenting attendees with an overview of the project scope and key objectives, the balance of the meeting was conducted in a "Conversation Café" format. The Conversation Café consisted of a series of table topics whereby meeting attendees would rotate from table to table to express their inputs and desires relative to each table topic. Each table was equipped in a restaurant style setting that included table cloths, menus, table settings with a project team member ("table host") to lead the discussion. The table topics discussed include; Linkage of Lakes, Land Uses and State Route 30, River Restoration/Preservation, and Investment Strategies/Project Partners.

The "Conversation Café" format was found to be extremely engaging and enjoyable for the meeting participants. Feedback provided at this meeting was critical to shaping the vision, goals and objectives for each of the discussion topics.



Community Workshop & Open House Meeting - May 21, 2015

Buckeye residents and interested stakeholders were invited and attended a community workshop and open house. The workshop was well attended and included a variety of interactive activities to elicit community input on the project. Mayor Meck introduced the project purpose, key objectives (salt cedar, flood control, ILF program and land use planning) and timeline. The Mayor and members of the project team answered various questions attendees had on the project.

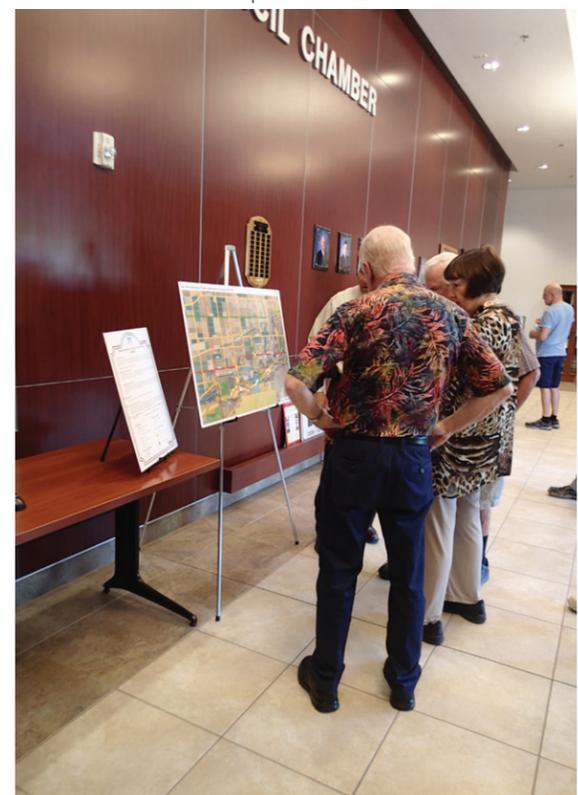
At the conclusion of the presentation, attendees were asked to visit various "information stations" and video kiosks that were arranged to provide in depth information on the diverse project components, speak with project team experts, and provide their comments and concerns relative to each topic.



A video kiosk provided the opportunity for meeting attendees to listen at their leisure:

- Video Kiosk #1 - continuous playing of two project related videos highlighting project opportunities and the fire, flood and water usage concerns associated with salt cedars.
- Video Kiosk #2 - slide show of various images and facts relating to the importance of this project.

Interactive information stations that matched the table topics from the council commission workshop were included in this open house meeting. Each information station included a summary poster of comments received to date on each topic and allowed attendees the opportunity to validate the observations presented and/or share their own ideas on the various topics.



Land Use Scenario Charrette - July 28, 2015

Buckeye City staff representatives and project team members rolled up their sleeves to partake in an interactive charrette exercise. The objective of the charrette exercise was to brainstorm and conceive various possible land use scenarios that responded to stakeholder and community desires and was complimentary to the restoration/preservation efforts and desired recreation opportunities in the Gila River. Project team members presented a variety of key variables and considerations - relating to existing land uses, physical challenges or impediments, existing General Plan guidance, etc. to initiate the charrette process. The group then created hand sketch drawings of possible land use scenarios. These scenarios became the foundation by which three formal land use plan scenarios were prepared by the project team and vetted with City Council.



City Council ILF & Land Use Scenario Briefing - September 15, 2015

Tim Wade, Contracts Branch Manager with the Arizona Game & Fish Department provided Buckeye City Council with a progress report and update on the development of the Buckeye In Lieu Fee (ILF) program. More specifically, the presentation provided a review of the ILF program summary, program benefits to AZGF, Buckeye and project proponents, as well as a thorough review of the opportunities and potential risks and next steps for the creation of the Buckeye ILF.

Kevin Kugler of the project team also presented Council with the three draft land use scenario plans for consideration. Each land use scenario presented outlined a - distinctive theme, how each plan responded to or portrayed elements desired by the residents and stakeholders, and the pro's and con's of each plan. City Council provided the project team with feedback to move forward with the preparation of one preferred land use plan.



An aerial photograph of a landscape. In the foreground, there is a dense area of green and brown shrubs on a sandy slope. A bright blue river flows through the middle ground. Beyond the river, there are large green and brown agricultural fields. In the distance, a range of mountains is visible under a clear blue sky.

WHAT EXISTS TODAY

A firm understanding of today provides the foundation for creating a plan that is achievable and sustainable.

Existing Plans & Studies

A number of planning studies have been prepared for the El Rio Planning Area, the City of Buckeye, and specific project sites within the study area.

Their careful attention to physical factors, local concerns, and community values, as well as, their acceptance and/or adoption by jurisdictional organizations, provides a strong planning foundation and starting point for the development of this Vision Plan.

General Plan

The Buckeye 2007 General Plan identifies the development issues and opportunities facing the City at the beginning of the Century. The plans' framework is predicated around four vision components: One Town-One Vision, Economic Sustainability, Protecting the Unique Environment, and Connectivity.

As part of enacting these vision components, the General Plan specifically outlines goals and policies that recognize the environmental and economic importance of the Gila River corridor as well as the development of the Buckeye City Lake project.

The General Plan Land Use Plan also provides guidance about the appropriate land uses and development patterns within the City's planning boundary. While the land uses within the project study area contain a significant amount of environmentally sensitive and low density residential land uses along the Gila River, it was noted that there are areas south of downtown that appear to be underutilized relative to creating a strong connection to the River and the proposed Buckeye Lake Project. Conversely, other portions of the study area potentially have an oversupply of non-residential uses that could reduce the implementation potential of this Vision Plan.

The City is currently embarking on the task of updating their 2007 General Plan. It is expected that this effort will provide a setting to carry forward the existing General Plan goals and policies that support the purpose and need behind this Vision Plan as well as create an opportunity to better align the City's long-range Land Use Plan with the development strategies introduced as part of this more detailed vision document.

Development Code

The Buckeye Development Code defines the standards for the physical character of the built environment within the City. The current code was updated in 2010 and has since been amended, making it relatively modern in terms of its applied structure, zoning and subdivision regulations, and development principles. The development code also includes fairly detailed residential and non-residential design guidelines that address both site and building design. However, these somewhat universal design guidelines lack specific guidance on or consideration of the special elements and relationships that are necessary to successfully achieve the vision of this plan for the Gila River.

A review of the existing City of Buckeye Zoning Map most notably concludes that a large portion of the study area is located within Maricopa County. Much of this unincorporated land, particularly between downtown and the Gila River, is within Buckeye's municipal planning area and will need to be annexed into the City at some point in the future to ensure development within the study area is carried out in a manner that reflects the City's desires.

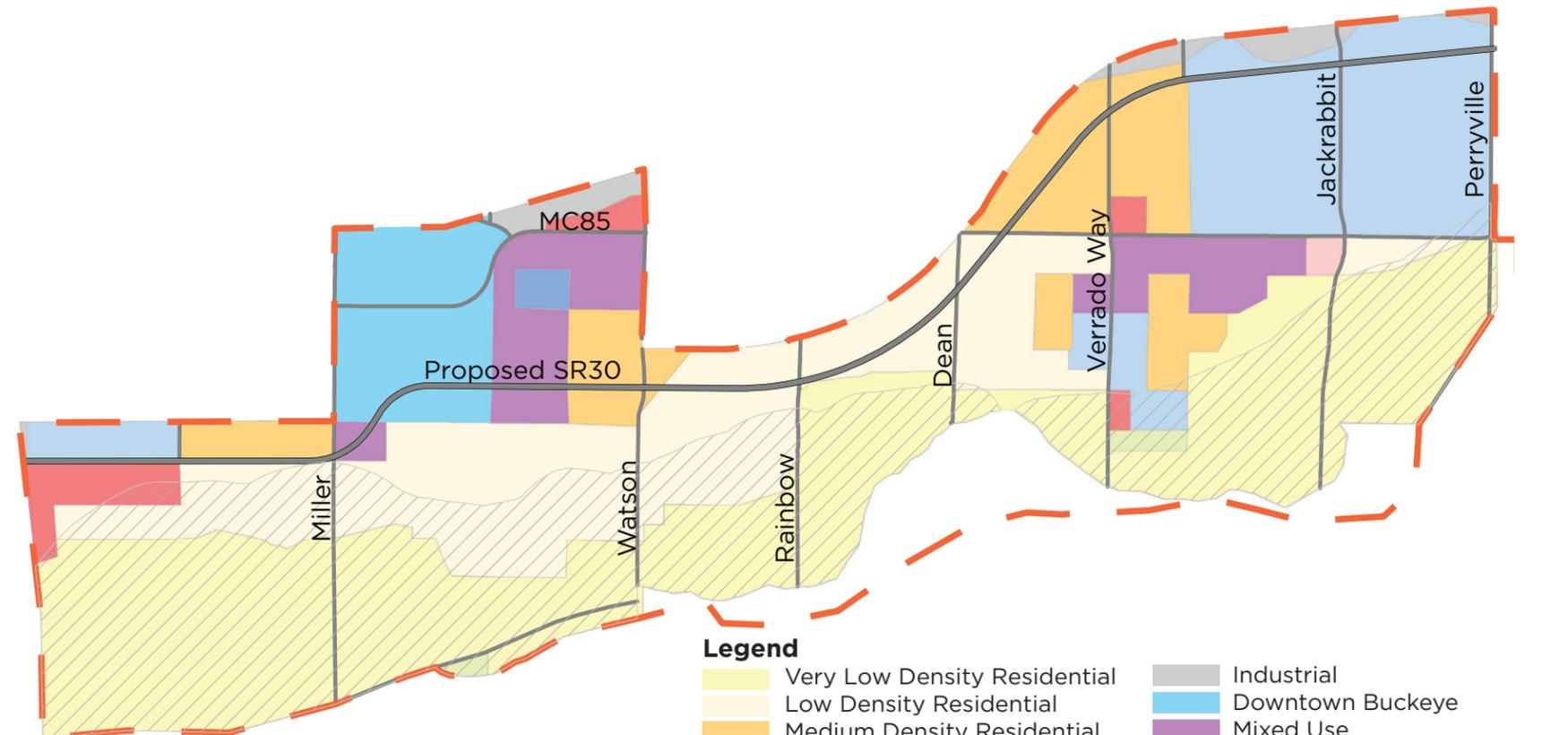


Figure 7: Existing General Plan

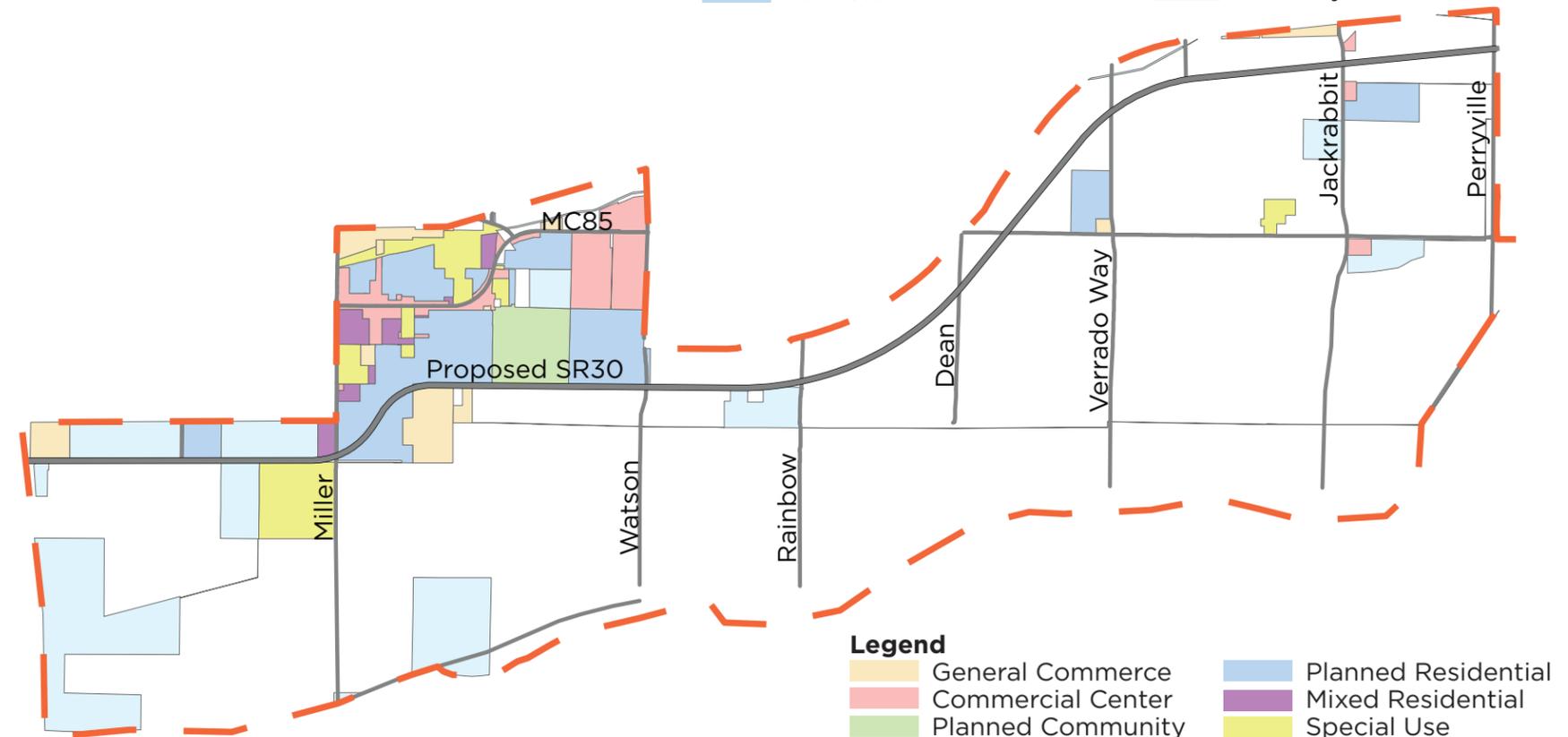
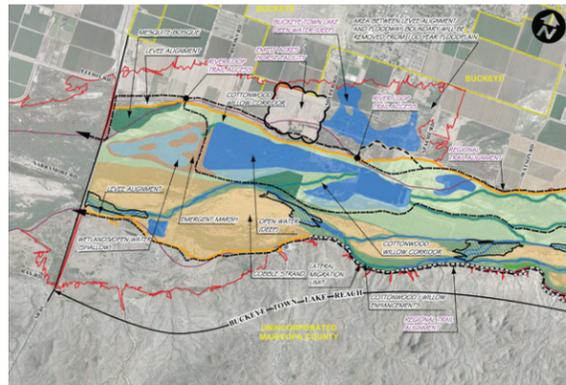


Figure 8: Existing Zoning Districts

El Rio Watercourse Master Plan



The El Rio Watercourse Master Plan (2006) provides a comprehensive analysis of the Gila River from the confluence of the Agua Fria River to State Route (SR) 85. Prepared by the Flood Control District of Maricopa County in cooperation with the City of Avondale, City of Goodyear and the City of Buckeye, this master plan establishes the initial desired form and function of the river from a flood control management perspective and preservation and restoration standpoint.

The extensive inventory and evaluation of river mechanics (hydrologic, hydraulic, sediment transport, and geomorphic evaluations), environmental resources (biological, water quality and quantity and cultural resource evaluations) and plan recommendations (alternative evaluations) are organized by reaches of the river. In Buckeye the subject study area primarily detailed within the Buckeye Town Lake Reach. These inventories and evaluations provide the greatest level of technical data to help inform planning and design decisions associated with this document.

City of Buckeye Parks and Recreation Master Plan



The City of Buckeye's Parks and Recreation Master Plan, provides goals and the framework for the vast amount of existing and planned open spaces and trails within Buckeye. There are a number of trails and paths that are found within the Gila River Vision Plan. The most significant trail is the Maricopa Trail, which is a 310 mile shared use non-motorized trail. This trail system connects all of the County parks within Maricopa County. There is a series of Primary Paths which provide the highest level of functionality for its users, and a Secondary Path that generally connects neighborhoods to community parks and schools. This Vision Plan recognizes and builds upon the ideas within the Parks and Recreation Master Plan, to develop and maintain Buckeye's vision of an 'Active, Engaged and Vibrant Community'.

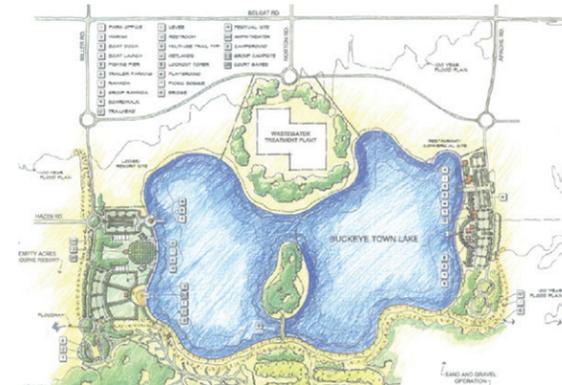
El Rio Design Guidelines & Planning Standards



Stakeholder completion in 2015 and adoption in 2016, the El Rio Design Guidelines & Planning Standards represent the most recent collaborative effort amongst Maricopa County and the Cities of Avondale, Buckeye and Goodyear to protect the Gila River while integrating future development and multi-use trails along this vitally important west valley corridor.

As a complement to the groundwork set by the El Rio Watercourse Master Plan, this document utilizes character areas and transect guides to apply a more detailed level of design and land management guidelines to land use, open space, trails, edge treatments, landscaping and signage within the El Rio project area. However, it is important to distinguish that this document is not intended to establish future densities and intensities within the El Rio District in Buckeye. Rather, it is meant to be a companion document that provides the necessary design guidance to define a unified look and feel to future projects that are developed within the corridor.

Buckeye Town Lake Feasibility Study



This study represents the first effort by Buckeye to explore the feasibility of developing a central community lake within the City. This 2005 Feasibility Study depicts the initial vision of the project as a 180-acre man-made lake located just south of the City's existing Central Buckeye Wastewater Treatment Plant. The study visualized the proposed lake to be developed over multiple phases on a combination of public and private lands. Specific components of the lake included a variety of commercial uses, recreational amenities, and conservation elements along with a levee and other infrastructure improvements.

Early discussions with City staff and Council during the development of this Vision Plan concluded that while a community lake is a desirable element of Buckeye's future, the original lake site, as proposed in the 2005 Feasibility Study, posed significant economic and physical development challenges. Predominantly these challenges reflected the need to purchase additional private land to develop the overall project and, most significantly, the lake itself would need to be excavated from scratch. The preferred alternative favors the utilization and incorporation of existing open water bodies located just south of the original site. These existing open water bodies have been formed from sand and gravel mining operations conducted within the study area.

UCLA City LAB / ASU Graduate Design Studio



In 2013, UCLA's cityLAB hosted the Western Regional Session of the Mayors' Institute on City Design Conference. During this conference, Mayor Meck along with mayors from six other western cities and a team of architecture, design, real estate, and city planning professionals collaboratively discussed design approaches to specific issues being faced by each city.

This conference resulted in the development of many beneficial relationships including a partnership with Arizona State University. During the spring of 2014, Professor Darren Petrucci, coordinator of the Master of Urban Design Program at ASU and participant at the Mayors' Institute on City Design Conference, led a studio team of eleven ASU graduate students who conducted extensive research and developed various projects that presented their vision for the city's growth potential as a "unique 21st century city".

The creative thoughts and ideas generated as part of this 15-week design program are now being considered to help feed the positive momentum the City has created in planning for Buckeye's future along the Gila River corridor.

Existing Land Use & Development Pattern

Understanding how land is used and the relationship between those uses is the essence of planning. Within this Vision Plan's study area, a variety of existing land uses create a unique development pattern that are shaped by several

key factors. The following analysis of these key factors helps to provide the understanding and insight to determine current and future land use needs and influencing variables in the study area.

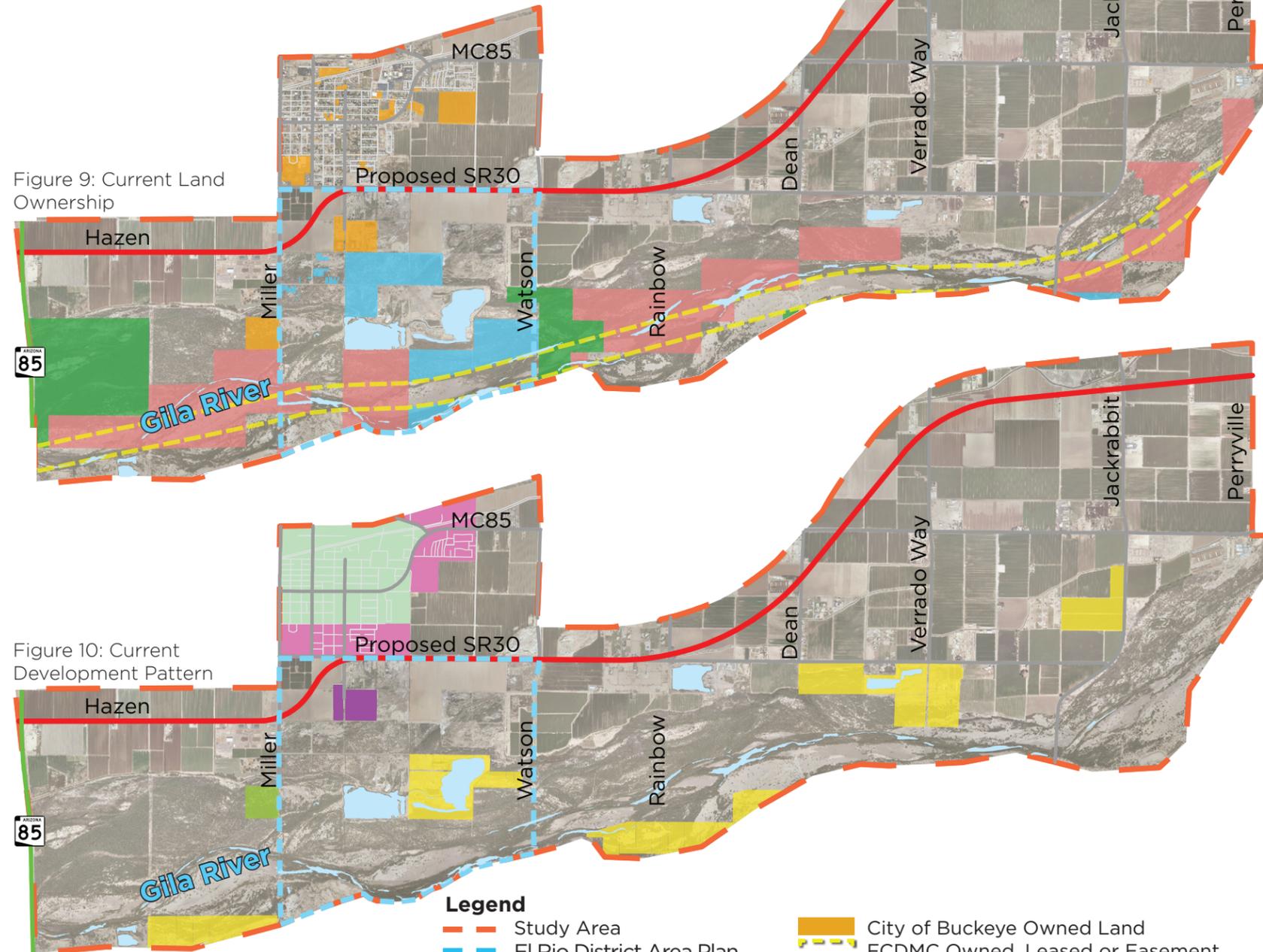


Figure 9: Current Land Ownership

Figure 10: Current Development Pattern

- Legend**
- Study Area
 - El Rio District Area Plan
 - Bureau of Land Management
 - Arizona Game & Fish
 - State Trust
 - Private
 - Open Water
 - City of Buckeye Owned Land
 - FCDMC Owned, Leased or Easement
 - Sand and Gravel Permitted Sites
 - City of Buckeye 40 Ac Pilot Project
 - Central Buckeye Waste Water Treatment Plant
 - City of Buckeye Downtown Area
 - City of Buckeye Extended Downtown Area



Land Ownership

Land ownership patterns within the study area reveal a mixture of public and private ownership. Of the approximate 14,892 acres (23 square miles) that comprise the study area, roughly three-quarters are privately held lands with the remaining quarter publicly controlled.

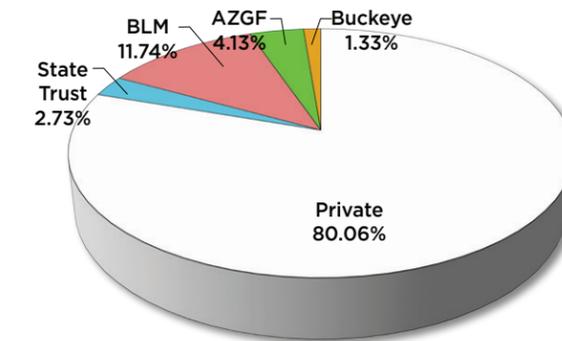


Figure 11: Percent of Land Ownership

The majority of the land located along the Gila River streamline consists of large tracts of Arizona Game & Fish, Bureau of Land Management, and State Trust land along with a continuous 1,000-foot wide linear track of Maricopa County Flood Control District owned, leased or easement land.

The remaining portions of the study area, generally located north of the Hazen Road alignment, consist of large tracts of privately held land. However, the City of Buckeye does own several parcels of non-contiguous land located within, east, and south of downtown.

The desire for preservation, revitalization and overall enhancement of the El Rio corridor is well matched with the concentration of public lands located along the Gila River. Conversely, the adjacent band of continuous private land is well suited for the placement of complimentary development. As this development takes place, the large tracts of undivided land surrounding the existing open water bodies within the study area can and should serve as focal points for this new growth.

Development Pattern

The existing land use patterns found within the study area today give it a great deal of potential to thrive as a premier destination that can help further establish the growing character of

Buckeye. In more detail, a review of this development pattern provides a snapshot of the community structure, developable features, and latent attributes that create both opportunities and challenges within the study area.

Downtown Buckeye. Established as the heart of an agrarian community, downtown is comprised of a mixture of residential and non-residential uses that emanate out from MC 85 between Miller Road and Apache Road. This creates a more fine-grained, dense development pattern compared to the greater portion of the study area, which is spread out with larger parcel sizes. Over time, the downtown continues to expand with the incremental introduction of new businesses. The City of Buckeye desires to fully support the creation of a future downtown that is vibrant and appealing to a myriad of residents and visitors. It is noted here that the land use design of future El Rio District complement and not hinder the City's aspirations for Downtown Buckeye.

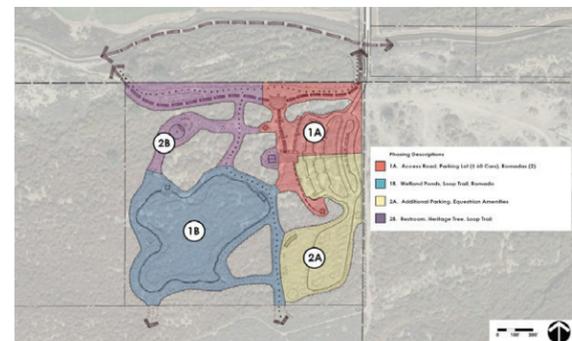
Agriculture Lands. With the exception of the natural, undeveloped land located along the Gila River, agriculture lands represent the most prevalent land use in the study area. These lands symbolize the historic roots of Buckeye and their cultivation directly contributes to the presence of open water bodies and riparian habitat within the Gila River corridor. Like many areas in rural Arizona, agricultural land uses were historically established adjacent to water-ways that flowed year round, which is historically the case with this area of the Gila River prior to the construction of Roosevelt Dam upstream. Equally, this large amount of agriculture land provides many opportunities for new development in the study area, particularly catalytic riverfront types of development.

Wastewater Treatment Plant. The City's Central Buckeye Wastewater Treatment Plant (WWTP) is located along 7th Street between Beloit Road and Hazen Road. The facility is currently 14.5 acres in size; and only receives .75 millions of gallons per day (MGD) of average daily flows. The City acquired the adjacent 37 acres to allow for expansion of this facility in support of anticipated future growth in the area. The City's foresight to ensure the provision of adequate

infrastructure in the future is certainly a benefit. Unfortunately, the location of this substantial land use, between downtown and the Gila River, also constitutes a physical barrier that greatly influences the development connectivity of this key growth area.

Presently, the prerecession, exorbitant growth rates and infrastructure plans that defined the need and sizing of this facility have drastically changed. This potentially means the capacity, and resulting size, of the WWTP may not be as large as originally required, which would allow for the planning of more compatible uses on portions of this City owned property. The city is currently in the process of updating its waste water treatment plan master plan.

Buckeye 40 Ac Pilot Project. The City currently owns a 40-acre parcel located along Miller Road, about a half mile south of Hazen Road. As part of the El Rio Design Guidelines and Planning Standards, this site was identified as a preferred location for the development of a pilot project that will help serve as a catalyst to attract interest to the river and educate the public on the benefits of El Rio.



Buckeye - Preferred Concept, Phasing Diagram
Source: El Rio Design Guidelines

The property does not have any existing structures on site and has been over-run with a proliferation of salt cedar growth on the property. Recently, Buckeye was awarded a fire suppression grant from the BLM and extensive clearing of the salt cedars on the property has recently commenced. Covered with dense vegetation of mostly saltbush, invasive salt cedar, and a few cottonwoods.

The site is located within the existing floodway, but does not appear to be subject to the 404 regulatory permitting. The conceptual design of this proposed trailhead development will have an equestrian emphasis but will also include walking and biking trails, educational kiosks, shade structures, a demonstration wetland, and parking areas.

While this project is not currently developed, it can play an important role in the planning and development of this Vision Plan by acting as a catalyst project.

Sand & Gravel Facilities. Within the study area there are a number of active, suspended, and retired sand and gravel (S&G) operations. These surface mining facilities are generally concentrated within and along the north bank of the Gila River due to the prevalence of natural aggregates in the area and accessibility to the local and regional transportation network.

The combination of the large pits created by the sand and gravel extraction process with the high groundwater table have resulted in the creation of several large open water bodies within the study area. Just south of downtown (within the El Rio District) there are two notable water bodies; mining operations associated with the western water body have ceased, while the eastern water body is suspended but has minerals that can still be mined. In the eastern portion of the study area, completed S&G mining activities created an additional water body at the southeast corner of the Beloit Road and Rainbow Road alignments. A fourth water body is also emerging at the southwest corner of Beloit Road and Airport Road, in association with an active S&G facility.

While under active mining, the environmental impacts to the landscape, heavy noise-producing operations of the plants, and the large volume of trucks needed to transport material can create significant land use conflicts within the study area. However, the remediation of these water bodies present a key opportunity to redefine and enhance the development potential of the study area over the long term.

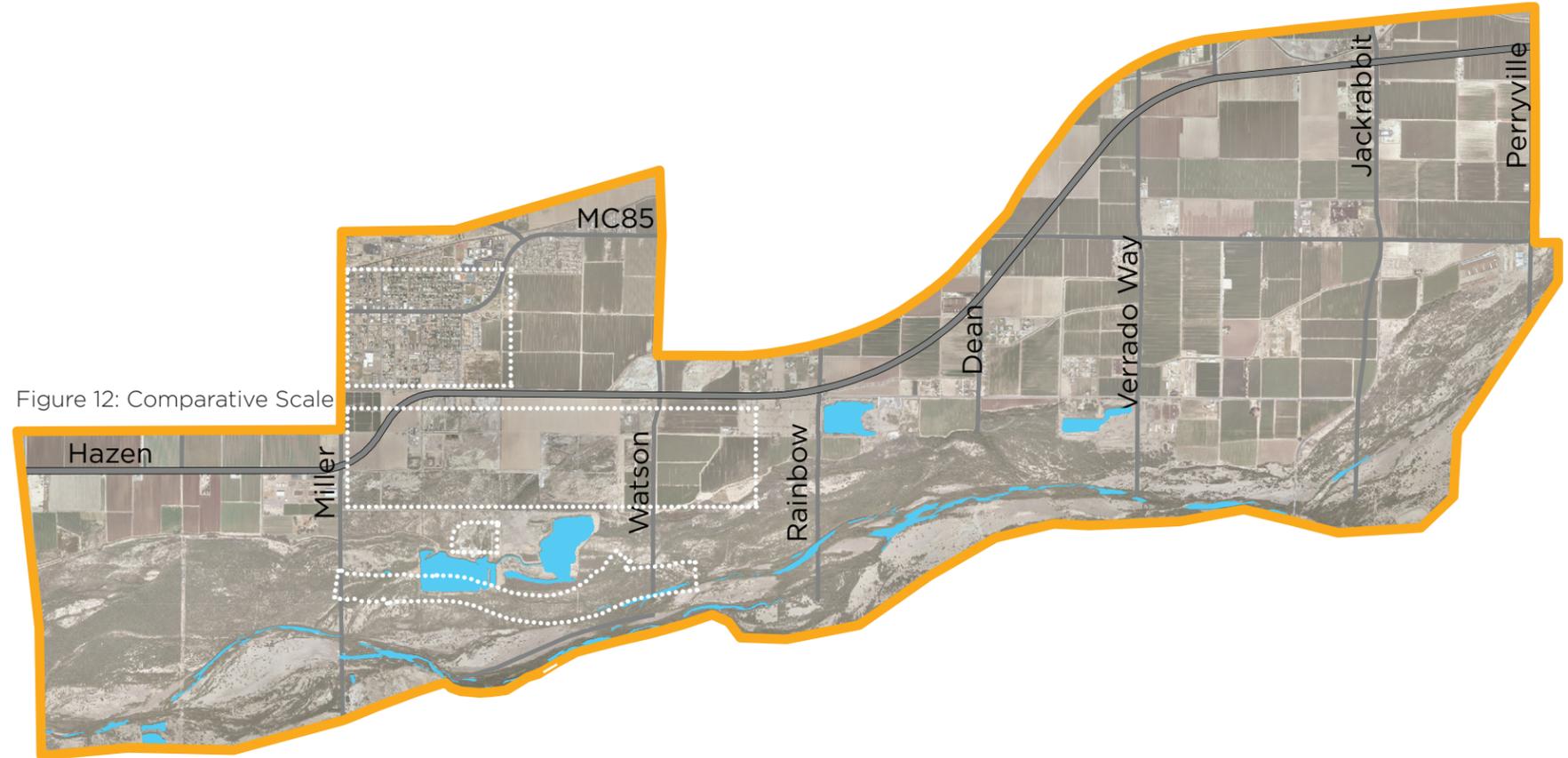


Figure 12: Comparative Scale

Gila River Study Area

14,892 acres



Central Park, New York

843 acres



Tempe Town Lake, Arizona

220 acres



Downtown Phoenix, Arizona

481 acres



Kierland Commons, Arizona

32 acres

Comparative Scale

The Vision Planning Area is very large. The total land area is actually larger in size than the entire planning area of the Town of Fountain Hills. In an effort to capture and convey the magnitude of the study area, a simple comparative scale exhibit was completed. Scale comparisons relate the scale of the study area to other memorable places. These places are shown (via white dotted lines) on the exhibit at the same scale as the study area.

Comparing Central Park, Downtown Phoenix, Tempe Town Lake, and Kierland Commons to the study area, gives light to the development possibilities, but also begins to help visually define the development limitations of what potentially can and cannot be supported in the planning area.

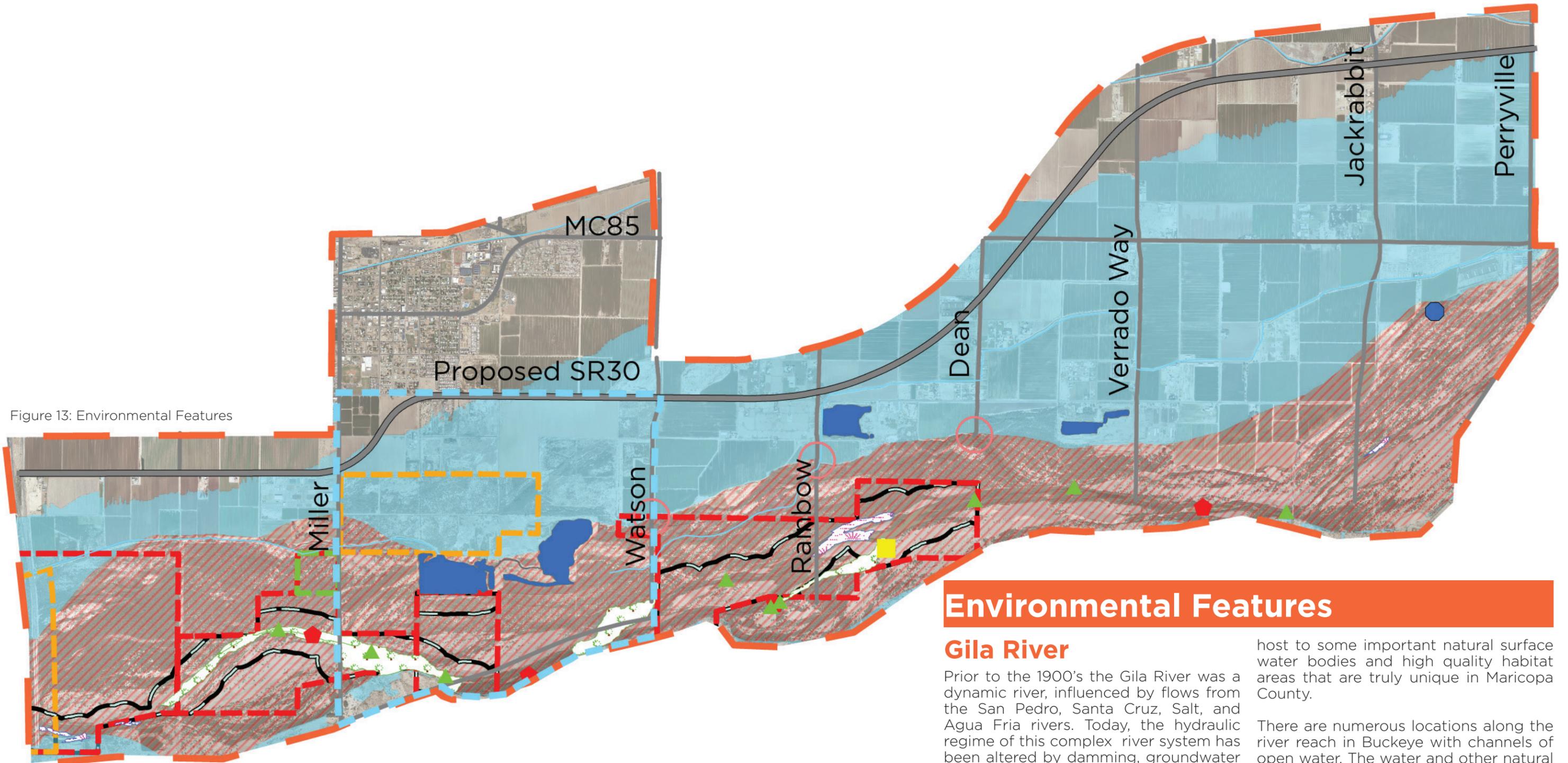


Figure 13: Environmental Features

Legend

- Study Area
- El Rio District Area Plan
- Open Water
- Floodplain
- Floodway
- Priority ILF Site
- Priority Habitat Areas
- Wildfire Fuel Reduction
- City of Buckeye Pilot Project
- Tailwater Discharge
- Canals

Unique Wildlife Features

- Willow/Salt Cedar
- Cattail
- ▲ Beaver Dam
- ◆ Beaver Lodge
- Egret Roost
- Great Blue Heron Rookery

Environmental Features

Gila River

Prior to the 1900's the Gila River was a dynamic river, influenced by flows from the San Pedro, Santa Cruz, Salt, and Agua Fria rivers. Today, the hydraulic regime of this complex river system has been altered by damming, groundwater pumping, and urban development. In order to implement a restoration program in this altered area, availability of water is critical for success. Restoration of lost habitat depends on the availability of water.

Although the perennial character of the Gila River is no longer apparent today, the region, and Buckeye in particular, are

host to some important natural surface water bodies and high quality habitat areas that are truly unique in Maricopa County.

There are numerous locations along the river reach in Buckeye with channels of open water. The water and other natural resources today provide an excellent opportunity to preserve priority habitats and establish active and passive recreation opportunities along the Gila River corridor.

Existing Wildlife & Priority Habitat Areas

As Figure 13 demonstrates, the Gila River in Buckeye is currently home to unique wildlife features including beaver dams and lodges and egret roosts. Great blue herons frequent the area with one rookery located just outside of the study area. The beaver dams and lodges tend to modify the structural flow patterns of the low flow channels to create variations in normal flow patterns. The beavers tend to harvest available cottonwood and willow trees for construction of their lodges which can, in the short term, further challenge the vegetation management efforts to balance cottonwood and willow species to not be overtaken by the salt cedars.

Much of the area in the Gila River is also suitable habitat for three endangered species; the Southwest Willow Flycatcher, the Yuma Clapper Rail and the Yellow-Billed Cuckoo (El Rio Environmental Resources Report, Stantec 2003).

Marsh habitat in the project area is suitable and desired habitat for the Yuma Clapper Rail. The plant communities of salt cedar/cottonwood, arrow-weed/willow/salt cedar, arrow-weed/willow, salt cedar/cottonwood/willow, cottonwood/willow and willow/salt cedar should be considered potentially suitable habitat for the Southwest Willow Flycatcher when they occur adjacent to perennial water. Both of these habitats are also suitable for the Yellow-Billed Cuckoo. It is these high quality habitat areas that are the intended focal point for the creation of the Buckeye ILF areas that will be preserved and restored in perpetuity for future generations to enjoy.

Salt Cedars & Other Vegetative Communities

Native riparian vegetation along the study reach of the river includes stands of cottonwood and willow trees as well as cattail and bullrush that line open bodies of water. However, most of the vegetation within the study reach consists of dense stands of salt cedar.

Salt cedar is an invasive species that threatens the ecosystem balance and diversity of the Gila River. Salt cedar has spread extensively in the Gila River since the 1940's. Large stands of impenetrable thickets have taken over large sections of the riparian ecosystem in Buckeye (and throughout rivers in the western U.S.) and have degraded native wildlife habitat. Stands of mature salt cedars prevent the establishment of native species in its understory due to loss of light, water, and the secretion of salt from its stems and leaves. The salt cedars also cause river bank instability and fire hazards.

Salt cedars "choke" the river by outcompeting the native cottonwood and willow species, increasing the salinity of the soils, consuming large amounts of water and altering the flow characteristics that (in part) contributes to the lateral migration of the river causing a wider

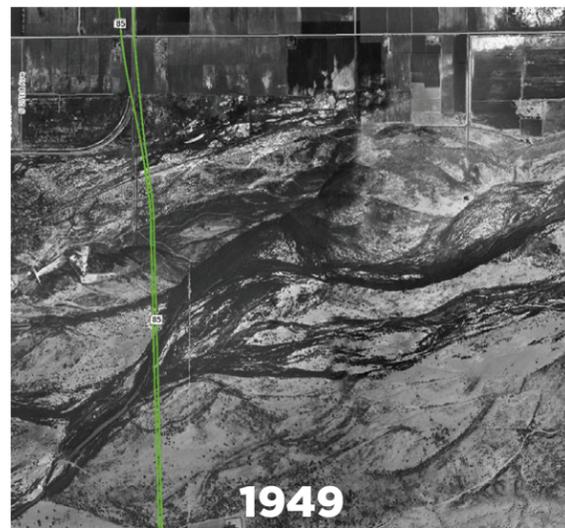


Figure 14: Proliferation of Salt Cedar

occur under more managed vegetative conditions. When excess surface water is released from upstream dams, river bank erosion is caused by salt cedars clogging the waterway; this can erode away farmland along the streambed resulting in economic loss to producers. Moreover, the thickets of salt cedars pose a fire hazard as evidenced by the recent Buck Fire and others that have occurred in the Gila River.



Figure 15: Buckeye Fire, 2005

Figure 14 below illustrates the proliferation of the salt cedar among the existing vegetative communities in the Gila River study area. Other vegetative communities within the study area generally consist of cottonwood/willow and salt cedar mixes, atriplex, arrowweed and marsh communities.



Open Water Bodies

There are many existing open bodies of water (lakes) that are supplied by effluent and agricultural tailwater return and de-watering. Some of these are smaller pockets of open water bodies situated along the low flow channel along the streamline of the river. Other larger, more distinguishable open water bodies are borne from extraction pits from sand and gravel operations. As Figure 16 shows, there are four considerably sized existing open water bodies within or adjacent to the Gila River. The water resource supplying each of these lakes is predominately groundwater from sub surface flows that rise as a result of the excavation of the aggregate materials. Upon completion of the extraction operations, the reclamation of these facilities represent an outstanding opportunity to be transformed into outstanding recreational lakes that can be interconnected with a series of trails.

Water Quality

In August of 2015, the US Environmental Protection Agency, at the request of the Arizona Department of Environmental Quality, removed its warning against the human consumption of fish taken from the Gila River. A warning against the consumption of fish in the Gila River had been in effect for 24 years. As a result, fish in the Gila River are now safe to consume, thanks to the eradication of pesticides like DDT, toxaphene and chlordane previously used in farming operations near the Gila River.

ADEQ has also deemed that the quality of the waters within this reach of the lower Gila River is suitable for 'partial body contact'. Partial body contact activities can include boating, kayaking, and fishing but not swimming. The improved water quality is a favorable sign for the continued enhancement of the rivers ecosystem and offers an opportunity for future active and passive recreation activities in the Gila River in Buckeye.

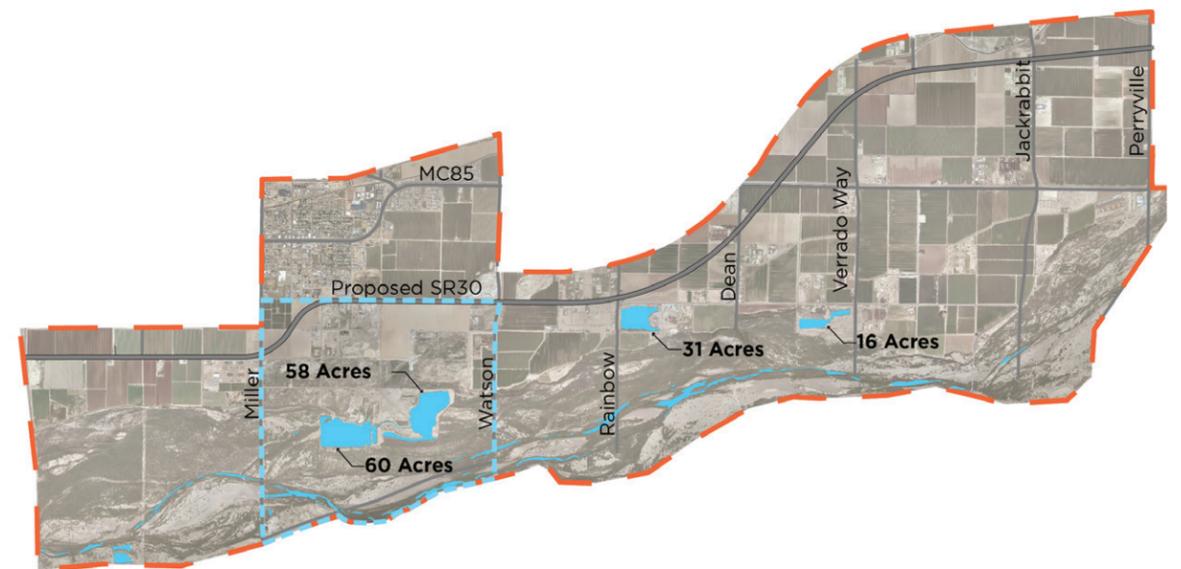


Figure 16: Open Water Bodies

Existing Connectivity

In planning terms, connectivity refers to the density of connections and the directness of links in a circulation network. In theory, as connectivity increases, travel distances decrease and route options increase, which creates more opportunity for the use of alternative modes of transportation. By assessing how available circulation options connect people to their intended destinations within the study area today, a stronger understanding of what transportation improvements need to be made in the future can be attained.

