

A Home for the Hia-Ced O'odham

research, design principles, and recommendations for the Hia-Ced O'odham Land Base near Why, AZ



Arizona
Department
of Housing



THE DRACHMAN INSTITUTE

COLLEGE OF ARCHITECTURE AND LANDSCAPE ARCHITECTURE
THE UNIVERSITY OF ARIZONA TUCSON, ARIZONA

January 2010

A Home for the Hia-Ced

Credits

The Drachman Institute is the research-based outreach arm of the College of Architecture and Landscape Architecture (CALA) at The University of Arizona dedicated to environmentally-sensitive and resource-conscious planning and design with a focus on underserved and vulnerable communities. We engage students, staff, faculty, and citizens as an interdisciplinary collaborative striving to make our communities healthier, safer, more equitable, and more beautiful places to live. We embrace a service-learning model of education serving the needs of communities while providing an outreach experience for students as a fundamental educational goal consistent with the mission of CALA and The University of Arizona.



The information in this report is intended as guidance for the Hia-Ced O'odham Program in informing decisions related to this project. The research, design process, and recommendations were achieved to the best knowledge and judgment of the Drachman Institute staff, students, and faculty, and is subject to verification by the Hia-Ced O'odham Program or other parties prior to implementation of any action.

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Table of Contents

Project Introduction	5
Introduction and Scope of Work	6
Community Development Timeline	8
Project Context	11
Site Context	12
Cultural Context	24
Process	29
2005 Master Land Use Plan Summary	30
First Community Presentation	32
Community Survey Summary	38
Second Community Presentation	40
Third Community Presentation	50
Design Principles	53
Site	54
Housing Clusters	70
Home Design	72
Design	79
Site Design	80
Cluster Concepts	84
Homes	88
Appendix	95
Scope of Work	96
Public Announcements	98
Presentation Handouts	100
Community Survey	104
Community Survey Results	106
Wastewater Treatment Options	114

Project Introduction

- Introduction and Scope of Work •

- Introduction
 - Timeline of Project Events
 - Scope of Work Overview

- Community Development Timeline •

Project Introduction

Introduction & Scope of Work

The Hia-Ced O’odham Program was established in 1987 to identify the Hia-Ced O’odham descendents and to acquire aboriginal lands of the Hia-Ced O’odham. In 2003, based on their work, the Tohono O’odham Nation purchased a 642.7-acre site (a full section or one square mile) near Why, Arizona as a “home base” for the Hia-Ced O’odham. In 2005, the Hia-Ced O’odham Program worked with the Drachman Institute to develop the “Hia-Ced O’odham Master Land Use Plan.” While this plan was instrumental in the future development of the Hia-Ced O’odham site, current community response indicated a desire for an updated plan that reflects the knowledge, concerns, and objectives of those community members currently involved in the project. In January 2009, the Hia-Ced O’odham Program requested that the Drachman Institute, through a technical assistance grant from the Arizona Department of Housing (ADOH), provide assistance in planning and design for the “home base” site. The information and ideas in the 2005 Master Land Use Plan served as the basis for the Drachman Institute’s development of an updated and progressive plan.

Based on site constraints, coordination with the Hia-Ced O’odham Program, and feedback from the Hia-Ced O’odham Advisory Committee and other community members, the Drachman Institute developed a series of alternate site plans that included residential, commercial, and community development. The primary focus of this plan was to develop a prototype community that exemplifies the best of sustainability, culture, community connectivity, and appropriate land use.

The site, housing, and community designs and principles were presented to the Hia-Ced O’odham Advisory Committee and other community members through a series of public community meetings. Their feedback resulted in a final recommended master site plan and multiple housing design concepts.

The goal of this document, which presents the housing designs and the master site plan developed through that process, is to provide the Hia-Ced O’odham with the information, knowledge, and momentum to move this project forward toward becoming a district of the Tohono O’odham Nation and ultimately creating a permanent, sustainable, healthy, and beautiful community they can call home.