It is important to note, the City of Buckeye has recently begun the process of updating their General Plan and Transportation Master Plan. These documents will undoubtedly establish a circulation vision for the community as a whole. Consequently, as this Vision Plan is completed in the near term, the proposed circulation framework outlined in this document should be utilized to inform these citywide planning efforts to ensure a unified, multi-modal circulation network is created within this vision plan study area.

Roadways & Gateways

Currently, within the study area, vehicular and pedestrian circulation is most prevalent within the downtown area. Roadways generally follow a traditional grid system and sidewalks are found along most collector and arterial streets. As one travels south away from the downtown area, the land use character becomes more agrarian causing circulation patterns and options to become more fragmented and/or non-existent.

In these rural areas, circulation is predominantly facilitated by two-lane roadways that include no pedestrian or bicycle amenities. The linear geography of the Gila River coupled with the number of large tracts of land

dedicated to farming activities also limit the circulation system to, in most areas, a one-mile grid system. These rural roadways then connect to regional routes such as MC 85 that travels east-west through the northern portion of the site, SR-85 that travels north-south along the west boundary of the study area, and to a greater extent I-10 located approximately 4 miles north of the study limits.

Most notably the limited circulation system within the study area lacks a clear sense of arrival and is void of any connectivity to the Gila River. However, the lack of existing roadways also means that the possibility exists to define a more enhanced and multi-modal system for the El Rio District that will foster the goals and overall vision of this plan.

State Route 30

The future planned State Route 30 (Interstate 10 reliever) has a significant impact on the long-term planning of the study area. A preferred alignment of the proposed facility has yet to be defined by ADOT and funding for the design of this segment is not programmed to be available until 2029.

Although the alignment of SR-30 has not been finalized by ADOT, existing physical conditions, such as minimum system interchange spacing requirements and the desire to avoid the need for grade separated crossings of the Union Pacific Railroad into downtown, suggest that the facility will connect to SR 85 along an alignment that is located between downtown Buckeye and the Gila River. The conceptual SR 30 alignment shown throughout this Vision Plan was obtained from the City of Buckeye's GIS database.

Placement of SR 30 along this alignment will create both opportunities and constraints within the study area. SR 30 will inevitably provide enhanced access

to the El Rio District, particularly from visitors outside of Buckeye, but the facility will also most likely be built at- or above-grade along this segment due to the high water table in this portion of the City. This condition creates a design challenge in maintaining a cohesive integrated land use plan and north-south connectivity between downtown Buckeye and the El Rio District.

Walking & Biking

Being able to move around on foot or by bike are important characteristics of any healthy and vibrant community. Unfortunately, with the exception of the limited sidewalks located in downtown

Buckeye, pedestrian and bicycle traffic is relegated to the same streets as automobiles and trucks throughout the study area.

Furthermore, trail linkages within the study area are also very limited. While there are no formal trail corridors in the study area, within the Gila River there are many informal trails that have been created over the years. In the future, the Buckeye Parks and Recreation Master Plan and the El Rio Design Guidelines together identify several regional, primary, and secondary trail alignments planned for the study area. The most notable of these future trails include the El Rio Trail which is planned to travel

along the Gila River and connect with the Maricopa Trail within the Estrella Mountain Regional Park as well as a north-south trail corridor that will connect the Gila River to the Skyline Regional Park via the planned Watson Drainage Channel.

Certainly this lack of sidewalks, bike lanes, and formal trails can be, in part, attributed to the very low population density found within the study area. However, to generate greater support for the development of this Vision Plan, the creation of enhanced pedestrian, equestrian and bicycle linkages within the study area will be a key design driver.

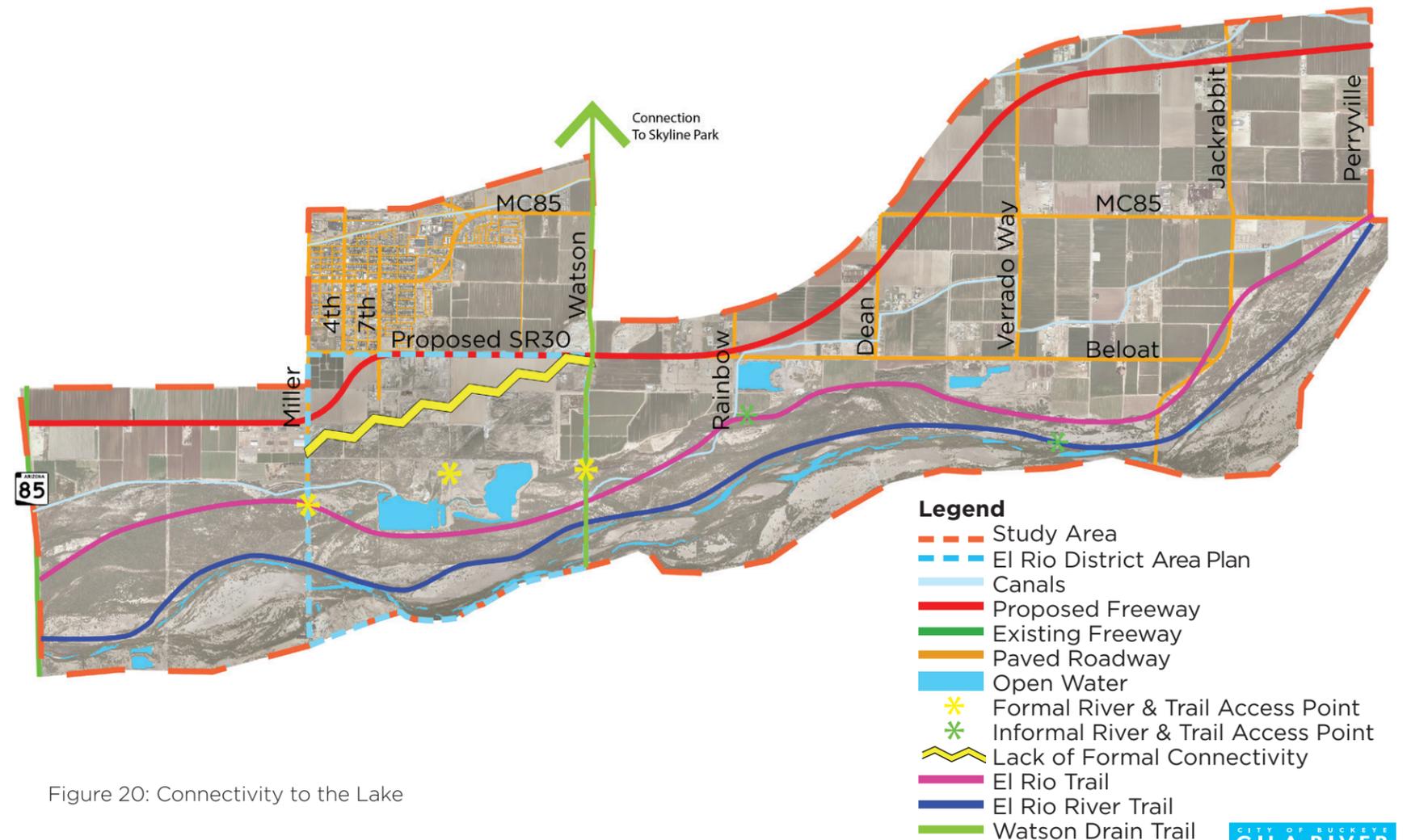


Figure 20: Connectivity to the Lake



A VISION FOR THE FUTURE

“A planning foundation cannot be achieved without a comprehensive approach that recognizes the interrelationship of physical, economic, and social development.”

Community Structure

The preceding chapters reflect the intuitive knowledge and preferences of citizens and stakeholders who are familiar with the Gila River and its adjacent banks, as well as the planning team's technical analysis of the complex land use and associated river dynamics of the planning area.

The following sections integrate this background information into a community structure that will be transformative for the overall study area and define a more detailed urban design strategy for the central El Rio District.

Urban Sections a Planning Continuum

To be truly transformative, the overall planning of the study area must embrace a new urban fabric that builds strategic relationships between social life, economic realities, and the natural landscape. This is achieved by creating a land use structure that provides equal emphasis on both regional and local development patterns and then recognizes how those development patterns can and should relate to the river itself.

As Figure 21 shows, the approach to defining the community structure of the study area first focuses on the placement of a series of "urban sections" that emanate out from the core of the study area. While these urban sections differ in character and function, collectively they are envisioned more as a "planning continuum" where the intersection from one to the next is gradual and without a precise dividing point, yet the extremes are clear and distinct. It is this structure that puts into context the prescribed hierarchy of the community and provides the framework for more refined land planning within the study area. This vision plan recognizes the following four urban sections:

El Rio District - This area is the focal point or "nest" of the larger community and brings residents, businesses, and visitors together to congregate and create a strong and vibrant sense of place. Higher densities provide the basis for expanded commercial choices and employment opportunities. As the regional hub, along with downtown Buckeye, this area offers a greater concentration of community-based infrastructure such as, transit, higher education, health-care, cultural facilities, recreational activities, and social services.

Enterprise Corridor - As the trend continues to a more mobile workforce that will have greater flexibility in their choice of where to live, work and play; this urban section leverages the connectivity to SR-85 and the proposed SR-30 along with the investments made within the adjacent "El Rio District" to attract the entrepreneurs, researchers and professionals needed to foster a vibrant employment corridor. This creative corridor accommodates a wide range of business development opportunities in high-value industries, such as health sciences, bio-medical research and the high-tech fields, and at the same time provides varied workforce housing options.

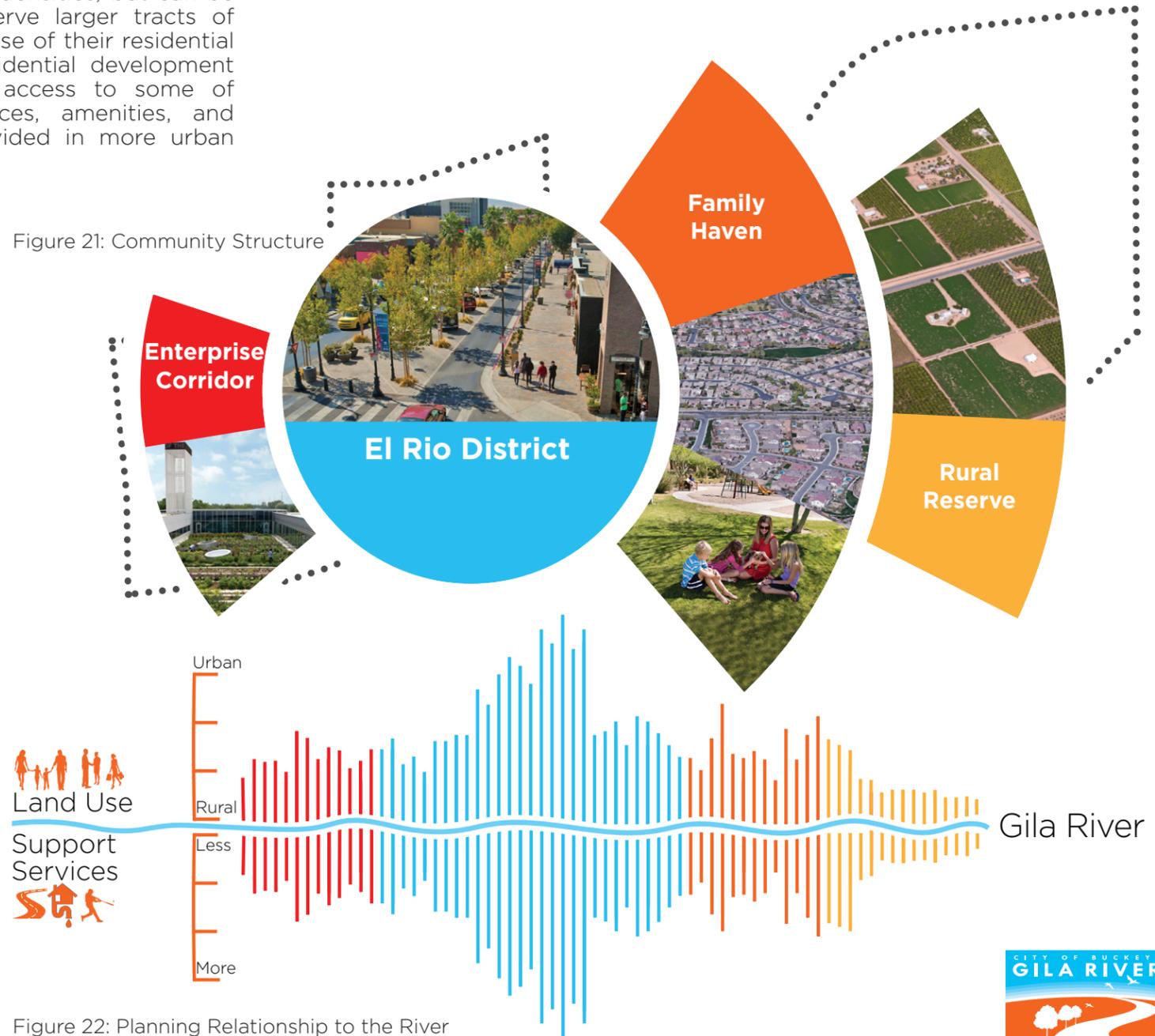
Family Haven - The Family Haven is an essential urban component because it will contain the vast majority of the population within the study area; including younger and older residents, singles and families. Developments within this urban section offer many different types of housing options to support this diverse population base along with all the facilities and services that meet resident's everyday needs; including schools, public spaces, parks, community facilities, and retail and commercial shops.

Rural Reserve - Blending the historic agriculture practices of Buckeye's past with compatible rural community development is the focus of this area. While agricultural practices at the rural-urban interface will become leaner in the future, they will also become more efficient and take advantage of increased demand for locally sourced foods and goods.

To be compatible with adjacent farming, rural residential developments are provided at lower densities, but can be clustered to preserve larger tracts of open space. Because of their residential function, rural residential development can also require access to some of the normal services, amenities, and infrastructure provided in more urban sections.

While the structure of the planning area radiates out from the El Rio District, equally important is the recognition of how land uses within the study area are managed to interact with the Gila River as well as preserve its natural qualities. With its long linear axis through the study area, the Gila River is physically exposed to a variety of existing and future land uses that range from urban to rural in character. This in turn creates pressure for the provision of varying levels of

support services to be placed along the banks of the river that do not always coincide with the intensity of the land uses. To this end, Figure 22 graphically shows how the relationship of land uses to the Gila River is expected to vary to be in harmony with the underlying planning continuum; however, that variation should be mirrored by commensurate support services so as to control access and preserve larger sections of the river for more passive uses.



Land Use Character Types

Once an understanding of the community structure was defined, greater definition could then be given to the actual composition of the individual land use building blocks or “character types” that will guide development within the study area. These character types are established in response to the ideas and desires brought forth from the residents and stakeholders at the community meetings and workshops. Maintaining the existence of rural, agricultural land uses was a comment often received and thus is an inherent component to the land use character along the Gila River in Buckeye. Residents and stakeholders also requested this Plan to identify a broad representation of the envisioned character of the built environment. It is expected that more defined and potentially diverse land use types may be developed as General Plan and Zoning efforts evolve in the future; however, the overall character of any given area should invoke the land use qualities expressed in this plan.

Rural Agriculture

This character type provides the opportunity to support and enhance agricultural activities along with rural, detached single-family residential development, natural resource management, outdoor recreation and limited commercial uses that focus on offering public interaction with agriculturally based products or uses such as riding stables, u-pick farms and other related operations.

Rural Neighborhood

This character type exclusively provides detached, large lot single-family residential development in a rural setting. Very limited shops/services that support the rural lifestyle including small-scale retail or grocery stores, feed and tack stores, commercial nurseries, and places of worship that are in scale and context to the character of the rural neighborhood are acceptable. Typically, the keeping of horses and livestock are permitted.

Suburban Neighborhood

This character type is suited for detached and attached single-family residential development primarily within planned residential neighborhoods that are designed to include well-connected streets and active and passive open

spaces that are designed and located to provide high pedestrian accessibility within and around the neighborhood. Supporting land uses such as personal and convenience shops/services, parks, places of worship, community centers and schools to serve the day to day needs of the local residents are suitable for this character type. On a limited basis, small-scale multi-family residential may be appropriate to parallel and/or buffer commercial development.

Where suburban character areas are planned for future traffic interchanges along the State Route 30 freeway facility (Watson Road and Dean Road), Suburban Activity Centers that encourage a horizontal mixture of “big box” and commercial retail users, professional office, entertainment centers, hotels and supporting restaurants and specialty stores are encouraged. These Suburban Activity Centers must possess strong vehicular circulation with appropriate access control from adjacent arterials and buffered from suburban neighborhoods with higher density housing and/or professional office uses.

Transitional Neighborhood

This character type acts as a buffer - or transition - between suburban and urban neighborhoods by providing medium intensity single family detached and single family attached residential, commercial, personal service and civic development. Residential development can include small-lot, duplexes, townhomes and low-rise apartments; and should have strong vehicular and multi-modal accessibility to serve the increased density of these neighborhoods. Supporting land uses such as convenience shops/services, parks, places of worship, community centers and schools to serve the day to day needs of the local residents are suitable for this character type.

Urban Neighborhood

This character type provides the opportunity for higher density residential mid-rise multi-family development and larger retail centers intended to serve a community or regional area. Office, entertainment and cultural uses may also be included in this area. Urban neighborhoods are predominantly residential in nature and are characterized

by a diverse mixture of residential types; from small-lot to vertical multi-unit developments which are typically in close proximity to one another to promote a dense, pedestrian oriented, urban environment served by transit and other alternative forms of transportation.

Mixed Use District

This district type is intended to provide a dense, vibrant, pedestrian friendly urban environment. Uses are vertically mixed to include high-quality mid-rise multi-family residential, destination retail and professional office buildings, that include commercial retail, restaurants and similar activities on first floors to provide pedestrian interest. These areas also typically include civic and/or government amenities, plazas, urban parks and places of worship.

Employment District

This district is intended to promote business and job growth opportunities that are vital to the economic sustainability of Buckeye. This area is best suited for Class A office buildings, incubator spaces for innovative startups, light industrial and indoor fabrication and other small businesses along with low intensity commercial and support services that can border nearby residential areas.

Recreation/Tourism/Entertainment

This character area identifies flexible areas that are suitable for a mixture of recreation, tourism, and entertainment related uses along the Gila River.

Government/Quasi-Public

This character type identifies areas suitable for public/private owned facilities that provide institutional or community services.

Conservation/In-Lieu Fee (ILF) Sites

AZGFD land suitable for mitigation banking and habitat restoration

Riparian/Open Space

These are environmentally sensitive lands that are ideal for conservation

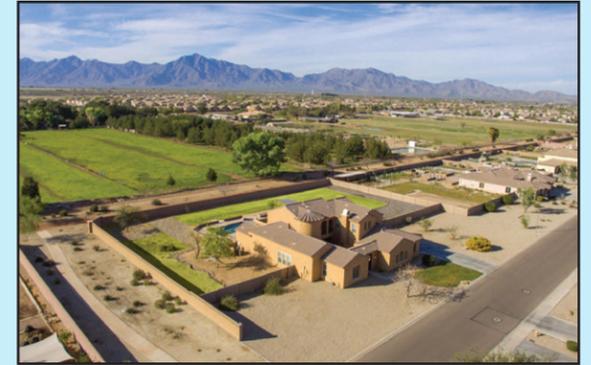
Existing Downtown/Downtown Expansion Area

To be further defined through future plans and studies.

Rural Agriculture



Rural Neighborhood

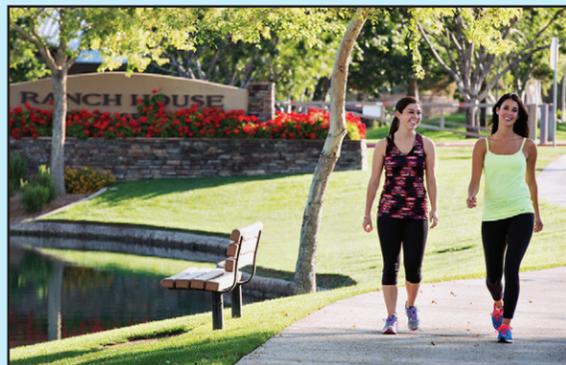


Suburban Neighborhood

Transitional Neighborhood

Urban Neighborhood

Mixed Use District



Employment District



Recreation/Tourism/Entertainment



Land Use Character Matrix

To provide an added level of context as to the “look and feel” of each land use character type, Table 1 provides guidance of the typical uses that must, should, and could be found within each character type. The format of this table is also intended to provide guidance on the intensity and function of some of the uses that are deemed appropriate and compatible within individual character types. However, a degree of flexibility was also purposely included within this matrix in order to provide an ability to respond to market trends, as necessary and appropriate, while ensuring overall community and neighborhood values are maintained.

	Agritainment	Farming	Single-Family Residential, Detached	Single-Family Residential, Attached	Multi-family Residential, Low Rise	Multi-family Residential, Mid Rise	Leisure Residential, Interval Ownership/Resort Residential	Regional/Destination Commercial	Community/Lifestyle Commercial	Neighborhood Commercial	Medical Campus/Hospital	Resorts/Hotels	Office	Light Industrial	Primary Education	Higher Education	Religious Assembly	Entertainment	Civic/Cultural Facilities	Pocket/Neighborhood Parks	Community/Regional Parks	Camping/Hiking	Public Safety	Bike Lanes	Off Street Trail	On Street Parking	Standard Sidewalks	Street Trees	Trail Heads	Transit	Wide Sidewalks
Rural Agriculture	Must	Must	Should							Could													Could								
Rural Neighborhood			Must							Should														Could	Should						
Suburban Neighborhood			Must	Should	Could					Should														Should	Should	Should	Should	Should	Should	Should	Should
Transitional Neighborhood			Should	Must	Must	Could				Should														Should	Should	Should	Should	Should	Should	Should	Should
Urban Neighborhood			Should	Should	Should	Must				Should														Should	Should	Should	Should	Should	Should	Should	Should
Mixed Use			Should	Should	Should	Must				Should														Should	Should	Should	Should	Should	Should	Should	Should
Employment			Should	Should	Should	Must				Should														Should	Should	Should	Should	Should	Should	Should	Should
Recreation/Tourism/Entertainment	Could				Should	Should				Should														Should	Should	Should	Should	Should	Should	Should	Should

Table 1: Land Use Character Matrix

Evaluating The Options

Initially, three (3) alternative land use scenario plans were developed for the study area (a detailed description of these land use scenario plans can be found within the adjacent subsection). One common design tenant intentionally integrated into each alternative is Buckeye's over-arching desire to establish a physical and visual connection between the downtown, the El Rio District and the Gila River. Following detailed analysis by the project team, as well as extensive community input through workshops, design charrettes, focus group discussions, and City Council work sessions to vet the alternatives, individual elements from each of the three scenarios were then merged into the final preferred land use character plan. These scenario plans are provided within the adjacent subsection along with a brief summary of their distinct planning elements.

Alternative One - Urban Green Plan Highlights:

- The framework of the plan is centered on a series of planning sections that transition from rural (east) to urban (west) in character. Rural agricultural uses are established along the north bank of the river at the eastern portion of the study area.
- The focal point of the plan is a large urban green and park placed adjacent to the proposed lakes that would act as an active space for community gatherings and special events.
- Mixed uses and higher residential densities are focused around the urban green to

Alternative Two - Central Meadow Plan Highlights:

- The framework of the plan is focused around preserving a more rural, natural character along the Gila River. As such, the rural agriculture land uses are more prominent throughout the community structure from east to west.
- Low density residential uses are concentrated along the north bank of the river to promote a less intense development pattern along the entire river corridor.
- 7th Street and a "Central Meadow" connect the downtown with the passive recreational amenities located in and along the river.

Alternative Three - Green River/Blue River Plan Highlights:

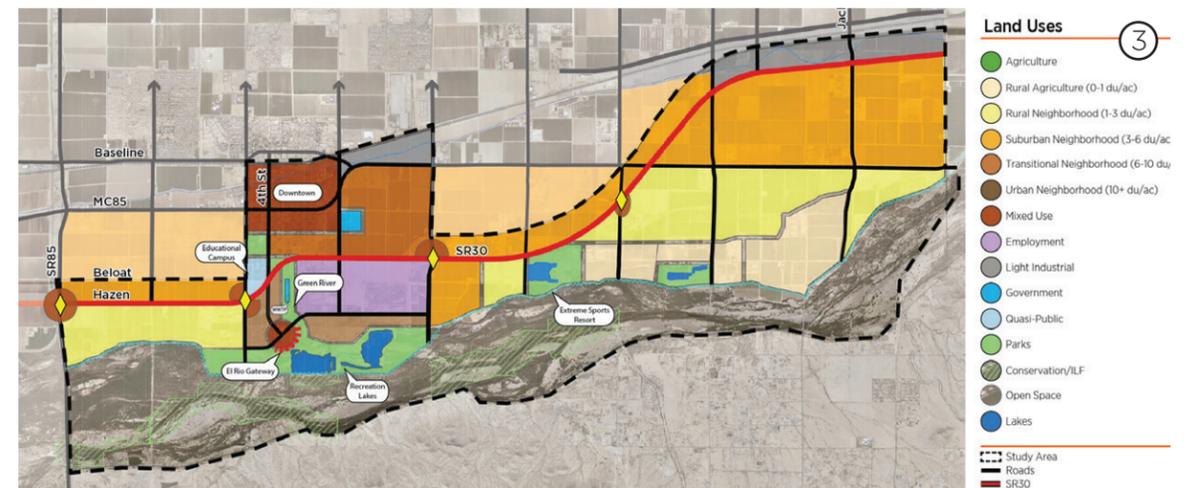
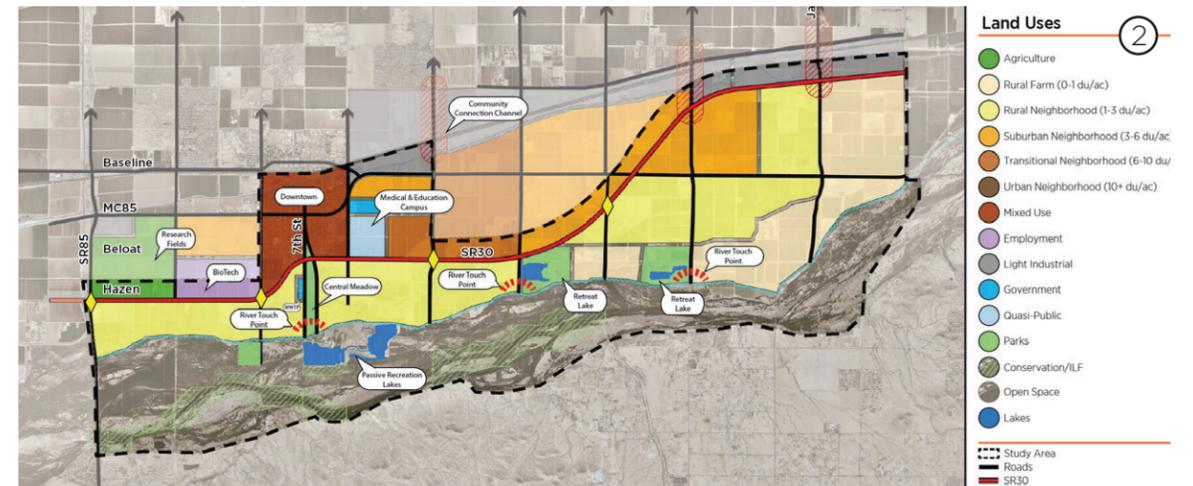
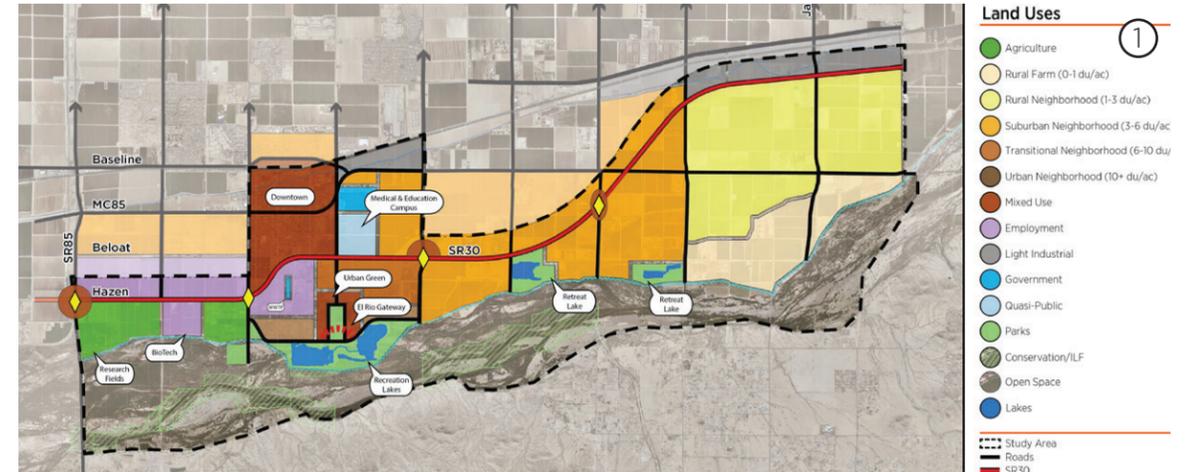
- The framework of the plan is centered around blending urban elements with rural qualities to create a balanced community character.
- The plan envisions a "Green River" of connecting active recreational uses that link downtown with water based recreational activities along the Gila "Blue River".
- The 4th Street alignment is envisioned as the primary multi-modal ribbon between a mixed use activity node adjacent to the lakes, a higher education campus adjacent to the proposed SR 30 and downtown Buckeye.

create a strong activity node adjacent to the lakes.

- The Apache Road alignment acts as the center spine of the plan, which connects downtown Buckeye with the proposed lake experience.
- An employment corridor along the proposed SR 30 acts as a "front door" to the study area and supports the higher densities around the urban green.
- The proposed levee alignment is relocated to the south of the lakes to allow for permanent structures and active recreation activities to be placed in and around the lakes.

- The Central Meadow is a passive, linear park that would be designed to extend the natural character of the river into downtown Buckeye.
- Employment, commercial, and high density uses are reduced in scale to coincide with the lower population base of the overall planning area.
- The proposed levee alignment is placed north of the lakes, which limits the placement of structures and certain active recreational uses around the lakes due to the increased flooding potential.

- A mixture of urban and rural residential densities are placed along the river's edge to preserve the natural character of this riparian corridor while also providing a variety of lifestyle choices. Rural agriculture is established at the eastern most and western most reaches of the study area while a higher density of mixed uses are promoted along the nodes adjacent to the lakes.
- The employment core is centrally located and provides enhanced connectivity to residential, commercial, and recreational uses creating a true live, work, play environment
- The proposed levee alignment is shifted south to incorporate the lakes and adjacent park, which allows for enhanced active water based recreational options.



Preferred Land Use Character Plan

The preferred land use character plan described within this section utilizes the preceding Community Structure and Character Types to present a development pattern that accommodates the overarching purpose of this plan, which is to restore the natural character of the Gila River and compliment those preservation efforts with appropriately designed land use and recreational activities along its banks.

This land use character plan is not intended to be a definitive plan on how development should occur in the study area, rather it should be used as the preferred example of how quality development and urban design principles can be applied to realize the study areas ultimate vision. Furthermore, this land use plan should be used as a reference for City staff, the Planning & Zoning Commission, and the City Council when considering land use decisions within the study area.

El Rio District

While the preferred plan must provide development opportunities in an environmentally sensitive manner to protect the ecological significance of the river, it must also make the river accessible to promote educational and recreational activities that will inform residents and visitors on the need for stewardship. However, with its wide floodway and limited perennial flows, achieving enhanced access to the active edges of the Gila River itself is a challenge.

Recognizing the unique waterfront setting that the existing sand and gravel lakes located just south of downtown Buckeye could provide, the preferred land use plan focuses around these under utilized amenities as the gateway to the greater Gila River corridor. The Recreation/Tourism/Entertainment Land Use is located adjacent to these prominent lakes to support educational, active and passive recreational, and

water-oriented activities that can provide a stepping-stone to the Gila River beyond.

The compact development form that then emanates out from these lakes ranges from transitional, medium-density residential neighborhoods to urban, high-density residential neighborhoods that are all within walking distance of educational, cultural, and mixed use developments along with employment opportunities. At the same time, the plan recognizes future community desires to revitalize downtown Buckeye and understands the impact of market forces on the intensity and simultaneous growth of these potentially opposing activity nodes. In order to achieve a synergetic relationship, this plan uses the Fourth Street alignment as the central connecting ribbon between these destinations and limits the scale of planned urban lakeside development to complement and not compete with future downtown redevelopment efforts. Another driving factor for the land use planning of this area required careful consideration for the placement of compatible land uses adjacent to the existing WWTP and its future expansion area.

Enterprise Corridor

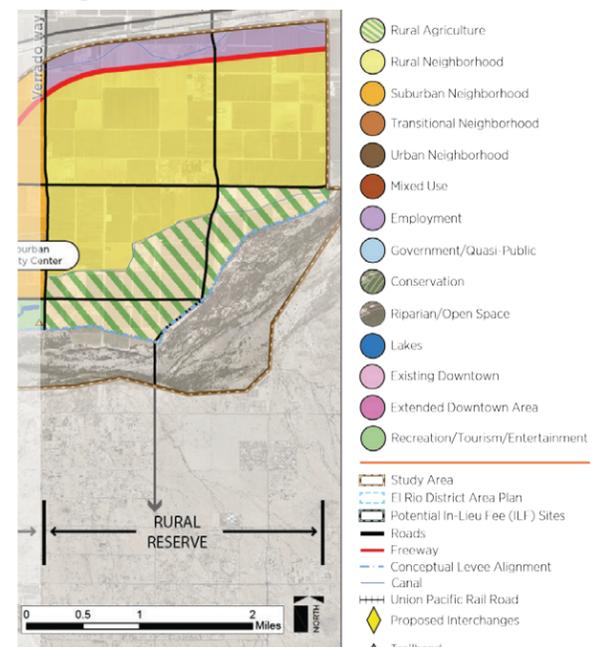
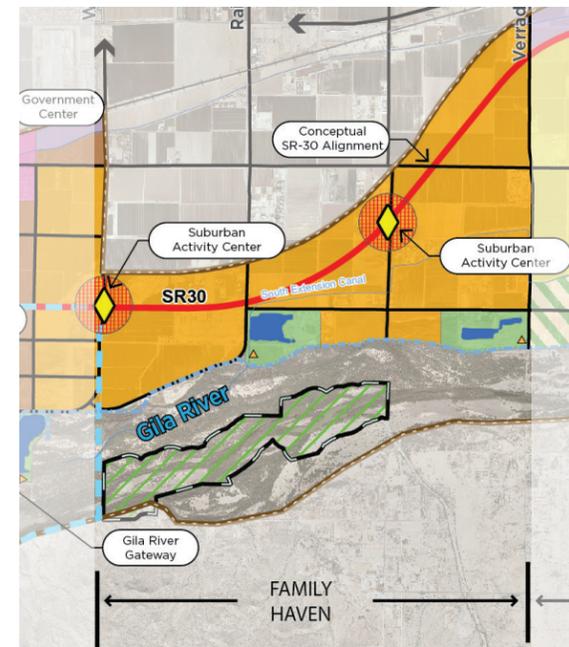
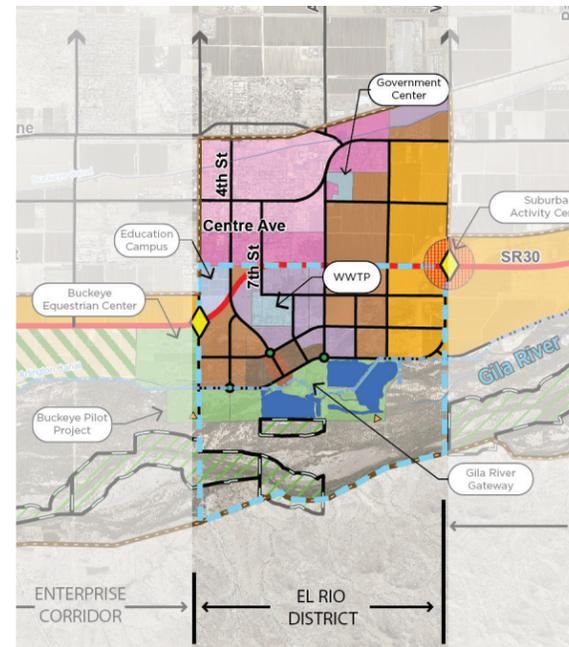
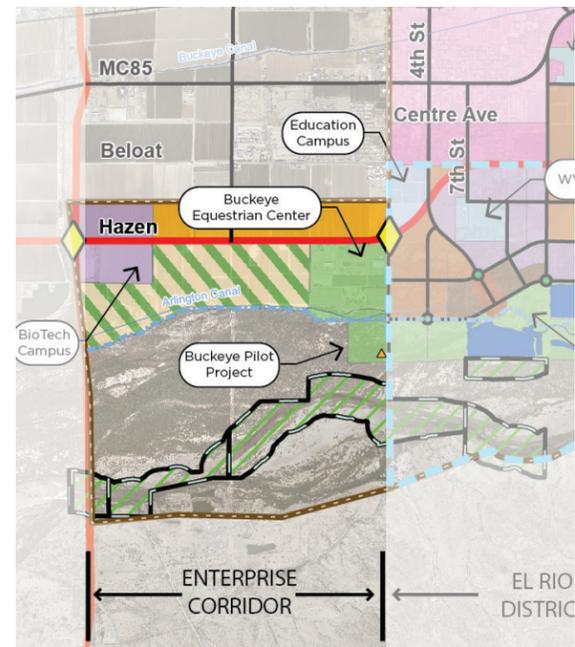
The western portion of the study area will function as an important gateway into the Buckeye community. With its direct access to SR-85 and the proposed SR-30 corridors, this area is targeted for employment generating, office, and emerging technology uses. However, this areas existing agricultural uses also create a unique opportunity to preserve, as well as physically incorporate, these historically significant activities into the urban fabric by promoting bio-medical research and development uses or developing complimentary uses to the successful Buckeye Equestrian Center located within this portion of the study area. The remainder of this section of the study area is dedicated to suburban neighborhood development that will provide varying types of workforce housing to service the planned employment uses along SR 85 and support more intense social, cultural and recreational uses proposed within the adjacent El Rio District.

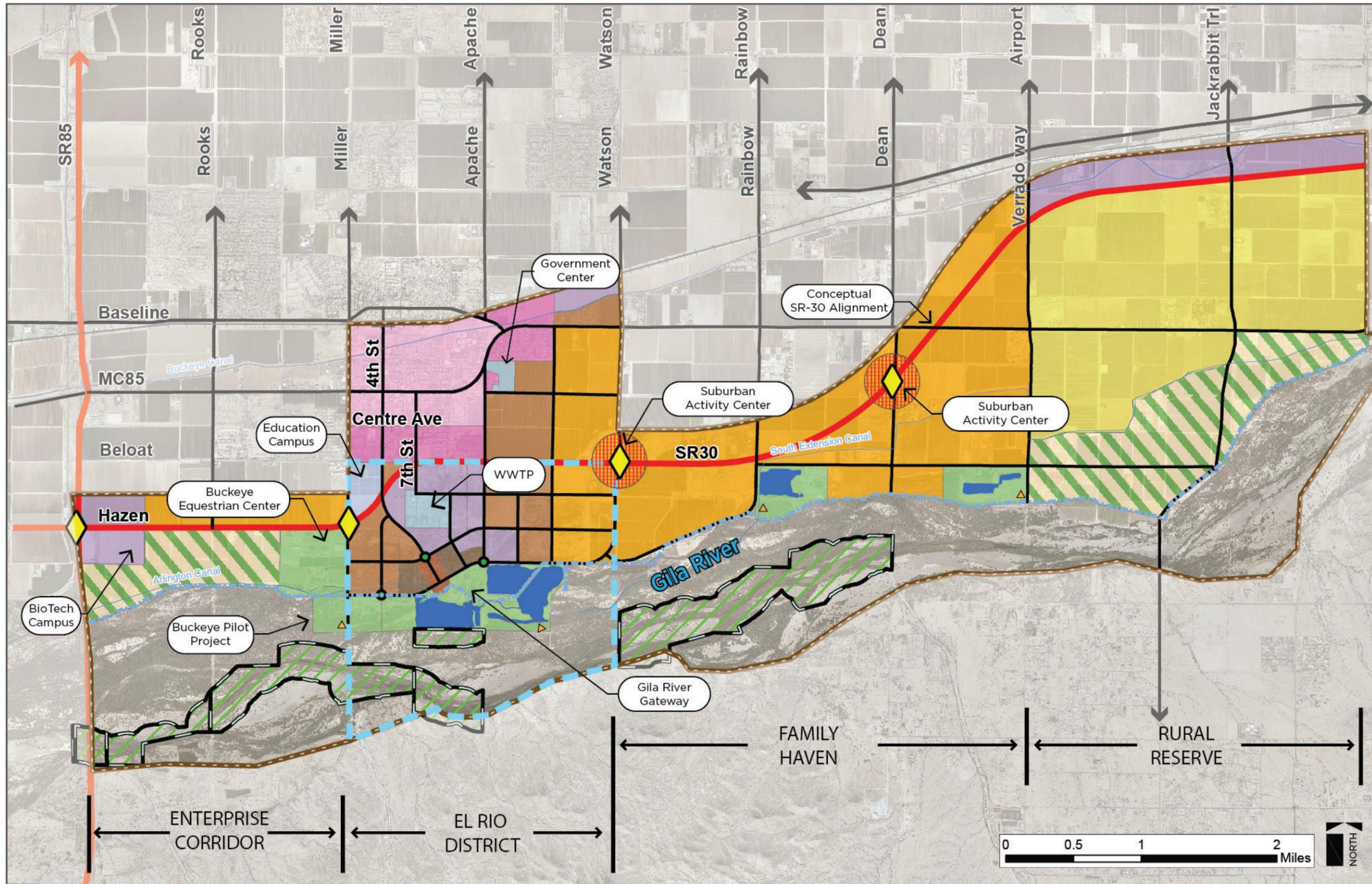
Family Haven

More than anything else, the central portion of the study area is planned to reflect the expected future changes in family, work, and travel patterns by offering a range of housing choices, which are supported by local neighborhood centers that serve the everyday needs of surrounding residents. Although almost entirely dedicated to suburban neighborhood type development, this area is envisioned to maintain a high quality of life by linking to the larger social and cultural community network, providing exceptional multi-modal connectivity, offering a healthy and active living environment, and capitalizing on the areas proximity and access to the Gila River. Transitional and Urban Neighborhood land use character types are intentionally excluded from this planning area so as to encourage higher density and intensity development to be concentrated in the El Rio District, thereby supporting and strengthening the desired growth of this urban core.

Rural Reserve

The growth that is anticipated within the study area and the region as a whole will undoubtedly increase pressure on the rural land uses that are located in Buckeye today as well as the natural resources that are currently present in and along the Gila River. This reality was also realized by community members during the public engagement process, who expressed strong desires to preserve the rural qualities of Buckeye as well as protect the environmental character of the Gila River. Therefore, the historic development patterns in the eastern portion of the study area is reserved for rural agriculture and rural neighborhood land use character types. Providing opportunities for low density, large-lot or cluster residential development and appropriately scaled support uses will be in harmony with encouraging the continuation of agriculture based industry in the area that can source local foods for uses such as farm to table restaurants and sponsor agritainment type activities. In addition, these rural land uses will protect the health of the river and adjacent natural areas by limiting the intensity of development along its banks.





CITY OF BUCKEYE
GILA RIVER
PROJECTS
 RESTORE THE RIVER

Land Use Character Plan

Land Use Character Types

- Rural Agriculture
 - Rural Neighborhood
 - Suburban Neighborhood
 - Transitional Neighborhood
 - Urban Neighborhood
 - Mixed Use
 - Employment
 - Government/Quasi-Public
 - Conservation
 - Riparian/Open Space
 - Lakes
 - Existing Downtown
 - Extended Downtown Area
 - Recreation/Tourism/Entertainment
-
- Study Area
 - El Rio District Area Plan
 - Potential In-Lieu Fee (ILF) Sites
 - Roads
 - Freeway
 - Conceptual Levee Alignment
 - Canal
 - Union Pacific Rail Road
 - Proposed Interchanges
 - Trailhead

Figure 23: Preferred Land Use Plan



AREA PLAN FOR THE EL RIO DISTRICT

It will take an integrated network of urban and natural systems to create a new waterfront legacy for Buckeye

The El Rio District

With the development of the preferred land use plan, a more detailed vision of the El Rio District was created to ignite the imagination and ambition necessary to take the first challenging steps towards success. The approach to the development strategy for this area can be framed into three distinct efforts:

Claim

Currently, the Gila's floodplain extends well beyond the banks of the river, which greatly impacts the advancement of development within the El Rio District. In order for the district to serve the future of Buckeye it is essential that this flood prone land is first CLAIMED to allow for the placement of meaningful and memorable buildings and public spaces directly along the water's edge. Through

the incorporation of various flood control measures such as a structural levee and/or vegetation management, a significant portion of the El Rio District can be removed out of the flood zone and thus prepared for development.

Integrate

The El Rio District is dramatically underserved in terms of formal access to the Gila Rivers natural amenities. This lack of connectivity, both vehicular and non-vehicular, compounds the challenges of defining a new urban form for the district. INTEGRATING existing development with the Gila River through enhanced connectivity increases accessibility to desired visitors and thus potential for future growth. Creating more direct linkages both within the district and to the river can be facilitated through

improved roadways and conveniently located paths and trails.

Activate

To position itself as a destination within the region, the El Rio District must ACTIVATE its newly claimed and integrated land by enhancing the programming of the surrounding built environment. Through weaving a unique tapestry of physical, economical, and environmental improvements a successful dialogue between land and water will define the unique image of the El Rio District in Buckeye.