Timeline of Project Events

January 2009	Hia-Ced O’odham Program (Program) applied with the Arizona Department of Housing (ADOH) for a technical assistance grant.
January 30, 2009	ADOH accepted the Program’s application, which initiated work with the Drachman Institute.
March 2009	A Scope of Work was developed by the Drachman Institute outlining the project scope and setting a preliminary schedule.
May 12, 2009	An initial kick-off and planning meeting was held between the Drachman Institute and the Program at the Program office in Sells, Arizona. This meeting was followed by an initial site visit and tour at the Land Base.
June 03, 2009	A meeting was held with Drachman Institute staff, Program staff, Tohono O’odham Attorney General staff, and Brandy (Billingsley) McLain (author of the 2005 Master Land Use Plan) to review past plans and current conditions.
June 06, 2009	A meeting was held with Drachman Institute staff, Program staff, and Tohono O’odham Utility Authority (TOUA) staff to discuss preliminary wastewater treatment options.
May-June 2009	Site analysis, initial site concepts, and initial housing concepts were developed.
June 27, 2009	Site analysis, initial site concepts, initial housing concepts and density analysis were presented to the Hia-Ced O’odham Advisory Committee and community members for their review and feedback at their monthly committee meeting at the Land Base near Why, Arizona.
June-July 2009	Program staff developed and administered a community survey to help determine the housing and community planning needs and preferences of Hia-Ced O’odham community members.
July 29, 2009	Program staff meet with Drachman Institute staff in Tucson, Arizona for a design charrette and to review the site and housing concept development.
July-August 2009	Based on feedback from community members and Program staff, three site concepts, three housing cluster concepts, and multiple housing design concepts were developed.
August 22, 2009	Site concepts, housing cluster concepts, and housing design concepts were presented to the Hia-Ced O’odham Advisory Committee and community members for their review and feedback at their monthly committee meeting at the Land Base.
Sept.-Oct. 2009	Based on feedback from community members and Program staff, an overall community site plan was developed and site and housing principles and designs were refined.
October 24, 2009	Refined site designs and planning principles were presented to the Hia-Ced O’odham Advisory Committee and community members for their review and feedback at their monthly committee meeting at the Land Base.
January 2010	This document - A Home for the Hia-Ced O’odham - reflecting feedback throughout the process, was developed and published as part of completion of the Drachman Institute’s work on this project.

Scope of Work Overview (see Appendix for complete document)

Kick-off Meeting and Initial Site Visit

- Drachman Institute staff will meet with the Hia-Ced O’odham Program staff to review and finalize the Scope of Work and identify issues and priorities of the project development.
- Drachman Institute staff will become familiar with the site and obtain site/context photos and additional resources as needed.

Site Evaluation and Alternative Sites Development

- Drachman Institute will review and evaluate the “Hia-Ced O’odham Master Use Plan” that was previously developed in 2005.
- Drachman Institute will develop two alternative site plans that will reflect changes to the original plan that show: 1) change of some uses to residential, and 2) higher density residential areas.

Community Survey

- The Hia-Ced O’odham Program staff, with selected assistance from the Drachman Institute, will develop a questionnaire covering topics such as housing needs, housing type preference, finance preference, public use areas, cultural perspectives, outdoor uses, special needs, etc. A group other than the Drachman Institute will administer and collect the information from the local Hia-Ced community.

Community Meeting 1

- Presentation of existing and two alternative site plans to the Hia-Ced O’odham community for review and feedback.
- Presentation of the community survey results.

Site Development and Conceptual Housing Design

- Drachman Institute will develop the two alternative site designs based on comments and feedback from the community meeting.
- Drachman Institute will develop conceptual designs for four housing prototypes.

Community Meeting 2

- Presentation of two alternative site plans to the Hia-Ced O’odham community for review and feedback.
- Presentation of conceptual housing prototype designs and their integration with the site to the Hia-Ced O’odham community for review and feedback.

Schematic Housing Design

- Drachman Institute will develop schematic designs for four housing prototypes based on the conceptual designs and feedback from the community meeting.
- Schematic designs are not intended to be construction documents; schematic designs serve the purpose of communicating to the architect who will be doing construction documents the full intentions of the project. Schematic designs will include overall site features, circulation, housing plans, material palettes, and intentions for construction.

Community Meeting – Final

- Final Presentation of site plans to the Hia-Ced O’odham community.
- Final Presentation of schematic housing prototype designs and their integration with the site to the Hia-Ced O’odham community.



1882- **Tohono O'odham**
Gila bend settlement is preserved as a reservation.

1993- **Hia-Ced O'odham Alliance**
is reinstated as a non-profit
corporation.



1937- **Hia-Ced O'odham**
native land is set-aside for
the Organ Pipe Cactus
National Monument.

1939- **Hia-Ced O'odham**
native land is designated as
Cabeza Prieta Wildlife Refuge.

1996- **Hia-Ced O'odham Alliance**
purchases 20-acre cemetery near
Darby Wells.



Future(may occur at any point in time)- **Hia-Ced O'odham** complete the process to become a district of the Tohono O'odham Nation and establish a district council.

August 2009- **Tohono O'odham Nation** delivers preliminary well test results.

August 2009- **Drachman Institute** Presentation II (Survey Results, Living Traditions, Site Concepts, Housing Cluster & Design Concepts).

October 2009- **Drachman Institute** Presentation III (Final Design & Principles).



Future- **Hia-Ced O'odham** conduct a market study on commercial activities the site might support.

Future- **Hia-Ced O'odham** develop and adopt a final plan.

Future- **Hia-Ced O'odham** hire contractor and begin construction.

Future- **Hia-Ced O'odham** move-in.



August 2009- **Hia-Ced O'odham** site enters federal trust status.

June-July 2009- **Hia-Ced O'odham Program Office** administers a community survey.

June 2009- **Drachman Institute** Presentation I (Wastewater Treatment, Site Concepts, Housing Densities, Housing Configurations).

Future- **Hia-Ced O'odham** determine interested, committed, and qualified future residents.