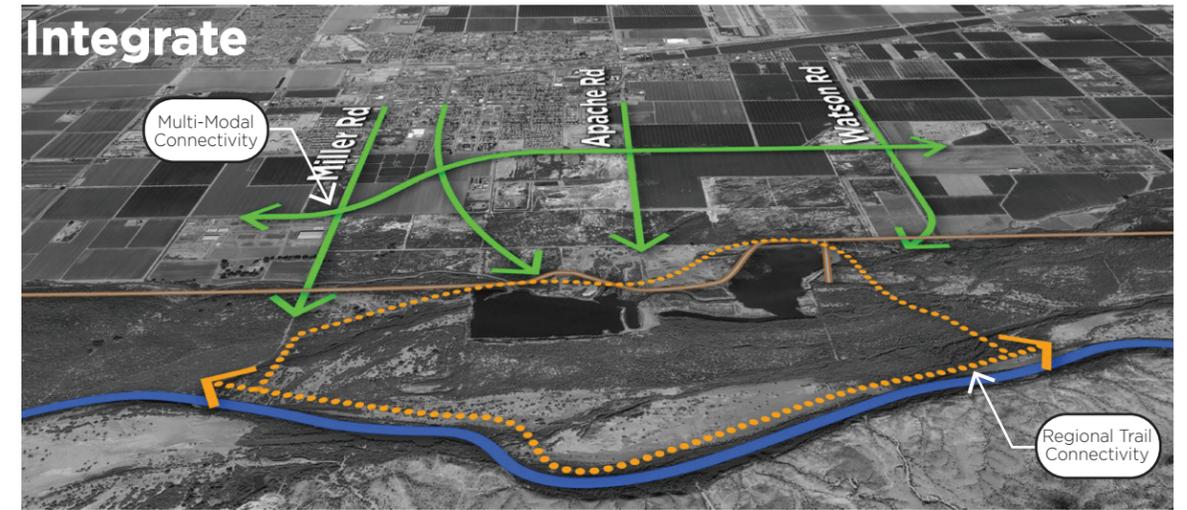
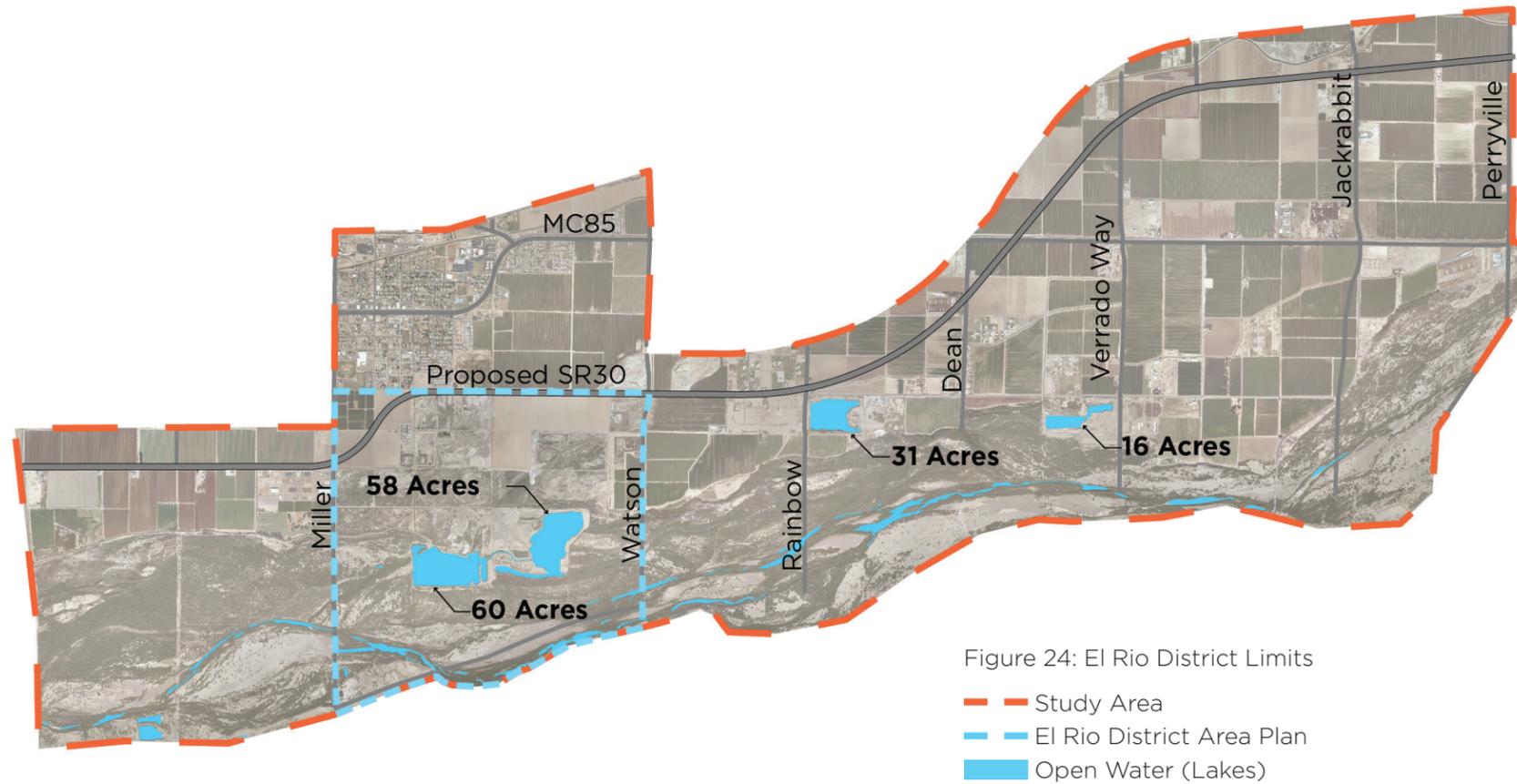


Figure 25: El Rio District, Development Strategy

Concept Plan

Guided by the CLAIM, INTEGRATE, ACTIVATE development strategy, the El Rio District Area Plan illustrates big ideas and specifically recommends projects, policies, and programs necessary to achieve the desired vision for this key focus area.

The concept plan is focused on integrating the “Lakes” through the placement of an engineered levee for flood protection that is seamlessly integrated into the landscape. These lakes, and the reclaimed land around them, act as a natural gateway to the Gila River that can host a variety of public and private program elements including; entertainment venues, outdoor sporting options, resort destinations, multifunctional education and community structures, open spaces, natural play environments, adventure courses, or boating and full-body-contact water based activities. With these enhancements and its adjacency to the identified ILF areas, the “Gila River Gateway” becomes a front door to the restored riparian river corridor that can offer more passive opportunities such as; urban camping, regional trails, and improved wildlife observation.

The development of the Gila River Gateway is accompanied by a new mixed use destination hub. This development is primarily planned on State Trust land adjacent to the western most lake and will offer prime access to the new waterfront. The mixed-use design compliments the future downtown revitalization plans by limiting retail, restaurant, entertainment, and residential development to a walkable scale, village-style area.

From this vertical mixed use, the development program for the District then sensitively transitions to a lower-intensity, horizontal mixture of uses. Along the strategically placed “Lakeside Drive”, housing is predominantly placed to accommodate upscale condos, townhouses and affordable rentals along with other innovative housing types for

emerging markets. These residential developments will help provide the human capital needed to invigorate the El Rio District.

The plan links the existing downtown with the El Rio District via “Fourth Street”, which utilizes a continuous chain of recreation, education, and employment nodes to reach up from the river into the historic center of Buckeye. The application of complete street principles will establish this corridor as a comfortable environment to either walk, ride a bike, or use transit to explore the greater Buckeye lifestyle.

The existing City of Buckeye Central Wastewater Treatment Plant (WWTP) and its expansion area poses a challenge to the El Rio District. The facility’s secondary impacts and required buffer areas significantly limit the type of development that can be placed around its border. However, the concept plan embraces this limitation as an opportunity to ensure necessary, and more compatible, employment uses are positioned immediately within the district. It will be imperative that any complimentary development, such as light industrial uses, are designed and constructed in a manner that enhances the public realm and minimizes negative impacts to the desired quality of life of the area.

Figure 26: El Rio District, Concept Plan

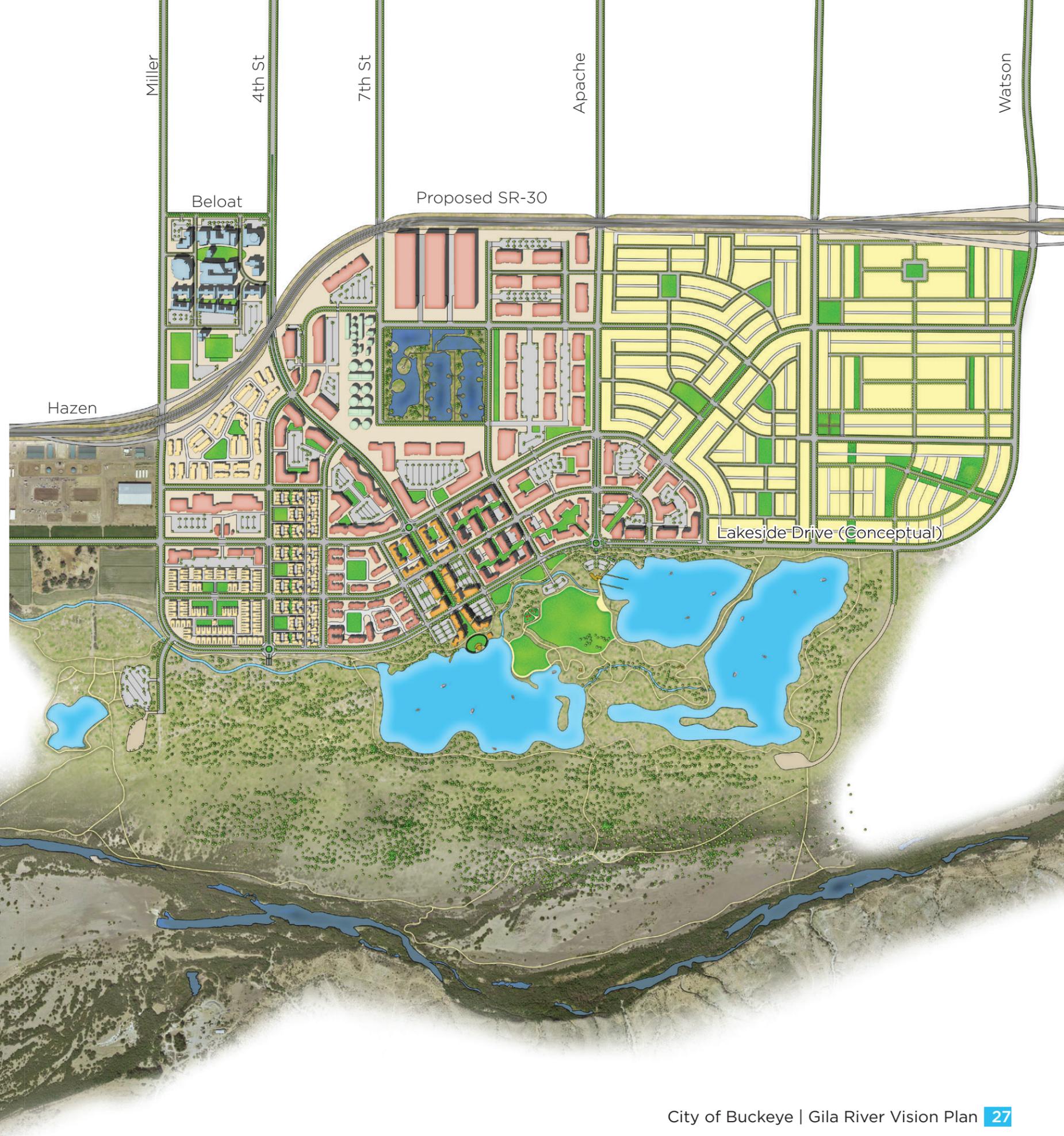




Figure 27: El Rio District - Conceptual Rendering, North



Figure 28: El Rio District - Conceptual Rendering, South

Major Features of the Concept Plan

The following section highlights in greater detail some of the priority projects that will be transformative for the El Rio District and the study area as a whole.

Levee

To protect floodway fringe property from being inundated and to achieve the integrated development character that is desired along the banks of the Gila River, the construction of a levee within portions of the study area is necessary. To fully determine the overall design and placement of a levee requires a comprehensive analysis of river mechanics that reaches well beyond the scope of this vision plan. However, while a complete engineering analysis was not completed for this project, a baseline analysis of the impacts to the water surface elevation and water velocity was conducted to test the impacts of various proposed levee alignments specifically within the El Rio District focus area.

The results of the baseline analysis concluded that any levee alignment that would encroach on the proposed FEMA floodway would likely create fairly dramatic increases to both the water surface elevation and the water velocity, which in-turn would alter the hydrologic and hydrophilic dynamics of the river. With the restoration of the Gila River a critical goal of this long range vision, a levee alignment that is consistent with the natural river corridor and generally follows proposed FEMA floodway limit was defined as the preferred alternative within the El Rio District. As Figure 29 shows, this alignment places a large percentage of the Lakes within the El Rio District boundary in the floodway, which limits (to some degree) their recreational potential. Alternatively, the alignment also creates an opportunity to define a third lake adjacent to the Gila River Gateway that will help to maintain the desired waterfront



vista and interaction that was expressed by residents and stakeholders during the public involvement process.

The design of the levee itself is envisioned to mimic the soft structural design alternative proposed within the original El Rio Watercourse Master Plan, where landscape fill is placed over the structural levee to create a more gradual topographical transition (see Figure 30). This design approach will help to blur the levee edge and improve the relationship between the built and natural environment. In specific areas, such as the mixed use node adjacent to the western lake, an expansion of the levee profile is also encouraged to provide an opportunity for development to create a direct visual connection with the water's edge.

Figure 29: Conceptual Levee Alignment

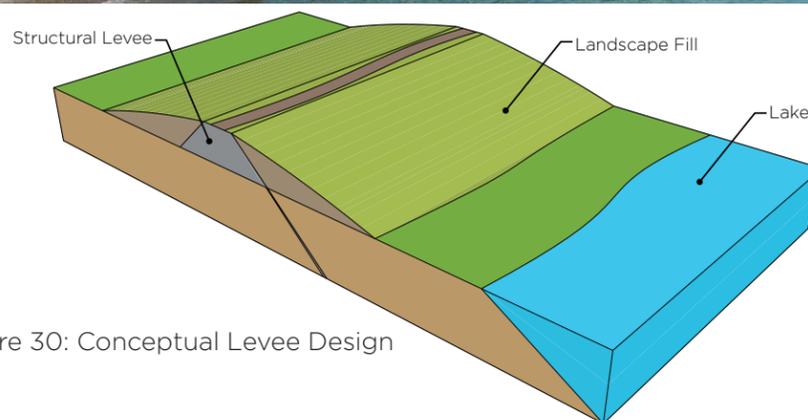


Figure 30: Conceptual Levee Design

Gila River Gateway

The Lakes within the El Rio District and the accompanying land around them are privately owned. Therefore, the Gila River Gateway area is envisioned as an entertainment and recreational environment that will ultimately support a variety of private, owner defined development types. Regardless of its final program of elements, the Gateway area is anticipated to be a meeting and gathering point within the community. It is also expected to be a launching point for visitors to explore all that Buckeye has to offer.

Once protected by a levee, the privately owned portion of the Gateway area located outside the floodplain and floodway, will be able to function as a more active zone that has the potential to offer a robust program of activities were people can vacation, try a new adventure, take a tour, grab a bite, enjoy a concert, learn something new, try to water ski, enjoy a cruise, take a dip or just get their feet wet.

As one travels further south, out of the Gateway area, they will navigate across the levee onto public lands and experience a noticeable transition into the natural corridor of the river. This more passive zone provides recreational activities that are less intense, but just as enjoyable. Here you can blaze a trail, take a ride, paddle around, hook the big one, use your binoculars, camp under the stars, or simply slow down and enjoy nature.

Program of Potential Uses/Facilities

- Lakes
- Resort
- Marina
- Boathouse
- Boating (Electric/Sail)
- Kayaking/Rowing
- Fishing
- Fishing Piers
- Tow Skiing
- Swimming
- Private Vendor/Rental Services
- Amphitheater
- Activity/Events Lawn
- Ropes Course
- Nature/Education Center
- Nature Based
- Playground
- Children Stream and Activity Fountain
- Water Garden
- Picnic Areas
- Pavilion/Ramada
- Parking
- Restrooms
- Iconic Overlook Structure
- Bird watching
- Bird Blinds
- Private/Public Trails
- Horseback Riding
- Water Trail
- Interpretive Station
- Camping



Figure 31: Gila River Gateway Concept Plan

Fourth Street

Downtown Buckeye sits approximately 1.5 miles from the mixed use center of the El Rio District. Given the close proximity of these two destinations and their similar desired functions, it is imperative to their mutual success that they function as a complimentary unit. One of the best urban planning tools that can produce this cohesion is enhanced connectivity.

Although several corridors provide access from downtown to the waterfront, Fourth Street serves as the most viable gateway/route because of its ability to connect multiple activity nodes, which will help to attract additional movement along the corridor (see Figure 32).

The general composition of Fourth Street is viewed as a “complete street” profile that will safely accommodate pedestrians, bicyclists, motorists, and transit riders. However, given the varied land uses that abut this corridor, the composition and manner in which this street is designed will transition or evolve as one travels through the corridor.

As Figure 33 shows, in the northern portion of the El Rio District where higher traffic volumes are expected due to the level of employment uses and proximity to SR 30, Fourth Street is envisioned as a four-lane divided roadway with bike lanes, street trees and a detached sidewalk. Conversely, the southern section of the corridor that reaches the urban neighborhood and mixed use districts desires a more walkable environment. To achieve this urban form, the Fourth Street section is transformed to provide narrowed, single travel lanes in each direction with shared bike routes, the central median is expanded to provide a public space that can host special events, on-street parking is offered, the use of street trees is increased for enhanced shade, and the sidewalks are widened to accommodate adjacent store fronts. It is worth noting that these newly proposed roadway cross sections for Fourth Street within the El Rio District will need to be incorporated into the City’s adopted roadway cross-sections.

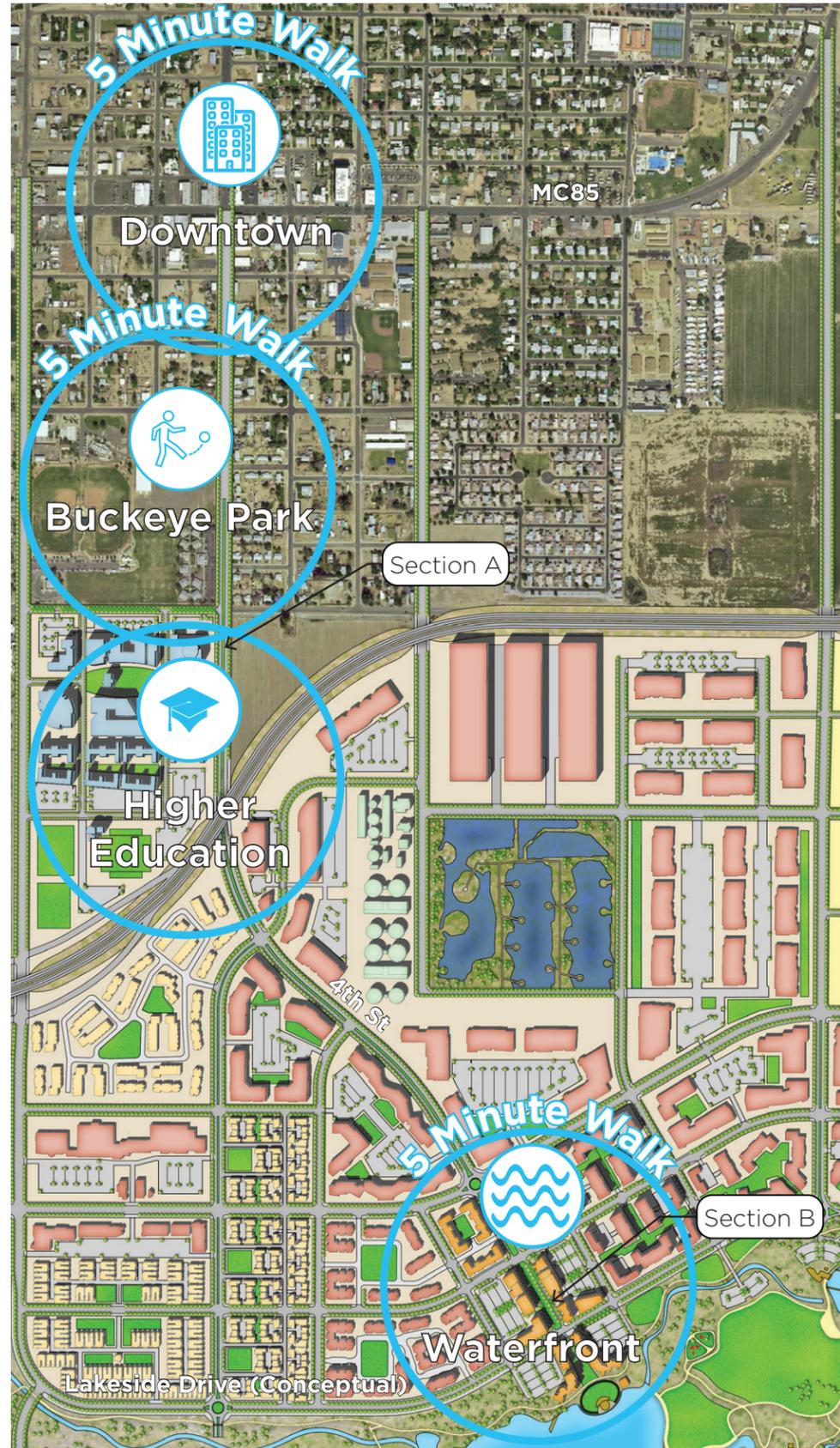
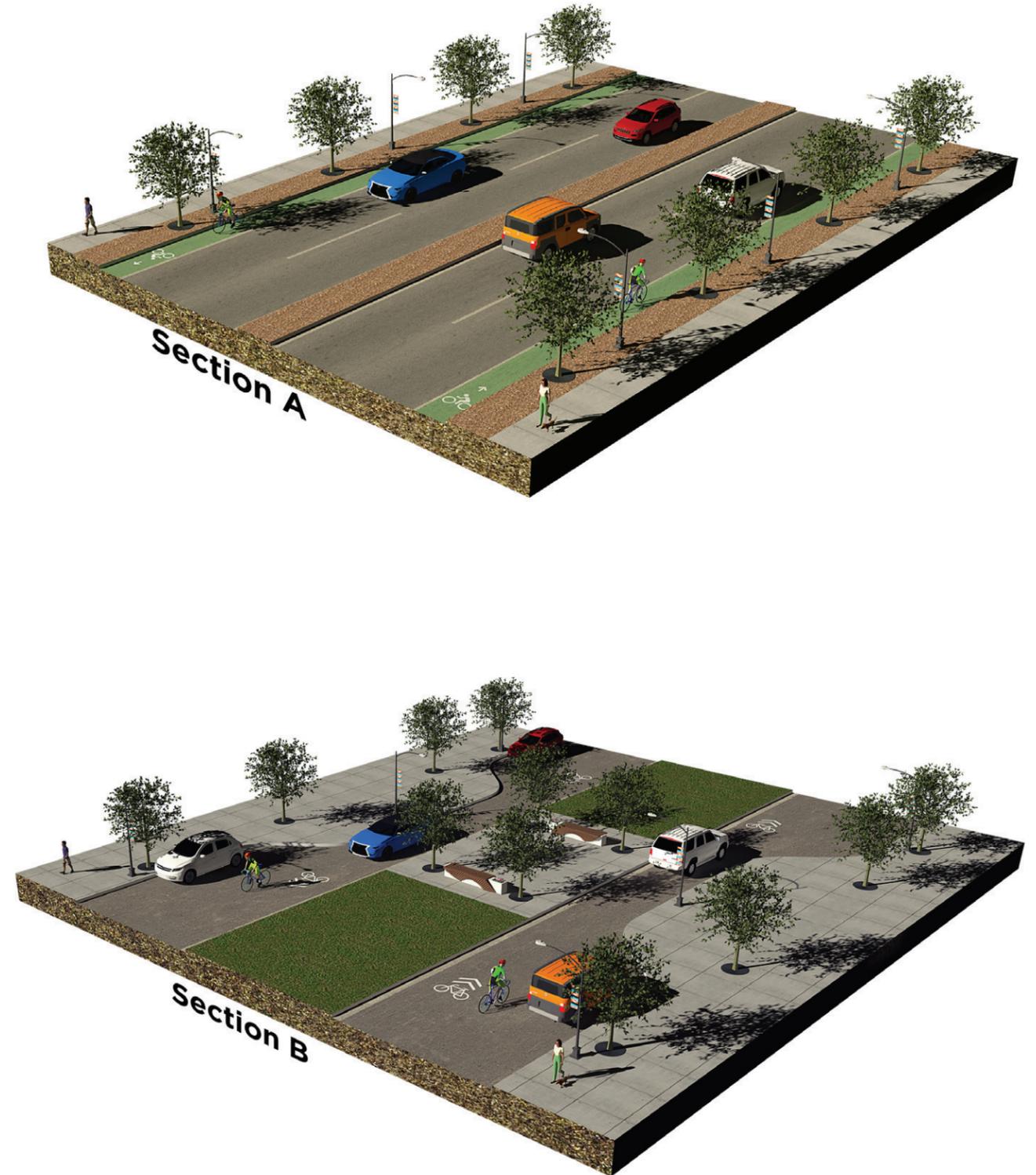


Figure 32: Fourth Street Alignment

Figure 33: 4th Street Cross Sections



SR-30

As Buckeye looks to the future, improving mobility by creating a well-connected transportation network that offers choices to the people who live, work, and visit the City is critical. To this end, the preferred strategy for the proposed SR-30 (“I-10 Reliever”) Corridor focuses on enhancing access to the area without creating a physical impediment to maintaining the connectivity and cohesiveness between Downtown Buckeye and the El Rio District. This will be accomplished in part by ensuring that development in the area does not create traffic issues that undermine the area’s economic growth and quality of life, while also establishing a visual character that creates a strong first impression to new visitors. This is achieved by ensuring high traffic generating uses that require convenient access to regional transportation routes are located adjacent to the proposed freeway as well as appropriately placing land uses along the corridor that can exemplify Buckeye’s rural heritage.

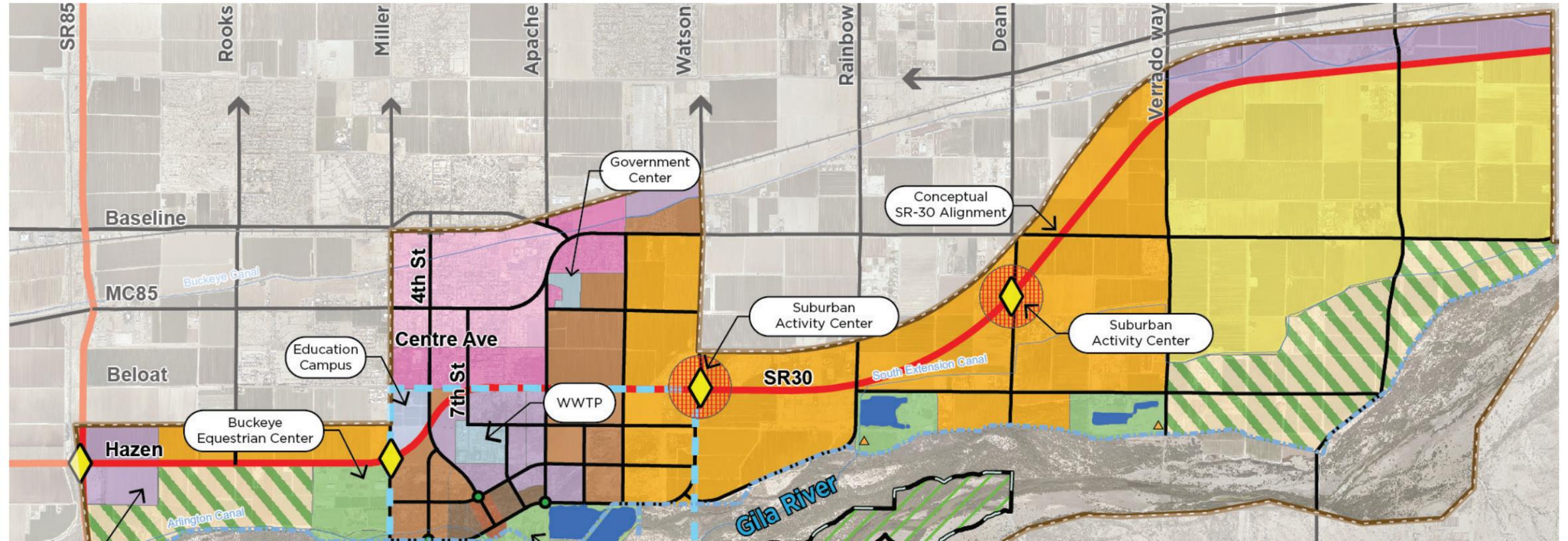


Figure 34: SR-30 Conceptual Alignment

Future design of the SR-30 facility should also consider Buckeye’s desire to establish a facility right-of-way “footprint” that will include wet and dry utilities to serve the area. Added rights-of-way and/or easements to accommodate planned regional overhead transmission lines is also desired. This end condition will centralize facilities into one cohesive corridor and limit their intrusion into the Gila River edge. Furthermore, consideration of an incremental approach to the construction of the ultimate SR-30 facility is preferred by establishing at grade roadways along the alignment that can be utilized as frontage roads for the ultimate configuration.

Major transportation corridors can often act as barriers that impede connectivity rather than improve it. While the ultimate configuration of the SR-30 corridor within the study area will be further defined by ADOT through future studies, careful thought during future transportation

planning efforts should be given to the design of the facility and preferably avoid a profile that would raise SR-30 above the existing grade particularly between Watson Road and Miller Road. In addition, particular attention should be given to the layout of key intersections within the El Rio District, such as Fourth Street, so as to provide a condition that is aesthetically pleasing and walkable.



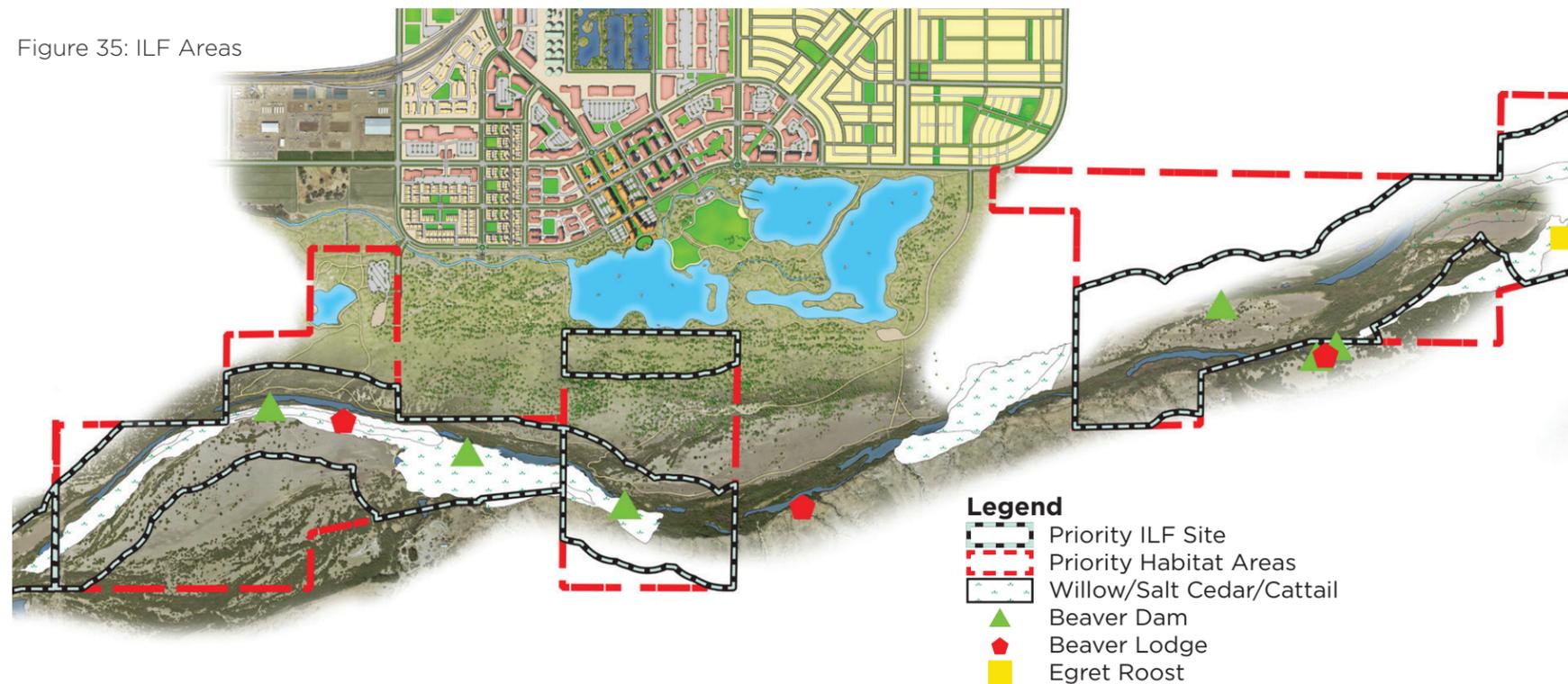
Gila River/ILF Areas

Sometimes referred to as a “mitigation bank”, the Buckeye In-Lieu Fee (ILF) program will be a long term City of Buckeye collaboration with the Arizona Game and Fish Department (AZGFD). Together they will implement, perform, and conduct the long-term protection and management of in-lieu fee compensatory mitigation projects that are to be approved by the United States Army Corps of Engineers and accepted by the Arizona Game and Fish Department as the program sponsor. Under Federal law and state guidance, the primary objective of restoration projects developed under the ILF Program are to replace functions and values of aquatic resources and associated habitats that have been degraded or destroyed as a result of activities conducted in compliance with or in violation of Section 404 of the Clean Water Act of 1972 and/or Section 10 of the River and Harbor Act of 1899.

Through this Vision Plan process, AZGF and the project team have worked to research, evaluate and field verify the natural resources and priority habitat areas on AZGFD and PLO 1015 lands owned or managed lands in the Gila River that would satisfy federal and state ILF program requirements and objectives. These areas have been preliminarily mapped and are shown in Figure 35. These areas are primarily located on AZGFD managed lands largely centered in the Gila River channel where unique wildlife features such as egret roosts, beaver dam/lodges and great blue heron rookery exist on or near existing open waters and endangered habitat areas. These priority habitat areas will be preserved and restored through enhanced management of salt cedar and select reintroduction of cottonwood, willow and mesquite species.

As the Restoration Plan for the Buckeye ILF continues to be prepared by AZGFD, a more precise determination to the assignment of implementation phasing and the number and monetary value of credits in Buckeye will occur. The Restoration Plan will consist of an inventory and assessment of cultural resources, existing wildlife utilization, security and public access provisions and long term management and financial assurances. Collectively, these will be packaged into the Buckeye ILF Restoration Plan and Prospectus to seek formal plan approval and adoption by the USACOE and a multi-agency Interagency Review Team (IRT) consisting of the AZGFD, USFWS, USEPA.

Figure 35: ILF Areas



- Legend**
- Priority ILF Site
 - Priority Habitat Areas
 - Willow/Salt Cedar/Cattail
 - ▲ Beaver Dam
 - ⬠ Beaver Lodge
 - Egret Roost

The Buckeye-AZGFD ILF Program

How it Works.....

Once the Buckeye ILF program is formally adopted and fully operational in the near future, the following is a general breakdown of how the ILF program functions.

- Project proponents (typically property owners, developers, or mining companies) in the same watershed purchase credits from ILF program operator (AGFD) as compensatory mitigation from their impact.
- Credits for the Buckeye ILF area are sold to property owners with approved compensatory mitigation plan approved by the USACOE.
- Funds received from purchase of credits “deposited to Buckeye ILF account” and can be allocated toward:
 - restoration,
 - enhancement,
 - preservation and/or creation of riparian, xeroriparian/freshwater wetland habitats;
 - operation and maintenance (in perpetuity) of Buckeye ILF site.
- Property owner proceeds with a streamlined 404 permit approval process on of his/her property.
- AZGFD experts perform monitoring and adaptive management for the Buckeye ILF site in perpetuity.

Benefit to Buckeye

- Collaborations between Department and the City
- Implement restoration on City's properties with little or no expense on their part
- Provides project proponent funds:
 - To Implement habitat enhancement projects on appropriate project sites
 - For Long Term Operation and Maintenance for enhancements on project sites
 - To conduct Pre and Post Implementation Monitoring
 - To implement Adaptive Management strategies over time

Benefit to Property Owners with 404 Permit

- Ability for property owner to commit to mitigation requirements in a timely manner thus streamlining the 404 permitting process
- Ability for property owner to have certainty regarding mitigation costs earlier in project timeline
- Property owner not responsible for implementing compensatory mitigation
- Property owner not tied up with minimum of five years of mitigation monitoring

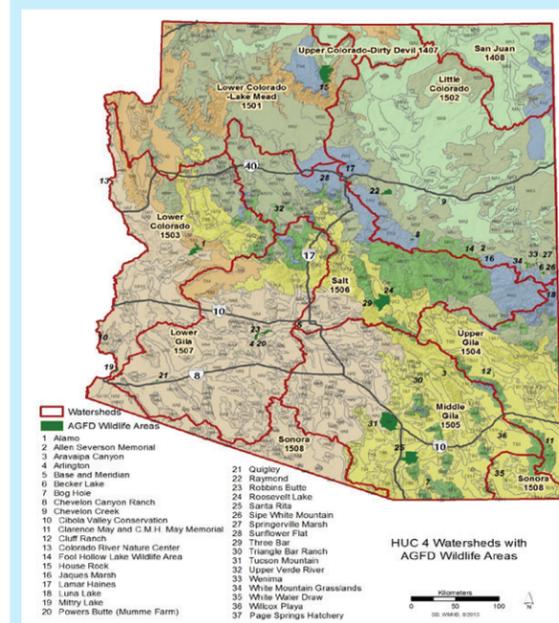


Figure 36: HUC 4 Watersheds with AGFD Wildlife Areas

Source: AZGFD



HOW DO WE GET IT DONE

The vision plan sets our
direction, but its
implementation will define
our success

Implementation

“Reclaim the River; Enliven the Banks” has been instrumental in drawing added interest and enthusiasm from potential Federal, State and local government agency partners in preserving and restoring the lower Gila River corridor as well as inspiring private sector investments to the area.

This overall Plan offers a complex mosaic of short, medium and long term implementation needs that will germinate out of the “Reclaim the River; Enliven the Banks” effort. This Plan, while groundbreaking for the City of Buckeye, represents the initial project that begins to prescribe a wide variety of preservation and restoration projects in the lower Gila River, but also charts the course for establishing living, shopping, employment, entertainment and timeless public gathering spaces in the El Rio District.

This chapter is organized to first describe implementation measures that “Restore the River” and a second set of implementation measures that further the land use, transportation and economic development objectives that “Enliven the Banks”. Specifically, this implementation chapter contains:

Restore the River

- Preservation of High Quality Habitat
- Restoration/Creation of High Quality Habitat
- Enhancement of Low Quality Habitat
- Salt Cedar Eradication & Management
- Site Specific Restoration Projects
- In Lieu Fee Program Development
- Coordination with FCDMC on Lower Gila River Projects and Permitting Activities
- Sand and Gravel Reclamation Guidelines

Enliven the Banks

- El Rio District
- Flood Protection
- Annexation Throughout the El Rio District

- Gila River Gateway Lake and Trail Connectivity
- Fourth Street and El Rio District Roadways
- State Route 30
- Infrastructure Funding & Investment Choices

Restore the River

The Restoration Plan prepared by Wass Consulting with input provided by the Arizona Game & Fish Department represents a significant component and driver to the overall “Restore the River; Enliven the Banks” plan. The Restoration Plan (please see Appendix B) provides an exhaustive evaluation and assessment that has led to many of the implementation recommendations relating to “Restore the River” outlined below. An inventory of existing resources and existing conditions was conducted utilizing guidance from the El Rio Watercourse Master Plan (2006) along with updated aerial imagery and supported by a series of field investigations to “ground truth” existing conditions that inform plan recommendations described below.

To preserve, restore and enhance the Gila River in Buckeye, the following three complimentary and actionable activities are identified for implementation.

Preservation of High Quality Habitat

Preservation of high quality habitat involves protecting and maintaining resources for their continued survival and the associated environmental benefits. Lands identified for preservation currently support a combination of open-water, established emergent wetland communities, shoreline cottonwood and willow forests with native understory and ground cover. The majority of these lands are associated with (or within close proximity to) the thalweg (low flow channel) of the channel where groundwater levels are expressed as surface water. These areas are illustrated in Figure 37.

The Buckeye reach of the Gila River does contain swaths of riparian resources which create and sustain high quality habitats and those are located within the braided low flow channel or thalweg. Preservation of such properties should be the highest priority of the City and stakeholder groups as it will be more cost effective than restoring or creating quality lands, and protection is needed to avoid degradation. Mapping and numerous site visits concluded the following criteria to establish high quality habitat for preservation:

- Presence high quality flora and fauna
- Water resources to support flora/fauna
- Allowable depth to groundwater for key species
- Soil conditions and vegetative suitability
- Elevation of property with respect to low flow channel

As Figure 37 illustrates, approximately 642 acres of “preservation lands” are identified for preservation of high quality habitat along the Gila River corridor in Buckeye. Due to their proximity to the low flow channel, the majority of the preservation areas are located on parcels managed (PLO1015 lands) by the Arizona Game and Fish Department.

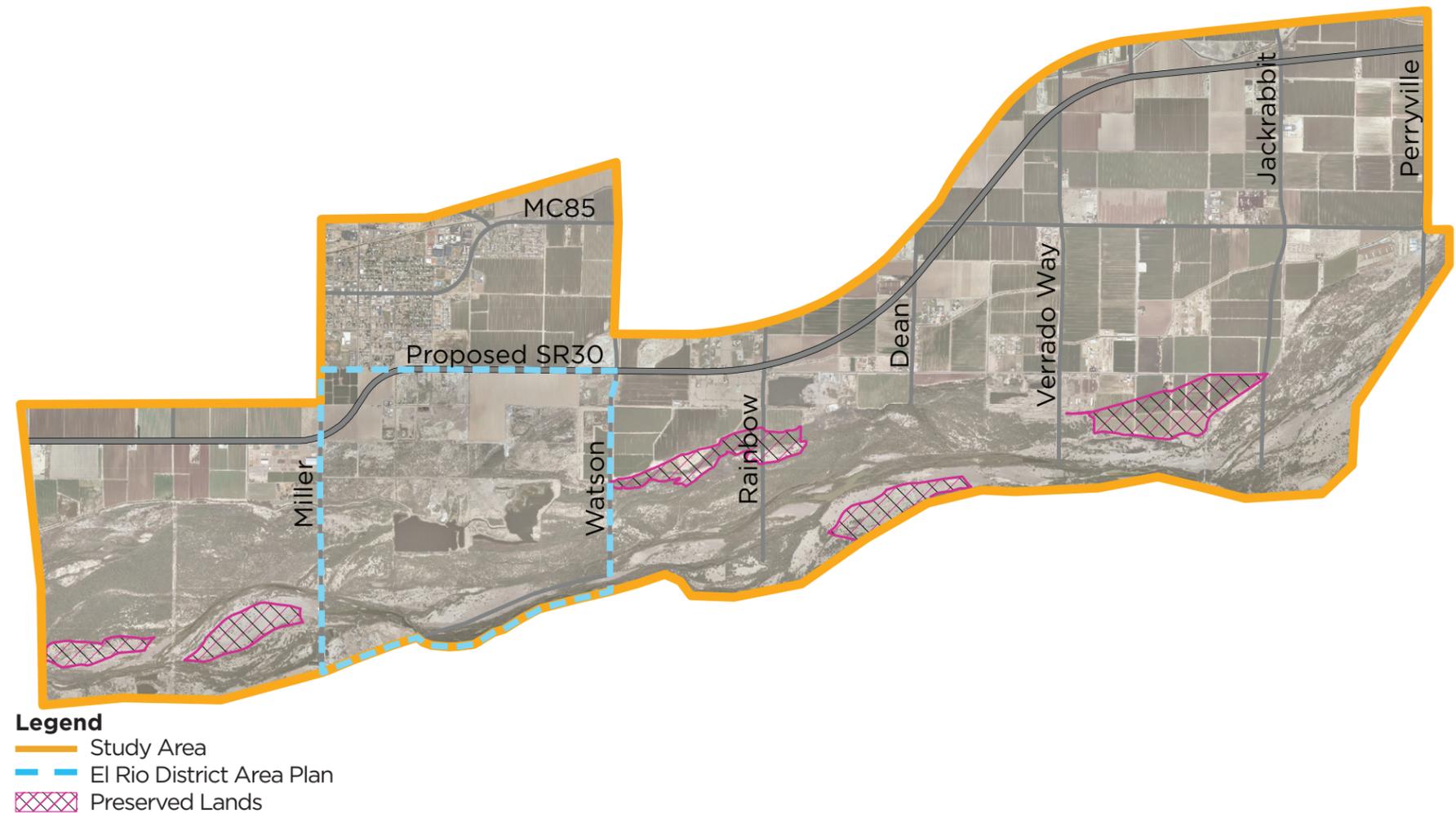


Figure 37: Areas of High Quality Habitat Preservation

Conservation easements and/or cooperative agreements that prescribe a direct approach to preserving these high quality habitat areas can also be achieved with the appropriate balance of tools and activities such as the ILF program, salt cedar removal and management and new plantings of cottonwood, willow and mesquite vegetative communities. For these areas located upon privately held properties, land swaps, conservation easements and property purchase are the implementation tools most likely necessary to achieve preservation objectives.

Lessons learned from upstream restoration experiences such as Tres Rios and Rio Salado include:

- Protect existing desirable vegetation in place where practical.
- For Buckeye, this means protecting vegetation near stormwater or irrigation outfalls, the thalweg and along the southern banks of the river.
- Minimize the impact of O&M roads by utilizing wet crossings, culverts and bridges where practicable.

Specific Implementation Tools and Activities for Designated Preservation Areas:

- ILF Program
- Property acquisition or land swaps
- Zoning and access control restrictions (dumping) to designated sites
- Grants and Foundations
- Salt Cedar Eradication and Management
- Conservation Easements
- Cooperative agreements with AZGFD, BLM, USACE
- Collaboration with FCDMC on regional 404/USACE permitting and vegetative management planning
- Habitat and plant palette guidance contained in the Gila River Restoration Technical Memorandum

Please refer to the Gila River Restoration Program in Appendix B for specific guidance on threatened and special status species habitat requirements and plant palette species, densities and installation guidelines for dominant canopy, understory, riparian groundcover and wetlands to specifically guide preservation activities.

Restoration/Creation of High Quality Habitat

Areas within the Gila River considered for restoration and/or creation of high quality habitat are mainly attributed to the shallow depth of groundwater, irrigation tail-water releases and effluent discharges in the Buckeye reach. Following the preservation of high quality habitats, many opportunities exist to renew areas which are slightly damaged or degraded to enhance or restore high quality habitats. There is also the opportunity for the creation of high quality habitat in areas which likely once supported, and are suitable to sustain, such land use.

As Figure 38 illustrates, “riparian restoration areas” and “riparian buffer zones” (which consist of a 220-yard buffer extending out from the restoration areas) or areas identified for restoration /creation of high quality habitat consist of approximately 1,672 acres and run along the entire reach of the river corridor within the study area. At times these areas also co-mingle with priority habitat/low-flow channel areas.

Being that these restoration areas primarily run along the entire river reach, there are multiple property owners in these areas. Collaboration in the form of conservation easements, cooperative agreements and support for grant and regulatory permitting processes from AZGFD, ASLD, USACE, FCDMC and private property owners is essential to the success of the restoration efforts. In fact, the sites likely to be selected for the initial ILF program will contain some of these locations.

In areas of degraded or threatened high quality habitat located in the thalweg of the channel, the use of Low-Impact Restoration (LIR) techniques is proposed. Such a technique involves minimal disruption of the soil surface and is largely conducted manually. In this case, non-native plants (primarily salt cedar) are to be cut above ground and the stump painted with an herbicide. Follow-up treatments to manage re-

sprouting and new salt cedar growth will be necessary. Cottonwood and Willow pole plantings and a consortium of plants will be installed to replace the salt cedar removed. Please see the Gila River Restoration Plan Technical Memorandum in Appendix B for additional detail on planting species used, densities and installation form.

Specific Implementation Tools and Activities for Designated Restoration Areas:

- ILF Program
- Property acquisition or land swaps
- Zoning and access control restrictions (dumping) to designated sites
- Grants and Foundations
- Salt Cedar Eradication and Management
- Fire suppression activities
- Conservation Easements
- Cooperative agreements with AZGFD, BLM and USACE
- Collaboration with FCDMC on regional 404/USACE permitting and vegetative

- management planning
- Co-Sponsoring USACE Section 205 projects with the FCDMC
- Habitat and plant palette guidance contained in the Gila River Restoration Technical Memorandum

Enhancement of Low Quality Habitat

These areas include private and publicly owned lands within the floodway and floodplain of the Gila River where salt cedar is the dominant vegetation and illegal dumping and illicit activities occur with high frequency. These lands are also located in areas where the City of Buckeye would benefit from a fire suppression standpoint as well. In some cases, these areas consist of salt cedar encroachment onto lands that historically were used for agricultural purposes.

Figure 39 identifies these areas as “Tamarisk (salt cedar) clearing” along with incursions of “riparian/mesquite corridors”. Together these areas total

approximately 3,750 acres. The clearing of salt cedar is a central objective of this habitat restoration activity and because of its proliferation over the years and negative impact on the recent expansion of the floodplain in this area, specific implementation recommendations are provided.

It is also worth noting that the FCDMC is currently working on the “El Rio Vegetation Management Plan” for the Lower Gila River in Maricopa County. A key objectives of the plan is to provide a framework for reducing the size of the recently expanded floodplain through salt cedar eradication and management for the entire river reach in Maricopa County. Any future salt cedar management activities in these areas must work in conjunction with a systems approach to vegetative management and any regulatory permitting that may result from desired vegetative management activities at the FCDMC/regional level.