Future- **Hia-Ced O'odham** create development partnerships and select an ownership model.

Future- **Hia-Ced O'odham** acquire a reliable water supply.



Future- **Hia-Ced O'odham** hire architects, civil engineers, and landscape architects for the creation of construction documents.

Future- **Hia-Ced O'odham** with the Tohono O'odham Nation solicit funding through federal grants etc. for the design and construction.

Project Context

• Site •

- Site Context
- Site Inventory
- Site Panorama
- Site Hydrology
- Site Climate
- Site Vegetation
- Site Maps

• Cultural Context •

- The O'odham Lands
- Hia-Ced O'odham Lands
- Origin
- Religious Background
- Himdag
- Traditional Lifestyle
- Traditional Ceremonies
- Traditional Foods
- Language
- Material Culture
- Traditional Housing



Visiting the site (the banks of Gunsight Wash). May 12, 2009. Photo: Gary Antonio

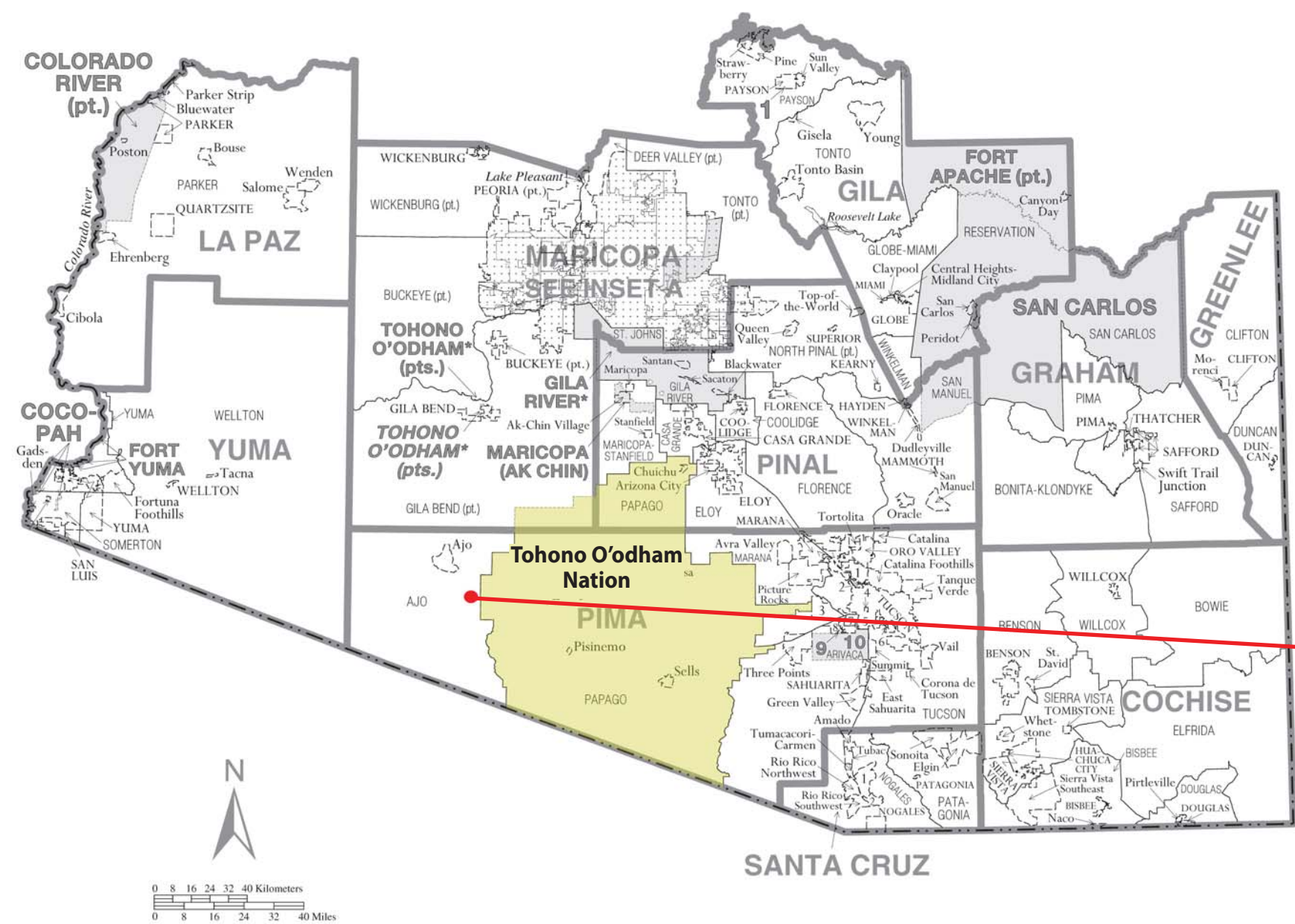
Project Context

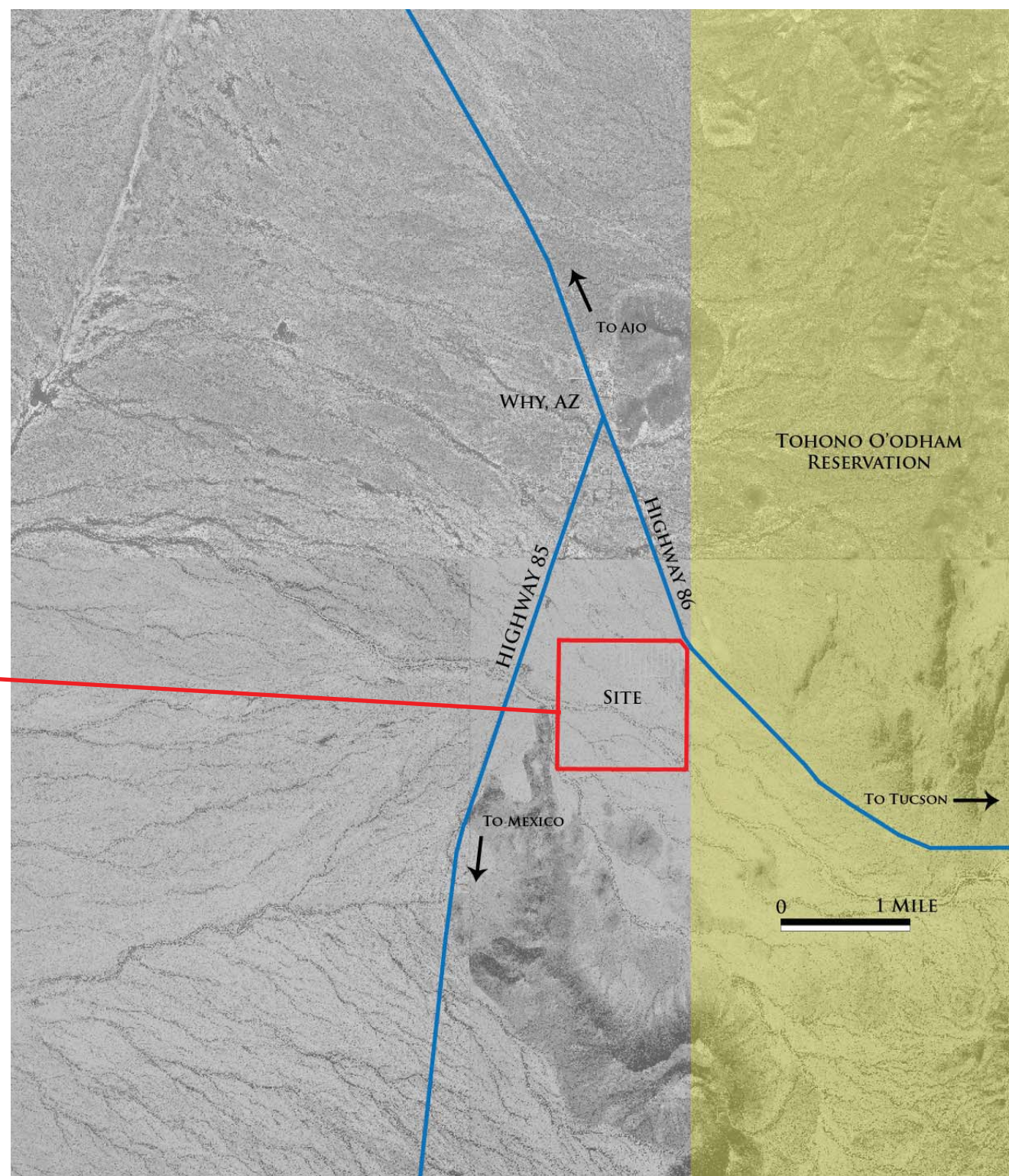
Site Context

In 2003, based on the work of the Hia-Ced O’odham Program to acquire aboriginal lands of the Hia-Ced O’odham, the Tohono O’odham Nation purchased a 642.27-acre site near Why, Arizona as a “home base” for the Hia-Ced O’odham. This parcel of land recently received Federal Trust Land status, and as such has all the legal rights and privileges of land within the Tohono O’odham Nation.

The site is located in southern Arizona, one mile south of Why, Arizona. It is contiguous to the western border of the Tohono O’odham Nation and can be accessed directly from Highway 86. The site’s western boundary is within close proximity to Highway 85.

The site is a full section of land - approximately one square mile or 642.27 acres.





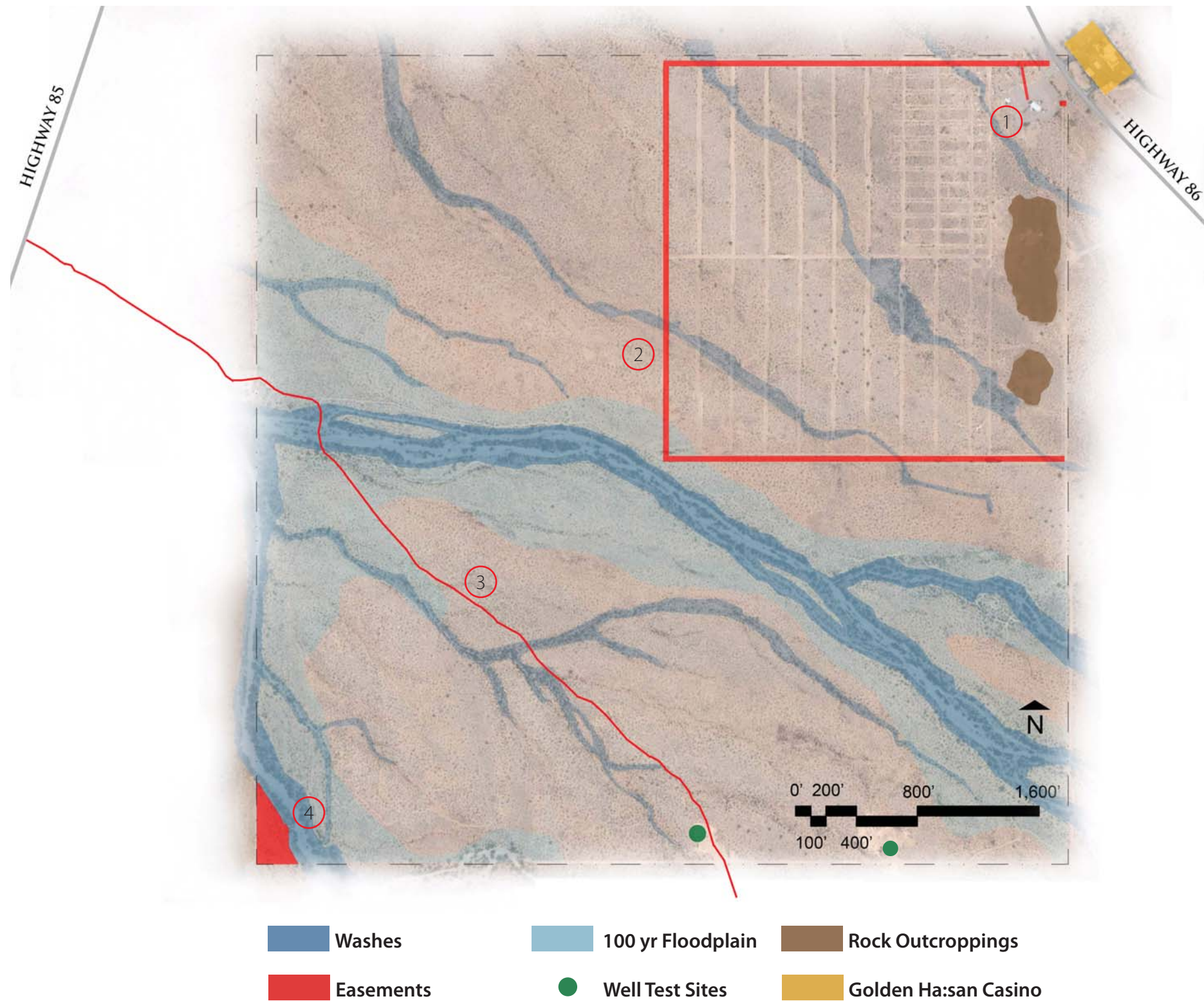
Project Context

Site Inventory

Prior to acquisition by the Tohono O’odham Nation, the northeastern corner of the site served as an RV park designed to accommodate 444 RV lots. While dirt bladed roads service all lots, utilities are only provided to 115 of the lots. All of the existing utility infrastructure remains, including approximately six septic tanks. Several uninhabited structures also remain on the site.

Washes large and small run across the site traveling in a general northwest direction.

- The site has several existing legal easements including:
- 1. Utility easements at the northeast corner of the site
 - 2. Pima County ingress/egress easements surrounding the old RV park perimeter
 - 3. Vehicle/horseback access easement
 - 4. Livestock access easement





The Golden Ha:san Casino and gas station is located along Highway 86 opposite the site's entrance.



A remnant of Roberts RV Ranch, this modular facility is located near the site's entrance and serves as the Hia-Ced O'odham land-base headquarters.



A non-functioning water tank is situated along the eastern property line atop a small rock outcropping.



The Gunsight Wash runs through the property and is flanked by a 100 year floodplain that imposes restrictions on buildings and infrastructure.



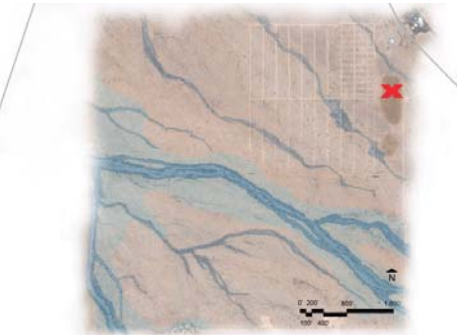
A previous connection supplying the site with water from Why is no longer available. Well test results from the site came back inconclusive and further testing is required to identify a water source.