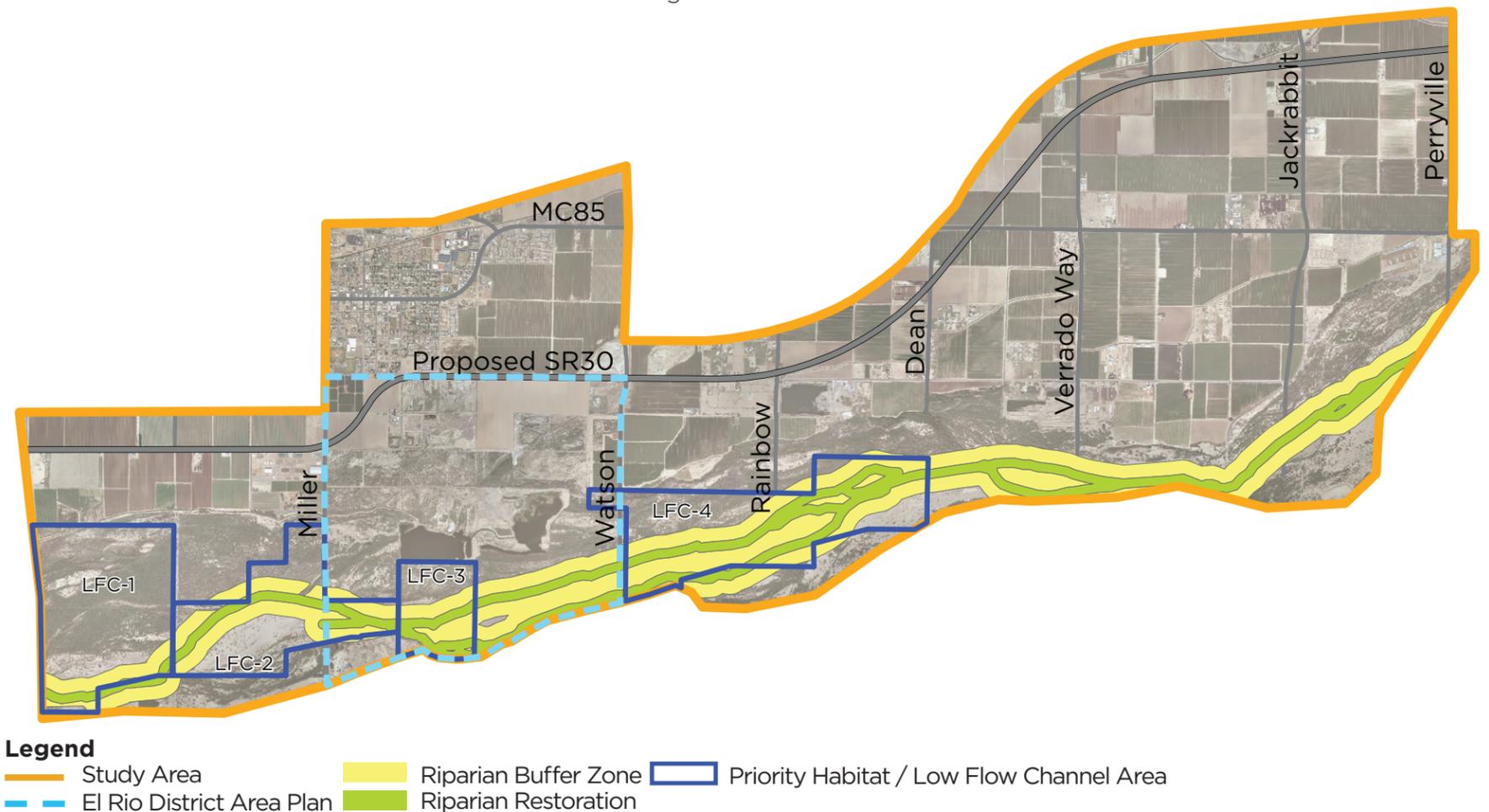


Figure 38: Areas of Restoration/Creation of High Quality Habitat

Specific Implementation Tools and Activities for Designated Enhancement Areas:

- Property acquisition or land swaps
- Zoning and access control restrictions (dumping) to designated sites
- Grants and Foundations
- Salt Cedar Eradication and Management
- Fire Suppression activities
- Cooperative agreements with AZGFD, BLM and USACE
- Collaboration with FCDMC on regional 404/USACE permitting and vegetative management planning
- Habitat and plant palette guidance contained in the Gila River Restoration Technical Memorandum

Salt Cedar Eradication and Long Term Management

The Gila River Restoration program has been focused to a large extent on the management of invasive plant species. The most robust being salt cedar but several other weedy species noted upstream of the project will over time, likely impact restoration efforts. To that end, the following section discusses the management techniques available for the control/management of salt cedars and other weedy species. The descriptions will focus upon salt cedars, but also infers as reference to other weedy species as well.

Six primary techniques are available for salt cedar management: prevention, cultural, mechanical, biological, herbicide treatment, and prescribed burns. Because burning is not a viable option for the Gila River Restoration Project plan, it is not discussed.

Salt cedar management options are typically most effective when used in combination. There is rarely one quick fix. Rather, management personnel should track which methods are used for different species and adjust the weed management program as needed to address specific situations.

Prevention:

- Prevention is the most inexpensive and important salt cedar management action.
- Avoiding disturbance is the best defense against salt cedar invasion.
- Areas disturbed by flooding or human activity should be quickly revegetated.
- Emergent marsh, riparian, roadside/trail areas, and recently disturbed areas should be surveyed weekly to detect weeds early and reduce their spread.
- Salt cedar dispersal should be reduced by properly disposing of seeds and reproductive plant parts.
- Minimize travel through sensitive areas and avoid leaving exposed soil in construction areas.

Cultural Controls

- Cultural methods include revegetation, flooding, fertilization, and shading to create healthy plant communities which make it more difficult for weeds to survive.
- Revegetation may be the best, long-term alternative especially in fire suppression areas.
- Care should be taken to ensure seed mixes do not contain weed seeds.
- Flooding has been used to encourage cottonwood growth over tamarisk.
- Appropriately using fertilizers for healthy plant growth and encouraging dense stands of native vegetation can deprive sunlight from emerging weeds.

Mechanical Controls

- Salt cedar control through mechanical means are typically used for small infestations and include pulling, hoeing, mowing and cutting, tilling, and mulching.
- Care should be taken to dispose of plant materials properly as many species re-sprout from plant parts left on soil or near the water.
- Hand pulling and hoeing can be effective when the complete crown can be removed. This technique should only be used for small areas as it typically needs to be continually repeated until the weed does not reappear.
- Tilling can be useful if combined with a revegetation program. The technique is species dependent, as some rhizomatous species such as leafy spurge spread readily by tillage. It is not appropriate for natural areas as

it disturbs the soil, disrupts the natural plant community, and encourages the spread of weed seed.

- Mowing can reduce seed production in annuals but can also stimulate growth of some plants. Stage of growth and weather should be considered.
- Root raking and brush grinding are techniques used to remove mature tamarisk infestations. Select areas (City of Buckeye’s 40-acre parcel and infestations located in the Fire Suppression areas) can likely be removed during construction.

Biological Controls

- Biological weed control uses other living organisms to damage weeds. The weed is not removed, but rather reduces to acceptable levels. Its effectiveness is not clearly documented. It is considered most effective on large, dense infestations. Costs can be high in order to find and test control organisms.
- Given the large expanse and the maturity of the salt cedar infestations, the use of grazing animals for biological control is not a viable option for the

Project areas.

- The biological control that will likely have the most impact is the introduced salt cedar consuming Beetles *Diorhabda carinulata* and allied species (USDA, 2014). They are expected to occur in the project area sometime in next 5 to 20 years.
- In many cases the beetle will defoliate the plants but not necessarily cause mortality. This results in higher potential for fire and reduces the habitat value of the areas.
- That is a primary reason to protect the existing high quality habitat by LIR techniques, i.e. removal of the exotic plant with minimal soil disruption and replanting with native riparian and wetland species.

Herbicides

- Herbicides are chemical substances used to kill or inhibit the growth of plants. They should be selected based on the target weed species, the presence of desirable plant species, soil texture, depth and distance to water, and environmental conditions. It is typically appropriate for eradication of the most

invasive weeds, such as Salt Cedar. Please see Appendix B, Restoration Plan Technical Memorandum for a detailed review of herbicide types and application methods specific to Salt Cedar. Some of the key implementation take-aways include:

- Salt Cedar has been successfully treated using the cut stump method with an herbicide application on the cambium layer.
- Research has been conducted on the Las Vegas Wash to evaluate the toxicity and build-up of herbicides on tall whitetop, giant bamboo, and tamarisk.
- Glyphosate, imazapyr, 2,4-D, chlorsulfuron, metsulfuron, and triclopyr have been shown not to exhibit significant aquatic toxicity when used as directed.

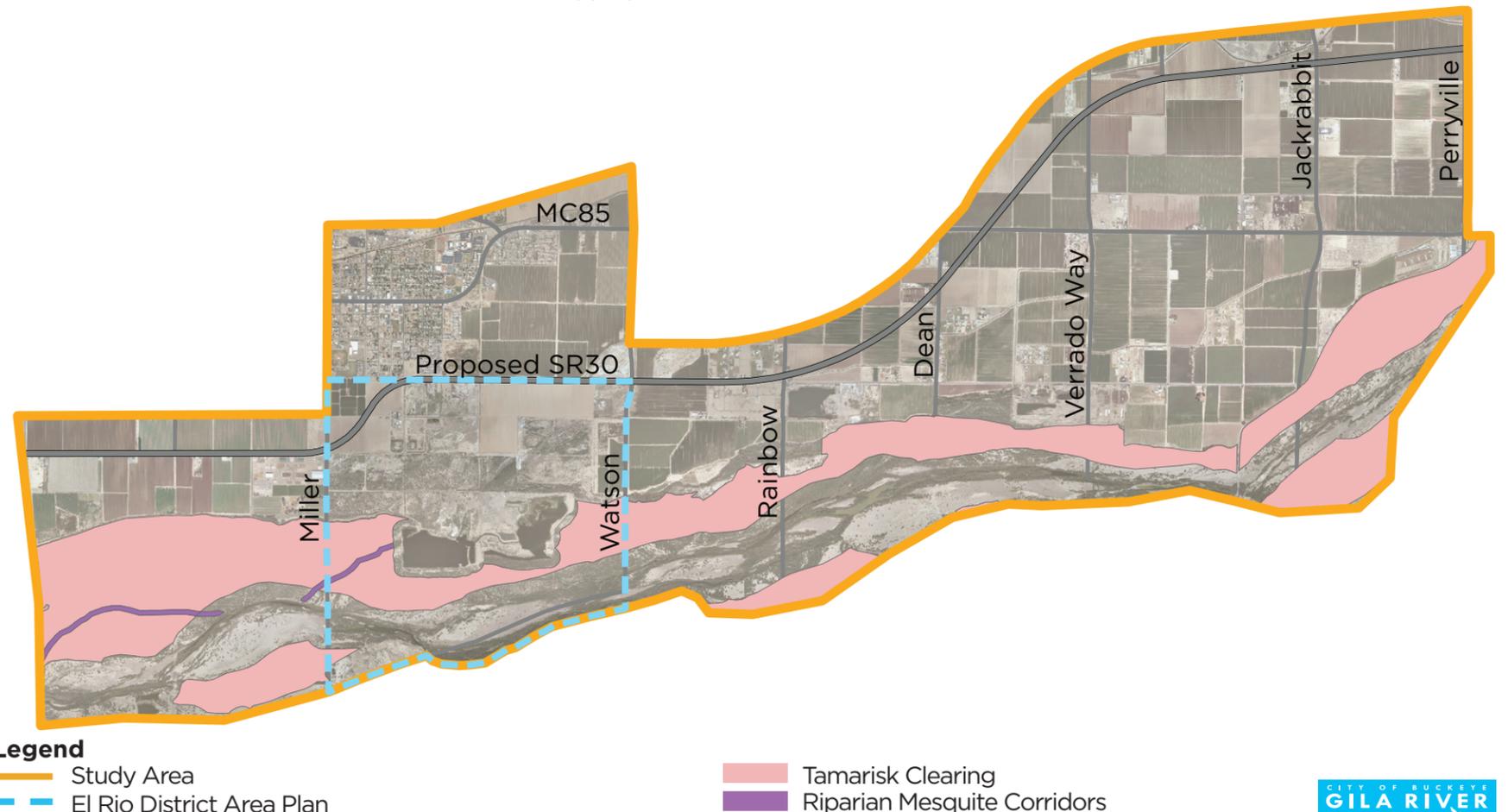


Figure 39: Environment of Low Quality Habitat

O&M Considerations

- The habitat areas designed for the Buckeye Gila River Restoration Project reach will have several O&M considerations. This section discusses O&M activities once the project is constructed and operational. As specific features are designed, this section will be refined and more specific.

Vector Control

- Monitoring of both larval and adult mosquito populations within and immediately adjacent to the constructed project features is recommended.
- This should become a routine activity with larval monitoring focused in continuously inundated areas such as the wetlands associated with the sand and gravel pit lakes, irrigation outfalls, flood irrigated habitats and stormwater outfalls.
- Initial locations should be sought that are characterized by dense riparian vegetation as these areas are places of refuge and sustenance for adult mosquitoes.

Litter/Debris Management

- Large amounts of litter and debris can be transported into the system with both dry weather and stormwater runoff events.
- This will likely occur at stormwater and irrigation outfalls which will have associated wetland and riparian habitats.
- These areas need special attention with respect to the design of trash guards and access by equipment that effectively controls and can remove the litter/debris while protecting the associated habitat.

Access to Habitats

- With the exception of flood flows within the river, access for O&M should be provided for most of the habitat areas.
- Most important will be the wetland and flood-irrigated riparian areas, as these will have the potential to breed mosquitoes as mentioned above.
- This access will have to be maintained and could require repairs and/or reconstruction after significant flow events.

Open Channels

- Project water may be supplied by open channels in order to facilitate flood irrigation.
- The City of Buckeye's 40-acre parcel may be the best option to utilize flood irrigation techniques as it is immediately adjacent to the Arlington Canal.
- Additional open channels to also serve as non-motorized trail systems connecting the various recreation lakes is highly recommended. Use of canal water as a resource should be considered.

Vegetation Management & Monitoring

- Vegetation should be routinely monitored for physical hazards and undesired species.
- Vegetation hazards should be addressed for the safety of O&M staff and the public. This may include pruning or trimming of low-lying branches, clearing established access ways, and remediation after storm or river events.
- Monthly site visits should allow staff to remove the newly sprouted undesirable species by hand. For those plants that are too large to be pulled by hand, the cut stump and herbicide treatment methodology should be employed.
- In areas where the groundwater is in excess of 10-ft below ground surface (b.g.s.), mechanical means may be used for the removal of salt cedar. This is especially true for the majority of the portion of the river that underlies the SR85 bridge. The northernmost 4,600-ft is infested with salt cedar and the groundwater depth is likely too deep to sustain native riparian species with the exception of mesquite and desert adapted trees. This area is also characterized by saline soils and might be best stabilized with low growing salt tolerant grasses or plated with cobbles.

Site Specific Restoration Projects

As described previously, the vast size of the Gila River ecosystem in Buckeye includes areas of high quality habitat as well as a proliferation of salt cedar growth - together these areas yield ample opportunities to define projects aimed to preserve, restore, and enhance the Gila River in Buckeye. While the number of potential preservation and restoration projects seem limitless, available resources and funding is not.

Recognizing these factors, site specific restoration projects (in addition and complementary to the ILF restoration project) were identified.

The site specific projects described below are selected based on their enhanced potential for near term funding relating to eligibility for emergency preparedness grants, ability to be included in the ILF program or ability to work collaboratively with mining interests.

SR 85 Bridge

Approximately 178 acres owned by the AZGFD, BLM, FCDMC, and ADOT is occupied predominately by salt cedar (see Figure 40). This proliferation of salt cedar at this location poses a direct threat to the State Route (SR) 85 bridge should a fire occur and in turn impacts public safety, transportation and the movement of commerce and accessibility to key government facilities such as the Lewis Prison facility.

As can be seen in Figure 40, the northernmost 4,600-ft is infested with salt cedar and the groundwater depth is likely too deep to sustain native riparian species with the exception of mesquite and desert adapted trees. It is recommend that mechanical means to remove the salt cedar is employed in this area such that a fire suppression buffer 220 yards wide both upstream and downstream of the State Route 85 bridge is created. After removal of the salt cedar, revegetation in this area would be accomplished using the Riparian Buffer Hydro-Seed Mixture further identified in Appendix B - Gila River Restoration Plan Technical Memorandum.

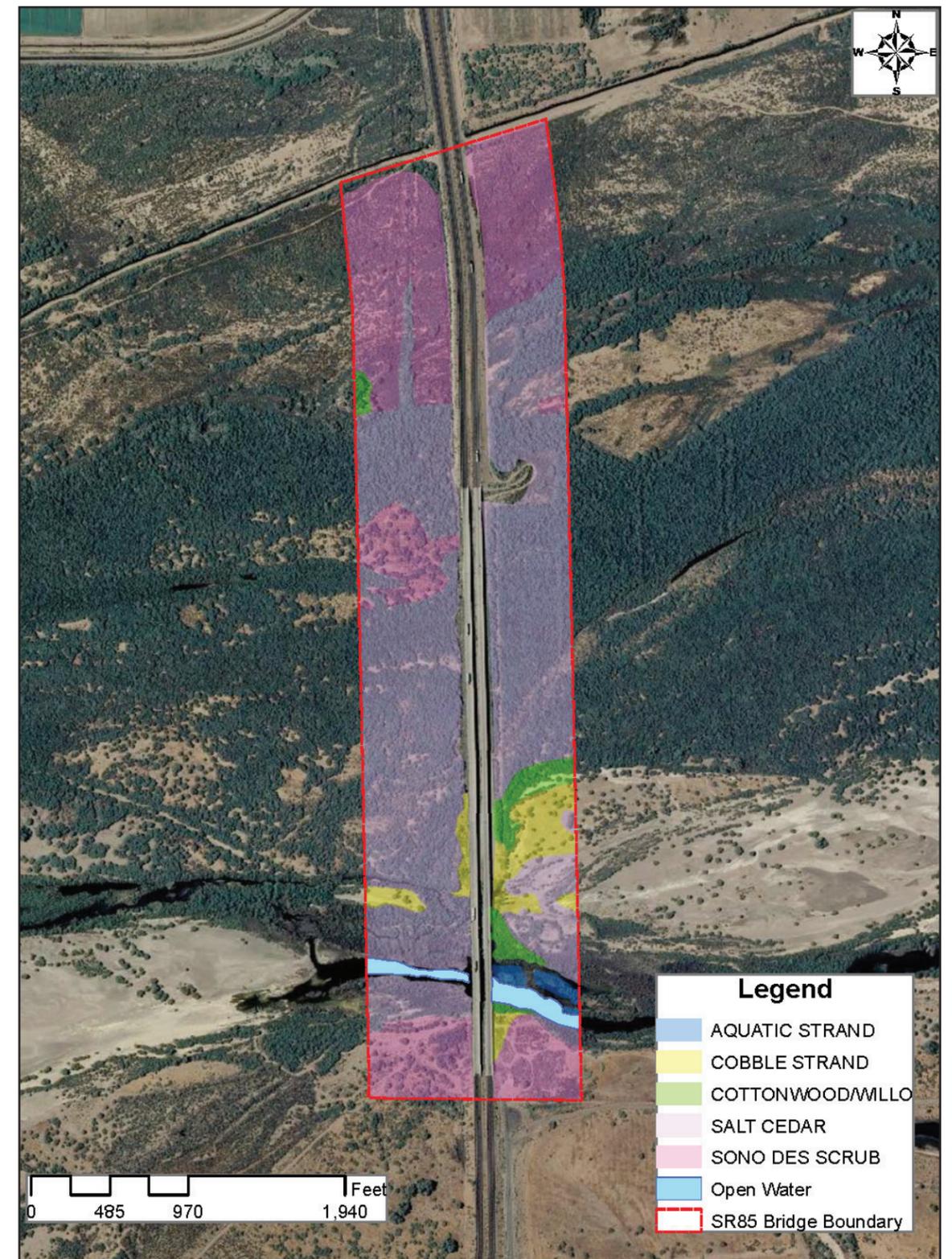


Figure 40: Proposed ecosystem restoration project of the SR 85 Bridge.

Recognizing the priority public safety threat, the City of Buckeye has already obtained an emergency preparedness/fire suppression grant and began the clearing of salt cedar under and adjacent to the SR 85 bridge. A project like the SR 85 bridge gives a jump start to the salt cedar control efforts and could be used as model for additional restoration projects. The existing land owners (AZGFD, ADOT, FCDMC, BLM) have similar goals, and there is a good chance for receiving cost-share funds due to its visibility, salt cedar management activity, the need to ensure public safety, and opportunity near the south side of the channel to restore high quality wetland and riparian habitat. As with all restoration activities, it is important that desirable native plant species be protected in place as much as is possible. Table 7 and Table 8 of the Restoration Plan provide specific guidance for replanting characteristics.

As with all of the restoration efforts, monitoring and maintenance to ensure regrowth of salt cedar is not occurring should be conducted in both areas for 2 years after initial removal and replanting activities has been completed.

Project ID	SR85 Bridge	Vegetative Community	Veg Area (ac)
Project Area (ac)	178	Aquatic Strand	1.5
Land Owners	AZGF	Cobble Strand	7.5
	BLM (PLO1015)	Cottonwood/Willow	6.9
	FCDMC	Salt Cedar	110.4
	ADOT	Desert Scrub	49.9
		Open Water	2.5
Description			
Buffer area of the SR85 bridge crossing the Gila River 200m downstream and upstream, from approximately the Arlington Canal to the southern bridge abutment.			

Table 2: Restoration Project at SR85 Bridge and the Gila River, AZ.

Gila River Low Flow Channel High Quality Riparian Habitat Areas

These areas represent the highest quality riparian habitat within the project reach. It presents numerous aquatic areas intimately lined with cattail marsh, Gooding willow and Fremont cottonwood. The hydrology is generally supported by groundwater with infrequent augmentation by surface flows and precipitation events.

Figure 41 identifies four low flow channel "priority areas" for implementation. While there are many opportunities and approaches to the restoration efforts for these high quality riparian habitat areas, it is assumed here that some or all of these parcels will be included into the ILF program that will be managed by the AZGFD. To the extent that a portion of these lands will not be included into the ILF program due to endowment and/or other resource limitations, the City of Buckeye will seek funding and/or collaboration from other funding

resources and collaborative agreements with project partners.

These are sensitive areas in which a least a portion of the surface water flows are partially dictated by dam building activity of beavers. As such, it is imperative that minimal ground disturbance occurs within approximately 30 yards of any existing open water area(s).

City of Buckeye 40 Acre Property

This site represents another example of recent restoration activities already underway as a result of the guidance and momentum generated by this project. The City of Buckeye owns 40 acres of property at the southern terminus of Miller Road along the north bank of the Gila River. The majority of the site has been infested with salt cedar and the City has recently completed the clearing of the salt cedar with the assistance of grant funding.

The resulting land after the salt cedar removal is sandy, lacking organic content and likely high in salts. The site however has access to both well water from beneath the property and canal water from the adjacent Arlington Canal. Being located adjacent to Miller road also allows for very good access to the site. As such, restoration options are numerous. The El Rio Design Guidelines & Planning Standards identifies a pilot project for this site, called "The Pond".

The Pond pilot project calls for a myriad of passive and active recreation amenities on this site, including equestrian facilities, wetland, trails with interpretative signage, and others. To support and carry forward the design intentions of the Pond pilot project, this Plan furthers those intentions by recommending that a 10-15 acre gallery forest of cottonwood and willow be established in the areas on the Pond pilot project that support the intended design as well as leverage the proximity to the irrigation water resources. Mesquite Bosque habitat

could then be established around the perimeter along with a small (1 acre or less) wetland or series of wetland ponds to complete the vegetation component. The irrigation system could be linked through the wetlands and serve as a guide for interpretative trails. During design, the habitat features could be coordinated with small parking areas, ADA approved trails, informational kiosks, and bathrooms to serve as a trail head for entering the Gila River corridor.

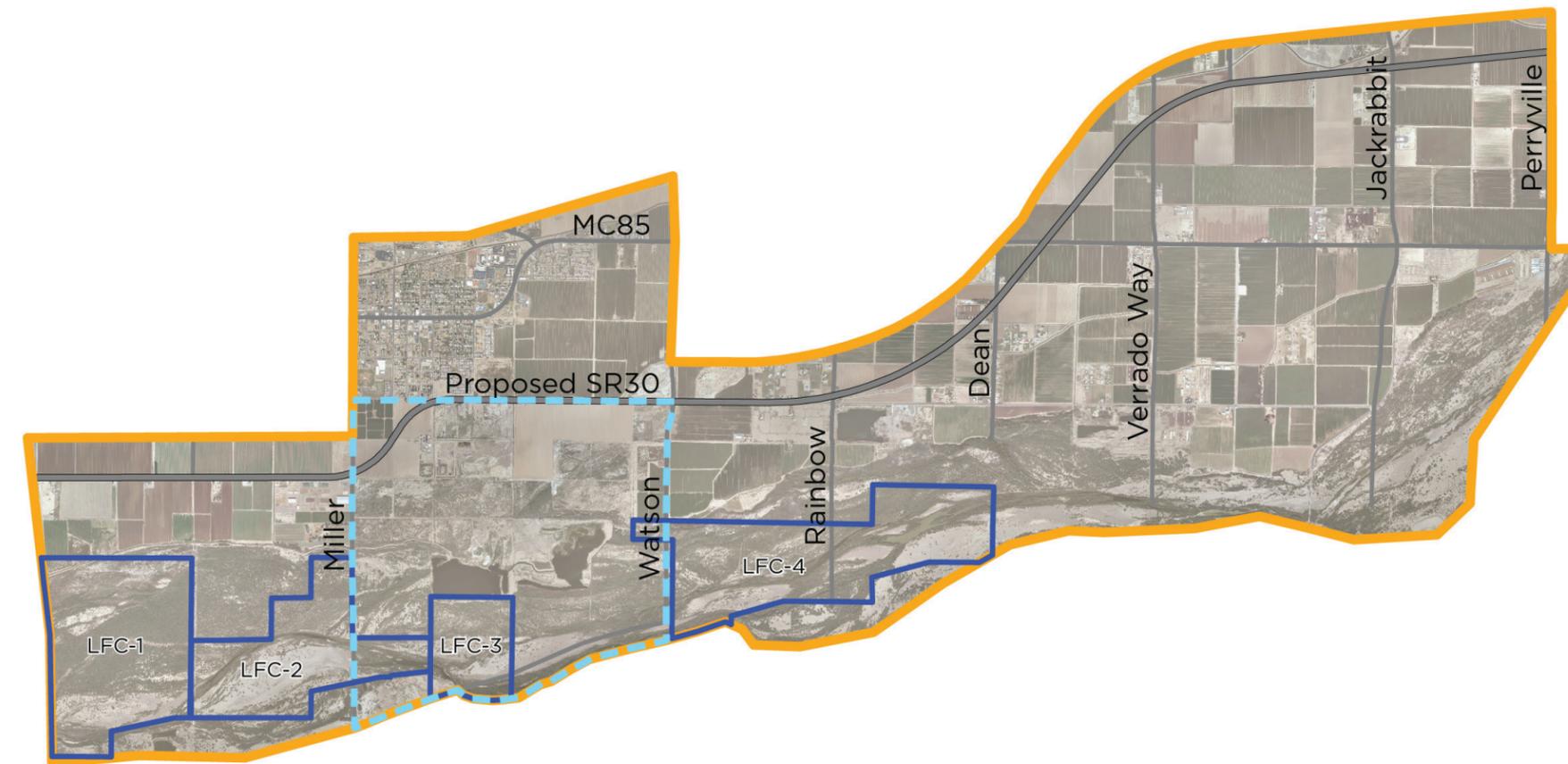
Because the site has already been cleared of salt cedar, the recommendation here is to begin monthly maintenance to ensure that there is minimal to no regrowth of the salt cedars. Tables 7, 8, 9 and 10 of the Technical Memo offer specific guidance for planting species and densities and Tables 13 and 14 should be utilized to cover the disturbed ground.

In Lieu Fee Program

A cornerstone piece of "Restore the River; Enliven the Banks" is the conceptualization and creation of a mitigation bank or In Lieu Fee (ILF) program site. With great potential for such an ILF program in Buckeye, the initiation of an ILF project can be a lengthy and complex process with many variables that can influence implementation. Through the preparation of this Plan, the efforts to establish and implement an ILF program in Buckeye has taken a number of technical and policy-oriented twists and turns.

Program Development

In an effort to streamline the creation of the Buckeye ILF program, while at the same time reducing the bureaucratic and regulatory processes necessary to establish this program, the creation of the Buckeye ILF may actually consist of an expansion of the Arlington Wildlife Area (ILF). Originally conceived as a newly created ILF project site, immediate opportunities for endowment funding and other regulatory challenges presented an undue and lengthy challenges to the creation of a stand-alone "Buckeye ILF" program. Thus, other avenues were evaluated and pursued, which included the potential of expanding the existing Arlington Wildlife Area (ILF) project site.



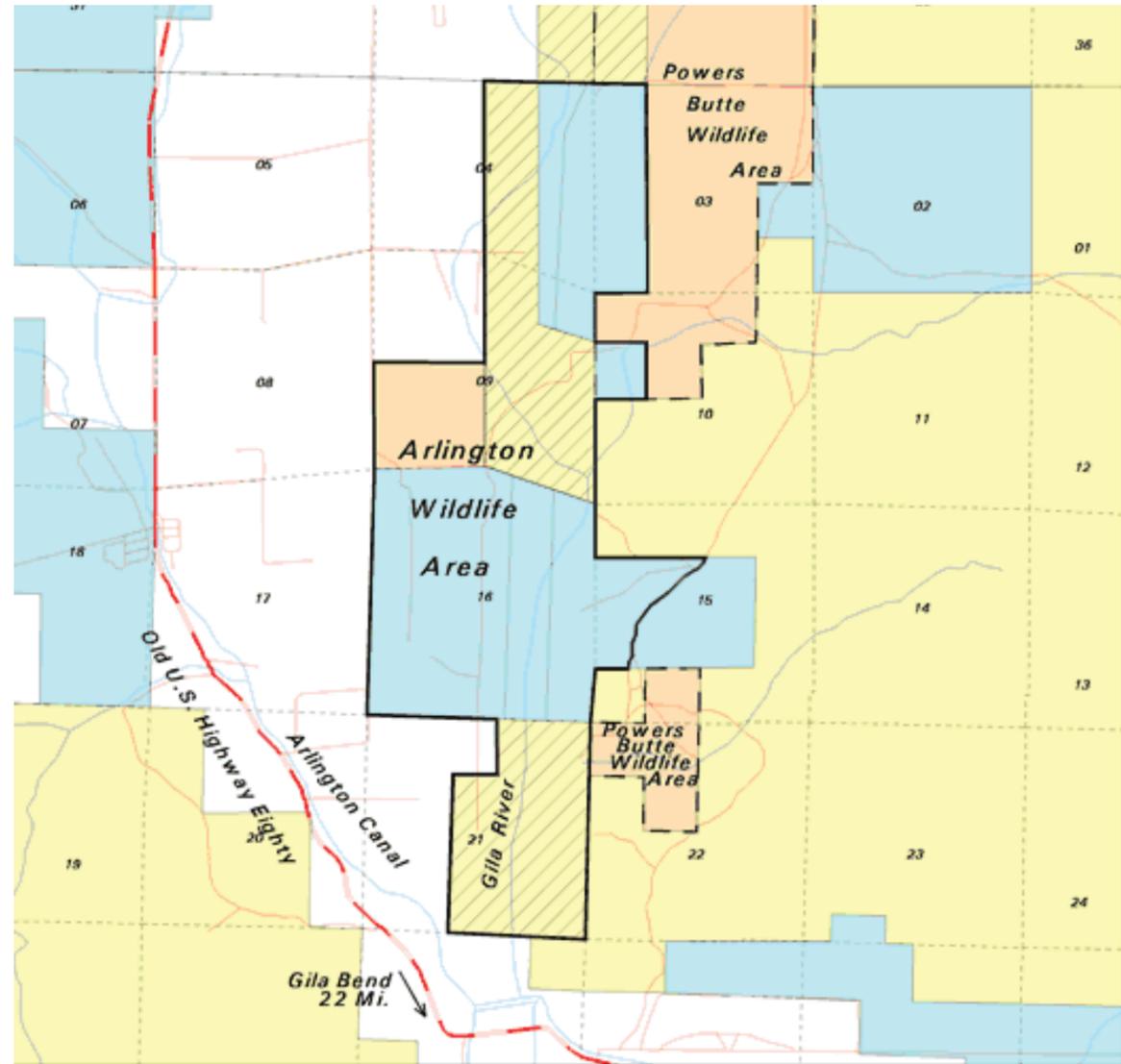
Legend
— Study Area
— Priority Habitat / Low Flow Channel Area
- - - El Rio District Area Plan

Figure 41: Areas of Restoration/Creation of High Quality Habitat

If implemented, the Arlington ILF project site could be renamed the Lower Gila River ILF project site (see Figure 43).

Expansion of an ongoing program located downstream approximately 15 miles enhances the ability and timeline for the Buckeye ILF program to be established in that the creation, review and approval

(including the various technical studies, endowment funding, and authorization/performance documentation is less extensive and costly than that of starting a new ILF project site from scratch.



Refinement of Lands Suitable for the Buckeye ILF

There is a notable policy direction that has significantly altered - and is now hampering the original approach, land configuration, and ownership within the Buckeye ILF. This involves a recent Federal rule change prohibiting any encumbrance upon PLO1015 lands managed by AZGFD (since 1954) on behalf of the U.S. Fish and Wildlife Service. The ILF program requires a legal protection instrument be placed on any ILF project site to ensure protection in perpetuity. So this recent Federal ruling now may eliminate any PLO1015 lands from inclusion into the Buckeye ILF program.

Unfortunately, a large percentage of the priority habitat areas originally identified by this project for inclusion in the Buckeye ILF areas are situated upon PLO1015 lands. As Figure 43 shows below, this includes PLO1015 lands immediately south of the lakes in the El Rio District and the mile length of river between Miller and Rooks Roads. However, talks are ongoing between the AZGFD, the USFWS and the USACE to try and resolve this issue to the satisfaction of all stakeholders.

Select portions of existing PLO1015 lands in Buckeye possess high quality habitat along the Gila River main channel. If

Legend

- Study Area
- El Rio District Area Plan
- Bureau of Land Management (PLO 1015)
- Arizona Game & Fish
- State Trust
- Private
- City Lakes
- City of Buckeye Owned Land
- FCDMC Owned, Leased or Easement
- ILF Boundary

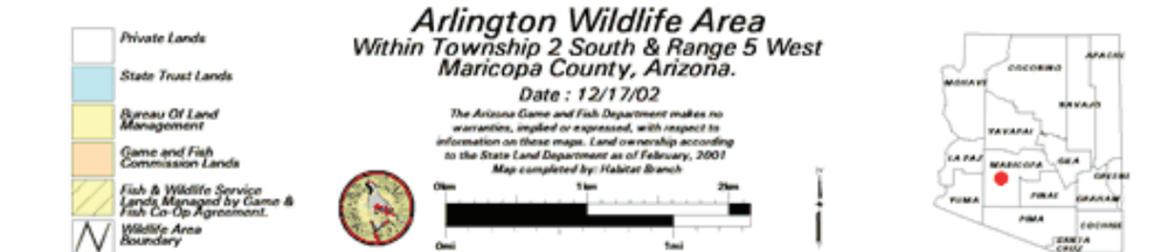


Figure 42: Arlington Wildlife Area Source: AZGFD.com



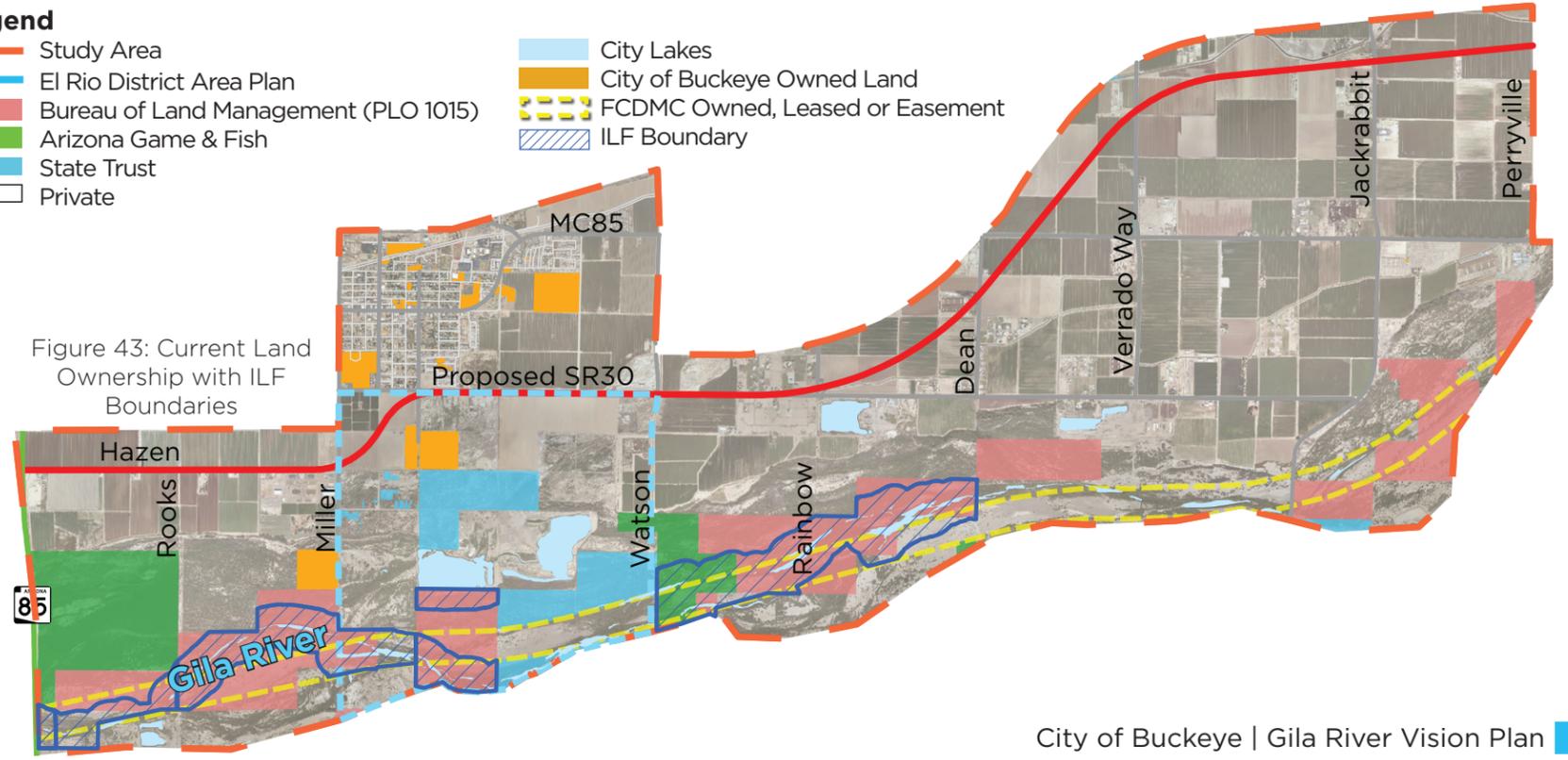
and until this ruling remains in effect, Buckeye must look to other restoration and preservation methods to preserve and restore the priority, quality habitats along the river thalweg. There are still many other priority habitat areas to establish ILF preservation and restoration opportunities. In the meantime, there are ongoing efforts by stakeholders and proponents of the Lower Gila River in Buckeye - (such as, "Friends of the Gila River") who are also working to resolve this issue with the USFWS and the USACE.

Next Steps for the ILF Program

- 1) **Modify Conceptual Plan** - Collaborate with AZGFD to formally expand the Arlington Wildlife Area to include Buckeye Gila River ILF Areas.
- 2) **Endowment Legislation** - AZGFD lead the effort to amend Title 17 in the upcoming legislative session to allow the AZGFD to request that the State Treasurer's Office deposit funds received by the Department's ILF program in long term endowment investment mechanisms so that the funds will be available for long term O & M on the ILF project sites.

- 3) **Prepare a Conceptual Restoration Plan** to include the new portions of the Arlington ILF project site (or new named site) and through the use of the Department's credit valuing system, determine the price per acre for mitigation credit purchases. Submit to the USACE for approval to start selling Advance Credits to benefit the new ILF lands.
- 4) **Sell Advance Credits** to fund the necessary technical studies described below.
- 5) **Complete Technical Studies** - per ILF program requirements, collaborate with AZGFD to prepare various technical studies needed to support the formal creation of the Buckeye ILF. Technical studies may generally consist of but not be limited to, hydrological, grading, depth to groundwater, vegetative community's inventory, and habitat and species inventories in the ILF areas.
- 6) **Complete Final ILF Plan** - refine the Conceptual Plan to incorporate the findings from the technical studies.
- 7) **Begin to Sell Project Specific Credits** - Upon completion and approval of the technical studies

Figure 43: Current Land Ownership with ILF Boundaries



by the USACE and other agency partners, begin to sell project credits to project proponents.

8) **Perform long term monitoring and adaptive management.**

Buckeye to enter into a partnership agreement to collaborate with AZGFD to oversee the operation and management of the ILF into perpetuity.

Coordination with FCDMC on Lower Gila River Projects and Permitting Activities

As previously noted, Buckeye will continue to partner with the FCDMC on these additional activities occurring along the Lower Gila River that are aimed at defining a systems approach to reducing the recently expanded FEMA designated floodplain and establishing a vegetative management plan designed to reduce the proliferation of salt cedar along the Lower Gila River in Maricopa County.

USACE Regional General Permit

The FCDMC is in the process of coordinating with the USACE in evaluating the probability and appropriateness of a Regional General Permit for authorization to perform various actions to enhance the Lower Gila River ecosystem and flood protection with minimum disturbance. The intended Regional General Permit will be broad in scope and application, providing a combination of vegetative clearing and management and levee(s) for flood protection under one permit as opposed to applying for multiple permits for each individual action. At this time, the USACE has not determined if a Regional General Permit is a viable or suitable approach for the Lower Gila River.

USACE Section 205 Program

The City of Buckeye is currently partnering with the FCDMC to request a formal Letter of Intent to the USACE for funding through the Section 205 Continuing Authorities Program for identification of methods to mitigate floods through the introduction of levees and/or removal of overgrowth such as salt cedars.

If successful in receiving funding from the USACE, the Section 205 program requires a 65/35 match for the funding of a Cost/Benefit Analysis Concept Report to study and identify those areas with the most critical flood hazards and needs. A cost sharing agreement between the USACE, FCDMC and the City of Buckeye will be necessary. Buckeye has pledged their support and financial contribution to the matching requirements to fund the cost benefit analysis.

If this project is successful in receiving USACE funding, Section 205 funding limitations are approximately \$10M. This will be incredibly useful to initiate projects to begin to address flood control needs, and is hoped to gain additional funding momentum for longer term projects in the \$100M range that will be necessary to provide ultimate flood protections solution in this area.

FCDMC El Rio Vegetative Management Plan

The FCDMC has been developing a Vegetative Management Plan that is intended to provide a framework for reducing the extent of flooding under the predicted 100-year flow event through salt cedar management while also maintaining and enhancing riparian habitat assets. The preparation of this plan has been provided in large part as a response and potential solution to reducing the newly identified floodplain footprint through the clearing and long term management of salt cedars and revegetation of native species that together will enhance the ecosystem of the Lower Gila River.

The Buckeye Gila River Restoration Plan prepared as a part of this project provides detailed recommendations for the preservation and restoration of high quality habitats as well as areas designated for salt cedar clearing within our project study area. Coordination with the FCDMC Vegetative Management plan was conducted to ensure that the desires, intentions and recommendations brought forward are consistent between the two documents.

Sand and Gravel Reclamation Guidelines

Today, none of the existing mining operations located within the Gila River are located within the City of Buckeye. They are currently under the jurisdiction of Maricopa County. Once mining operations are completed, it is the goal of the City to guide the process of reclamation to achieve an end use that is a product of the surrounding natural landscape and/or development pattern. The long term vision is to ultimately create a chain of lakes connected by a series of water trails. This will not happen overnight, but can become a reality incrementally as mining operation cease over time.

It is a realistic consideration that existing operators will not find it beneficial to annex into the City of Buckeye if the annexation directly leads to an increase in exposure to greater regulations and/or restrictions than they currently enjoy today under other county and state regulatory authorities. Recognizing these practical realities, implementation measures for the reclamation of sand and gravel operators shall include:

- 1) Identifying those mining operations that are in closest proximity to near term development activity and achievement of recreational opportunities. Focus on the existing open water body sites along the north bank of the Gila River near Apache Road and Beloat Road.
- 2) Develop an annexation policy/strategy for the identified priority parcels.
- 3) For each individual mining operator/property owner identified for annexation, craft a pre-annexation development agreement that clearly defines:
 - Transfer of property liability to the City for a public use
 - Road construction and transportation corridors to access the public road network
 - Reclamation of a mining site to position the property for an end recreational or conservation use

- Buffers around mining sites while in production
- Adjacent property coordination for joint use utilities and infrastructure
- City considerations that may include the waving or reduction annexation and/or zoning application fees
- Clearly identifies reclamation strategies and land shaping techniques that are consistent with the Sand and Gravel Reclamation Guidelines.



Enliven the Banks

The creation of the El Rio District can become a reality. It will not happen overnight, not without a lot of hard work, or without the commitment of the city, area landowners, residents, government agencies, institutions and businesses. Recent private sector investment in significant parcels in and near the El Rio District serve as a potential catalyst in moving forward with the realization of the Plan vision for an El Rio District that can become the recreation and economic development cornerstone of the City of Buckeye.

The El Rio District Area Plan coming to fruition demands vision, innovation, creative financing, leadership, community participation, dedication and the forging of public/private partnerships. It also demands time and patience – many steps need to occur in the near term with other additional implementation items to occur incrementally over time.

It is recognized here that “Reclaim the River; Enliven the Banks” establishes the inaugural vision plan that will help stimulate public and private investment to create a vibrant district that embraces the Gila River and the passive and active recreation opportunities it provides, as well as a vibrant mixed use center that encourages job creation and economic development opportunities. Due to the magnitude of this Vision Plan and sheer number of components that must come together to realize this vision, it is reasonable to assume that there will be modifications and adjustments to the vision as the practical realities of marketplace forces, infrastructure needs and development opportunities influence the sequence and/or manner in which the Vision Plan is achieved.

This Plan embraces the need to maintain flexibility in achieving plan goals and recognizes that there is no one recipe for achieving plan success. The implementation provisions outlined below are then established as a framework for plan implementation with the intention of embracing flexibility so long as the fundamental design tenants of the Plan are achieved.

El Rio District

This Section identifies the key organizing elements of the El Rio District Area Plan and the implementation framework necessary to initiate making the vision articulated in this Plan a reality.

Flood Protection

The City of Buckeye is a current cost share partner with the FCDMC for the preparation of a Design Concept Report (DCR) that will explore potential levee location(s) and designs along the north bank of the Gila River within the project study area. This DCR is primarily being done to seek flood protection solution(s) for the large number of properties which recently were identified through new studies as being within a FEMA designated floodplain. This area is generally referred to as the Buckeye Slough. The Buckeye Slough is approximately 6,163 acres that have a western terminus in and around the planned El Rio District. This area is a complex hydrologic and hydraulic “collision course” of Gila River and upland flows that present flood protection challenges and solutions that would likely require Federal government participation to develop a “systems” solution.

The DCR is likely to focus on the flood protection priority to site levee(s) where “breakouts” of the river occur along the Buckeye Slough, located east of the El Rio District. This Plan recommends that the El Rio Levee DCR process and project preferred flood protection alternative take into account or consider the following:

- 1) Strong consideration be given to a systems solution for the Buckeye Slough that also consider where practicable, a levee system that provides protection to the “City Lakes” and El Rio District. This levee location and concept is depicted on Figure 29.
- 2) Also provide consideration of a “groin” like levee upstream of the El Rio District that could partially redirect upstream flows away from the El Rio District.
- 3) Per recommendations and concept designs presented in this Plan, design

a levee that mimics a soft structural design alternative that generally is aligned with the existing FEMA designated floodway alignment as identified in the El Rio Watercourse Master Plan,

- 4) In the El Rio District, expansion of the levee profile is also encouraged to provide an opportunity for development to create a direct visual connection with the water’s edge.

Annexation of the El Rio District

As previously discussed and illustrated in Figure 4, the majority of the land area that comprises the El Rio District is currently located in Maricopa County’s jurisdiction, not the City of Buckeye’s. From Belloat Road south to the Gila River, only 448 of the total 2,244 acres (20%) in the El Rio District are currently within Buckeye’s jurisdiction.

The ASLD manages approximately 380 acres, 160 of which are strategically significant lands in the El Rio District. As the conceptual plan illustrates, the ASLD parcels include the future planned El Rio District core – its gateway road access, mixed use center, urban neighborhoods and priority public spaces. The density and intensity of land uses prescribed for the ASLD parcels via this Area Plan process will, with future annexation and zoning entitlements, greatly enhance the value and appeal of these ASLD parcels. To fully realize and sequentially implement the El Rio District vision, the City of Buckeye will need to ensure that the future zoning, infrastructure planning and urban design elements of the El Rio District are harmoniously evaluated and delivered under the City of Buckeye’s guidance and oversight. These elements are vital to achieving the El Rio vision, ability to securing appropriate flood protection and infrastructure facilities and ability to secure future district funding opportunities. Each of these vital ingredients can only occur if these areas are annexed into the City of Buckeye.

What is encouraging is that there are very few existing structures and the current parcel ownership does not create undue

complications in the prospects of future annexation(s) by the City of Buckeye. While there are several smaller parcels in the decades-old Allenville platted subdivision, other parcels are much larger with just a handful of property owners including ASLD.

It is recommended that the City of Buckeye encourage the annexation of these properties by:

- 1) Setting meetings with groups or individual property owners, including the ASLD to present and discuss the merits of this El Rio District Area Plan. How the plan will enhance the value of their properties, and is in their best interest to participate in the annexation and future development of the area.
- 2) Encourage the use of a Pre-Annexation Development Agreement with ASLD and/or other like-minded property owners to identify and mutually agree upon a desired level of density and intensity for annexed parcels and the infrastructure commitments by either parties to serve these parcels. The City of Buckeye shall use incentives such as, the reduction of annexation and zoning application fees and enhanced review times.
- 3) For annexation of ASLD lands, consider the use of a “zoning bank” concept to incentivize ASLD and provide the opportunity for both parties to calibrate densities and intensities of land uses in conjunction with market adjustments. Utilize the zoning bank concept to also reserve ASLD parcels within and along the Gila River for permanent open spaces.

Gila River Gateway Lake and Trail Connectivity

The Gila River Gateway which includes the Lakes as a primary program element has tremendous potential to be the crown jewel of Buckeye’s entertainment and recreation areas. Providing trail connectivity along the banks of the Gila River that connect to the City-owned 40

acre pilot project at Miller Road and trail linkages to downtown and to the White Tanks Regional Park is imperative. Some of the preliminary implementation measures needed to accomplish this include:

- 1) Consistent with the Buckeye Parks and Recreation Master Plan, identify a preferred route for the public “primary path” trail alignment generally located along the north bank of the Gila River by collaborating with relevant property owners to connect regional parks and natural resources to communities, neighborhoods and other major destinations.
- 2) Establish a portion of the public “primary path” trail, possibly utilizing an interim native tread trail design, to connect the City’s 40-acre pilot project at Miller Road to the Gila River Gateway/Lake area and its anticipated private internal trail system. Also establish agreements to indemnify their liability for use of the public portion of the multi-use trail system.
- 3) Utilize volunteer support such as the Boy Scouts of America or similar organization to construct the trail facility. Where necessary, solicit material donations from home improvement stores and other businesses.
- 4) Locate and construct interpretive kiosks along the trail route to denote riparian flora and fauna and identify key features of the future El Rio District.
- 5) As more formal access to the El Rio District is established via the Fourth Street alignment, provide ample non-motorized connectivity as presented in Figure 32 to join the Gila River Gateway area to the downtown.
- 6) Secure City Council commitment and support for capital, operating and program funding through effective development planning, earned revenue, leveraging of existing investments and public/private grants and sponsorships.

- 7) Seek funding and/or joint partnerships with private property owners and the ASLD for the site planning, and construction of the various El Rio District program elements.
- 8) Reserve CIP funding, development impact fee proceeds or other bonding/financing for acquisition of strategic El Rio District parcels.

to establish right-of-way corridors to provide east-west mobility to the El Rio District. This includes defining a final Lakeside Drive alignment from Miller Road to Watson Road.

State Route 30

The future planned State Route 30 (Interstate 10 reliever) someday will have a significant impact on the urban design and mobility of the El Rio District. The future facility will provide ease of access for regional travelers to downtown Buckeye and the El Rio District, but the roadway facility also presents challenges to maintaining the cohesive, integrated land form and multi-modal connectivity between downtown, the El Rio District and the Gila River that is so very necessary and important to the City of Buckeye and the success of meeting the vision for the El Rio District.

The SR 30 alignment study (Loop 303 to SR 85) by ADOT has been on hold since a reduction in Proposition 400 funding during the Great Recession. This reduction delayed and/or eliminated some projects scheduled to receive funding. Currently, MAG is in the process of evaluating a re-balancing of Proposition 400 project dollars and its Regional Transportation Plan (RTP) projects due to an up-tick in sales tax revenues the last couple of years.

The MAG RTP funding calls for the study, design and construction of the SR 30 freeway facility from the Loop 202 to Loop 303. The Loop 303 to SR 85 segment that traverses this study area includes MAG RTP funding for only the alignment study, DCR, right-of-way preservation and design and construction of a two lane roadway. If funding is re-allocated by MAG, this could occur during the Phase 4 timeframe of 2020-2025.

With a look ahead to the future State Route 30, the City of Buckeye wishes to achieve the following considerations:

- 1) Establish a public right of way alignment and footprint that will accommodate sufficient spaces for wet and dry utilities, drainage channels, catchments and retention areas designed for maintenance of roadways and non-motorized facilities when practicable.

- 2) Emphasize the importance of SR 30's likely location and alignment with respect to:
 - It's close and central proximity between downtown Buckeye and the El Rio District, and
 - It's east-west orientation within a north to south interior drainage pattern out-falling at the Gila River less than a mile away. Utilize intercept channels along the north side of the SR 30 facility and minimize outfall locations to the Gila River. Design outfall channels to also provide multi-use trail and/or recreation opportunities and linkages to the Gila River.

- 3) Promoting traffic interchange access points at Miller and Watson Roads.
- 4) Actively discourage any suggested placement of traffic interchanges at Apache Road or Fourth Street.
- 5) Underscore the importance of the need for an at-grade or preferably below grade roadway prism in this area so as to encourage but also recognize:
 - Existing groundwater elevations for many areas along this reach of the Lower Gila River (and adjacent areas along the north bank) have been found to range from only 10-30 feet below ground surface elevation. The high water table, depending on the final SR 30 alignment, may limit the ability to design and construct a freeway facility that is significantly below existing grade.
 - Two mile traffic interchange spacing that will "bracket" the east (Watson Rd.) and the west (Miller Rd.) of the El Rio District. This configuration will also provide a desired level of service for the adjacent and surrounding land uses to the El Rio District
 - Maintaining preferred surface street vehicular and non-vehicular connections between downtown and the El Rio District as identified in this Plan, and
 - Two mile traffic interchange

spacing is consistent with Federal Highways Administration traffic interchange spacing for suburban highway segment types.

- To not let the SR 30 roadway facility bifurcate the existing and future connection and synergy between downtown Buckeye and the El Rio District. Elevated freeways create physical and psychological barriers that can challenge the connection between two places. This condition can be minimized to by strongly promoting a SR 30 roadway design where the roadway is designed at or preferably below existing grade as much as physically practicable. A higher than average water table in this areas possess design challenges.

- 3) If considerable public and private collaborative interests can be identified to do so, consider the establishment of Recreation Corridor Channelization District per ARS 48-6001. The current statutes were originally intended for activities along the Agua Fria River but no recreation/channelization district was ever formed and now the statutes have expired in June of 2015.

With the adoption of this Plan and the existence of a water course master plan, Buckeye is well-positioned (having already met the two largest requirements) to take advantage of this potentially unique statute that would be instrumental in allowing for the formation of a tax-levying district for the purpose of providing flood protection measures and recreation opportunities.

Fourth Street and El Rio District Roadways

Downtown Buckeye sits approximately 1.5 miles from the mixed use center of the El Rio District. Though the road profile will vary in order to serve the differing adjacent land uses, the general composition of Fourth Street is viewed as a "complete street" profile that will safely accommodate pedestrians, bicyclists, motorists, and transit riders. The conceptual alignment identified will encourage re-development opportunities in the downtown and adjacent transition neighborhood, minimize right of way acquisition costs and enhance the circulation and urban design of the El Rio District. Near term implementation measures needed include:

- 1) The proposed alignments for Fourth Street, Lakeside Drive, and all other supporting roadways along with SR 30 traffic interchange locations within the El Rio District are conceptual and will require further analysis as part of the Buckeye citywide transportation master plan and/or at the time of development.
- 2) Upon final study, the City should update their approved roadway cross-sections to include the new sections for Fourth Street as recommended and illustrated in Figure 32 of this document.
- 3) Initiate a more formal study to determine the final alignment and right-of-way needs for Fourth Street from its existing southern terminus at Beloit Road to the El Rio District.
- 4) Begin to preserve and/or acquire the necessary Fourth Street right of way through partnerships and/or acquisition agreements with private property owners.
- 5) As a flood protection solution for the area becomes closer to a reality, begin

Infrastructure Funding & Investment Choices

- 1) Pursue City of Buckeye support and commitment of CIP funding of infrastructure investments to seed development activity in the El Rio District. The City should begin to program El Rio District projects to compete in its annual CIP update process. The following are potential CIP projects: 4th avenue ROW, extend water and wastewater facilities.
- 2) Develop public-private partnerships to fund and establish the El Rio District Development Corporation (ERDDC). The ERDDC would consist of a nonprofit organization focused on the potential of the Gila River and adjacent lands as an economic, environmental and social resource for the city and region. Its mission would be to lead, manage and implement the short and long term development of the riverfront in partnership with public and private stakeholders. The organization's goals are to stimulate public and private investment and job creation consistent with this Plan.

Plan Adoption and Amendment

Having been considered and recommended for adoption by the City of Buckeye Planning Commission and City Council, the El Rio District Area Plan provides a policy and decision-making framework for the land use, river restoration, circulation, open space and community design place-making principles for the El Rio District and adjacent land areas along the Gila River.

In the near term, the El Rio District Area Plan is intended as a Council-adopted policy document. As the City of Buckeye completes its ongoing city-wide General Plan update process in 2017, the El Rio District Area Plan will ultimately become an element of the city-wide General Plan. Bringing the two documents together will provide unified guidance for all land uses in Buckeye and ensure a compatible relationship between the principles of the El Rio District Area Plan and surrounding land uses in Buckeye.

Requests to amend the El Rio District Area Plan, whether initiated by the City or any property owner, will be evaluated and processed in accordance with the Major Amendment and Minor Amendment procedures and requirements as defined in the existing Buckeye General Plan.





Appendix A:

Sand and Gravel

Reclamation Guidelines

CITY OF BUCKEYE

Sand and Gravel Reclamation Guidelines

December 3rd, 2015

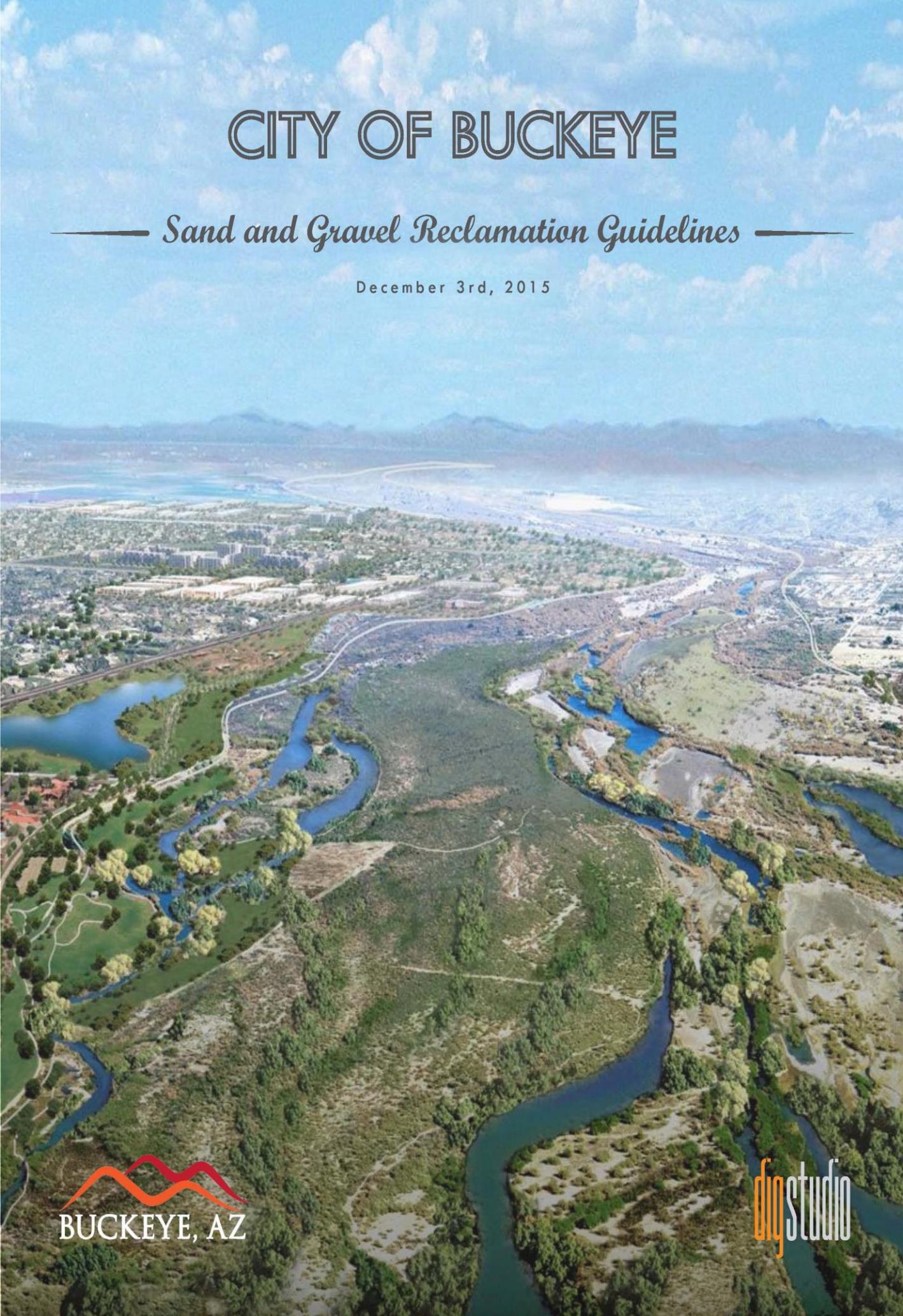


Table of Contents

1.1	Introduction	1
2.2	Reclamation Guidelines	1
2.2.1	Need for the Guidelines.....	2
2.2.2	Flood Control District of Maricopa County Authority	2
2.2.3	Background	3
2.3	Reclamation Plan	3
2.4	Contextual Site Information	4
2.4.1	Regional Setting	4
2.4.2	Project Environmental Setting.....	4
2.4.3	Local Setting.....	6
2.5	Proposed Future Use	7
2.5.1	Factors Influencing Post Mining Use.....	7
2.5.2	El Rio and Lower Hassayampa Watercourse Master Plans	7
2.5.3	Post Mining Use Categories.....	8
2.5.3.1	Open Space/Naturalized Area.....	8
2.5.3.2	Recreation	10
2.5.3.3	Agriculture	11
2.5.3.4	Lakes/Offline Storage/Recharge	11
2.5.3.5	Development	12
2.5.3.6	Insert Landfill	13
2.6	Reclamation Strategy	14
2.6.1	No Adverse Impact.....	15
2.6.2	Land shaping and soil layering.....	17
2.6.3	Re-vegetation	17
2.7	Techniques in Land Shaping	18
2.7.1	Allow for Slope Warping and Meandering of Pit Edges	18
2.7.2	Final grades must emulate pre-mining topographic character.	19
2.7.2.1	Mines occurring in compound channels with meandering low flow flood channels. ...	20
2.7.2.2	Mines occurring in braided channels with multiple bar formations.....	21
2.7.2.3	Mines occurring in incised channels	22
2.7.2.4	Mines occurring adjacent to high water table conditions	23
2.7.3	Consider alternate berming configurations	23
2.7.4	Allow for continued discharge into the floodway	24
2.7.5	Encourage natural re-vegetation by runoff management.....	25
2.7.6	Encourage natural re-vegetation through grading techniques	26
3.1	Agreement Between City and Mine Operator	28
3.2	Timeline and Phasing	278
3.3.1	Initiation, extension and completion of reclamation	278
3.3	Financial Assurances	28
3.3.1	Financial Assurance Amount.....	28
3.4	Compliance Verification	28
3.4.1	Annual Status Report	28
3.4.2	Mined Site Inspections	29
3.4.3	Performance Standards	29
3.4.4	Violations	Error! Bookmark not defined.
3.5	Compliance with other Laws	29

Prepared By:
Dig Studio, Inc.
808 N. 1st Street
Phoenix, Arizona 85004
602.595.4101

Reclamation Guidelines

1.1 Introduction

The City of Buckeye has embarked on a visionary plan to reclaim the Gila River and the Hassayampa River as environmental, recreational and economic assets for the City. The current condition of the Gila River is choked by Tamarisk, an invasive tree that out-competes native riparian vegetation and restricts the natural flow of the river. To restore the river's natural vegetation and flow, a series of reconstructive projects will be necessary. The Hassayampa River is located within a high growth area west of the White Tank Mountains and represents a dichotomy of providing sand and gravel required for the growth while the corridor represents a potential amenity to the future development. It is the goal of the City to ensure that development and sand & gravel mining are managed affectively so that the City maintains a balance between development, the environment and the quality of life.

The scale of the project will require cooperative partnerships between the City of Buckeye, Maricopa County, State and Federal Agencies and private land owners.

Currently, the Floodplain Regulations for Maricopa County (Regulations) define development standards and permit requirements for sand and gravel excavation within the floodplain. Floodplain use permits for the purpose of sand and gravel extraction are regulated by the Flood Control District of Maricopa County (District). Reclamation plans are regulated by the Arizona State Mining Inspector (ASMI). The interest in both agencies is that reclamation of a mining property generally address how the land is left so as to maintain stability of the floodway through backfilling, contouring, leveling and revegetation,..

2.2 Reclamation Guidelines

Once mining is complete, it is the goal of the City to guide the process of reclamation to achieve an end use that is a product of the surrounding natural landscape and/or development pattern. The Reclamation Guidelines presented herein are intended to serve as a tool to aid the process of reclamation so as to develop more creative and productive approaches to establishing a desired end condition. The Guidelines outline standards toward achieving the desired future landscape character and end use.

The City emphasizes that this is a guidance document only and is not a rule or regulation. This document is intended to assist mine operators in environmentally sensitive floodplain areas and provide guidance in the design of those reclamation strategies.

Generally, the reclamation guidelines will cover reclamation relating to new mining applications, existing operation renewals and closed mines.



Existing lake at the confluence of Salt River and Agua Fria River

2.2.1 Need for the Guidelines

Sand and gravel mining tends to occur close to urban growth, supplying needed sand and aggregate for the expansion of infrastructure and urban development. Mining operations close to development reduce the cost for transportation, reducing congestion and emissions and many times are still in operation as the surrounding development becomes established, resulting in conflicts between mine operators and adjacent users. With the advent of rapid growth and urbanization adjacent to the river systems, there is a dramatically increased public expectation that the river systems will be left as a naturalized open space with beneficial use.

The floodplains and floodways under the jurisdiction of the District and the Valley Cities hold immense value for future generations in terms of flood conveyance, developable land, open space recreation use and habitat value. Once mining is complete it is goal of the City that the mined pits be reclaimed to a condition that emulates the natural landscape and supports a future land realization for a desired end use. Successful reclamation also sets the standards for outstanding examples of stewardship. These Reclamation Guidelines provide the tools that set forth the steps and procedure for the evaluation of the surrounding landscape and determination of the desired end use.



Abandoned mines are a safety concern and an eyesore.

2.2.2 Flood Control District of Maricopa County Authority

Federal laws require the Flood Control District of Maricopa County (District) to manage and regulate all floodplain development within the County. Aggregate mining is included in the definition of development. Development standards and permit requirements for sand and gravel excavation within flood and erosion hazard zones are defined in the Floodplain Regulations for Maricopa County, Amended June 14, 2014 (Regulations). The primary purpose of the regulation of sand and gravel mining is to comply with the Federal Emergency Management Agency (FEMA) requirements and the National Flood Insurance Program (NFIP).

The District looks to Federal law if State law is not specific. Under Statutory Authority, the Regulations promote and protect the health, peace, safety, comfort, convenience, and general welfare of residents within the jurisdictional area of Maricopa County, Arizona. Regulatory measures serve to minimize public and private losses due to flood conditions and enable residents in flood prone areas to participate in flood assistance programs.

2.2.3 Background

Historically, the District has regulated sand and gravel mining purely from a hydraulic and sediment control aspect as it relates to flood control and public safety. Typically local and county regulations pertaining to industry, including mining operations, set operational standards including hours of operation, noise control, screening, water quality and environmental quality. Additionally, permits may also be required from the US Army Corps of Engineers if the excavation disturbs existing vegetation that provides habitat or enters into an area designated as a “Waters of the US” (404 Area).

Reclamation standards establish the conditions for how a mined site is left once mining is complete to ensure the stability of disturbed slopes and no impacts to neighboring properties. Currently, existing State standards of reclamation do not necessarily result in the creation of the most productive, useful or even attractive sites.

Recent trends for sustainability and community responsibility goals by the sand & gravel industry indicate an increasing realization on the part of mining operators and owners that the value from mine sites, once mining is complete, provides for continued financial and social benefit if appropriately reclaimed. Current efforts in reclamation planning and implementation by aggregate mine operators points to a genuine response to comply with floodplain regulations and to achieve much higher standards in reclamation. Successful reclamation plans and their implementation potentially extend returns from the mined site well into the future and greatly enhance mining operations as responsible stewards of their land and to their community. The reclamation of mined lands to emulate natural features, create lakes, or provide a platform for recreational and urban amenities denotes exemplary environmental stewardship. The reclamation of a mining site is a cooperative effort between industry and the jurisdiction entities and must be recognized equally.

2.3 **Reclamation Plan**

Reclamation plans are most successful when planned as part of the actual mining operation. Equipped with information about the character of the site, the mining operation, and the end use, educated decisions can be made about the movement of material and phasing to achieve reclamation in the shortest possible time. In general the reclamation plan should demonstrate the final state of the excavation will be stable, will not result in increased flood and erosion hazards on adjacent properties, will not be subject to flood and erosion damage, and provide a sustainable ecological environment.

As part of the City’s goal of establishing reclamation guidelines, a series of reclamation plans are necessary to establish a level of understanding between the City and the mine owner of the expected outcome and are in addition to the required reclamation plans required by the ASMI.

The recommended reclamation plans includes the following components:

- Contextual Site Information
- Proposed Future Use
- Reclamation Strategy
- Timeline and Phasing
- Financial Assurances

2.4 Contextual Site Information

It is beneficial to analyze information pertaining to the mining site at both a regional and local context to establish an appropriate reclamation plan. This will also ensure that the reclaimed use is developed taking into consideration factors and influences that will promote the success of the reclamation effort. Contextual site information includes the following:

2.4.1 Regional Setting

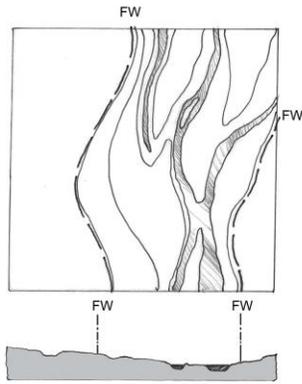
The information required for the regional setting includes:

- i. Site location at a regional scale (i.e. project site located on a city-scale aerial).
- ii. Aerial map showing the location of the mine overlain by contour map; indicate floodplain, floodway, and lateral migration erosion hazard delineation.
- iii. Existing and future land use in the areas adjacent to the site. Refer to zoning maps from the City of Buckeye or the County if the mined sites are located outside of the incorporated areas of the City. It is necessary to account for future urban growth in order to predict how the project area may change if the mining is expected to be a long term operation.

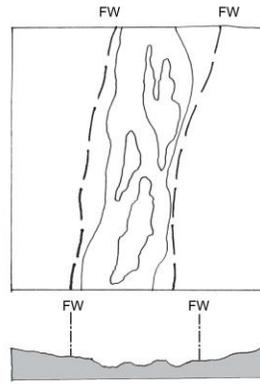
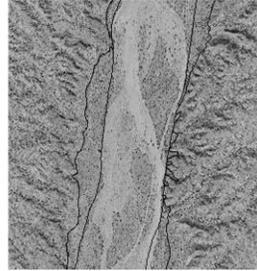
2.4.2 Project Environmental Setting

Since the guidelines serve as a tool to reintegrate reclaimed areas back into the surrounding riverine landscape, the natural channel pattern of the river has a bearing on the final character of the reclaimed pits. In situations where the final use is open space, open water or where land is left for eventual higher alternate use with interim open space use, channel patterns have a strong influence on the final grading of the pits either as a reclamation form or as tie in points up-stream and down-stream of the pit. Pre-mined site conditions or if already disturbed, untouched areas in the vicinity may be used as a reference to determine the character or the tie-in points of the pre-mined site with respect to four distinct channel patterns typical of dry rivers. With respect to mining and reclamation, channel patterns most commonly encountered in Gila River and Hassayampa River are illustrated in the following stream pattern examples.

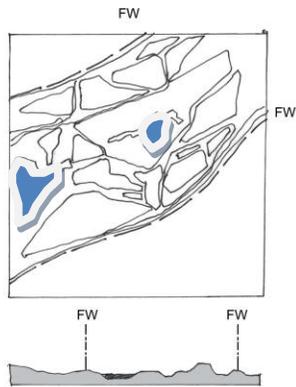
COMPOUND CHANNELS - MEANDERING LOW FLOW & HIGHER BRAIDED FLOOD CHANNEL



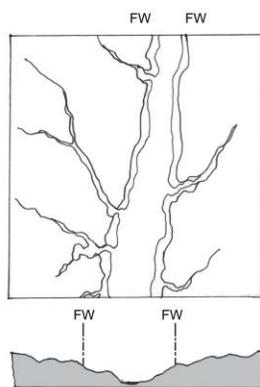
BRAIDED CHANNEL WITH MULTIPLE BAR FORMATIONS



DISTURBED RIVER SYSTEMS



INCISED CHANNEL - INSET WITHIN ALLUVIAL TERRACES



KEY
 --- FLOODWAY

Natural and disturbed stream pattern examples

Any of these streams may be perennial, ephemeral, or intermittent. Each of these topographic patterns elicits a different response with regard to reclamation. The vegetation character on pre-mining sites are a function of these landscapes, and may provide a good indication of plant species that may be used for re-vegetation or identified for removal and replacement with native species.

The environmental project setting may include the following information:

- i. Channel Pattern illustrating the form of the mining area with respects to the floodplain channel pattern, including an area 500' up-stream and down-stream of the proposed mine.
- ii. Relevant site sections parallel and perpendicular to the main watercourse no more than 500 feet apart. Indicate average depth to mine-able material and approximate depth to water table. Two perpendicular sections through the highest and lowest elevation are encouraged.
- iii. The determination of the vegetative conditions of the site is of particular relevance when final use is open space or of a similar naturalized character. For pre-mining sites in undisturbed conditions, the use of sampling plots to determine the species composition and abundance on the site is encouraged. Where the site is already of a disturbed nature, a representative site with a similar setting (aspect, elevation, soils and hydrology) may be used as a frame of reference. Any established vegetation sampling method may be adopted to determine a typical representation of vegetation on the site. Initial stratification of the site may be necessary to obtain a good representation of highly localized and distinct vegetative communities. The topographic and soil related variation in the mine site will provide a good indication of distinctly identifiable plant communities (e.g. vegetation in drainage washes, creosote flats and upland scrub areas support different plant communities). Indicate test plots on aerial map.
- iv. Provide one photograph of each sampling site.
- v. A plan illustrating observed wildlife and habitat areas encountered on the site (species, wetlands and nesting areas). Please note that recognized wetlands may require additional mapping and regulatory evaluation.

2.4.3 Local Setting

A visual evaluation of the natural and manmade features of the site that contribute to its character is encouraged before establishing a reclamation plan. The landform, water features and vegetation within and immediately adjacent to the site provide a good representation of the character the reclaimed site must emulate. The evaluation also helps in identifying existing natural features that can be utilized to screen and buffer operations.



Sensitive sites of particular aesthetic or ecological value can also be determined.

Agriculture within the Gila River Floodplain

For this purpose, it is beneficial to document the character of the site and its surroundings using the information:

- i. Aerial map at not less than 1"=200' scale indicating significant natural and manmade features within and adjacent to the site including site access, flood control structures, utilities, tributaries, washes, wetland habitat areas, tree stands, rock outcroppings, habitat or nesting areas, archeologically significant sites etc.
- ii. Photographs taken into the site from opposing corners of the site.
- iii. Photographs of important natural features of the site.
- iv. Photographs of the pre-mined site taken outwards from opposing boundaries of the site. Show orientation on the site features map.
- v. Indicate all locations, photograph numbers and orientation of shots on the site features map.
- vi. Cultural features and historic structure preservation or mitigation may be required under the State Historic Preservation Office (SHPO). The property owner is required to meet all requirements and clearances of the SHPO.

2.5 Proposed Future Use

2.5.1 Factors Influencing Post Mining Use

The site information collected provides a clear understanding of the specific site factors that will affect the reclamation approach. Adjacent existing and proposed land uses provide a good indication of a range of post mining uses that will be compatible. Other social and economic factors that may influence the proposed future use for a reclaimed site include:

- Level of demand for the type of use proposed.
 - Engineering and environmental feasibility of proposed use.
 - Cost benefits analysis – to determine return on investment put into the reclamation effort.
 - Social, environmental and economical impacts of proposed use.
 - Degree of support from surrounding community and lead agencies.
- In determining a feasible end use for the mined site it would be beneficial to investigate these factors and their influence on future land values, including adjacent lands.

2.5.2 El Rio and Lower Hassayampa Watercourse Master Plans

A Watercourse Master Plan (WCMP) is defined by the District as '*a hydraulic plan for a watercourse that examines the cumulative impacts of existing development and future encroachment in the floodplain and future development in the watershed on potential flood damages, and establishes technical criteria for subsequent development so as to minimize potential flood damages for all flood events up to and including the one hundred-year flood*'. In the interest of the City and the previous participation by the City in the preparation of WCMP, the Reclamation should be in conformance with the WCMP plan objectives and development criteria.



Gila River Existing River Corridor



Gila River Simulation of the Possibilities

The City urges the responsible parties to seriously investigate various options for reclamation. Some proposed end uses require substantial studies initially to prove their feasibility for the particular site while others require preliminary studies and involve much less investment during the initial stages. However, thorough initial studies during the planning phase ensure successful reclamation completion and may also result in great financial benefit for the responsible parties well past the life of the mine. Typically three reclamation development problems have been associated with unplanned mining practices including: a) Mined out areas not shaped to accommodate the desired uses; b) Unique features that can be created by mining, such as interesting land forms, open water areas, and distinctive rock formations are rendered un-useable for development; c) Increased earthmoving costs when the shaping of mined lands is not part of a planned mining and land shaping program. The possibilities for reclamation are numerous and efforts should involve creative approaches that achieve efficiencies, maximize benefits and minimize adverse environmental impacts.

Because of the long term nature of mining, it may be prudent to be flexible with the end use so as to accommodate unforeseen changes in the social, cultural and economic environment of the future. Any changes to the reclamation plan must be reviewed with the City and may require amendments to agreements between the City and the mine operator and property owner.

2.5.3 Post Mining Use Categories

Generally, post mining use can be generally classified into the following categories:

- | | |
|------------------------------|-----------------|
| Open space/ naturalized area | Recharge |
| Recreation / Lakes | Agriculture |
| Development | Inert Landfills |

2.5.3.1 Open Space/Naturalized Area

Uses in this category may include, but are not limited to pre-mining river corridor character, wetland and habitat areas and resource conservation areas for future mining. Mining pits reclaimed as open space or naturalized areas should closely match pre-mining conditions in terms of land slopes and vegetation. As illustrated in the project setting chart below, open areas can occur in all of the project settings, but may vary in nature depending on the site context. Recreational uses that are compatible with open space areas such as equestrian, hiking or bird watching may be integrated into the final use.

OPEN SPACE	ADVANTAGES	DISADVANTAGES
River Corridor/ Conservation Areas	<ul style="list-style-type: none"> • Beneficial river corridor enhancement through re-vegetation and grading concurrent with mining completion • Best use in ecologically less sensitive areas such as industrial zoned parcels in urban areas • Minimum required for reclamation, barring inert landfills • Re-establishes appealing landscapes concurrent with the surrounding natural river corridor for open space, equestrian uses, fish habitat and improving water quality. • Less expensive reclamation option • Managed as a recreation area 	<ul style="list-style-type: none"> • Typical natural conditions of adjacent non-mined areas in the river corridor need to be ascertained • Low value-added reclamation strategy if mine is located in dense residential areas or urban areas where there may be demand for alternative value-added uses
Recharge and Wetland Habitat Creation	<ul style="list-style-type: none"> • Groundwater replenishment and related water credits earned • Wetland habitat creation • Interpretive and educative centers as park components • Set examples for outstanding land stewardship which may convert to credits for alternate mining permits • City partnerships for finance support and maintenance is a possibility 	<ul style="list-style-type: none"> • Dedicated effort required with professional team to establish balanced and sustaining wetlands • Chances for the establishment of invasive species like Tamarisk • Needs to be compatible with surrounding uses • Needs to respond to fluctuating water without vegetation loss • Managed as a recharge facility and may restrict recreational use
Re-vegetation, habitat restoration and mitigation bank	<ul style="list-style-type: none"> • Beneficial re-establishment of vegetation, slopes and habitat consistent with pre-mining landscape character and habitat quality • Best use in outlying and rural areas of high ecological value • Comparative ease in concurrent establishment with mining completion • Set examples for outstanding land stewardship which may convert to credits for alternate mining permits 	<ul style="list-style-type: none"> • Effort is required in determining planting species and density • Earnest efforts to quantify and qualify habitat conditions are required • Need to determine typical topography and hydrologic conditions that will help re-establish regional flow patterns once mining is complete • Managed restoration may limit recreational use



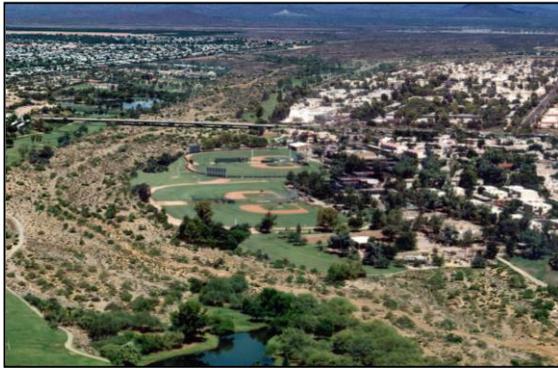
Wetland Habitat Area - Gila River



Wetland Habitat Area – Agua Fria River

2.5.3.2 Recreation

The range of recreational uses that can be incorporated into reclaimed sand and gravel pits are many and varied. The feasibility of the proposed recreational use depends greatly on the population demographics and surrounding land uses. Access to neighborhoods, linkage to trails, water availability and protection from large flood events will influence the type of recreational use that can be developed. If located within the City, it may be possible to develop investment partnerships and maintenance agreements as these contribute to the City’s growing needs for improved recreational space. Golf, active sport fields, passive parks, botanical gardens, zoos, skateboard parks, controlled ATV parks and water based recreation are a few examples of the reclamation possibilities that can happen and which have been implemented in other parts of the state and nation.



Recreational area simulation adjacent to the Agua Fria river corridor



The Pines - Reclaimed mine/Golf course in Marana, Arizona

RECREATION	ADVANTAGES	DISADVANTAGES
Golf Courses	<ul style="list-style-type: none"> • Golf courses are more flexible with grading requirements • Golf courses in below grade mined areas provide opportunities for lit courses and night golf • Opportunities to absorb difficult grading situations into the golf course design • Opportunities for lake features in low lying areas 	<ul style="list-style-type: none"> • Future golf course management strategy needs to be worked out • Adjacent uses need to be compatible with golf course use (i.e. golf course in an industrial area may not be successful)
Active Parks	<ul style="list-style-type: none"> • Great opportunity for field sports in mined areas with appropriate grading • Lighting of fields can be maintained below grade to cut nuisance lighting and noise to adjacent residential areas • Depending on the size and location, these can serve as community or regional parks for adjacent cities • New parks help cities achieve their park and open space requirement and hence city partnerships in park developments are key to their success • Structural fill is not required for park installations • Great opportunity for linear connectivity to parks along the river corridor 	<ul style="list-style-type: none"> • Future park management strategy and city partnership needs to be worked out • Adjacent uses need to be compatible with park use (parks in an industrial area may not be successful)

2.5.3.3 Agriculture

The use of mined pits for agricultural uses has many advantages. The backfill into the pit can be graded to achieve the appropriate slopes and drainage that are optimum for crop production and need not necessarily be filled to original levels. Soil amendments and the necessary irrigation system can be put into place during backfill operations. The location of the mine, the availability of water and the water table level would be the limiting factors..

AGRICULTURE	ADVANTAGES	DISADVANTAGES
	<ul style="list-style-type: none"> • Beneficial use in outlying rural areas where agriculture is already a typical use in surrounding areas • Beneficial re-use of overburden material as top soil for farming • Fill to pre-mining levels is not required to establish farmland • Grading can be manipulated to take advantage of good conservation practices for cultivation 	<ul style="list-style-type: none"> • Care has to be taken not to overly compact fill material during fill operations and to provide layering of topsoil that would sustain farming for long periods. • Grading for good drainage to be achieved • Team work with experienced and knowledgeable farmers is key to success



Citrus farming on the Agua Fria River



Agricultural fields along the Gila River floodplain

2.5.3.4 Lakes/Offline Storage/Recharge

This is an environmentally responsive reclamation option which aids in water conservation and will also accommodate open space, agricultural, recharge and recreational uses advantageously. Lake or pond features occur when the mining depth extends into the water table. This is common in the Gila River due to the naturally occurring shallow water table providing an opportunity to create open large bodies of water for recreation and habitat. Offline storage areas are typically detention areas adjacent to the floodway that can hold a large amount of flood water. This can aid in many ways during large flood events, the offline storage of flood waters will reduce the quantity of discharge reaching downstream all at once and hence reduce the erosive impacts on downstream property. During the dry season, when no flood waters are anticipated, offline storage pits can also be used for recharge purposes. Effluent water from wastewater treatment plants can be discharged into inline storage areas first before being released into the river for recharge. This could also result in the creation of vibrant wetland habitat /

interpretative facilities. Partnerships with recharge projects along the Valley water ways can be investigated for their feasibility. Offline storage areas will be required to be structurally stable during large events to guard against the possibility of lateral movement of flood waters.

LAKES / OFFLINE STORAGE / RECHARGE	ADVANTAGES	DISADVANTAGES
	<ul style="list-style-type: none"> • Beneficial use in areas where frequent flooding creates disturbance downstream • Useful for water storage and controlled release • Lake environment and associated recreational features are possible • Interpretive facilities • Wetland habitat created • Slow release of effluent water for recharge into river • Aids in Water Conservation • Possible earned water credits as part of water recharge districts • Possible tie-ins with district and municipalities for water credits or other incentives 	<ul style="list-style-type: none"> • Storage areas will be required to be structurally stable during large flood events • Dependent on availability of water as effluent or during flood events and the need for such facility • Collaboration with the District or concerned municipalities are key to the success of such facilities • Water related habitat or recreation must accommodate fluctuation in water availability



Recharge area and riparian preserve, Gilbert, Arizona



Recharge area and riparian preserve, Gilbert, Arizona

2.5.3.5 Development

In areas where there is significant growth and land values are considered to be high, reclaiming the site for development will be considered a ‘higher and better’ use. The type of use will vary depending on the surrounding land uses, demographics and expected growth and whether the land is outside of floodplains. Generally proposed uses – whether residential, commercial or industrial, should be compatible with the surrounding use. If reclaimed as a building sites, that portion of a mined pit must be backfilled with structural fill and be protected against potential flood threats before development. Backfill with structural fill can be limited where parking or recreational features (golf, parks) are part of the development.

DEVELOPMENT	ADVANTAGES	DISADVANTAGES
Residential Use	<ul style="list-style-type: none"> • High value use over low value mined area. • Advantageous infill development in built out urban areas. • Adjacent river landscape provides recreational opportunities for residents. • Mined pit provides opportunities in land forming and creation of interesting building organization for space maximization. • Supports commercial and employment growth, services and job creation 	<ul style="list-style-type: none"> • Structural fill for building stability required. • Area may take years to achieve acceptable level of aesthetic improvement • Mining expansion into adjacent areas may intervene with on-going residential development
Industrial/Commercial Use	<ul style="list-style-type: none"> • Suitable use in areas zoned as industrial or commercial areas • Mutually beneficial use with mining sites for processing and sales of mined material • Concurrent use that may transition well with long term mining operations • 	<ul style="list-style-type: none"> • Use needs to be compatible with adjacent uses • Suitable commercial in more urban areas • Must meet City landscape design standards for screening • May not require fill up to pre-mining levels for location industrial buildings • Structural fill is required
Water Front Development	<ul style="list-style-type: none"> • Allows for urban expansions towards river or lake • Provides opportunities for very high value water oriented developments • Boardwalks and river parks are valued components of waterfront developments • Calls for high density use • City Lakes and waterways are key to successful waterfront developments • Takes advantage of high water table situations and deep pit situations • Water oriented sports that promotes surrounding development 	<ul style="list-style-type: none"> • Situations where urban centers adjoin river corridors are limited • Large quantities of water required • Demographic studies and market research are required to establish feasibility of such waterfront developments to ensure their success • Construction costs



Office park development on reclaimed site



Waterfront office park, Tempe, Arizona

2.5.3.6 Inert Landfill

The backfilling of pits with inert material is an efficient way to backfill pits. The demand for inert landfills must however be present. The backfill must be compacted

sufficiently to not be susceptible to floods or erosion. Refuse landfills are prohibited within and adjacent to the floodplain and the floodway.

Any fill material proposed in the regulated floodplain and floodway must show to have no detrimental effect and be in conformance with local, county, state and federal regulations. The nature of landfills requires specific approvals that are beyond these guidelines. These guidelines do address the City's desire to provide a site that demonstrates a useable end use whether natural, active or passive recreational or developed.

Minimum standards for landfills are they must be plated with a layer of amended soil to allow for vegetation to take hold and survive. A fixed timeframe must be established for the complete filling of the pit as an inert landfill. The timeframe will be determined on a case by case basis.

<p>INERT LANDFILL</p>	<ul style="list-style-type: none"> • Beneficial where there is demand for disposal of inert material • Useful when fill to achieve pre-mine elevations is required • Suitable use in ecologically less critical areas and industrially zoned areas • Recreational uses can be accommodated on landfill sites 	<ul style="list-style-type: none"> • Demand for inert waste disposal has to be present • Very low value-added reclamation strategy if mine is located in dense residential areas or urban areas where there may be demand for alternative value-added uses
---------------------------	--	--



**Paseo Vista Park built on previous landfill
Chandler, Arizona**



**Coldwater Park built on previous landfill
Avondale, Arizona**

2.6 Reclamation Strategy

The reclamation strategy identifies the approach that will be adopted for executing the reclamation plan. Generally, the reclamation strategy will vary depending on the type of post mine use selected. It is beneficial to integrate reclamation with the mining operation in-order to take full advantage of the deposit structure and the overburden material and to maximize the end-use potential of the mined-out site. If planned initially, the strategy for reclamation can limit on and off site impacts, make the operations and use of equipment more efficient and speed up the reclamation process.

Generally the reclamation strategy must assure three components:

- No impact to adjacent property
- Accommodate end use through land and water edge shaping and soil layering
- Re-vegetation of the reclaimed site

2.6.1 No Impact to Adjacent Properties

Currently floodplain regulations require mined areas to have no adverse impacts on adjacent property and infrastructure. Though the term “Adverse Impact” is currently being defined by the District, for the purposes of these guidelines the intent is that once mining is complete, the reclaimed mine must ensure continued stability and address the protection of the health, safety and welfare of the public.

Until now, the aesthetic aspects of mine reclamation were not considered a significant part of the reclamation. It is the goal of these guidelines to address the aesthetic issues of reclamation without, at any point compromising the safety of the mined area. Apart from ensuring no impacts to adjacent properties, the reclamation strategy should also address two predominant factors that allow the completed mine site to blend in with the surrounding character. This includes land and water edge shaping and re-vegetation.

For purposes of mine reclamation within the jurisdiction of the State Mining Inspector, the location of the mines occur

- In the floodplain
- In the floodway
- Exist both within the floodway and floodplain

For purposes of mine reclamation within the jurisdiction of the City, the location of mines extend to all sand & gravel mining activity and not restricted to floodways and floodplains.

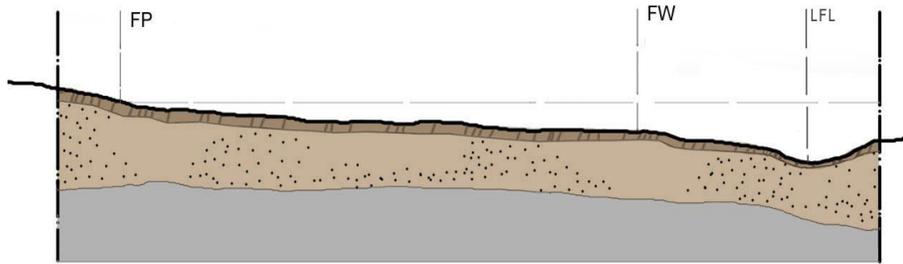
All mining operations will require engineering analyses to demonstrate that the final state of the excavation will be stable, will not result in increased flood and erosion hazards . Typically slopes of 4:1 or shallower are required on final reclaimed sites.

Sites reclaimed as waterbodies must meet minimum slopes of 12:1 along the shoreline, extending a minimum of 20’ above high water mark and 50’ below high water mark. Specific design criteria may be required depending on the recreational use of the water and the future public access location.

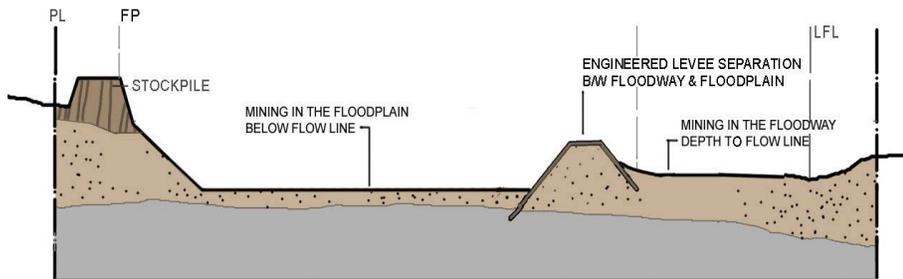
Generally factors addressed include

- Sediment and erosion control
- Slope stability and safe access zones
- Flood control management through appropriate flood control structures
- Re-vegetation

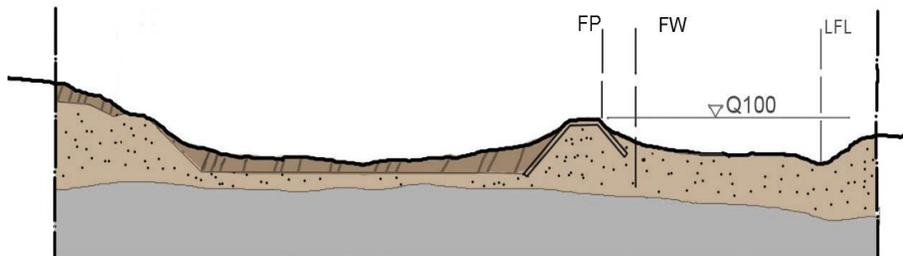
For the purpose of guideline discussions, a mining location that extends into both the floodplain and floodway will be used.



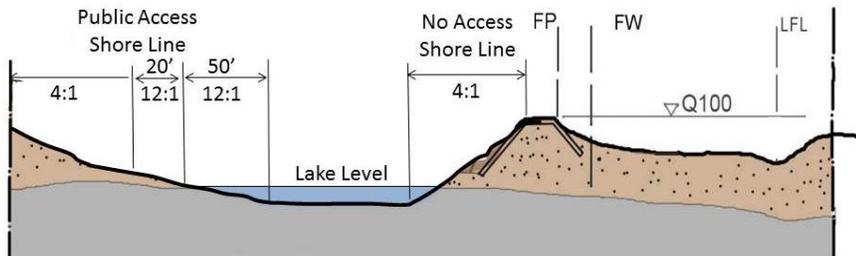
MINE SITE - EXISTING CONDITION



MINE SITE - DURATION OF MINING



DESIRED RECLAIMED MINE SHAPING



DESIRED RECLAIMED MINE AS A LAKE

FW – Floodway
FP – Floodplain
LFL – Low Flow Line

If the mine is in both the floodway and floodplain, is treated as a floodway mine. If there is a protected levee built between the floodway and floodplain, these are considered as two separate mines. If the levee is a stabilized flood protection structure that contains a 100 year storm plus freeboard, the mine it protects is considered to be within the floodplain and mining depths may extend deeper. The distinction will greatly influence the reclamation strategy. Where mining is within the floodway the land shaping will most likely emulate a natural stream. Mining within the floodplain may reflect a number of reclamation strategies.