The site is relatively flat and predominately populated by creosote shrubs. Hills in the distance rise above the landscape forming a scenic backdrop.

Project Context

Site Panorama



SOUTH

WEST

Images were taken from the top of the water tank on the eastern property line.

Access from Highway 86
Through Adjacent Property
(cont'd)

Roads from RV Park



NORTH

Land Base Modular

Golden Ha:sa:n Casino

Highway 86

Access from Highway 86
Through Adjacent Property



Project Context

Site Hydrology

The Gunsight Wash cuts through the center of the site with a peak discharge of 12,000 cubic feet per second at the east property boundary. Several smaller washes also run through the site in a general northwest direction. These washes impose restrictions on buildings and infrastructure within the washes floodplain and surrounding areas.

When the RV park was operational, a line from nearby Why, Arizona supplied water to the site. This source of water is no longer available, and an alternative source will need to be identified. A pump test was conducted at a new well located near the south property boundary, but the results remain inconclusive. Before development can begin a reliable water source will need to be identified.



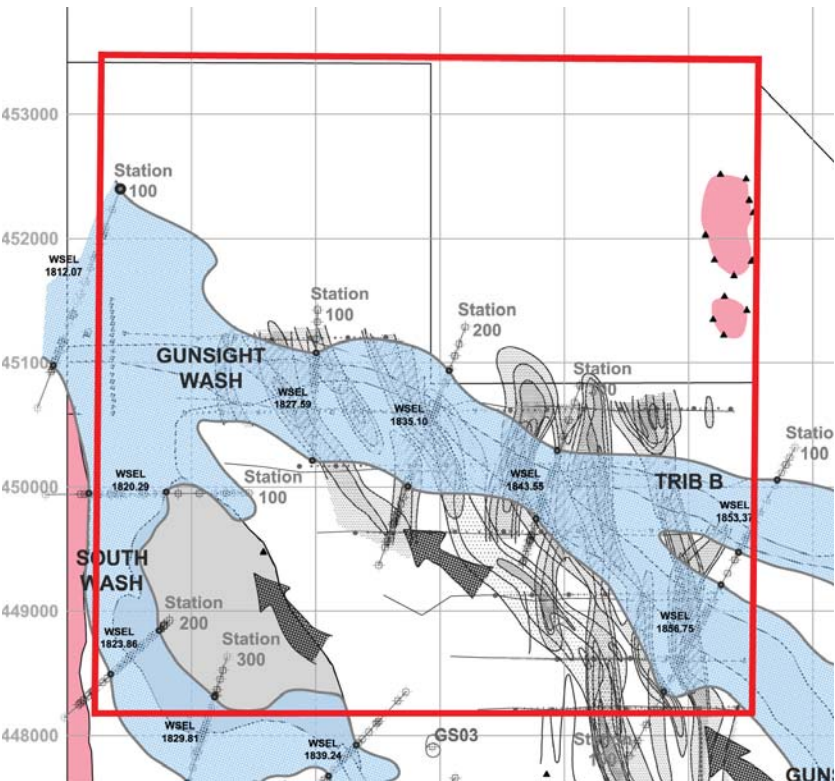
Left: Gunsight Wash



Right: Unnamed Wash

Floodplain Setbacks

Although Pima County has no jurisdiction over the Tohono O’odham Nation, it is recommended that the ordinances in place in Pima County be used as guidelines for the Hia-Ced O’odham development.



Hydrology Map: Billingsley, Briandy. Hia-Ced O’odham Master Land Use Plan. April 2005.

Floodplain Setbacks, Pima County, AZ

Ordinance

Title 16 Floodplain and Erosion Hazard Management, §16.54.030
Chapter 16.40

EROSION HAZARD AREAS AND BUILDING SETBACKS

Sections:

- 16.40.010 Building setback requirements.
- 16.40.020 Setbacks near major watercourses.

- 16.40.030 Setbacks from minor washes.
- 16.40.010

Building setback requirements.

In erosion hazard areas where watercourses are subject to flow-related erosion hazards, building setbacks are required as set out in Sections 16.40.020 and 16.40.030. (Ord. 1999-FC-1 § 1 (part) 1999; Ord. 1988-FC2 Art. 12 (part), 1988)

16.40.020

Setbacks near major watercourses.

For major watercourses, with base flood peak discharges of two thousand cfs or greater, the following building setbacks shall be required where approved bank protection is not provided:

A. Along the following major natural watercourses where no unusual conditions exist, a minimum building setback, as indicated below, shall be provided at the time of the development unless an engineering analysis which establishes safe limits is performed by an Arizona registered professional civil engineer and is approved by the county engineer. Unusual conditions include, but are not limited to, historical meandering of the watercourse, large excavation pits, poorly defined or poorly consolidated banks, natural channel armoring, proximity to stabilized structures such as bridges or rock outcrops, and changes in the direction, amount and velocity of the flow of waters within the watercourse.