2.6.2 Land shaping and soil layering

Land shaping and soil layering refers to techniques of contouring and the layering of topsoil in order to achieve the proposed end use selected for the site. The phasing and time frames associated with final implementation also affect decisions for land shaping. If the land is left as open space / naturalized area, the final land shaping and re-vegetation must be a function of regional conditions and surrounding landscape character. If a recreational use is contemplated for the site, the reclamation plan must address how the mined site is left to provide safe public access.

In situations where the mined pit is graded to accept an eventual higher end use, but which may not get implemented within two years of mining completion, the following section serves as a tool that addresses land shaping, soil layering and re-vegetation of the mined area for the interim period.

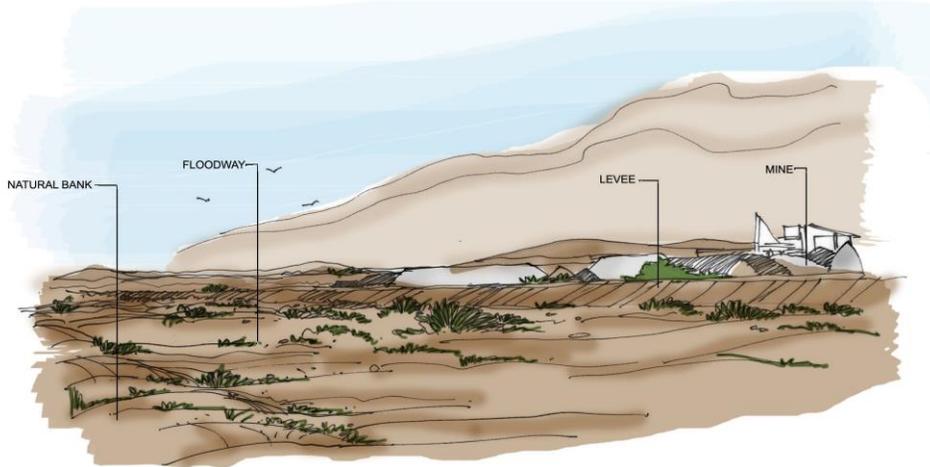
2.6.3 Re-vegetation

The re-vegetation of the reclaimed site consistent with the final end use is required. The reclamation plan must demonstrate measures by which complete and successful final re-vegetation can be achieved. Measures may include surface conditioning, soil amendments and mulching to provide more amenable conditions for plant establishment. The provision of a top eight inches of growth medium or topsoil is encouraged over final graded slopes. The season of planting must be noted on the reclamation plans and preferably coincide with the optimum growing season to ensure the establishment of planting material. Soil stabilization and irrigation may be required to ensure the success of re-vegetation. Plant establishment methods must be indicated on the reclamation plan.

For proposed end uses that include open space or naturalized end uses, it is encouraged that the removal of Salt Cedar and the establishment of vegetation species, density and diversity be consistent with the pre-mining landscape character or in conformance with the El Rio Design Guidelines and the FCDMC Vegetative Management Plan. The City encourages the mining owner and operator to partner with adjacent land owners and public agencies in the removal of Salt Cedar and other invasive plant species. Continued care of the re-vegetated area for the following growing seasons, with gradual withdrawal of irrigation is encouraged. For proposed end uses other than open space, the reclamation plan should specify how the re-vegetation plan supports the end use. Where an interim period of more than one year exists between completion of the mining operation and implementation of the final end use, temporary hydroseeding is recommended.

2.7 Techniques in Land Shaping

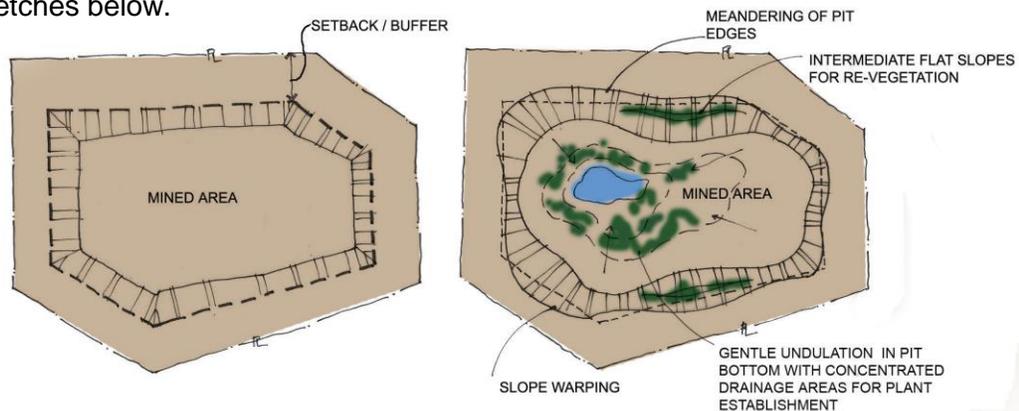
The configuration of the property boundaries tends to be a function of surveyed lines, and as such form straight unnatural rectilinear shapes. Generally the mining pits tend to follow the rectilinear nature of the mining limits in-order to obtain maximum material. Mined pits and stockpiling of overburden material can greatly contrast with surrounding naturalized areas. Therefore, land shaping is an important part of reclamation, as described in the following pages.



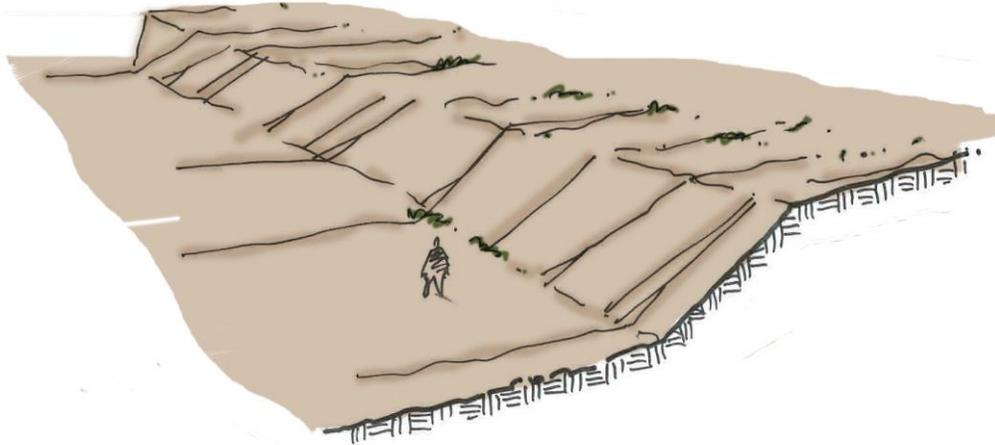
Mining operation levees, stockpiles & overburden form rigid lines against background.

2.7.1 Allow for Slope Warping and Meandering of Pit Edges

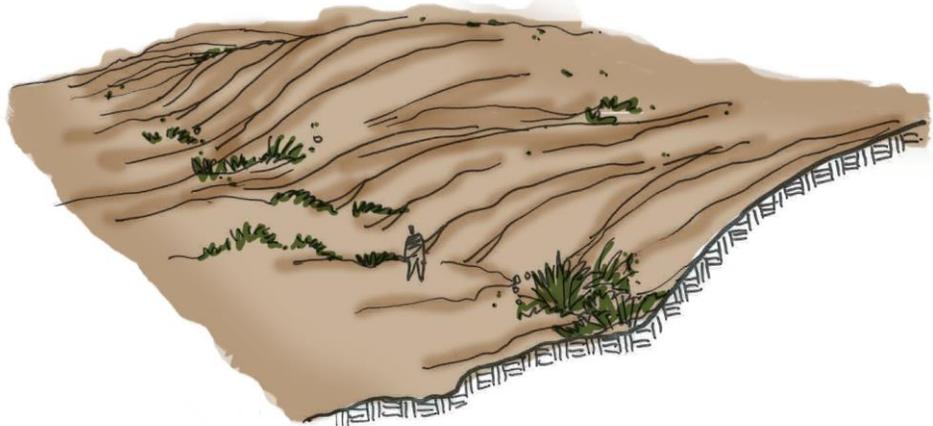
Generally, the edges of the reclaimed pit should meander, reflecting the lines of the surrounding landscape. Use aerial maps to determine appropriately scaled meanders. Allow for a minimum of 50% of the circumference of the pit edges distributed evenly, to be meandering, avoid aligning pit boundaries to property lines, and avoid straight lines in the reclaimed pit configuration. Corners should be rounded and 50% of the vertical cut slopes must vary from 1:4 or shallower. In addition to meandering edges, provide a variety of mounds and depressions of varying heights within the setback buffer zones, to break up sight lines and effectively transition to adjacent properties at the top surfaces of the pit. Cut material from flattened slopes at pit edges may balance with fills for mounding at other areas along the edges. Also allow for free form shaping and bottom contouring. See sketches below.



Land Shaping to Create a Natural Form



Typical post mining condition side slopes



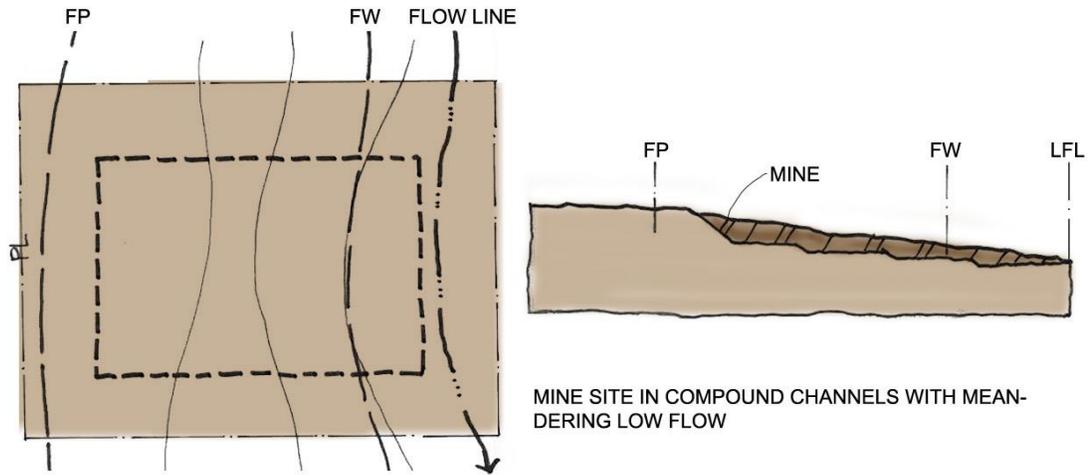
Proposed post mining side slope land shaping to blend into adjacent properties

2.7.2 Final grades must emulate pre-mining topographic character.

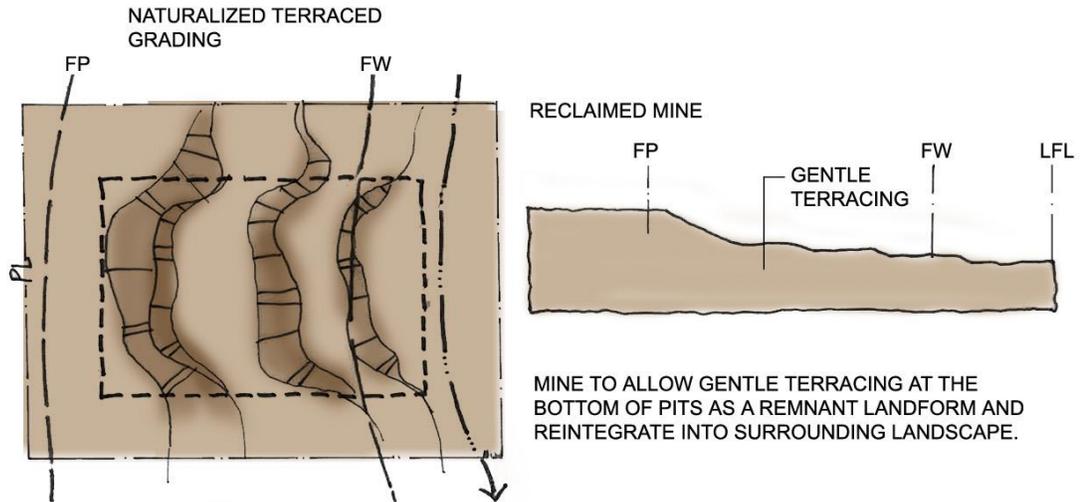
The following graphic examples present land shaping techniques that can be used for the reclamation of mined pits, specifically addressing mining conditions that extend into both the floodway and floodplain. Levees may be required when mining in the floodplain extends deeper than the main low flow line in the floodway. Pits separated from the floodway by stabilized levees potentially do not have access to original storm flow conditions. Pits protected by levees possess their own localized watershed.

The options shown on the following page or below illustrate techniques as they apply to the four main channel flow patterns identified earlier.

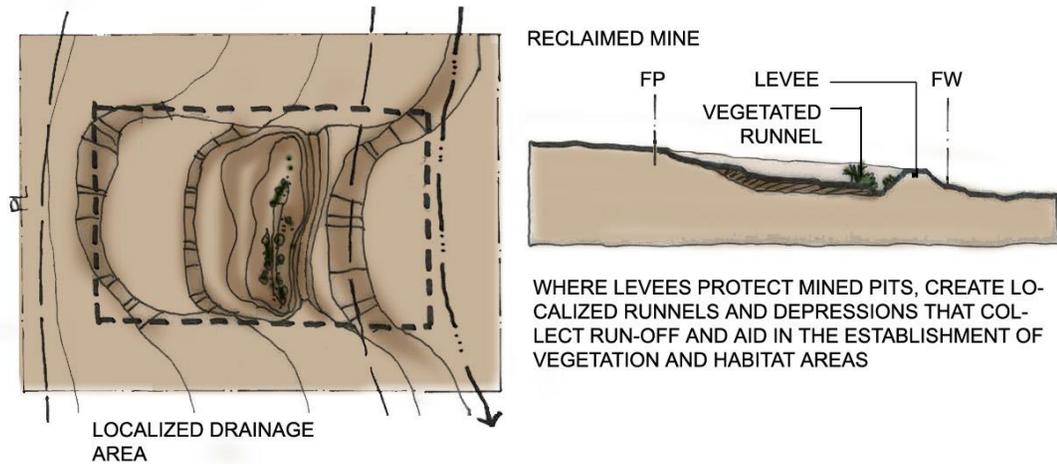
2.7.2.1 Mines occurring in compound channels with meandering low flow and higher braided flood channels.



MINE SITE IN COMPOUND CHANNELS WITH MEAN-
DERING LOW FLOW

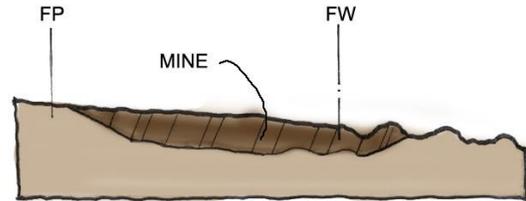
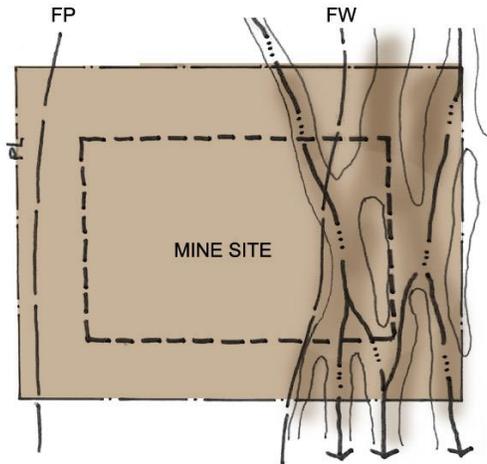


MINE TO ALLOW GENTLE TERRACING AT THE
BOTTOM OF PITS AS A REMNANT LANDFORM AND
REINTEGRATE INTO SURROUNDING LANDSCAPE.

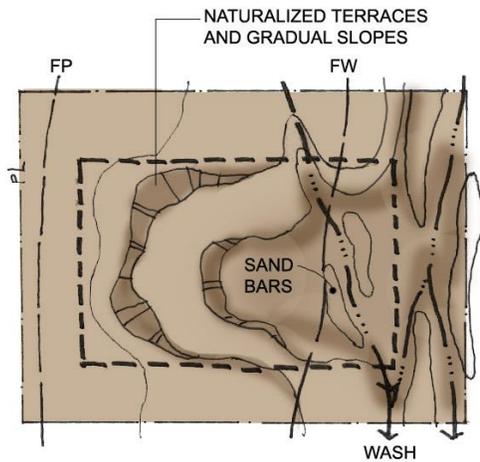


WHERE LEVEES PROTECT MINED PITS, CREATE LO-
CALIZED RUNNELS AND DEPRESSIONS THAT COL-
LECT RUN-OFF AND AID IN THE ESTABLISHMENT OF
VEGETATION AND HABITAT AREAS

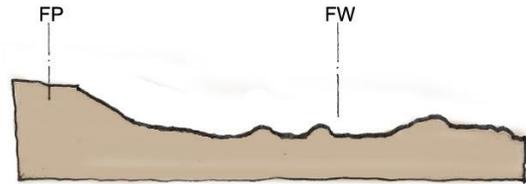
2.7.2.2 Mines occurring in braided channels with multiple bar formations



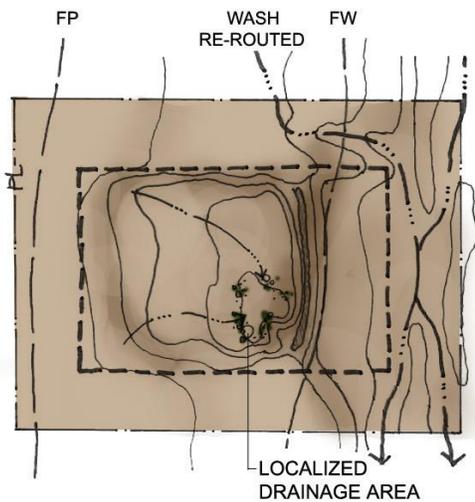
MINE SITE IN BRAIDED CHANNEL WITH WASH RUNNING THROUGH



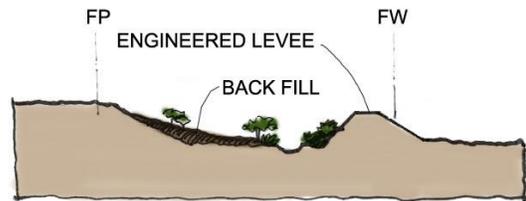
RECLAIMED PIT



BORROW FROM ELEMENTS OF THE NATURAL LANDSCAPE SUCH AS SAND BARS AND REGRADE TO BLEND SLOPES INTO SURROUNDING AND TO RESTORE FLOW TO THE FLOODWAY. LEAVE REMNANT UNDULATIONS AT PIT BOTTOM THAT EMULATE BARS FORMATIONS.



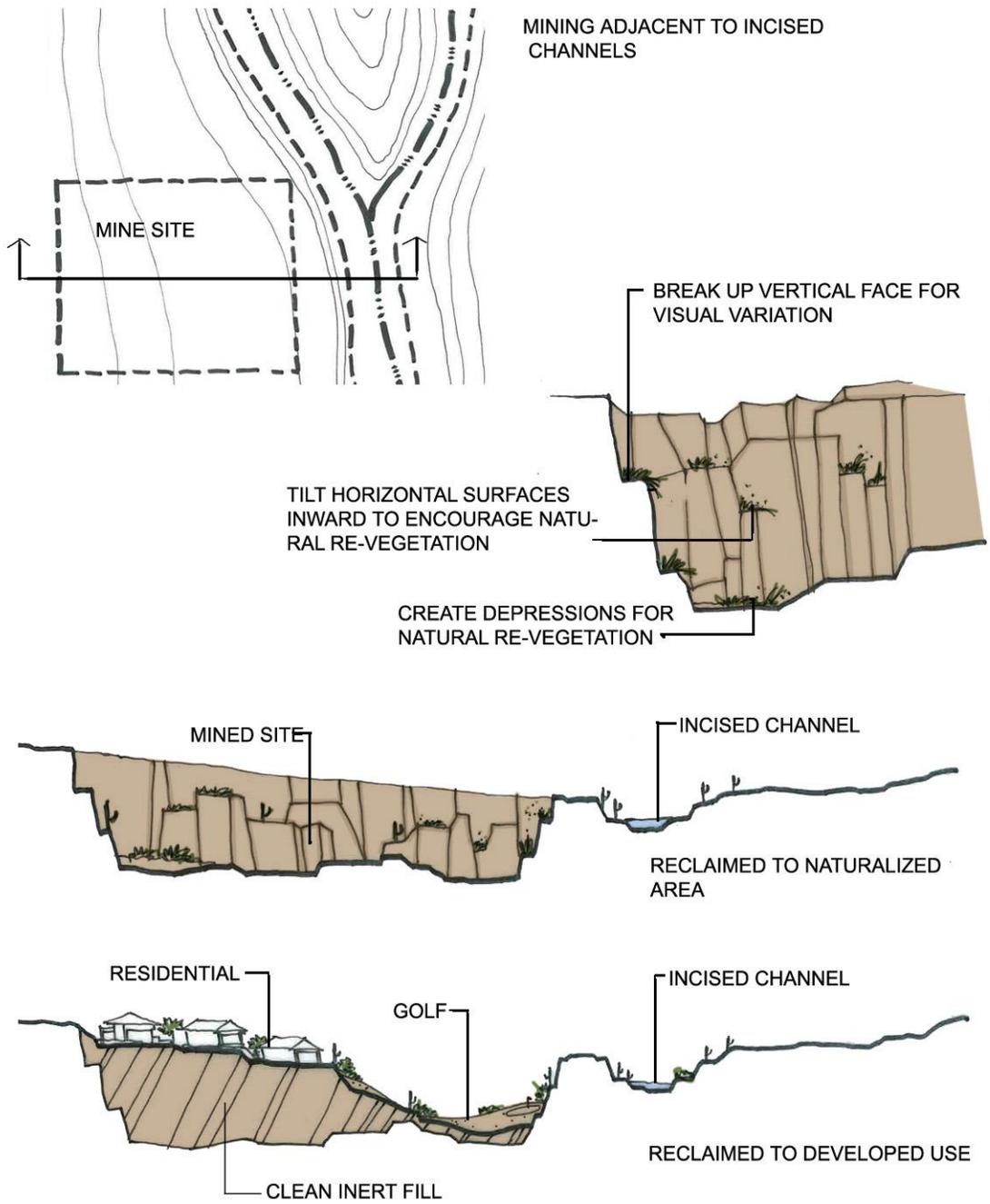
RECLAIMED PIT



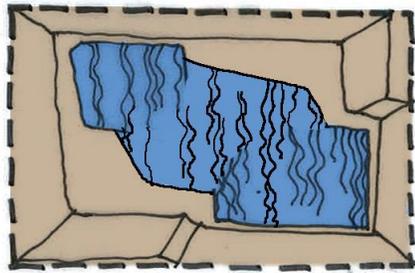
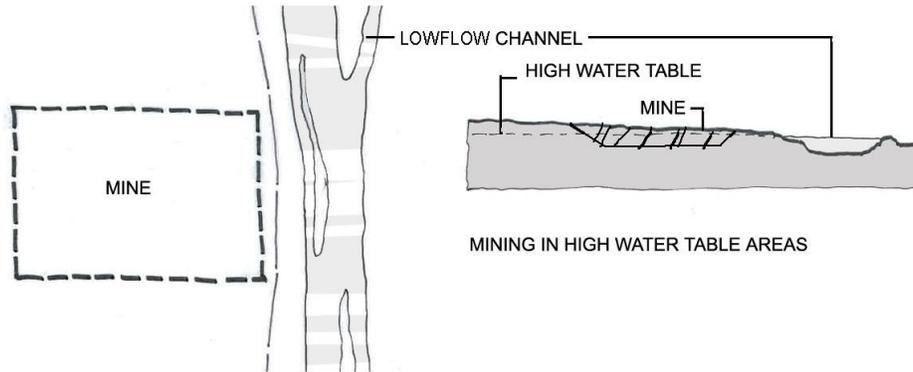
WHERE LEVEES PROTECT THE MINED PIT, CREATE LOCALIZED RUNNELS AND DEPRESSIONS THAT COLLECT RUN OFF AND AID IN THE ESTABLISHMENT OF VEGETATION AND HABITAT AREAS

IF POSSIBLE DIVERT WASHES AROUND PIT TO MAINTAIN DISCHARGE TO FLOODWAY. IF NOT, PROTECT AGAINST HEADCUT.

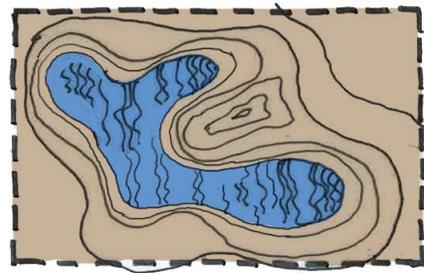
2.7.2.3 Mines occurring in incised channels



2.7.2.4 Mines occurring in and adjacent to high water table conditions where lakes are formed. In addition to curvilinear forms and islands, the mining operator should create shallow areas that can be developed as wetlands and fish habitats.

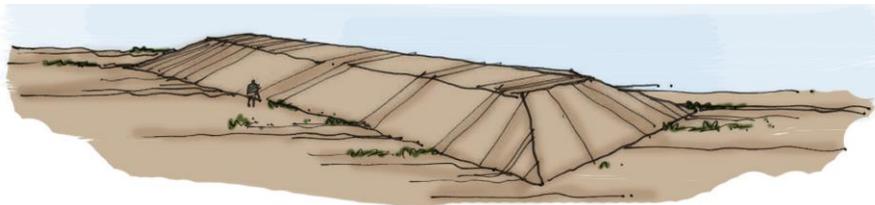


CONVENTIONAL MINING STRATEGY



PREFERRED STRATEGY - CURVILINEAR FORMS AND ISLANDS

2.7.3 Consider alternate berming configurations that use curvilinear forms and allows for variations in vertical slopes.



CONVENTIONAL STRAIGHT EDGE BERMING

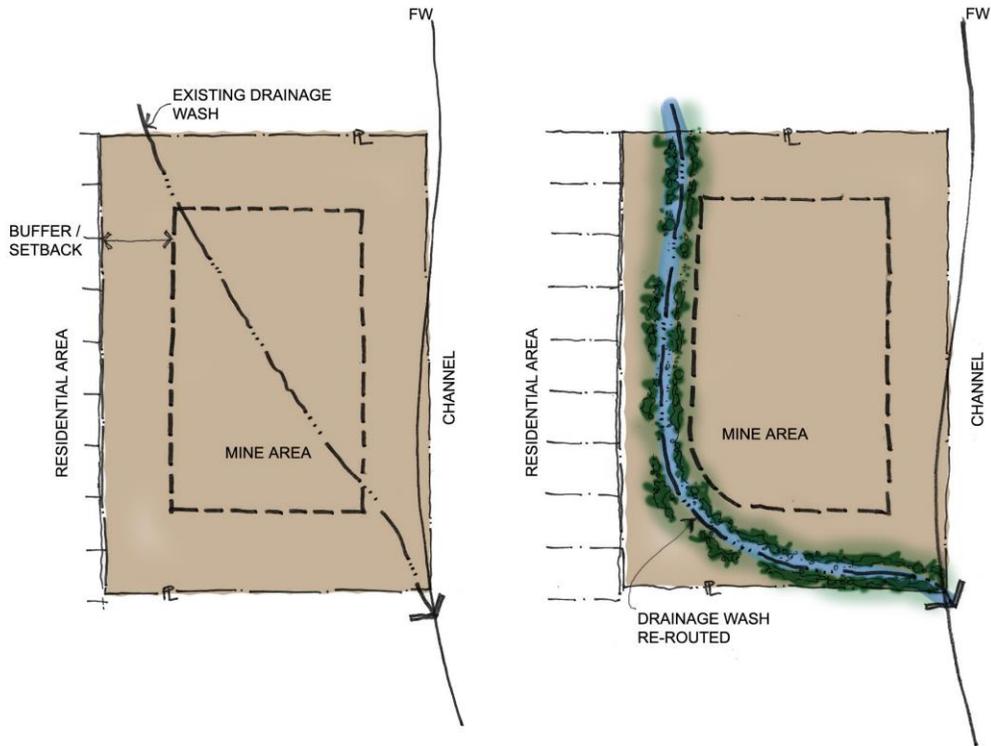


BERMING WITH SLOPE WARPING AND MOUNDING ON TOP SURFACE

Temporary or permanent berms should be reshaped or additional fill added to create natural forms.

2.7.4 Allow for continued discharge into the floodway from tributaries and main channel braids.

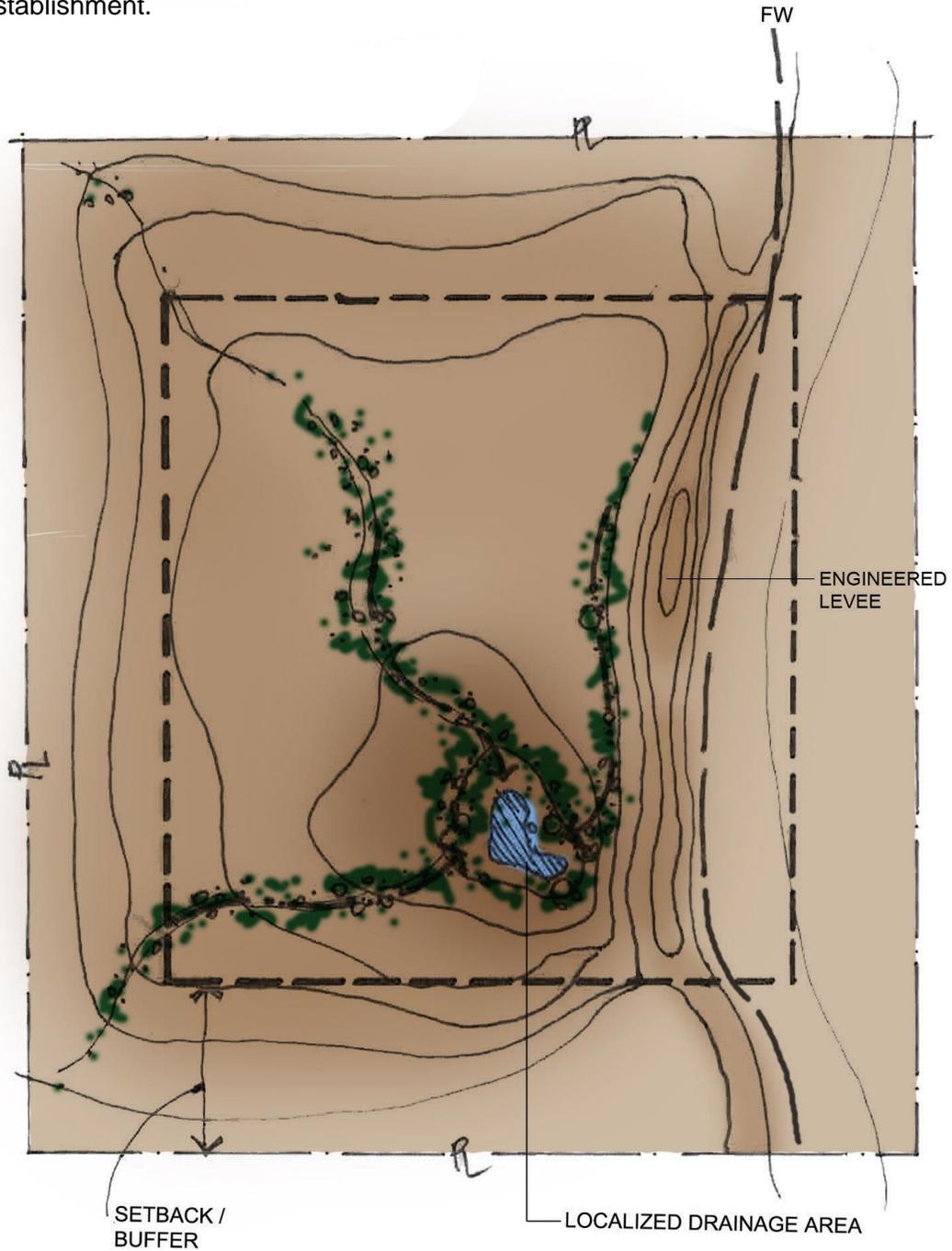
In streamlined mining conditions along the floodplain, washes and existing drainage channels can be re-routed along buffers and/or accommodated in the final reclamation plan to continue drainage to the main floodway. The redirection of drainage flows along buffers also allow for the establishment of vegetation that will further help to screen mining operations from surrounding conflicting users.



Buckeye Irrigation Diversion Channel within the Gila River

2.7.5 Encourage natural re-vegetation by runoff management.

In non-streamlined conditions where mined pits are considerably deeper, land shaping must aim to create localized vegetated areas within mined pits that are sustained by annual rainfall and run off from within the pit. By concentrating run-off through runnels to depressed areas, the potential for the natural establishment of vegetation is increased. Such areas also become conducive for habitat establishment.



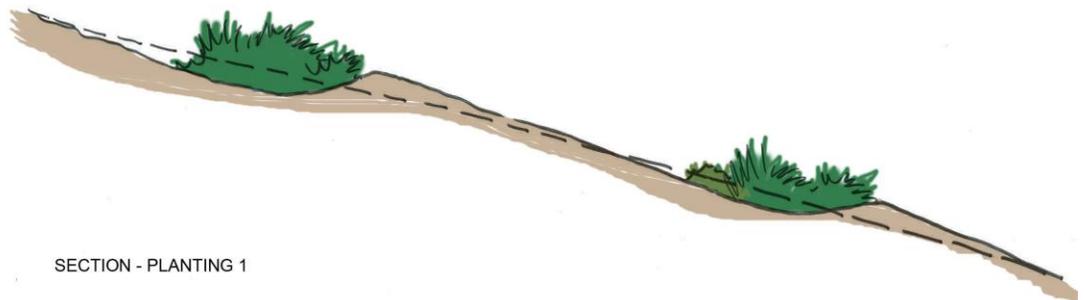
Isolated mining pits can create their own ecosystem

2.7.6 Encourage natural re-vegetation through grading techniques that concentrate run off to edges and runnels.

Measures adopted to encourage natural re-vegetation will be considered partially effective in the re-vegetation of the entire site and may require less manual re-vegetation. Invasive species still must be managed during the re-vegetation process whether natural or manual re-vegetation method.



SECTION - PLANTING 2



SECTION - PLANTING 1

Water harvesting and ponding can encourage natural revegetation

3.1 Agreement Between City and Mine Owner

The goal of the City is to enter into an agreement that is equally beneficial for both the property owner and the City. One option available to the property owner is a Development Agreement. A development agreement is a contractual relationship between the City and the mine site property owner. The purpose of the agreement is to specify standards and conditions that will govern the development of the property. The development agreement provides assurances to the property owner that the development regulations controlled by the City will not change during the term of the agreement and the City may have certain obligations and requirements as the property is developed, all for the betterment of the overall community.

Development agreements typically contain physical, land based infrastructure requirements that are installed for public benefit. In a typical development, these may include roads, water, sewer and electrical services. Many times there are partnering agreements between the City and the property owner to share in the costs, all which would be outlined in a development agreement. Pertaining to sand and gravel operations and their importance to a community in providing the basic building materials to construct our roads and foundations, it is recognized that the industry plays an important part in our economic development. The City supports this use, but also has a long-term interest in ensuring that all properties play a sustainable role within the community. To this end, there is a point where mining on a particular property is no longer a feasible either from depleted reserves or the cost of transportation makes it no longer competitive. Under these circumstances is where the City can play an important role in the transition of mine site into a sustainable land use that may include a recreation use, habitat creation or part of a water management strategy.

A few of the options that may be explored as part of a development agreement may include:

- Transfer of property liability to the City for a public use
- Road construction and transportation corridors to access the public road network
- Reclamation of a mining site to position the property for an end recreational or conservation use
- Buffers around mining sites while in production
- Adjacent property coordination for joint use utilities and infrastructure

3.2 Timeline and Phasing

Part of a Development Agreement is a proposed timeline and phasing anticipated for the completion of the mining operation and initiation of the reclamation. A written description and plan drawing of the phasing strategy is typically necessary for more complicated reclamation plans.

3.2.1 Initiation, extension and completion of reclamation

- i. For mines within the floodway and floodplain, a schedule of implementation should be part of the reclamation plan.

- ii. Reclamation is preferably initiated concurrently with the mining operation. If concurrent reclamation is not feasible, reclamation should be initiated within one year of completion of the mining operation, provided a financial surety is held. An extension for the initiation of reclamation will be permitted if the operator can demonstrate the likelihood of the operation continuing due to renewed demand for the resource, or due to the discovery of additional resource, or to facilitate production and sale of the product in keeping with market demand or per State Law.
- iii. An extension for the initiation of reclamation may be permitted if the operator can demonstrate the likelihood of the operation continuing due to renewed demand for the resource, or due to the discovery of additional resource, or to facilitate production and sale of the product in keeping with market.
- iv. Reclamation initiation that is subject to delays beyond one year after mining completion may be accompanied by an interim plan that details how the site will be maintained during the period it remains idle. The interim plan may remain in effect up to five years maximum if financial assurance of reclamation is maintained.
- v. Once initiated, the final reclamation measures will be performed in accordance with the approved reclamation plan and any changes will be subject to approval by the City and the ASMI.
- vi. Where sufficient detail does not exist in the guidelines to resolve specific issues, State Law shall apply.

3.3 Financial Assurances

A financial assurance mechanism may be part of the reclamation plan to ensure the final implementation in accordance with the approved plan.

3.3.1 Financial Assurance Amount

The specific amount will be mutually agreed upon between the City, ASMI and the Responsible party based on the projected cost of completing the reclamation or based on an incremental system associated with the mining operation. A good faith estimate for the cost of reclamation would be submitted as part of the reclamation plan. The estimate need only specify cost for reclaiming mined pits to an open space/ interim use with re-vegetation and need not include costs for implementing further development. Re-vegetation efforts to achieve post mining land use objectives are considered adequate if the owner or operator has taken reasonable measures to achieve vegetative success. Technical and economic practicability as it relates to site specific condition and the proposed post mining use will be taken into account in making that determination. For mines regulated by the State or County Agency, the owner will provide the required financial assurances as required by law . The City may or may not require additional financial assurances.

3.4 Agreement Compliance

3.4.1 Annual Status Report

On initiation of the reclamation efforts, an owner or operator may be required to submit an annual status report for the preceding year to the City. The report must provide the status of the mining unit and include aerial maps showing the location of

disturbance, and extent of reclamation. The mining operator must also quantify acreage of disturbed, mining and reclaimed areas.

3.4.2 Mined Site Reviews

Semi-annual monitoring inspections would be conducted by a representative of the City to determine the level of compliance with the reclamation plan, its adherence to the time schedule and to determine the percentage of completion of reclamation.

3.4.3 Performance Standards

Performance standards generally provide a clear understanding of what will be considered as successful reclamation of the site in terms of:

- Top soil management
- Erosion and sediment control
- Re-vegetation
- Wildlife and habitat protection
- Site operations must comply with ASMI office.

These standards may be defined at the onset, as part of the reclamation plan based on City codes and standards or site specific conditions. Generally the initial documentation of the undisturbed site or data from an adjoining undisturbed reference site can be used to provide baseline data against which performance standards will be measured.

3.5 Compliance with other Laws

Apart from achieving compliance with the Development Agreement, it is imperative that other applicable State and Federal laws are met.

End of Design Guidelines



Appendix B:
Gila River Restoration Plan
Technical Memorandum

July 2016



WASS CONSULTING, LLC
Roland Wass, Phd, P.E.

*Gila River
Restoration
Program*

City of Buckeye

*Technical
Memorandum*

Restoration Plan

TABLE OF CONTENTS

Introduction	4
Evaluation Criteria	6
Potential for Near-Term Funding.....	6
Preservation of High Quality Habitat	7
Creation and Restoration of High Quality Habitat.....	8
Enhancement of Low Quality Habitat	8
Threatened and Special Status Species Habitat Requirements	9
Ridgeway’s Clapper Rail Habitat	9
Southwestern Willow Flycatcher Habitat	10
Western Yellow-Billed Cuckoo Habitat	11
Western Burrowing Owl Habitat.....	12
Land Ownership Overview	13
GIS - GRRP Priority Property Layer Criteria	13
Layer: Open Water	13
Layer: Land Ownership	14
Layer: Initial Project Lands	14
Existing High Quality Habitat	14
Wildfire Fuel Reduction	14
COB Trailhead Park	14
Layer: Priority Preservation and Restoration.....	15
Depth to Groundwater.....	15
Restored Habitats	16
Cottonwood / Willow	17
Mesquite	17
Plant Palettes	17
Mesquite	19
Wetlands	20
Riparian Buffer Areas	21
Operation and Weed Management Options	23
Weed Prevention	23
Cultural Controls	23

Mechanical Controls 24

Biological Controls 24

Herbicides 25

O&M Considerations 26

 Vector Control..... 26

 Litter/Debris Management 26

 Access to Habitats 27

 Open Channels..... 27

 Vegetation..... 27

Site Specific Restoration Projects 27

SR 85 Bridge Restoration..... 28

High Quality Existing Riparian Habitat Associated with the Gila River Braided Thalweg/Low Flow Channel 30

City of Buckeye 40-Acre Trail Head 36

Implementation Concerns 38

 Permit Considerations..... 38

 Potential Project Costs..... 39

Literature Cited 43

List of Tables

Table 1. Threatened and Special Status Survey Windows..... 9

Table 2. Habitat requirement summary benefitting the Ridgeway’s Clapper Rail 10

Table 3. Habitat requirement summary benefitting the Southwestern Willow Flycatcher 11

Table 4. Habitat requirement summary benefitting the Western Yellow-Billed Cuckoo 12

Table 5. Initial project lands considered for restoration. 15

Table 6. Allowable Depth to Groundwater for Key Species..... 16

Table 7. Dominant Canopy and Understory Tree Species 18

Table 8. Riparian Groundcover (Shrubs and Grasses) Species (assumed spacing 20-foot centers) 19

Table 9. Mesquite Bosque Species and Densities 19

Table 10. Mesquite Xeric Species and Densities 20

Table 11. Wetland Species Proposed for the Gravel Pit Lake and 40-acre parcel Constructed Wetlands 21

Table 12. Buffer and Riparian Scrub Species 21

Table 13. Hydro seed Mix for Mesquite Areas..... 22

Table 14. Hydro seed Mix for Riparian Buffer and Scrub Shrub Areas 22

Table 15. Salt Cedar Herbicides Table (Reproduced from USDA, 2014)..... 25

Table 16. Restoration Project at SR85 Bridge and the Gila River, AZ. 29

Table 17. Gila River Low Flow Channel Restoration Opportunity No. 1. 33

Table 18. Gila River Low Flow Channel Restoration Opportunity No. 2. 33

Table 19. Gila River Low Flow Channel Restoration Opportunity No. 3. 34

Table 20. Gila River Low Flow Channel Restoration Opportunity No. 4. 34

Table 21. City of Buckeye Property at South Miller Road. 36

Table 22. Per acre cost estimates for removal and disposal of salt cedar and associated debris, as well as, the cost for re-vegetation and maintenance for a 100-yr life of project. 41

Table 23. Potential Grants that could be applied for and used by the City of Buckeye for restoration efforts in the Gila River and associated Floodplain. 42

List of Figures

Figure 1. Downstream Study Area restoration opportunities. 5

Figure 2. Upstream restoration opportunities. 6

Figure 3. Land ownership and restoration opportunities. 13

Figure 4. Site Specific Restoration Opportunities in the Buckeye Gila River Restoration Project. 28

Figure 5. Proposed ecosystem restoration project located up and downstream of the SR 85 Bridge at the Gila River, AZ. 30

Figure 6. Braided Low Flow Channel lands that support the highest quality riparian, wetland, and aquatic habitat in the Gila River Restoration Project reach (Sheet 1). 31

Figure 7. Braided Low Flow Channel lands that support the highest quality riparian, wetland, and aquatic habitat in the Gila River Restoration Project reach (Sheet 2). 32

Figure 8. The 40-acre City owned Trail Head parcel. 37

Gila River Restoration Program

City of Buckeye

Technical Memorandum

Restoration Plan

Introduction

The City of Buckeye, Arizona is located along 26 plus miles of the Lower Gila River which the City recognizes as a unique and valuable ecosystem in Arizona and the Southwestern United States. At this point in the river, upstream discharges and the geology underlying and surrounding the Gila allows for perennial open water and shallow groundwater conditions. Such conditions historically supported large gallery forests of cottonwood and willow, open water, and wetlands. The floodplain was wide and covered with mesquite bosques. In turn, these landscapes supported abundant wildlife species including fish, reptiles, amphibians, and avian species. Today this reach of the Gila River is listed as having critical habitat for several species including the Ridgeway's clapper-rail, Southwestern willow flycatcher, and the Yellow-billed cuckoo. Unfortunately, the majority of the area listed as critical habitat is unsuitable due to a lack of instream flows and the invasive plant Salt Cedar.

Since its introduction into the United States in the Early 1800's as an ornamental and for erosion control, Salt Cedar has invaded many waterways in the Southwestern United States and the Gila River and can thrive in areas where native species flourish as well in areas where historically little or no vegetation grew. Such is the case with the Lower Gila River. In 2002/2003 vegetation mapping on the Lower Gila River from its confluence with the Agua Fria downstream to the SR85 Bridge indicated twelve distinct plant communities and that Salt Cedar represented 54% of all vegetation within that reach. Recent aerial photography and field observation indicate that percentage has increased.

Not only is the biodiversity negatively impacted by the Salt Cedar, so are public safety, water supply, and soil salinity. The SR85 Bridge is a critical transportation route linking Interstate 10 with Interstate 8. If the Salt Cedar located underneath and immediately adjacent to the Bridge burns, temperatures can be sufficient to cause damage to the structural integrity of the concrete Bridge. There is a mixture of public and private lands within the floodplain of the Gila that are at risk for both flooding and fire. In fact, continued Salt Cedar growth has resulted in close to a 4,500-acre increase in lands located in the floodplain and 7,000-acres of farmland affected by flooding within Buckeye alone. The extremely high density at which Salt Cedar can grow puts numerous structures and facilities at risk and hence management in those areas is necessary. Although Salt Cedar may not transpire much more water than native plants, they have successfully established themselves in areas that the natives would not be able to tolerate. As such, management of the large dense Salt Cedar assemblages in areas not adjacent to open-water and where groundwater depths exceed the requirements of the native species should result in an overall water saving for the area. Finally, Salt Cedar tends to take up salts/minerals in the water

they utilize and exudes them via litter fall which makes surface soils higher in salinity and hence less suitable for native plant recruitment and establishment.

River Restoration Identification and Prioritization of Site-Specific Restoration Opportunities

Through its on-going "Gila River Restoration Plan" (GRRP), the City of Buckeye has identified three major classes of restorable lands within the Lower Gila River through Buckeye, AZ. These include the following:

1. Areas where the Salt Cedar is an existing threat to public safety due to fire.
2. Areas within the channel that currently have existing high quality riverine habitat but is being encroached on and threatened by Salt Cedar.
3. Areas within the Floodplain and owned by mining interests where almost monotypical stands of Salt Cedar exist, but there is no open-water and the depth to groundwater is too deep to support native riparian species (approximately 10 ft. below ground surface (b.g.s.)).

An inventory of the existing resources was done utilizing findings from the El Rio Watercourse Masterplan (FCDMC, 2006a) and updated with new aerial imagery and field verification (Figure 2 and 3). In identifying the specific areas for restoration the following criteria were used for evaluation and could be refined to better meet site specific requirements as necessary.

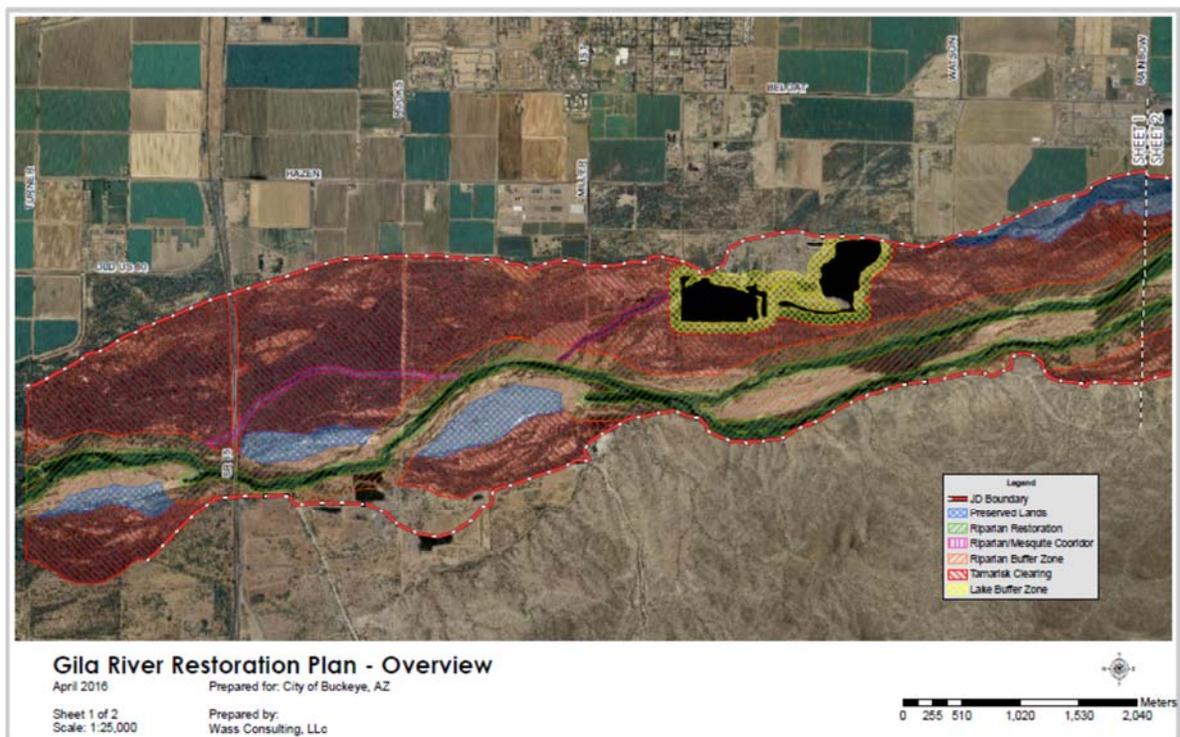


Figure 1. Downstream Study Area restoration opportunities.