1. The building setback shall be five hundred feet along the Santa Cruz River, Rillito Creek, Pantano Wash, Tanque Verde Creek and the Canada del Oro Wash downstream of the confluence with Sutherland Wash;

2. The building setback shall be two hundred fifty feet along major watercourses with base flood peak discharges greater than ten thousand cfs;

3. The building setback shall be one hundred feet along all other major watercourses with base flood peak discharges of ten thousand cfs or less, but more than two thousand cfs.

B. Along major watercourses where unusual conditions do exist, building setbacks shall be established on a case-by-case basis by the county engineer, unless an engineering study which establishes safe limits is performed by an Arizona registered professional

civil engineer and is approved by the county engineer. When determining building setback requirements, the county engineer shall consider danger to life and property due to existing flood heights or velocities and historical channel meandering. Unusual conditions include, but are not limited to, historical meandering of the watercourse, large excavation pits, poorly defined or poorly consolidated banks, natural channel armoring, proximity to stabilized structures such as bridges or rock outcrops, and changes in the direction, amount, and velocity of the flow of waters within the watercourse. (Ord. 1999-FC-1 § 1 (part) 1999; Ord. 1988-FC2 Art. 12 (A), 1988)

16.40.030

Setbacks from minor washes.

For minor washes with a base flood peak charge of two thousand (2000) cfs or less, the following building setbacks shall be required where approved bank protection is not provided:

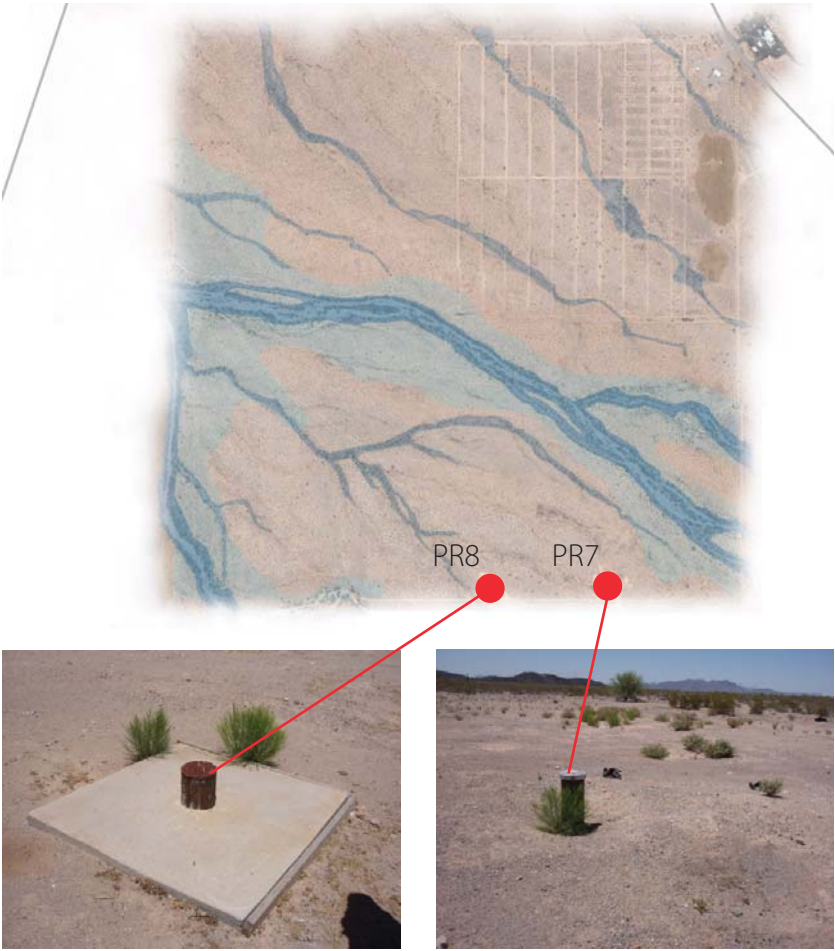
A. Along minor watercourses where no unusual conditions exist, a minimum setback of fifty feet shall be provided at the time of development unless an engineering analysis which establishes safe limits is performed by an Arizona registered professional civil engineer and is approved by the county engineer. Unusual conditions include, but are not limited to, historical meandering of the watercourse, large excavation pits, poorly defined or poorly consolidated banks, natural channel armoring, proximity to stabilized structures such as bridges or rock outcrops, and changes in the direction, amount, and velocity of flow of the waters in the watercourse.

B. Along minor washes where unusual conditions do exist, building setbacks shall be established on a case-by-case basis by the county engineer, unless an engineering study which establishes safe limits is performed by an Arizona registered professional civil engineer and is approved by the county engineer. When determining building setback requirements, the county engineer shall consider danger to life and property due to existing flood heights or velocities and historical channel meandering. (Ord. 1999-FC-1 § 1 (part) 1999; Ord. 1988-FC2 Art. 12 (B), 1988)

http://landuse.law.pace.edu/landuse/documents/laws/reg9/Reg9_AZ_PimaCounty_Riparian.doc

Pump Test Report

In September 2008 a pump test was conducted by the Department of Water Resources for the Tohono O’odham Nation. Testing was conducted on pump ing well PR8 and monitoring well PR7 near the south-central boundary of the Hia-Ced O’odham property.