Evaluation Criteria

- Existing Vegetative Cover, Structure, and Fitness
- Surface and Groundwater Water Availability and Rights
- Adjacent Land Use
- Ability to garner Ownership or Easements
- AZ Game & Fish Department (AZGF) “In-Lieu Fee Program” (ILF) Considerations
- Flood Control Benefits
- Likelihood of Garnering Funding for Implementation

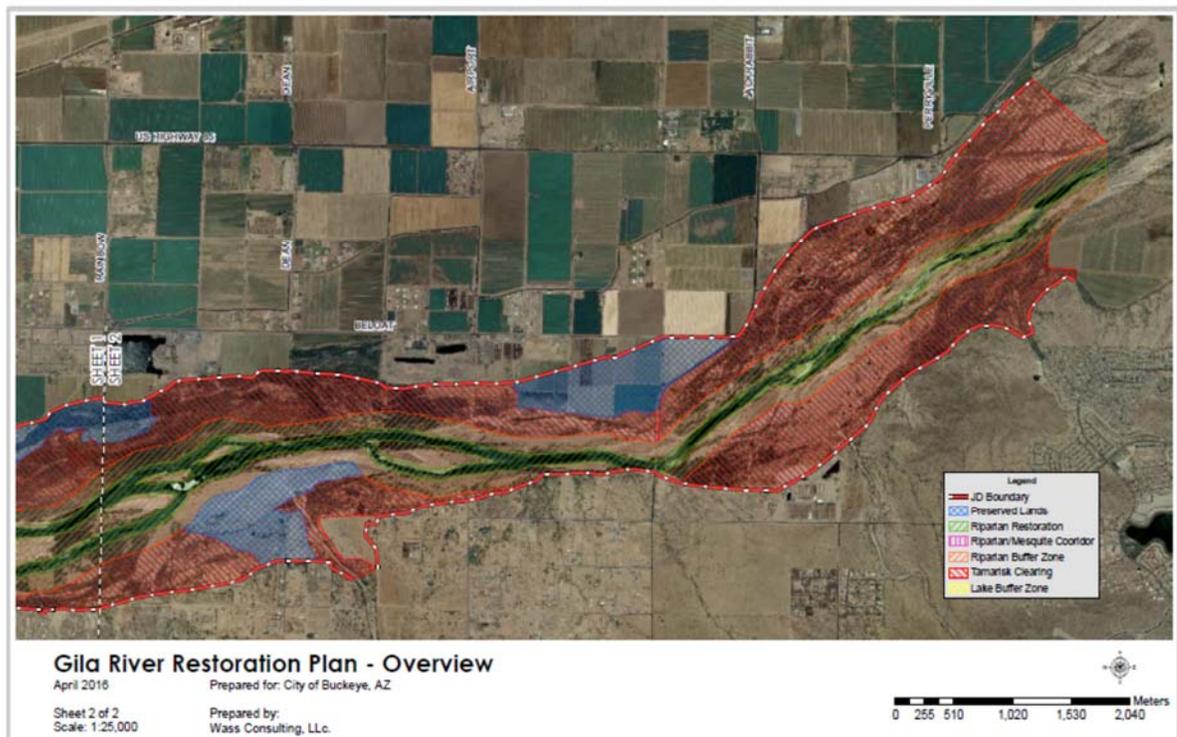


Figure 2. Upstream restoration opportunities.

Potential for Near-Term Funding

- ILF Lands would be self-funded in that they can sell “mitigation credits” to pay for the construction, maintenance and monitoring in perpetuity.
- Lands adjacent to the SR 85 Bridge because it should be eligible for emergency preparedness funds or other Grants targeted for public safety, fire suppression, and transportation safety.
- Lands that if restored would assist in removing the flood risks and qualify for the USACE Section 205 continuing authority program.
- Privately owned mining lands where the opportunity to develop agreements for restoration exist.

The City's Gila River Restoration Plan involves three actionable activities; Preservation of existing high quality riparian/wetland/aquatic habitat, Creation and/or Restoration of high quality riparian/wetland/aquatic habitat, and enhancement of low quality and/or degraded riparian/wetland/aquatic habitat. A brief definition within the context of this plan is provided below. Threatened and special species of concern and their habitat requirements, which are provided at the end of this section, are also considered.

Preservation of High Quality Habitat

Preservation involves protecting and maintaining resources for their continued survival and the associated environmental benefits. The Buckeye reach of the Gila River does contain swaths of riparian resources which create and sustain high quality habitats and those are located within the braided Low Flow Channel (LFC) or thalweg. Preservation of such properties should be the highest priority of the City and stakeholder groups as it will be more cost effective than restoring or creating quality lands, and protection is needed to avoid degradation. The first step in the preservation process is to identify lands which currently support high quality habitat. This was accomplished by using a combination of historical and recent mapping along with site visits for ground truth surveying to analyze criteria that is the framework of quality habitat. Some investigation into the existing habitat present in the Gila was conducted during the El Rio Watercourse Master Plan in 2006. This information was reviewed and updated as necessary. Lands identified as existing high quality habitat are then categorized and marked for preservation within the program's geographic information system (GIS). Criteria used to determine habitat quality included:

- Floral survey. All native and non-native vegetation established on the property
- Faunal survey. Species noted on site or known to inhabit similar vegetative cover
- Water source(s). Source of water for currently supporting flora and fauna
- Depth to groundwater. Range of distance from surface to typical aquifer on the property
- Soil conditions. Classification and vegetative suitability of soils on the property
- Elevation. Property location with respect to the thalweg / floodway / floodplain

Lessons learned from the upstream projects such as Rio Salado and Tres Rios indicate the importance of protecting existing desirable vegetation in-place, where practical. Within the Buckeye reach of the Gila, these conditions exist primarily near areas associated with stormwater or irrigation outfalls, in the thalweg, as well as along the southern bank of the river. Some of these areas also require access for inspection and maintenance of the outfalls which may require construction of O&M roadways. It should be a design goal to minimize such impacts by considering culverts, bridges, and wet-crossings.

Strategies for lands identified for preservation need to be developed. Obvious protection could come from land acquisition by the City via purchase or perhaps land swaps with cooperating landowners. Arizona Game and Fish have successfully utilized this method in past to protect high quality habitat from degradation by swapping less suitable lands for those that private landowners find more attractive for commercial endeavors such as mineral extraction.

If within the City's jurisdiction, land use restrictions, access control and protection policies can also be used to protect the resource. In the case of upstream projects such as Tres Rios, access control has been successfully implemented which in turn has resulted in less illegal dumping and illicit activities occurring along almost 6 miles of River. Responsible parties were defined who take on the management of the resource(s) and developed protection policies and programs which give the users a feeling of "ownership" resulting in self-policing of the area(s) and a reduction in deleterious activities.

Conservation Easements should also be explored and would likely involve the City of Buckeye, landowners, and others with land use authority such as the AZ State Land Department, Arizona Game and Fish Department, The Flood Control District of Maricopa County, and the Bureau of Land Management (BLM). Typically, a conservation easement is a voluntary legal agreement between a landowner and a land trust or government agency that permanently limits the use of the land in order to protect its conservation values.

Creation and Restoration of High Quality Habitat

Prior to upstream damming, the Salt-Gila River system through metropolitan Phoenix was an untamed natural channel and riparian zones supported unique wetland habitat in an arid climate. While much of the river system no longer reflects this past condition, the Buckeye reach does contain some high quality habitat. This is mainly attributed to the shallow depth of groundwater, irrigation tail-water releases and effluent discharges in the reach. Following the preservation of lands, many opportunities exist to renew areas which are slightly damaged or degraded to enhance or restore high quality habitats. There is also the opportunity for the creation of high quality habitat in areas which likely once supported, and are suitable to sustain, such land use.

In areas of degraded high quality habitat located in the thalweg of the channel we propose the use of Low-Impact Restoration (LIR) techniques. Such a technique involves minimal disruption of the soil surface and is largely conducted manually. In this case non-native plants (primarily salt cedar) are to be cut above ground and the stump painted with an herbicide. Follow-up treatments to manage re-sprouting and new salt cedar growth will be necessary. Cottonwood and Willow pole plantings and a consortium of plants will be installed to replace the salt cedar removed.

Enhancement of Low Quality Habitat

These areas include private and publicly owned lands within the floodway and flood plain of the Gila River where salt cedar is the dominant vegetation and illegal dumping and illicit activities occur with high frequency. These lands are also located in areas where the City of Buckeye would benefit from a fire suppression standpoint as well. In several locations within the floodplain the salt cedar appears to have encroached upon land historically used for agriculture but eventually could be developed. Maintenance of those areas could be facilitated through leasing the land for agricultural purposes, a portion of the sale of which could be used to offset the cost of the initial removal.

In areas where the groundwater is in excess of 10-ft below ground surface (b.g.s.), mechanical means may be used for the removal of salt cedar. This is especially for the majority of the portion of the river that underlies the SR85 bridge. The northernmost 4,600-ft is infested with salt cedar and the groundwater depth is likely too deep to sustain native riparian species with the exception of mesquite and desert adapted trees. This area is also characterized by saline soils and might be best stabilized with low growing salt tolerant grasses or plated with cobbles.

There are also areas with degraded or unstable channels, that if the current water can be augmented, could be restored through selective removal of exotics and installation of appropriate desirable species. These areas are associated with land owned by sand and gravel interests so a partnership with the landowner(s) would be beneficial. Such areas could be considered in when access and egress from the uplands to the river floodplain and channel. The reader is encouraged to consult the Sand and Gravel Partnership under development between the City of Buckeye and the Arizona Rock Products group (S&G Memorandum, 2015).

Threatened and Special Status Species Habitat Requirements

The Threatened and Special status species who may reside or travel through the GRRP reach will likely require site specific surveys, the timing of which will impact restoration activities and schedules. The Ridgeway's clapper rail, Southwestern Flycatcher and the Yellow-billed cuckoo survey windows and frequency are provided in the Table 1 (Haltermann et al, 2015; USFWS, 2000; AZGF, 2000).

Table 1. Threatened and Special Status Survey Windows.

Species	Survey Dates	# of Surveys
Ridgeway's Clapper Rail	March 15 through May 15	2
SW Willow Flycatcher	May 15 through May 31	1 survey minimum
SW Willow Flycatcher	June 1 through June 21	1 survey minimum
SW Willow Flycatcher	June 22 through July 17	3 surveys; 5-days apart
Yellow-Billed Cuckoo	June 15 through July 1	1 survey minimum
Yellow-Billed Cuckoo	July 1 through July 31	2 surveys; 5-days apart
Yellow-Billed Cuckoo	August 1 through August 15	1 survey minimum
Yellow-Billed Cuckoo	August 16 - September	1

Ridgeway's Clapper Rail Habitat

A goal of the Gila River Restoration Program is to protect, enhance, or create marsh habitats that benefit species of concern. Ridgeway's clapper rail (*Rallus o. yumanensis*) is a federally listed endangered species that inhabits freshwater or brackish marshes and along streams typically below 4,500 feet mean sea level. Shallow waters near uplands consisting of dense stands of cattails, sedges, bulrushes and other emergent

wetland vegetation are preferred habitats. Habitats include wet substructures such as mudflats, sandbars or slough bottoms. The species nests in riverine wetlands that were historically exposed to periodic flooding in upland areas dominated by mature herbaceous or woody vegetation at least 15 inches in height. Nests are often located at the base of a shrub or on dry hummocks, mudflats, or sandbars. The rails feed primarily at low tide in marshes and along stream banks, especially during low flow regimes. The clapper rail will consume small fish, isopods, and beetles, while its preferred meal is crayfish. The density of vegetation appears to be more important than composition of plant species. This rail nests in platforms of vegetation approximately 3-6 inches above the ground in dense marsh vegetation. The secretive bird also requires less dense habitat edges for access and mobility. Average water depth may also play an important role in habitat suitability. Water depths should remain shallow (less than 12 inches). Recommended vegetation includes expansive areas of bulrush and cattail with associated quail bush communities.

Lands with habitat suitable for this species within the project boundary were identified and digitally located and categorized with the program's GIS.

Table 2. Habitat requirement summary benefitting the Ridgeway's Clapper Rail

Habitat	Preference	Note
Canopy sp.	Cottonwood, willow, salt cedar	80% min. cover
Understory sp.	Herbaceous or woody	15" min.
Emergent sp.	Bulrush, cattail	High density
Open Water	n/a	Adjacent
Water Depth	Shallow waters, streamside, wetland	< 12"
Prey	Crayfish, small fish, isopods, beetles	

Southwestern Willow Flycatcher Habitat

Another species of concern which marsh protection, enhancement, or creation will benefit is the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). The Southwestern Willow Flycatcher is a federally listed endangered species and a wildlife species of concern in Arizona. The species occupies woody-riparian patches of a quarter acre in size, 35-feet wide, and greater than 13-feet tall with at least 80 percent canopy cover with an interior of dense foliage or branches. Nesting habitat consists of patchy to dense thickets of trees and shrubs near streams or other wetlands, or adjacent to surface water or areas with saturated soil. Microclimates of this vegetation with humidity are essential to breeding and nesting selection and success. Plant species may comprise only one species or many species, but typically may include Goodding willow (*Salix gooddingii*), seep willow (*Baccharis salicifolia*), box elder (*Acer negundo*), Fremont cottonwood (*Populus fremontii*), arrowweed (*Tessaria sericea*), and salt cedar (*Tamarix ramosissima*). Male flycatchers will typically vocalize atop mature cottonwood and willow trees – indicating that these species are also essential for successful breeding. The Southwestern Willow Flycatcher is insectivorous, primarily feeding on flying insects but will also eat few berries and seeds (USFWS, 1995). They are found in mixed exotic/native broadleaf associations in lower elevations including

Maricopa County, where nesting primarily occurs within stands of salt cedar. Recommended vegetation includes cottonwood and willow with an understory including yerba mansa, arrow weed and mesquite.

Table 3. Habitat requirement summary benefitting the Southwestern Willow Flycatcher

Habitat	Preference	Note
Canopy sp.	Cottonwood, willow, salt cedar	80% min. cover
Understory sp.	Seep willow, arrow-weed	High density
Emergent sp.	Cattail, sedges, bulrush	High density
Open Water	n/a	Adjacent
Water Depth	Streamside, wetland, moist soils	Saturated soils
Prey	Insects, berries, seeds	Insectivorous

Lands with habitat suitable for this species within the project boundary will be identified and digitally located and categorized with the program's GIS.

Western Yellow-Billed Cuckoo Habitat

A third species of concern which marsh protection, enhancement, or creation will benefit is the Western Yellow-Billed Cuckoo (*Coccyzus americanus*). The Western Yellow-Billed Cuckoo is a candidate for federal listing (proposed threatened) and a wildlife species of concern in Arizona. This species occupies large blocks of woody-riparian communities consisting of dense cottonwood groves and mesquite bosque habitats. The yellow-billed cuckoo prefers habitat patches greater than 42 acres in size, with a minimum of 7.5 acres of closed canopy broad-leaf vegetation. Its primary food sources consist of cicadas, caterpillars, bird eggs, frogs, lizards, ants, beetles, wasps, flies, berries and fruit (Corman, T.E. and R.T. Magill, 2000). The cuckoo will use adjacent agricultural lands and uplands given that the primary structure of a riparian gallery forest is also present. This species nests in deciduous vegetation with nests built on the ground or between approximately 9 and 62 feet above ground. Recommended vegetation includes a mixture of cottonwood, willow, and mesquite with understory vegetation.

Table 4. Habitat requirement summary benefitting the Western Yellow-Billed Cuckoo

Habitat	Preference	Note
Canopy sp.	Cottonwood groves, mesquite bosque	Large blocks, dense, closed
Understory sp.	Woody riparian	
Emergent sp.	n/a	
Open Water		
Water Depth	Streamside, wetland, moist soils	Riparian support
Prey	Caterpillars, eggs, lizards, ants, etc.	

Lands with habitat suitable for this species within the project boundary will be identified and digitally located and categorized with the program’s GIS.

Western Burrowing Owl Habitat

In Arizona, all owl species are protected by state law (ARS Title 17) and federally by the Migratory Bird Treaty Act. Therefore, any earth moving, grading or otherwise ground-disturbing activities planned during the course of this program should consider the existing habitat of the Western Burrowing owl (*Athene cunicularia*) and surveys should be performed in order to mitigate and protect this unique species.

Burrowing owl nesting habitat typically consists of dry, treeless, short-grassland or prairie plains. In the desert environment they nest in areas of short, open scrublands such as mesquite (*Prosopis* spp.), creosote bush (*Larrea tridentate*), rabbit-brush (*Chrysothamnus nauseosus*), and four-wing saltbush (*Atriplex canescens*). They tend to be tolerant of human presence, and will nest in human-modified landscapes such as: abandoned lots within rapidly developing urban areas, airports, golf courses, agricultural fields, irrigation canals, storm drains, roadsides, and parking lots. In the western United States, burrowing owls do not dig their own burrows, and therefore depend on the presence of burrowing mammals. Throughout Arizona, burrowing owls are associated with Gunnison’s prairie dogs (*Cynomys gunnisonii*), American badgers (*Taxidea taxus*), ground squirrels (*Spermophilus* spp.), rock squirrels (*Spermophilus variegatus*), foxes (*Vulpes* spp.), and coyotes (*Canis latrans*). Therefore, any open grassland, scrubland, or park-like area devoid of dense tree cover and containing burrowing mammals or adequate artificial nest burrows (e.g., erosion channels or storm drain pipes) can represent adequate nesting, wintering or migratory habitat (AZGF, 2009).

In addition to the species discussed above eleven (11) species of concern for the State of Arizona may also be found or occur within the project reach over the life of the project. These species are presented below.

- | | | |
|----------------------|---------------------------|------------------|
| Lowland Leopard Frog | American Bittern | Great Egret |
| Bald Eagle | Osprey | Snowy Egret |
| Least Bittern | Black-necked Stilt | White-faced Ibis |
| Belted Kingfisher | Black-Crowned Night Heron | |

Land Ownership Overview

The GRRP area contains a mixture of land ownership and except for funding, is probably the biggest hurdle to overcome in the restoration plan (Figure 3). The floodplain is primarily owned by private entities interested in developing the land for sand and gravel mining purposes with the exception of large tract of land owned by the Arizona Game and Fish department (NE quadrant of SR85 and the Gila River). Lands within the floodway appear to be owned by public and private interests including the FCDMC, AZGFC, AZ State Trust, AZ State Parks, and the US Bureau of Land Management (BLM).

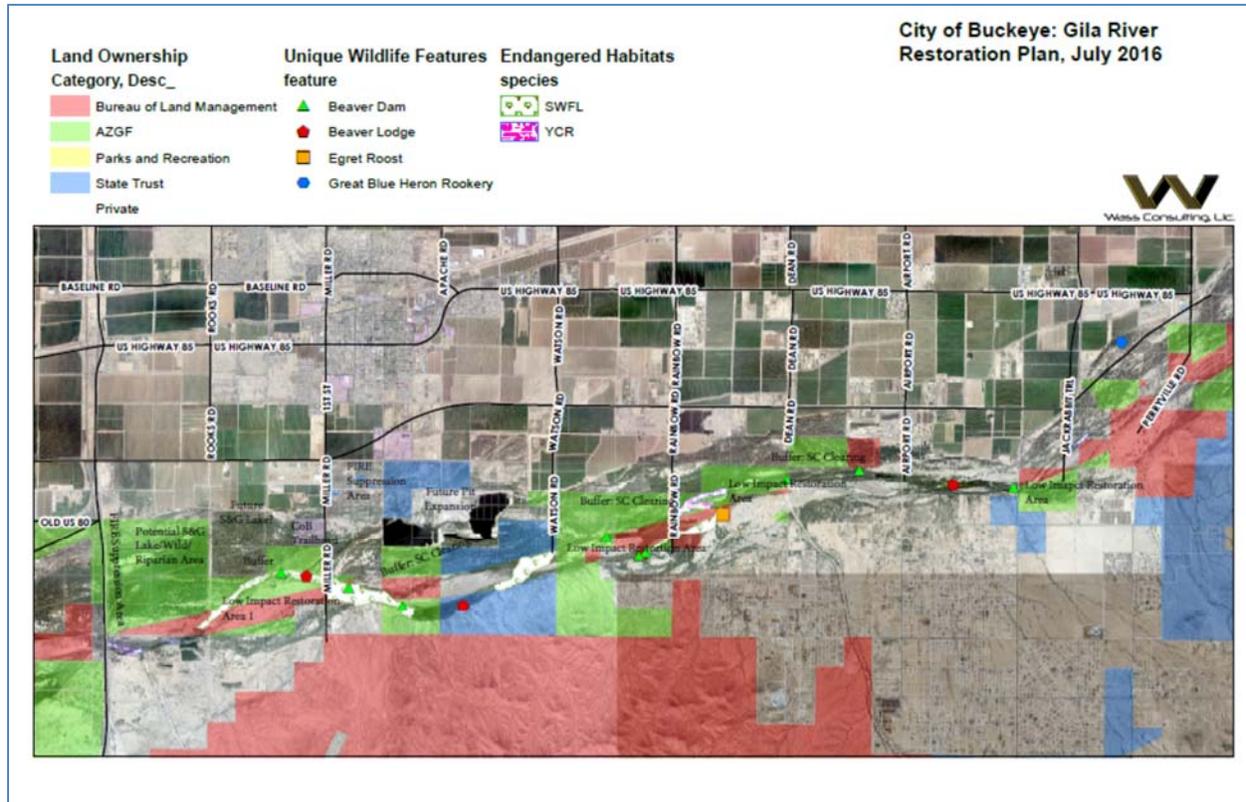


Figure 3. Land ownership and restoration opportunities.

GIS - GRRP Priority Property Layer Criteria

Layer: Open Water

Open water aquatic areas were identified and delineated using the most recently available aerial imagery. Open waters were then verified through field investigations in March, June, September, and October 2015. Generally, the open water areas are located along the braided thalweg or low flow channel (LFC) of the Gila River. It is not continuous throughout the reach which is likely due to a number of factors such as underlying soil conditions and bedrock, aggradation/degradation from past river flows, local expressions groundwater, vegetative obstructions, and beaver dam activity. Additional open waters are identified outside of the main river channel and are the result of current or past sand and gravel mining

operations which have created pits that fill with groundwater due to a high water table throughout the Buckeye area.

Layer: Land Ownership

Ownership of lands through the project reach were identified using the most recently available data from the Maricopa County Assessor's Office. Ownership was categorized to differentiate private, City of Buckeye, Maricopa County agency, State agency, and Federal lands. Overall there is a wide range of ownership along the river with various interests including preservation of open space, agriculture, flood control, mining, and development. Along the main channel thalweg/LFC the ownership mosaic is slightly less complicated, and perceived to be compatible with the goals of this restoration program. These land owners include Arizona Game and Fish Department, Arizona Department of Transportation, Arizona State Trust, Flood Control District of Maricopa County, and the US Bureau of Land Management – all of which should be engaged as project partners. It is important to note that the majority of BLM lands throughout this reach are PLO 1015. PLO 1015 refers to land transferred from the Bureau of Land Management to the Arizona Game and Fish Commission by Public Land Order Number 1015. The PLO 1015 land has been managed by the Commission since 1954 through a Cooperative Agreement with the U.S. Fish and Wildlife Service (FWS).

Layer: Initial Project Lands

This layer includes the identification of lands within the riverbed from approximately the SR85 bridge upstream to Jackrabbit Trail which meet the following criteria:

- 1) High quality habitat identified by El Rio Watercourse Master Plan and field verified March, June, September, and October 2015
- 2) Land ownership by those willing to undertake restoration, enhancement, and or protection
- 3) High probability of being funded (In-Lieu Fee program)

Existing High Quality Habitat

Lands that currently support a combination of open-water, established emergent wetland communities, shoreline cottonwood and willow forests with native understory and ground cover. The majority of these lands area associated with the thalweg of the channel where groundwater levels are expressed as surface water.

Wildfire Fuel Reduction

Lands identified as a risk for wildfire due to dense vegetation (namely salt cedar) with potential to burn in the vicinity of critical public infrastructure. 'Area 1' is 218 yd. buffer located around the SR85 bridge. 'Area 2' is approximately 35 acres of vacant land between the Gila River and City of Buckeye WWTP and fire training facilities.

COB Trailhead Park

The lone City owned parcel within or adjacent to the Gila River. This 40-acre parcel is highlighted to explore the potential for connectivity between the City's downtown via Miller Road and prioritized lands with existing quality habitat. The parcel is located south of the South Buckeye Equestrian & Events Center and Arlington canal on the north bank of the river. The parcel is adjacent to AZGF land with potential to be an In-Lieu Fee funded preservation area.

Layer: Priority Preservation and Restoration

Identification of a 220 yd. buffer surrounding open water and riparian areas. This buffer contains sites to be preserved and/or restored with low impact techniques through the ILF program or other partnership agreements. The majority of lands are owned or managed (PLO 1015) by AZGF. Adjacent FCDMC and ADOT lands were included in this phase as potential like-minded partners. The sensitive nature of these sites prescribes preservation and/or restoration using with low impact techniques possibly through the ILF program or other partnership agreements such as the US Army Corps of Engineers (USACE).

Table 5. Initial project lands considered for restoration.

Location	Description	Total Area
SR85 Bridge	Initial Project Lands	937 acres
SR85 Bridge	Wildfire Fuel Reduction	178 acres
Rooks Rd to Norton Dr	Initial Project Lands	485 acres
End of Miller Rd	COB Trailhead Park	40 acres
Miller Rd to east of Apache Rd	Wildfire Fuel Reduction	372 acres
Norton Dr to Apache Rd	Initial Project Lands	245 acres
Watson Rd to Dean Rd	Initial Project Lands	724 acres
Thalweg of Gila River Channel	656-ft open water buffer	1062 acres

Depth to Groundwater

The 2006 El Rio Watercourse Masterplan indicated that both perched and regional groundwater is present at varying depths under the Buckeye Gila River Restoration Plan Area. Static water levels range from 0.0 to 10 feet below ground surface (bgs) within the Gila River channel and from 10 to 33 feet bgs north of the river. The Masterplan also indicates that the static water level can vary on an annual basis of 5 to 15 feet due to groundwater pumping for agriculture.

The riparian and floodplain vegetation proposed to construct the habitat areas often rely on a combination of ambient rainfall, surface water, and groundwater for growth. The typical groundwater depths needed for sustaining the primary tree species are provided below in Table 6 which was adapted from the Tres Rios Feasibility Study, April 2000 (USACE, September 2000).

As seen in Table 6, the static water levels exceed the maximum required depth to groundwater for the cottonwood and willow and are on the edge of acceptability for mesquite. Although there may be areas within the project reach where groundwater is perched higher, the design will plan for surface irrigation of the CW areas not associated with the sand and gravel pit lake edges or constructed wetlands. In those cases, it will be assumed that the trees will survive using lake water or wetland water as their source. Mesquite areas will utilize planting stock that has approximately 36 inches of tap root fully developed by the time they are installed. A 1 to 2-inch diameter pipe may be installed in the driest/highest elevation mesquite plantings to direct water to the bottom of the planting hole to encourage faster deep tap root development; the goal being to reach groundwater as soon as possible.

Table 6. Allowable Depth to Groundwater for Key Species

Plant Species	Minimum Groundwater Depth	Minimum Groundwater Depth
Cottonwood	0-3 feet	10 feet
Mesquite	2-3 feet	17 feet
Salt Cedar	4-6 feet	26 feet
Willow	0-2 feet	33 feet

Due to sustainability goals, future groundwater conditions should be considered. During the El Rio WCMP (January 2006), HydroLogic Consultants conducted a study “Hydrogeology of the El Rio Study Area” to support the Flood Control District’s El Rio WCMP. Eight (8) scenarios were considered and it was found that Scenario 7 was most likely to occur in the future as the area transitions from agricultural to residential and commercial land uses; pumping in the shallow aquifer is discontinued and Recharge is eliminated north of the Buckeye Canal. Their results suggest that groundwater levels will stay roughly static in the area bounded by Rainbow Rd. on the downstream and Tuthill Rd. Along the thalweg, water levels are expected to stay the same or are slightly elevated as one moves upstream. This makes restoration efforts in these areas the most likely to succeed in the long-term.

Downstream of Rainbow Rd., depth to groundwater is expected to increase, more so in the northern floodplain and less so along the channel thalweg. In some cases, in the northern floodplain, levels may fall as much as 15 to 25 feet which should be considered when planning for long-term gravel pit lakes or establishing vegetation that will ultimately rely on groundwater for moisture.

Restored Habitats

The habitats to be restored in the GRRP Project will occupy areas that have been previously disturbed, are non-uniform with respect to soil character and depth to groundwater, and will be located adjacent too

commercial, industrial, and residential land uses. Select habitat types are included in the design to recreate what was once present in the Salt River area in past generations. Habitat will include cottonwood / willow (CW) forests, xeric mesquite and mesquite bosque, wetlands, and scrub shrub riparian areas.

Cottonwood / Willow

CW habitat will be established at the GRRP projects primarily through the use of pole cuttings of 2 native Arizona species: Fremont cottonwood (*Populus fremontii*), and Goodding willow (*Salix gooddingii*). The cottonwood and willow trees will be planted at densities of 60 and 40 poles per acre, respectively. Various container sizes may be used in conjunction with pole plantings to provide more structural diversity structure. The understory in these habitat areas will be composed of Arrow weed (*Pluchea sericea*), Mexican elderberry (*Sambucus mexicana*), and Desert willow (*Chilopsis linearis*). Far sparser densities are needed for the understory, with the recommendation of two Arrow weed, 3 Mexican elderberry, and three desert willow planted per acre. Understory species are to be planted using containerized shrubs – deep or tall pots. Hydro seeding of ground cover and additional shrubs will also be included in the design.

Mesquite

Mesquite habitat will be established in two characteristic forms, bosque and xeric. Mesquite bosques are commonly found five to 20 feet above the river channel where water is adequate. They require a water table or semi-saturated soil conditions 10 to 30 feet below the surface elevation, and rely on occasional saturated conditions 1 to 3 feet below the surface. Soil requirements range from fine to gravelly with some rocky areas. The mesquite bosques would be planted with a density of 100 velvet mesquite, 10 screwbean mesquite, and 40 understory shrubs per acre. Understory forbs would be planted using a seed mix.

In locations throughout the study with lower water supply rates or access, xeric stands of mesquite will be established. It is assumed that xeric mesquite would survive under drier conditions and on higher terraces than mesquite bosques. Plant densities are lower in these areas, with the installation of 25 velvet mesquite, 5 screwbean mesquite, and 10 understory shrubs per acre. Xeric mesquite will also be planted within 5-foot by 5-foot planting wells to harvest rainfall and runoff. Although the Xeric mesquite community is less dense than the bosques they provide habitat and can be used over a greater aerial extent of the project area without increasing project water demand.

Plant Palettes

The highest quality riparian environment will use Fremont cottonwood (*Populus fremontii*) and Goodding willow (*Salix gooddingii*) as the dominant canopy species. The mid-canopy species include Mexican elderberry, desert willow and arrow weed as was first proposed in the 2006 El Rio WCMP. The proposed density and installation forms are shown in Table 7.

Table 7. Dominant Canopy and Understory Tree Species

Species	Common Name	Density (#/acre)	Install Form
<i>Populus fremontii</i>	Fremont Cottonwood	60	Pole
<i>Salix gooddingii</i>	Goodding Willow	40	Pole
<i>Pluchea sericea</i>	Arrow weed	2	D-40 Deep pot (40 cu. in.)
<i>Sambucus Mexicana</i>	Mexican Elderberry	3	4" sq. x 14" high Tree pot
<i>Chilopsis linearis</i>	Desert Willow	3	4" sq. x 14" high Tree pot
	Total =	108	

As seen in Table 7, the installation form for the CW involve the use of dormant poles for planting stock. As was seen in the Rio Salado plantings located in and around Central Avenue, no real advantage is achieved using larger containerized planting stock (Stromberg JC, 2004). To reduce cost, the pole planting material could be obtained from local stands located in the project vicinity. The use of this source will also add to the overall sustainability of the project as these trees have been established for over three years in soils and water that will likely be similar to that encountered in the Gila River Restoration Plan Project area. Finally, long pole(s) can be used to assist the tree roots in reaching groundwater as soon as possible.

The planting stock proposed for the understory trees and shrubs include deep pot and tree pot installation forms. These are proposed because the stock comes with an established tap root which should allow the trees to develop deeper roots faster which in turn, will assist the plants in obtaining water.

A ground cover community (Table 8) is also recommended for the areas that will support the riparian plant species discussed above. There are several benefits to establishing the ground cover in riparian areas including noxious weed suppression, dust control, and providing refuge for wildlife such as small mammals and reptiles. The ground cover proposed for use in the riparian areas includes a mixture of eight shrubs, bushes, sedges, and grasses. The primary shrub species include yerba manza (*Anemopsis californica*) and button bush (*Cephalanthus occidentalis*), while the major grasses include alkali or giant sacaton, scratchgrass muhly, and inland saltgrass. Table 8 provides a listing of these species along with initial planting densities and installation size/form.

Table 8. Riparian Groundcover (Shrubs and Grasses) Species (assumed spacing 20-foot centers)

Scientific Name	Common Name	Density (#/acre)	Install Form
<i>Anemopsis californica</i>	Yerba Manza	20	2-1/4" pots @ 4-foot centers
<i>Cephalanthus occidentalis</i>	Button Bush	20	2-1/4" pots @ 4-foot centers
<i>Eliocharis parishii</i>	Walking Sedge	10	2-1/4" pots @ 4-foot centers
<i>Heliotropium curassavicum</i>	Heliotrope	10	2-1/4" pots @ 4-foot centers
<i>Juncus torryei</i>	Toad-flax	10	2-1/4" pots @ 4-foot centers
<i>Sporobolus airoides/wrightii</i>	Alkali/Giant Sacaton	10	2-1/4" pots @ 4-foot centers
<i>Muhlenbergia asperifolia</i>	Scratchgrass Muhly	10	2-1/4" pots @ 4-foot centers
<i>Disticlis spicata</i>	Inland Saltgrass	10	2-1/4" pots @ 4-foot centers
	Total =	100	

Mesquite

Mesquite will occupy areas of the site that are typically dryer than those that support the CW riparian species. There are two types of mesquite areas: Bosques in wetter areas and Xeric mesquite in drier areas. The primary difference between the two is the density of the initial plantings. As seen in Tables 9 and 10, the bosques are planted at 90 plants/acre while the Xeric areas use a density of 45 plants/acre.

Table 9. Mesquite Bosque Species and Densities

Species	Common Name	Density (#/acre)	Install Form
<i>Prosopis velutina</i>	Velvet Mesquite	40	6" dia. x 30" high Tall pot
<i>Prosopis pubescens</i>	Screwbean Mesquite	10	6" dia. x 30" high Tall pot
<i>Lycium fremontii</i>	Wolfberry	20	D-40 Deep pot (40 cu.in.)
<i>Encelia farinosa</i>	Brittlebush	10	1 gal.
<i>Cercidium floridum</i>	Palo Verde	10	D-40 Deep pot (40 cu.in.)
	Total =	90	

Table 10. Mesquite Xeric Species and Densities

Species	Common Name	Density (#/acre)	Install Form
<i>Prosopis velutina</i>	Velvet Mesquite	25	6" dia. x 30" high Tall pot
<i>Prosopis pubescens</i>	Screwbean Mesquite	5	6" dia. x 30" high Tall pot
<i>Lycium fremontii</i>	Wolfberry	5	D-40 Deep pot (40 cu.in.)
<i>Encelia farinosa</i>	Brittlebush	5	1 gal.
<i>Cercidium floridum</i>	Palo Verde	5	D-40 Deep pot (40 cu.in.)
	Total =	45	

As seen in Tables 8 and 9, the dominant mesquite species is the velvet mesquite (*Prosopis velutina*) with a few screwbean mesquites (*Prosopis pubescens*) interspersed. With the exception of the brittle bush all species use some form of tall pot or deep pot planting material to aide in the development of deep tap-roots. Early consideration and coordination is needed as the use of these plant forms will require that the contractor building the project start growing the plants 1.5 to 2 growing seasons prior to planting. Given the large aerial extent of the proposed mesquite plantings, the sooner the mesquite can access groundwater, the higher the chances for sustainability. This will lower the cost for supplemental/temporary irrigation in these areas.

Wetlands

Wetlands could occupy several locations throughout the Gila River Restoration Plan Project reach including within the existing high quality habitat associated with the rivers thalweg and on the perimeter of existing or future sand and gravel pits. Perimeter wetlands will decrease the amount of material needed to backfill the lakes and allow for maintenance and vector control activities to take place from the shore. Ideally, the steep pit walls would be graded in balance to minimize earthwork and import, provide terracing for habitat zones, as well as creating a safer platform for public access. Wetlands in the thalweg will be allowed to vegetate via volunteerism which will likely result in cattail (*Typha* species) dominated systems.

The wetland areas to receive plantings will be vegetated with the emergent marsh species provided in Table 11. It is proposed to use a planting plan that calls for the plants to be installed using 4-foot centers in staggered rows which results in approximately 2,723 plants/acre. Further, the species should be arranged in species-specific polygons randomly staged throughout the designated planting areas.

Table 11. Wetland Species Proposed for the Gravel Pit Lake and 40-acre parcel Constructed Wetlands

Scientific Name	Common Name	Density	Install Form
<i>Schoenoplectus acutus</i>	Hardstem Bulrush	4-foot centers	2-1/4" pots @ 4-foot centers
<i>Scirpus olneyi</i>	Olneyi's Bulrush	4-foot centers	2-1/4" pots @ 4-foot centers
<i>Scirpus maritimus</i>	Alkali Bulrush	4-foot centers	2-1/4" pots @ 4-foot centers
<i>Schoenoplectus californicus</i>	Giant Bulrush	4-foot centers	2-1/4" pots @ 4-foot centers
<i>Schoenoplectus tabernaemontani</i>	Softstem Bulrush	4-foot centers	2-1/4" pots @ 4-foot centers

The bulrush species proposed in Table 11 include Olneyi's and Alkali which will have to be located along the perimeter of the wetlands as they tend to survive in moist soils to 4 inches of water. The giant and hardstem bulrushes can be used in the interior of the wetland cell(s) and can tolerate inundation of 1 to 1.5 feet. It is proposed that the installation material be large 2-1/4-inch pots. The larger material is likely needed to withstand the saturated or inundated conditions that will be present at the sand and gravel pits. As was the case with the tree pots, the larger plants will need more time to develop so the contractor will need to contact the growers in advance to give them sufficient time to get the material ready for planting.

Riparian Buffer Areas

These areas are located in and between the designed habitat areas such as the riparian thalweg plantings and the mesquite areas. It is assumed that these areas will receive minimal irrigation and as such will be sparsely planted with three desert riparian willows. Table 12 provides the species, density and installation form.

Table 12. Buffer and Riparian Scrub Species

Species	Common Name	Density (#/acre)	Install Form
<i>Baccharis salicifolia</i>	Seep Willow	10	D-40 Deep pot (40 cu.in.)
<i>Chilopsis linearis</i>	Desert Willow	10	4" sq. x 14" high Tree pot
<i>Salix exigua</i>	Coyote Willow	10	4" sq. x 14" high Tree pot
	Total =	30	

Much of the proposed restoration areas outside of the high quality thalweg habitat area(s) could be disturbed prior to planting which in turn can accelerate the colonization of undesired plant species. As such, two hydro seed mixtures have been developed; one associated with the mesquite areas and another for use in the riparian scrub shrub areas. The intent is to provide a cover to serve as dust and weed control

while the desirable plants germinate and grow. Table 13 provides the mix proposed for use in the Mesquite areas while Table 14 provides the mix for use in the riparian scrub shrub areas.

Table 13. Hydro seed Mix for Mesquite Areas

Scientific Name	Common Name	Hydro seed	Units
Nursery Grass & Tackifier	Tackifier	1	lbs./acre
<i>Sporobolus airoides/wrightii</i>	Alkali/Giant Sacaton	6	PLS#/Acre
<i>Muhlenbergia asperifolia</i>	Scratchgrass Muhly	5	PLS#/Acre
<i>Distichlis spicata</i>	Inland Saltgrass	5	PLS#/Acre
	Total lbs. seed per acre	17	lbs./acre

Note: PLS = Pure Live Seed

Table 14. Hydro seed Mix for Riparian Buffer and Scrub Shrub Areas

Scientific Name	Common Name	Hydro seed	Units
Nursery Grass & Tackifier	Tackifier	1	lbs./acre
<i>Ambrosia ambrosoides</i>	Giant Bur-sage	1	PLS#/Acre
<i>Ambrosia deltoidea</i>	Bur-sage	2	PLS#/Acre
<i>Baileya multiradiata</i>	Desert Marigold	2	PLS#/Acre
<i>Chilopsis linearis</i>	Desert Willow	1	PLS#/Acre
<i>Encelia farinosa</i>	Brittlebush	2	PLS#/Acre
<i>Cassia covessii</i>	Desert Senna	2	PLS#/Acre
<i>Kallstroemia grandiflora</i>	Arizona Poppy	2	PLS#/Acre
<i>Larrea tridentata</i>	Creosote Bush	3	PLS#/Acre
<i>Prosopis velutina</i>	Velvet Mesquite	2	PLS#/Acre
<i>Eschschloa mexicana</i>	Mexican Poppy	3	PLS#/Acre
<i>Bothriachloa barbinodis</i>	Cone Beardgrass	2	PLS#/Acre
<i>Sphaeralcea ambigua</i>	Globemallow	2	PLS#/Acre
<i>Muhlenbergia wrightii</i>	Spike Muhly	1	PLS#/Acre
	Total lbs. seed per acre	26	lbs./acre

The use of a **tackifier** in the hydroseed mix should be used to stabilize the area soils while the native plant seeds germinate and set roots for growth. Subsequent design phases should explore the variety of tackifiers available.

Operation and Weed Management Options

The Gila River Restoration Project is focused to a large extent on the management of invasive plant species. The most robust being salt cedar but several other weedy species noted upstream of the project will over time, likely impact restoration efforts. To that end the following section discusses the management techniques available for the control/management of weedy species.

Six primary techniques are available for weed management: prevention, cultural, mechanical, biological, herbicide treatment, and prescribed burns. Because burning is not a viable option for the Gila River Restoration Project plan, it is not discussed. In the event the technique does become acceptable, it should be further investigated for its application if needed. The chosen technique varies from species to species and for individual circumstances such as site characteristics and economic and social considerations. Management and maintenance staff should consider weed reproductive methods when selecting management options.

This section describes some of the available treatment options. The Priority Weeds section further describes the main weeds of concern for the Project lands and their potential treatment options. Throughout time, the techniques used and the weeds of concern should be evaluated and updated. Conditions and industry practices evolve and management and operation staff should continually update and modify their approach.

Weed management options are typically most effective when used in combination. There is rarely one quick fix. Rather, management personnel should track which methods are used for different species and adjust the weed management program as needed to address specific situations.

Weed Prevention

Prevention is the most inexpensive and important weed management action. Healthy native plant communities are less likely to have invasive weeds than disturbed sites. Avoiding disturbance is the best defense against weed invasion. Areas disturbed by flooding or human activity should be quickly revegetated. Existing plant communities should be well maintained to create healthy native plantings which are able to compete and reduce the likelihood of weed establishment.

Early awareness and weed detection helps managers address invasions quickly and minimize potential threats. Emergent marsh, riparian, roadside/trail areas, and recently disturbed areas should be surveyed weekly to detect weeds early and reduce their spread. Weed dispersal should be reduced by properly disposing of seeds and reproductive plant parts; removing seeds embedded on clothing, animals and vehicles, and ensuring fill material such as hay, straw, and mulch is weed free. Vehicles should be cleaned prior to entering a weed free area and before leaving a weed infested area. Minimize travel through sensitive areas and avoid leaving exposed soil in construction areas.

Cultural Controls

Cultural methods include revegetation, flooding, fertilization, and shading to create healthy plant communities which make it more difficult for weeds to survive. Revegetation may be the best, long-term

alternative especially in fire suppression areas located along the northern fringe of the floodplain that could be used to cultivate agricultural crops. Care should be taken to ensure seed mixes do not contain weed seeds. Flooding has been used to encourage cottonwood growth over tamarisk. Appropriately using fertilizers for healthy plant growth and encouraging dense stands of native vegetation can deprive sunlight from emerging weeds.

Mechanical Controls

Weed control through mechanical means are typically used for small infestations and include pulling, hoeing, mowing and cutting, tilling, and mulching. Care should be taken to dispose of plant materials properly as many species re-sprout from plant parts left on soil or near the water. Hand pulling and hoeing can be effective when the complete crown can be removed. This technique should only be used for small areas as it typically needs to be continually repeated until the weed does not reappear.

Tilling can be useful if combined with a revegetation program. The technique is species dependent, as some rhizomatous species such as leafy spurge spread readily by tillage. It is not appropriate for natural areas as it disturbs the soil, disrupts the natural plant community, and encourages the spread of weed seed.

Mowing can reduce seed production in annuals but can also stimulate growth of some plants. Stage of growth and weather should be considered. Plants mowed during the late bud or flower stages often produce fewer seeds than those mowed later in the season. Soil moisture can increase the number of seeds produced after mowing. Repeated mowing may be needed. Some species, such as silver leaf nightshade and *Centaurea* continue to produce seed after cutting if mowed with flowers in bloom. It is important to remove all vegetative materials after mowing.

Root raking and brush grinding are techniques used to remove mature tamarisk infestations. Select areas (City of Buckeye's 40-acre parcel and infestations located in the Fire Suppression areas) can likely be removed during construction. If large infestations reoccur, this technique could be used as part of a major improvement project and revegetation program.

Biological Controls

Biological weed control uses other living organisms to damage weeds. The weed is not removed, but rather reduces to acceptable levels. Its effectiveness is not clearly documented. It is considered most effective on large, dense infestations. Costs can be high in order to find and test control organisms. It can take years see results, and should be used in conjunction with other control methods. Given the large expanse and the maturity of the Saltcedar infestations, the use of grazing animals for biological control is not a viable option for the Project areas.

The biological control that will likely have the most impact is the introduced salt cedar consuming Beetles *Diorhabda carinulata* and allied species (USDA, 2014). They are expected to occur in the project area sometime in next 5 to 20 years. The impact of the beetle will likely not be to eradicate the salt cedar but rather to introduce an outside stressor where formerly, one was not present. In many cases the beetle will defoliate the plants but not necessarily cause mortality. This results in higher potential for fire and reduces the habitat value of the areas. That is a primary reason to protect the existing high quality habitat by LIR techniques, i.e. removal of the exotic plant with minimal soil disruption and replanting with native riparian and wetland species.

Herbicides

Herbicides are chemical substances used to kill or inhibit the growth of plants. They should be selected based on the target weed species, the presence of desirable plant species, soil texture, depth and distance to water, and environmental conditions. It is typically appropriate for eradication of the most invasive weeds. They can be successful where a single weed species is present with few desirable plants and on small infestations. Herbicides are effective on rhizomatous species, those which require continually mechanical removal, and where access is difficult. Tamarisk has been successfully treated using the cut stump method with an herbicide application on the cambium layer.

Proper use, care, and application of herbicides are critical. They must be used according to the label. The chemicals should only be used on the target plants and application should minimize the risk of herbicides drifting or making unintended contact with the soil and water. Weed species may also build up resistance to herbicides. Research has been conducted on the Las Vegas Wash to evaluate the toxicity and build-up of herbicides on tall whitetop, giant bamboo, and tamarisk. Glyphosate, imazapyr, 2,4-D, chlorsulfuron, metsulfuron, and triclopyr were shown not to exhibit significant aquatic toxicity when used as directed.

Table 15. Salt Cedar Herbicides Table (Reproduced from USDA, 2014)

Common Chemical Name	Product Example ¹	Product Example Rate per Acre	Individual Plant Treatment (IPT)	Time of Application	Remarks
Triclopyr ester	Garlon 4, Remedy, Ultra, Others	NA	50:50 mixture of triclopyr and crop oil with a blue indicator dye.	Anytime	For cut stump treatment, apply to fresh cut stump within 15 minutes of cutting.
Imazapyr	Arsenal, Habitat, Others	2 quarts	1 percent mixture for foliage spray (1 gallon per 100 gallons of water with 0.25 percent surfactant and a blue indicator dye).	Late summer to early fall when plants are taking up nutrients; plants should be healthy and not stressed.	For IPT, spray to wet all foliage especially the terminal ends of branches. For aerial broadcast spraying, add 0.25 percent nonionic surfactant. Use a high spray volume; 15 gallons per acre total solution when applied by helicopter. Allow two full growing seasons before follow-up treatment. In addition to overspray, death or injury may occur from transfer of imazapyr between intertwined root systems.
Imazapyr + glyphosate	Arsenal + Rodeo	1.5 quarts + 1.5 quarts	1/2 to 1 gallon + 1/2 to 1 gallon (1-2 pounds + 2-4 pounds per 100 gallons of water with 0.25 percent surfactant and a blue indicator dye).	Same as imazapyr.	Same as imazapyr.

¹ Trade names for products are provided for example purposes only, and other products with the same active ingredient(s) may be available. Individual product labels should be examined for specific information and appropriate use with saltcedar.

“IPT cut stump treatment is often used in areas where mechanical treatments or foliar applied herbicide spraying are restricted due to logistical considerations or when there is a need to be highly selective and protect non-target vegetation. These are the ILF areas and those high quality riparian, wetland and aquatic habitats residing the Gila River thalweg.

The treatment involves hand cutting or chain sawing the salt cedar trunk or stems as close to the ground surface as reasonable, and then applying herbicide to the cut stump surface by paintbrush, hand-held spray bottle, or backpack sprayer. The cut surface should be horizontal to the ground to minimize runoff, and any residual sawdust over the cut surface should be removed prior to herbicide application. A solution of triclopyr ester or imazapyr mixed with bark or crop oil must be immediately applied within 15 minutes. The herbicide:oil mixture ratio can vary from 33:67 to 50:50 v/v depending on the number and size of plants to be treated and the application technique used. Lower ratios (e.g. 33:67) are typically used when applications are made with a low volume backpack sprayer or hand-held spray bottle, whereas higher ratios (e.g., 50:50) are used when the solution is brushed directly onto the cut stump cambium. Cut surfaces of plants with less than 4 inches’ diameter must be thoroughly wetted with herbicide to kill the roots; however, the herbicide should be applied to the cambial layer just inside the bark ring if the diameter. A blue indicator dye should be added to the spray mixture to show prior treatment of stumps. Disposal of trunks, limbs, and other top growth should follow acceptable practices (e.g., stack piles or chips and removal off-site).

Mortality rates from cut-stump treatments are directly related to care taken when treating cut surfaces. Control can be 60 to 80 percent under optimal conditions, but plant kills may be less than 40 percent due to difficulties with this method. Therefore, follow-up treatment using ground-based foliar applications should be anticipated (USDA, 2014).”

O&M Considerations

The habitat areas designed for the Buckeye Gila River Restoration Project reach will have several O&M considerations. This section discusses O&M activities once the project is constructed and operational. As specific features are designed, this section will be refined and more specific.

Vector Control

Monitoring of both larval and adult mosquito populations within and immediately adjacent to the constructed project features is recommended. This should become a routine activity with larval monitoring focused in continuously inundated areas such as the wetlands associated with the sand and gravel pit lakes, irrigation outfalls, flood irrigated habitats and stormwater outfalls. Adults should be monitored at yet to be selected fixed points located throughout the project. Initial locations should be sought that are characterized by dense riparian vegetation as these areas are places of refuge and sustenance for adult mosquitoes.

Litter/Debris Management

Due to the project’s location in the valley, large amounts of litter and debris can be transported into the system with both dry weather and stormwater runoff events. This will likely occur at stormwater and irrigation outfalls which will have associated wetland and riparian habitats. These areas need special attention with respect to the design of trash guards and access by equipment that effectively controls and can remove the litter/debris while protecting the associated habitat.

Access to Habitats

With the exception of flood flows within the river, access for O&M should be provided for most of the habitat areas. Most important will be the wetland and flood-irrigated riparian areas, as these will have the potential to breed mosquitoes as mentioned above. This access will have to be maintained and could require repairs and/or reconstruction after significant flow events.

Open Channels

Project water may be supplied by open channels in order to facilitate flood irrigation. The City of Buckeye's 40-acre Trailhead parcel may be the best option to utilize flood irrigation techniques as it is immediately adjacent to the Arlington Canal. An agreement would have to be made with the canal company but they also may be able to route effluent from the City's Wastewater Treatment Facility that could be diverted/pumped out of the canal for the purpose of supplying irrigation water to the restored features. In addition to or in lieu of the surface water, the City also has the right to develop a well or wells to supply water for irrigation purposes on the property.

The primary maintenance goal is to ensure that water is delivered efficiently along the entire length of the channel. Channels will be designed to discourage or prevent the growth of undesirable vegetation such as cattails. Typical maintenance activities will likely include periodic removal of organic biomass, litter, and debris.

Vegetation

Vegetation should be routinely monitored for physical hazards and undesired species. Vegetation hazards should be addressed for the safety of O&M staff and the public. This may include pruning or trimming of low-lying branches, clearing established access ways, and remediation after storm or river events. Since the site soils will be disturbed during construction, it is likely that seeds of undesired species will germinate. These are best handled by diligent removal over the first 1 to 2 years after initial plant installation. Monthly site visits should allow staff to remove the newly sprouted undesirable species by hand. For those plants that are too large to be pulled by hand, the cut stump and herbicide treatment methodology should be employed.

Site Specific Restoration Projects

Based upon the criteria presented above, three areas were identified for initial restoration efforts. Salt Cedar infestation associated with the SR 85 Bridge, High quality existing habitat located along the Gila river thalweg, and the City of Buckeyes 40-acre parcel located at the south end of Miller Road.

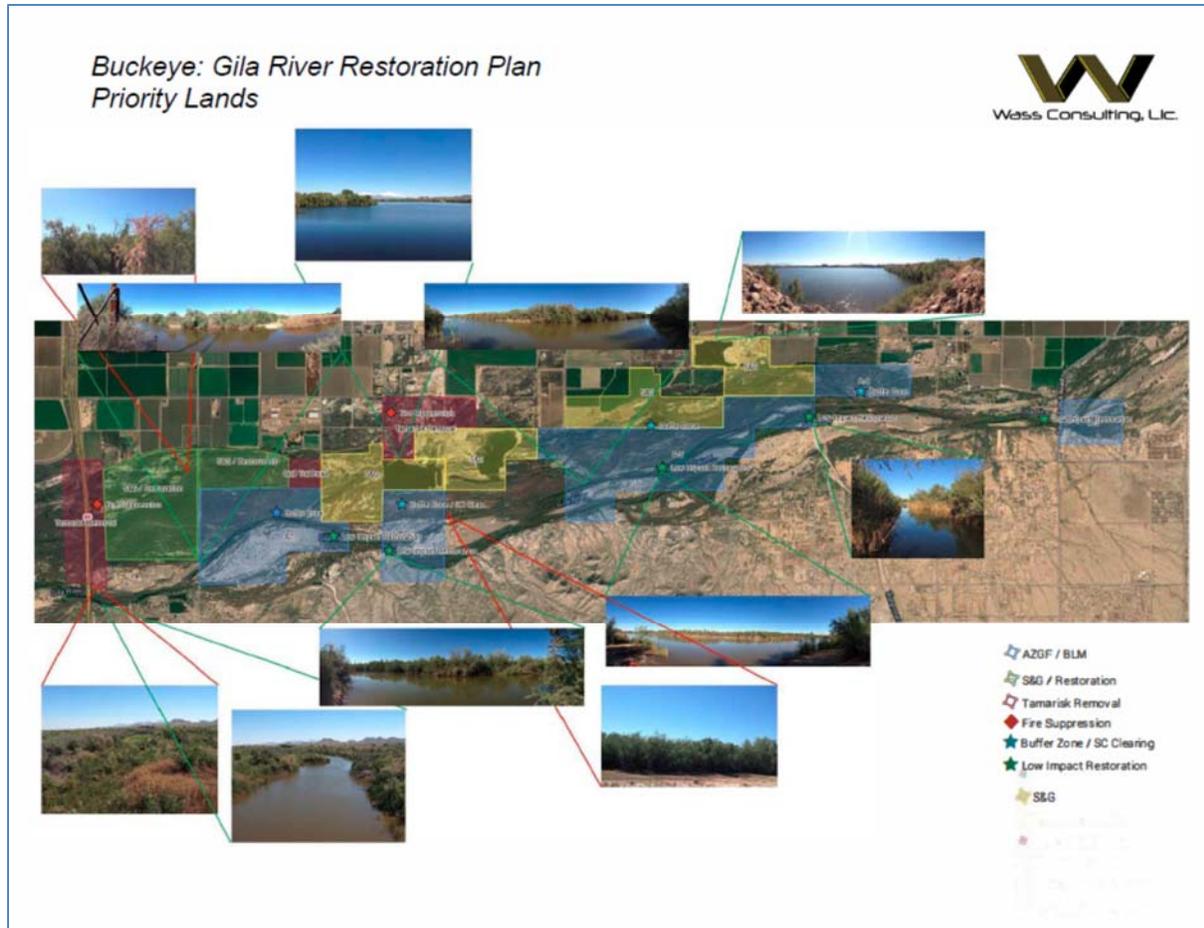


Figure 4. Site Specific Restoration Opportunities in the Buckeye Gila River Restoration Project.

SR 85 Bridge Restoration

Approximately 178 acres owned by the ASZG&F, BLM, FCDMC, and ADOT is occupied predominately by Salt Cedar (Table 16 & Figure 5). This poses a direct threat to the Bridge should a fire occur. This in turn impacts public safety, transportation, and the Lewis Prison facility located south of the Gila River along SR85.

Table 16. Restoration Project at SR85 Bridge and the Gila River, AZ.

Project ID	SR85 Bridge	Vegetative Community	Veg Area (ac)
Project Area (ac)	178	Aquatic Strand	1.5
Land Owners	AZGF	Cobble Strand	7.5
	BLM (PLO1015)	Cottonwood/Willow	6.9
	FCDMC	Salt Cedar	110.4
	ADOT	Desert Scrub	49.9
		Open Water	2.5
Description			
Buffer area of the SR85 bridge crossing the Gila River 200m downstream and upstream, from approximately the Arlington Canal to the southern bridge abutment.			

A project like the SR85 Bridge would give a jump start to the salt cedar control efforts and could be used as model for additional restoration projects. The land owners all seem to have the same goals, there is a good chance for receiving cost-share funds due to its visibility, salt cedar management activity, the need to ensure public safety, and opportunity near the south side of the channel to restore high quality wetland and riparian habitat. As with all restoration activities it is important that desirable native plant species be protected in place as much as is possible.

As can be seen in Figure 5 below, the northernmost 4,600-ft is infested with salt cedar and the groundwater depth is likely too deep to sustain native riparian species with the exception of mesquite and desert adapted trees. We recommend that mechanical means to remove the salt cedar is employed in this area such that a fire suppression buffer 220 yards wide both upstream and downstream of the Bridge is created. After removal of the salt cedar, revegetation in this area would be accomplished using the Riparian Buffer Hydro-Seed Mixture shown in Table 14.

The southern project area currently supports a mixture of native cottonwood, willow, and wetland plants but is currently being encroached upon by salt cedar. Because this area supports desirable vegetation and hydrology, minimal soil disturbance is recommended and manual techniques for the removal of salt cedar. In this case that means cutting the salt cedar stump approximately 12-inches above the ground surface. Immediately after the cut is made, an approved herbicide such as glyphosate or imazapyr.

Replanting of the area to replace the lost salt cedar should be accomplished using species from the plant palette provided in Table 7. If final design and site characteristics allow, riparian ground cover species such as those provided in Table 8 can be utilized.

As with all of the restoration efforts, monitoring and maintenance to ensure regrowth of salt cedar is not occurring should be conducted in both areas for 2 years after initial removal and replanting activities has been completed.

With the exception of in initial watering during the broadcast of the seed mixture, irrigation will not be necessary. Species within the seed mixture should sprout and grow using ambient moisture. Plantings located in the southern part of the project area should be installed in the saturated or moist soils adjacent to the perennial water features.

SR-85 BRIDGE - VEGETATIVE COMMUNITIES

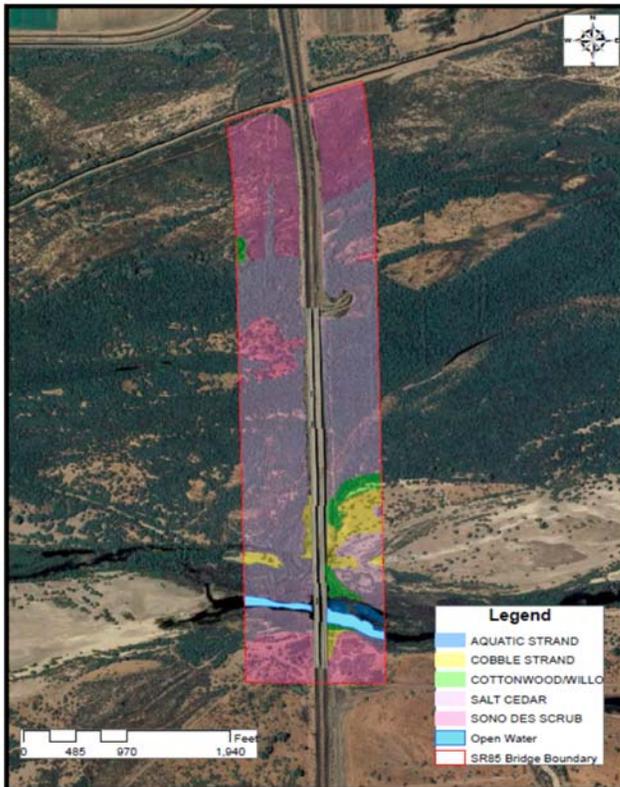


Figure 5. Proposed ecosystem restoration project located up and downstream of the SR 85 Bridge at the Gila River, AZ.

High Quality Existing Riparian Habitat Associated with the Gila River Braided Thalweg/Low Flow Channel

These areas represent the highest quality riparian habitat within the project reach. It presents numerous aquatic areas intimately lined with cattail marsh, Gooding Willow and Fremont Cottonwood (Figure 5). The hydrology is generally supported by groundwater with infrequent augmentation by surface flows and precipitation events.

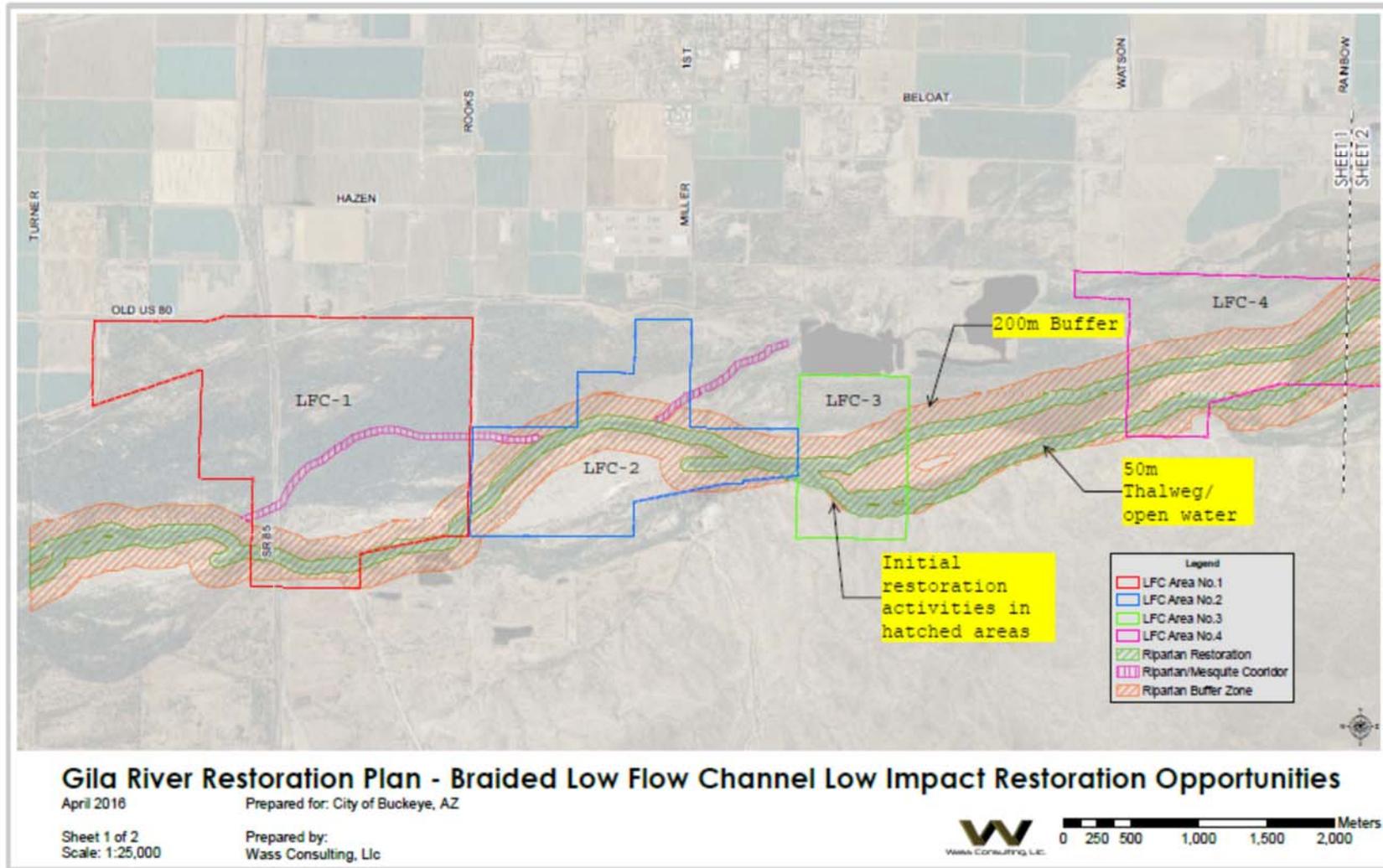


Figure 6. Braided Low Flow Channel lands that support the highest quality riparian, wetland, and aquatic habitat in the Gila River Restoration Project reach (Sheet 1).

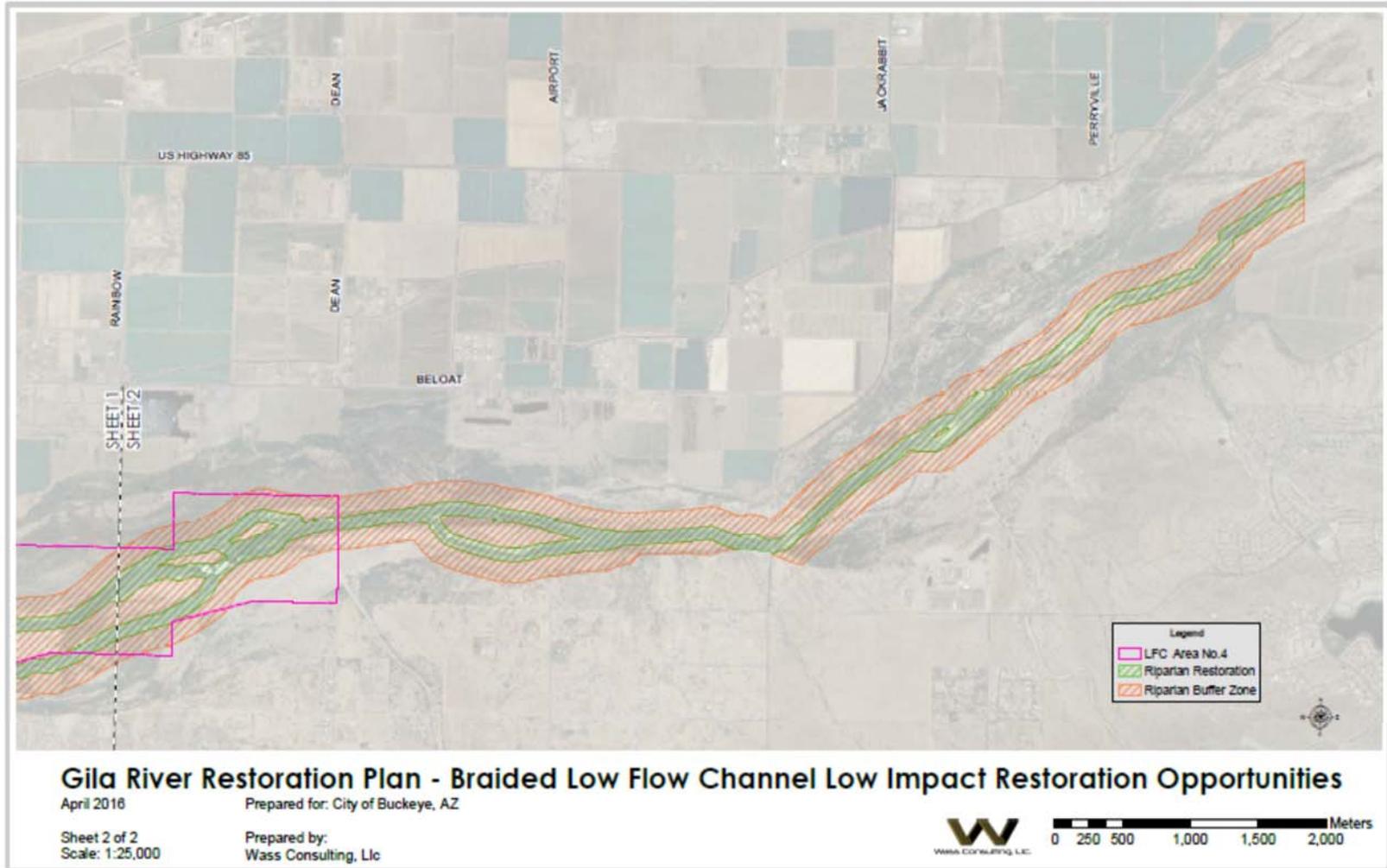


Figure 7. Braided Low Flow Channel lands that support the highest quality riparian, wetland, and aquatic habitat in the Gila River Restoration Project reach (Sheet 2).

Table 17. Gila River Low Flow Channel Restoration Opportunity No. 1.

Project ID	LFC Area No.1	Vegetative Community	Veg Area (ac)
Project Area (ac)	937	Aquatic Strand	3.1
Land Owners	AZGF	Cobble Strand	78.4
	BLM (PLO1015)	Cottonwood/Willow	32.89
	FCDMC	Salt Cedar	556
	ADOT	Desert Scrub	280.4
		Open Water	3.9
Description			
Lands owned or managed by AZGF, FCDMC, and ADOT from approximately Turner Rd to Rooks Rd (including 'SR85 Bridge' area), north bank to south bank of the Gila River.			

Table 18. Gila River Low Flow Channel Restoration Opportunity No. 2.

Project ID	LFC Area No.2	Vegetative Community	Veg Area (ac)
Project Area (ac)	485	Aquatic Strand	0.4
Land Owners	AZGF	Cobble Strand	202.3
	BLM (PLO1015)	Cottonwood/Willow	16.78
	FCDMC	Salt Cedar	245.2
		Desert Scrub	3.2
		Open Water	17.5
Description			
Lands owned or managed by AZGF and FCDMC from approximately Rooks Rd to Norton Dr, along the Gila River thalweg. Includes the 'COB 40 Acre' area.			

Table 19. Gila River Low Flow Channel Restoration Opportunity No. 3.

Project ID	LFC Area No.3	Vegetative Community	Veg Area (ac)
Project Area (ac)	245	Aquatic Strand	1.2
Land Owners	BLM (PLO1015)	Cobble Strand	78.1
		Cottonwood/Willow	4.9
		Salt Cedar	105
		Desert Scrub	0
		Open Water	4.3
Description			
Lands managed by AZGF from approximately Norton Dr to Apache Rd, along the Gila River thalweg.			

Table 20. Gila River Low Flow Channel Restoration Opportunity No. 4.

Project ID	LFC Area No.4	Vegetative Community	Veg Area (ac)
Project Area (ac)	724	Aquatic Strand	3.9
Land Owners	AZGF	Cobble Strand	232.6
	BLM (PLO1015)	Cottonwood/Willow	47.8
	FCDMC	Salt Cedar	416.3
		Desert Scrub	0
		Open Water	31.9
Description			
Lands owned or managed by AZGF and FCDMC from approximately Watson Rd to Dean Rd/Waterman Wash, along the Gila River thalweg.			

These are sensitive areas in which a least a portion of the hydroperiod is dictated by dam building activity of beavers. As such it is imperative that minimal ground disturbance occurs within approximately 30 yards of any existing open water area(s).

For restoration purposes these areas have been broken into three project tasks:

- Low Impact Restoration from the water's edge to approximately 55-yds toward the dry lands
- Mesquite Bosque Buffer Zone
- Salt Cedar Clearing 220-yd buffer

The Low Impact Restoration area(s) will be restored using manual techniques (ITP Cut Stump Method) for the removal of the salt cedar. This entails cutting the tree approximately 12-in above ground and immediately applying an approved herbicide to the freshly exposed cambium layer. The resulting salt cedar biomass will be removed from the area via rubber-tire vehicle and chipped for transportation to a yet to be defined disposal area(s).

Replanting in these LIR areas will be accomplished using the dominant canopy species provided in Table 7. Understory species (Table 8) can be used to augment existing species or in areas where ground disturbance could not be avoided.

Installation of the plant materials should be conducted in areas where the soils are saturated and or within the zone of capillary rise. This in turn will minimize the need for temporary irrigation which should not be required after the initial watering when the poles and plant starts are installed.

Maintenance in these areas will also be conducted manually and focused upon thwarting the regrowth of salt cedar. Monthly visits to the site to observe and remove any salt cedar regrowth should be conducted for at least 2 years as well as to gauge the fitness of the native plantings installed during the restoration.

The Mesquite Buffer Zone is located to the dry side of the LIR areas but in soils where the depth to groundwater does not exceed 10-ft. In these areas as with others, all native species should be protected in-place. Given the size homogeneity of the salt cedar stand, some mechanical means can be employed. Again, minimal disturbance of surface soils is recommended and the removal should be augmented with herbicide application to stumps that are deemed too large to remove due to soil disturbance or negative impacts to existing native species.

Once the salt cedar biomass has been removed and hauled away for disposal replanting can be conducted using the Mesquite Bosque palette species provide in Table 9. All areas that were disturbed during the salt cedar removal activities should have the seed mixture provided in Table 13 applied.

Over the course of the next two years monitoring and maintenance of these areas will entail visual inspection and spot treatments with herbicide to ensure salt cedar is not re-encroaching on the site. Further, visual inspection of newly installed plantings should be conducted to ensure the seed mixture has germinated and that the mesquite plantings are not showing signs of distress.

The last zone, identified as the Salt Cedar Clearing Buffer Zone extends past the Mesquite Bosque area by approximately 220-yds. Such areas are characterized by open cobble strand, riverine scrub shrubs, and

monotypical stands of salt cedar. The goal in these areas is to remove the salt cedar to provide conveyance and open space for raptor and other predators to forage within.

Removal activities in these areas should employ mechanical means such as root plowing, extraction, and or grinding. The resulting biomass should be removed and disposed of off-site at a yet to be determined location.

Surface regrading, if necessary, and replanting can then be accomplished. It is recommended that the cleared areas have the seed mixture in Table 13 applied to them. After an initial watering irrigation should not be required as the seeds are expected to germinate and grow using ambient moisture.

Monitoring and maintenance for re-growth and plant fitness should occur on a monthly basis for 2 years. If regrowth of salt cedar is noted, spot application of herbicides should be conducted.

City of Buckeye 40-Acre Trail Head

The City currently owns a 40-acre parcel located at the southern end and on the west side of Miller Road. As seen in Figure 7, the majority of the site is infested with Salt Cedar. At the time of this writing, the City via a Grant has cleared the site of salt cedar. The resulting land is sandy and lacking in organic content and likely high in salts.

Table 21. City of Buckeye Property at South Miller Road.

Project ID	COB 40 Acre	Vegetative Community	Veg Area (ac)
Project Area (ac)	40	Aquatic Strand	0
Land Owners	City of Buckeye	Cobble Strand	0
		Cottonwood/Willow	0
		Salt Cedar	39
		Desert Scrub	0.9
		Open Water	0
Description			
City owned 40-acre parcel located at the south end of Miller Rd, south of the Arlington Canal on the north bank of the Gila River.			

The site however has access to both well water from beneath the property and canal water from the adjacent Arlington Canal. Being located adjacent to Miller road also allows for very good access to the site. As such restoration options are numerous.

One option could be to generate 15 to 25-acre gallery forests of cottonwood and willow. These would be situated in areas graded to facilitate flood irrigation. Mesquite Bosque habitat could then be established around the perimeter along with a small (1 acre or less) wetland or series of wetland ponds to complete the vegetation component. The irrigation system could be linked through the wetlands and serve as a guide for interpretative trails. During design the habitat features could be coordinated with small parking areas, ADA approved trails, informational kiosks, and bathrooms to serve as a trail head for entering the Gila River.

BUCKEYE 40AC - VEGETATIVE COMMUNITIES



Figure 8. The 40-acre City owned Trail Head parcel.

Since the City has already removed the salt cedar from the site they should begin monthly maintenance to ensure that there is minimal to no regrowth. After developing and implementing grading and irrigation

plans for the site it can be re-vegetated using the riparian, wetland and mesquite species provided in Tables 7, 8, 9, and 10. The appropriate seed mixtures shown in Tables 13 and 14 could be used to cover disturbed ground under the Riparian and Mesquite areas respectively.

Operation and maintenance activities are similar to those described above for the restored habitats located within the Gila River channel. However, this site will likely be frequented by the public much more often. As such, the City should plan on managing this facility more like an urban park, rather than the wilds.

Implementation Concerns

Timing of surveys and plant material acquisition must be coordinated so that planting with poles can be accomplished in the February and March time-frame. This may work well in that removal of exotic species could be conducted during the November/December time-frame. Pole material for cottonwood and willow could be harvested in late January. Installation could then occur late February / March.

Such activities could be coordinated with local Game and Fish [personnel and/or paid consultants. Another area that will likely need to be addressed is the Cultural Clearance of lands slated for salt cedar removal and re-vegetation. This will be especially true for projects that cause significant soil disruption. The State Historic Preservation Office (SHPO) should be consulted early as there may have been surveys already conducted in the project area(S) or their might be exceptions due to past agricultural activities and or scour due to historical river and flood flow events.

Permit Considerations

If work is proposed within the Jurisdictional Area(s) of the Gila River and/or Federal monies are used to complete the project, it is likely that a US Army Corps of Engineers 404 or 404R permit and or Endangered Species Act (ESA) requirements will be required to be achieved. Alternately, if Federal dollars are not used and the land is privately owned outside of the jurisdictional areas, a 404 permit may not be required. However, a Maricopa County Floodplain Use permit may be need for grading, plant removal and replacement activities.

With respect to the 404 permit the project sponsor has several options. One of which is to enter into an agreement with the USACE to manage the project planning, design, and implementation. This is usually accomplished by the local sponsor requesting a project with the USACE. The City of Buckeye has approached the Corps and the USACE has offered two pathways, both of which are under their Continuing Authorities Program. First is the Section 206: Aquatic Ecosystem Restoration which focus upon improving the existing degraded aquatic and riparian habitats. Another candidate program which is typically better funded and less burdened by land ownership is the Section 205 Flood Damage Reduction Projects. Both of these mechanisms include a 404R permit that USACE grants to itself after the appropriate feasibility and consultations have been accomplished.

A local sponsor may also opt to be covered under one of several Nationwide 404 Permits. The likely permit for the in-channel areas would be the Nation Wide 27 Aquatic Ecosystem Restoration Permit, however in the floodplain fringe areas a NWP 42 might also be considered as it allows for the establishment of recreational features. Areas outside of the floodway such as the Fire suppression areas and the City of Buckeye 40-acre Trail Head parcel would be candidates. In both cases general and specific information regarding land ownership, existing conditions, proposed actions, and defined long-term funding and maintenance commitments must be made. In addition,

A more rigorous avenue would be to apply for an Individual 404 permit such as the one that was issued for the Cotton Lane Bridge. This is often the case when the Corps is not involved in the project planning or execution and the activities span a large multi-ownership land area and or impacts riverine and associated riparian and aquatic habitat. Such an effort can be extensive and will likely require the development of a Feasibility Study including an Environmental Impact Statement (at a minimum a Biological Assessment will be required). Such an effort may take three to 5 years.

In all 404 permit cases, the local sponsor, in this case the City of Buckeye, will have to obtain/secure for the life of the project (typically 50 to 100-yrs) all lands, rights, easements, and disposal areas for the project area. Given the multiple land ownership it is likely that the City, with the exception of their 40-acre parcel and fire-suppression areas, will need to develop a multi-sponsored approach. For example, the FCDMC has received word the LA District USACE has obtained funding to look at identifying and implementing a Section 205 Flood Damage Reduction Study. It will likely contain both structural (levee) and non-structural (vegetation management) components to address flooding on the north side of the river. It is highly recommended that the City participate in this effort as a project co-sponsor so that Buckeye's input can be included in the formulation of the project plan.

Potential Project Costs

Given the heterogeneous nature of the potential restoration projects, a single cost per acre is not provided. Instead, through the use of local contractor cost estimates several scenarios were estimated. These include areas of mixed and monotypical stands of salt cedar and areas that have significant amounts of dumped and waste materials versus those with monotypical stands of salt cedar. In all estimates it assumed that the City would have to provide its own endangered species and cultural surveys and that maintenance of the restored sites continues for a 100-yrs. This results in total costs over the 100-yr life of the project ranging from \$83,750 to \$95,450 per acre. This information is summarized in Table 22.

Although most if not all grants, awards, and USACE programs require a cost share, project costs may be defrayed through the use of competitive grants. The City has already had great success in receiving monies from the Federal Government for hazard mitigation due to fire and has also acquired a grant writer

to help in this effort(s). Table 23 provides a listing of potential grant opportunities that City could explore as a means of assisting in project funding.

Table 22. Per acre cost estimates for removal and disposal of salt cedar and associated debris, as well as, the cost for revegetation and maintenance for a 100-yr life of project.

Salt Cedar Removal Estimate				
Southwest Valley				
Notes:				
1	Bids are based upon specific salt cedar infestations and consider site specific conditions, e.g. salt cedar density, height of stand, access/egress and may not be reflective of sites in or adjacent to the Gila River through Buckeye, AZ.			
2	These Bids were received by an Agency located in Maricopa County in September 2014			
3	Assumes Grinding in Fall A, Spray #1 late Spring A, Spray #2, late summer A, spray #3 as needed in Spring B. This can be changed as long as there are no T&E species occupying the site and it is not considered suitable habitat.			
4	It is likely that removal of the ground-up material is optional.			
5	Cost-savings may be realized based upon the character of the stand, ease of access, disposal method(s) chosen, revegetation goals, volunteerism (labor, equipment, materials), and most importantly, the Bids received in response to an RFP.			
6	Staff and other costs the City wishes to cover can likely be used to fulfill cost-share requirements for grants.			
Cost Estimate Basis				
	Initial Removal (Assumes Mechanical Removal (Grinding)/Biomass left on site)	Cost	Units	Extended Cost
	Bid 1	\$ 950.00	Acre ⁻¹	\$ 3,000.00 mobilization
	Bid 2	\$ 2,600.00	Acre ⁻¹	
	Bid 3	\$ 14,000.00	Acre ⁻¹	
	<i>Recommended Initial Removal Estimate for Buckeye</i>	\$ 2,000.00	Acre ⁻¹	
	Biomass/Debris stacking and burning	Depends upon Public Works and Fire Department Personnel Costs		
Herbicide Treatment and Followup Treatments				
	Year 1	\$ 1,600.00	Acre ⁻¹	
	Year 2 (Should Negotiate a Lower Price Based Upon Effectiveness of Year 1 Application)	\$ 1,300.00	Acre ⁻¹	
	Year 3 (Should Negotiate a Lower Price Based Upon Effectiveness of Year 2 Application)	\$ 650.00	Acre ⁻¹	\$ 3,550.00
Revegetation				
	Hydroseed Application of Seed Mixture (\$0.10 ft ²)	\$ 4,356.00	Acre ⁻¹	
	Mesquite (1 gal pots; 60 tree per acre; \$7.74 per tree)	\$ 464.40	Acre ⁻¹	
Biological Survey / Clearances				
	Suitability Survey (Do lands have the potential to support T&E Species?) and Burrowing Owl Survey	\$ 1,800.00	day ⁻¹	13 days \$ 23,400.00
Permits				
	Maricopa County Floodplain Use Permit	\$ 150.00	LS	
	404 Permit (Not Applicable if project is in Floodplain/Just Notification)	Depends on Staff Time		
Salt Cedar Management Cost Estimate				
Cost to Restore (Initial biomass removal)				
	Clean monoculture of Salt Cedar	\$ 2,000	Acre ⁻¹	
	Trash and mixture of Salt Cedar and Native Trees that need to be protected in-place	\$ 4,500	Acre ⁻¹	
Cost to Replace with Native Plants				
	Mesquite and Upland Areas Low Cost	\$ 4,800	Acre ⁻¹	
	Mesquite and Upland Areas High Cost	\$ 7,500	Acre ⁻¹	
	Wetlands/Riparian Areas	\$ 14,000	Acre ⁻¹	
O&M Cost per Acre				
	Initial and Follow-up Herbicide Treatments	\$ 3,550	Acre ⁻¹	
	100-yrs of fence mending, vegetation maintenance, etc.	\$ 50,000	Acre ⁻¹	
Scenario Total Costs				
	Clean monoculture of Salt Cedar, Mesquite and Uplands Low, plus O&M	\$ 83,750	Acre ⁻¹	
	Trash and mix of SC and Native Trees, Mesquite and Uplands High, plus O&M	\$ 88,950	Acre ⁻¹	
	Trash and mix of SC and Native Trees, Wetlands/Riparian, plus O&M	\$ 95,450	Acre ⁻¹	

Table 23. Potential Grants that could be applied for and used by the City of Buckeye for restoration efforts in the Gila River and associated Floodplain.

Current Opportunities					
Title	Agency	Close Date	Applicant	Match	Link
BLM-(Arizona), BLM Arizona, Restore Arizona	BLM	2017 Undefined		N	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276367
North American Wetlands Conservation Act - Standard	USFWS	2017 Undefined		Y	https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php
Regional Conservation Partnership Program (RCP)	NRCS	2017 Undefined			http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/
NFWF/Walmart Acres for America	NFWF	2017 Undefined		Y	http://www.nfwf.org/acresforamerica/Pages/home.aspx
Pulling Together Initiative	NFWF	2017 Undefined	Multiple	Y	http://www.nfwf.org/pti/Pages/home.aspx#.VJMP-qDAA
Land and Water Conservation Fund State and Local Assistance Program	NPS	2017 Undefined	State		http://www.grants.gov/web/grants/view-opportunity.html?oppld=269579
FY16 Flood Mitigation Assistance	FEMA	6/15/2016		Y	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276901
FY15 Pre-Disaster Mitigation	FEMA	6/15/2016		Y	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276902
Heritage Fund	AZGF	9/30/2016	Multiple	Optional	http://www.azgfd.gov/w_c/heritage_apply.shtml
Sport Fish Restoration Grant Program	USFWS	2017 Undefined	State		http://www.grants.gov/web/grants/view-opportunity.html?oppld=270363
Wildlife Restoration Grant Program	USFWS	2017 Undefined	State		http://www.grants.gov/web/grants/view-opportunity.html?oppld=270364
North American Wetlands Conservation Act - Small	USFWS	11/3/2016	Multiple	Y	http://www.fws.gov/birdhabitat/Grants/NAWCA/Small/index.shtml
State Fire Assistance / Wildland Urban Interface Grants	Forestry	TBA			
5 Star Wetland and Urban Waters Restoration Grants	USEPA	TBA			
Wetland Program Development Grants	USEPA	TBA			https://www.epa.gov/wetlands/wetlands-funding
State Revolving Fund and Wetlands	USEPA/AZ				
Flood Mitigation Assistance Grant Program	FEMA	TBD		Y	
USACE Section 205 Flood Control and Incidental Aquatic Ecosystem Restoration	USACE	Proposal	Multiple	Y	
USACE Section 206 Aquatic Ecosystem Restoration	USACE	Proposal	Multiple	Y	
Additional Grant Links					
http://www.invasivespeciesinfo.gov/toolkit/grants.shtml					
http://www.fws.gov/invasives/partnerships.html					
http://www.weedcenter.org/funding/funding.html					
http://aznps.com/grants.php					
http://www.riparianrestorationconnection.com/funding-board					
http://www.waltonfamilyfoundation.org/environment/freshwater-conservation					
http://az.gov/invasivespecies/res_grants.html					
http://www.vanswers.com					
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/					
http://www.nrcs.usda.gov/wps/portal/nrcs/main/az/programs/					
http://azstateparks.com/grants/index.html					
http://www.nfwf.org/environmentalsolutions/Pages/2015rfp.aspx#.VJIGz1Yd-IJ					
https://azsf.az.gov/grants					
https://niwr.net/public/Migration/current-and-recent-requests-proposals					
http://www.ducks.org/arizona					
http://www.nfwf.org/fivestar/Pages/home.aspx#.VJMUQqDAA					
http://webarchives.cdlib.org/sw1rf5mh0k/http://www.ers.usda.gov/Briefing/InvasiveSpecies/preism.htm					
http://publiclandseveryday.org/grants/capacity-building-grants					
https://www.nationalforests.org/grant-programs/map					
http://www.epa.gov/pestwise/grants/index.html					

Literature Cited

AZGF, 2000. "Yuma Clapper Rail Survey Protocol January 2000".

AZGF, 2009. Development and Burrowing Owls in Arizona, AZGF Educational Brochure.

Corman, T.E. and R.T. Magill. 2000. Western yellow-billed cuckoo in Arizona: 1998 and 1999 survey report. Nongame and Endangered Wildlife Program, Arizona Game and Fish Dept., Tech. Rept. 150.

FCDMC, 2006a. El Rio Water Course Mater Plan and Area Drainage Master Plan. Contract FCD 2001C024, Stantec Project No. 82000240.

FCDMC, 2006b. Attachment 6, Groundwater Evaluation. El Rio Water Course Mater Plan and Area Drainage Master Plan. Contract FCD 2001C024, Stantec Project No. 82000240.

Halterman et, al., 2015. Halterman, M., M.J. Johnson, J. A. Holmes, S. A. Laymon. "A natural History Summary and Survey Protocol for the Wester Distinct Population Segment of the Yellow-billed Cuckoo". Harvey & Associates Ecological Consultants, Colorado Plateau Research Station and the US Fish and Wildlife Service.

Stromberg JC, 2004. Personal communication.

USACE, 2000. "Tres Rios Ecosystem Restoration Feasibility Study; Feasibility Report and Environmental Impact Statement April 2000". USACE Los Angeles District South Pacific Division.

USDA (2014). Filed Guide for Managing Saltcedar in the Southwest. United States Department of Agriculture, Southwestern Region Forest Service. TP-R3-16-02, September 2014.

USFWS, 1995. Endangered and Threatened Wildlife and Plants; Final Rule for Determining Endangered Species Status for the Southwestern Willow Flycatcher. Fish and Wildlife Service, 50CFR Part 17 RIN 1018 AB97.

USFWS 2000. "Southwestern Willow Flycatcher Protocol Revision 2000".



Appendix C: Grants and Funding Table

Title	Agency	Link
State Off-Highway Vehicle Recreation Fund	ASP	http://azstateparks.com/grants/index.html
Invasive Plant Grants (IPG)	AZFS	https://forestryandfire.az.gov/grants/forest-health/ipg
Community Forestry Grants	AZFS	https://forestryandfire.az.gov/grants/community
Heritage Fund	AZGF	http://www.azgfd.gov/w_c/heritage_apply.shtml
Doug Green Research Grant	AZNPS	http://aznps.com/grants.php
Horace Miller/Ginny Saylor Publication Grant	AZNPS	http://aznps.com/grants.php
Invasive Plant Grants (IPG)	AZSF	https://forestryandfire.az.gov/grants/forest-health/ipg
Fuels Mitigation Grants	AZSF	https://forestryandfire.az.gov/grants/hazard-fuels/mitigation
BLM-(Arizona), BLM Arizona, Restore Arizona	BLM	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276367
Challenge Cost Share	BLM	http://www.grants.gov/web/grants/view-opportunity.html?oppld=281220
PestWise	EPA	https://www3.epa.gov/pestwise/about/index.html
FY16 Flood Mitigation Assistance	FEMA	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276901
FY15 Pre-Disaster Mitigation	FEMA	http://www.grants.gov/web/grants/view-opportunity.html?oppld=276902
Flood Mitigation Assistance Grant Program	FEMA	
State Fire Assistance / Wildland Urban Interface Grants	Forestry	
Partners for Wildlife Program	FWS	https://www.fws.gov/partners/
Landowner Incentive Program	FWS	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/LIP/LIP.htm
North American Wetlands Conservation Act of 1989	FWS	https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php
Wildlife Restoration Act	FWS	http://wsfrprograms.fws.gov/Subpages/GrantPrograms/WR/WR.htm
Every Day Capacity Building Grants	NEEF	http://publiclandseveryday.org/grants/capacity-building-grants
Matching Awards Program	NFF	https://www.nationalforests.org/grant-programs
NFWF/Walmart Acres for America	NFWF	http://www.nfwf.org/acresforamerica/Pages/home.aspx
Pulling Together Initiative	NFWF	http://www.nfwf.org/pti/Pages/home.aspx#.VJMP-qDAA
Environmental Solutions for Communities Grant Program	NFWF	http://www.nfwf.org/environmentalsolutions/Pages/2015rfp.aspx#.VJIGz1Yd-IJ
Five Star and Urban Waters Restoration Grant Program	NFWF	http://www.nfwf.org/fivestar/Pages/home.aspx#.VJMUQqDAA
Water Resources Competitive Grants Program	NIWR	https://niwr.net/public/Migration/current-and-recent-requests-proposals
Land and Water Conservation Fund State and Local Assistance Program	NPS	http://www.grants.gov/web/grants/view-opportunity.html?oppld=269579
Regional Conservation Partnership Program (RCPP)	NRCS	http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/
Tamarisk Coalition	Tamarisk Coalition	http://www.tamariskcoalition.org/programs/funding-program
USACE Section 205 Flood Control and Incidental Aquatic Ecosystem Restoration	USACE	
USACE Section 206 Aquatic Ecosystem Restoration	USACE	
Agricultural Management Assistance Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/
Conservation Stewardship Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/csp/?cid=stelprdb1242683
Environmental Quality Incentives Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=stelprdb1242633
Water Bank Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/?cid=stelprdb1047790
Agricultural Conservation Easement Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/az/programs/easements/acep/?cid=stelprdb1248212
Regional Conservation Partnership Program	USDA	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/az/programs/farmbill/rcpp/?cid=stelprdb1254349
Program of Research on the Economics of Invasive Species Management (PREISM)	USDA	https://wayback.archive-it.org/5923/20120310025625/http://ers.usda.gov/Briefing/InvasiveSpecies/preism.htm
5 Star Wetland and Urban Waters Restoration Grants	USEPA	
Wetland Program Development Grants	USEPA	https://www.epa.gov/wetlands/wetlands-funding

State Revolving Fund and Wetlands	USEPA/AZ	
North American Wetlands Conservation Act - Standard	USFWS	https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php
Sport Fish Restoration Grant Program	USFWS	http://www.grants.gov/web/grants/view-opportunity.html?oppld=270363
Wildlife Restoration Grant Program	USFWS	http://www.grants.gov/web/grants/view-opportunity.html?oppld=270364
North American Wetlands Conservation Act - Small	USFWS	http://www.fws.gov/birdhabitat/Grants/NAWCA/Small/index.shtm
Multistate Conservation Grant Program	USFWS	http://wsfrprograms.fws.gov/subpages/grantprograms/MultiState/MS.htm
Freshwater Conservation	Walton Family Foundation	http://www.waltonfamilyfoundation.org/our-impact/environment/freshwater-conservation