Summary of Report

According to page 12 of the report, the maximum yield for the well at the depth that was tested is 8,600 gallons per day. This number can be used to generate the maximum number of homes the well could support based on assumptions of water usage. The national average of water use in the United States is 184 gallons per person per day. Tucson’s average is about 100 gallons per

person per day while Phoenix is around 200. If we assume 100 gallons per person per day at the Hia-Ced site, we can guess that the well at this depth could support approximately 86 people per day. If there are about three people per home, this could translate into approximately 28 homes maximum on the site. This number does not include any other land use other than residential, nor does it include any flexibility of water usage or storage. Thus, this estimate is a maximum and is very liberal.

The report also conducted simulations to estimate what the well may produce at greater depths. One simulation showed that if the well was drilled 80 feet deeper, then that resulting production could be at around 23,000 gallons per day. Using the same assumptions as before, this may translate to supporting a maximum of 76 homes (again, not including any commercial or other use, flexibility in water use, or storage). The last simulation showed a well that was estimated at a depth of 1,300 feet and used a larger diameter (12 inches) casing and larger pump. This simulation estimated a production of 93,600 gallons per day. So, again, using the same assumptions, this simulated well could support approximately 312 homes (again, not including any commercial or other use, flexibility in water use, or storage). These simulations lead us to conclude that additional testing will be necessary to fully understand the capacity of this well site.

In addition to the depths and production of water, the well report discussed a few other concerns. First, the water from the test well was at a temperature of 117 degrees Fahrenheit. This may be seen as a benefit. This indicates there is potential for using the water for heat exchange and/or as a source of energy. It might be able to be used for space heating in the winter and will make heating water more efficient. This will take more investigation and engineering. Second, the water was tested for chemicals. The results showed that the water meets safety standards for drinking. However, there may be unpleasant tastes or staining from the water, depending on the depth of the well.

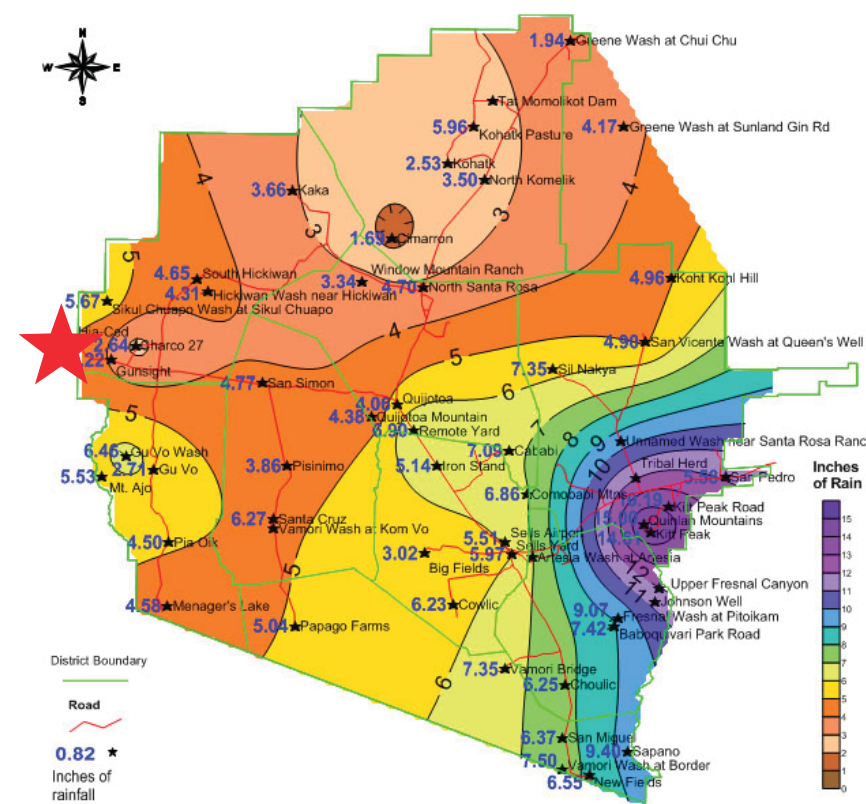
Project Context

Site Climate | Site Vegetation

The site has a rain gauge which is monitored by the Tohono O’odham Nation Water Resources Department. Additional climate data was collected from nearby Ajo, AZ. On average, the area receives 8 inches of precipitation in a year, with water evaporation from an open tank exceeding 6 feet annually. Prevailing winds are from the southwest.

Vegetation is predominantly creosote with an increase in biodiversity near washes and low points where water tends to collect. An environmental assessment should be conducted or consulted prior to development to identify impacts on the surrounding ecosystem.

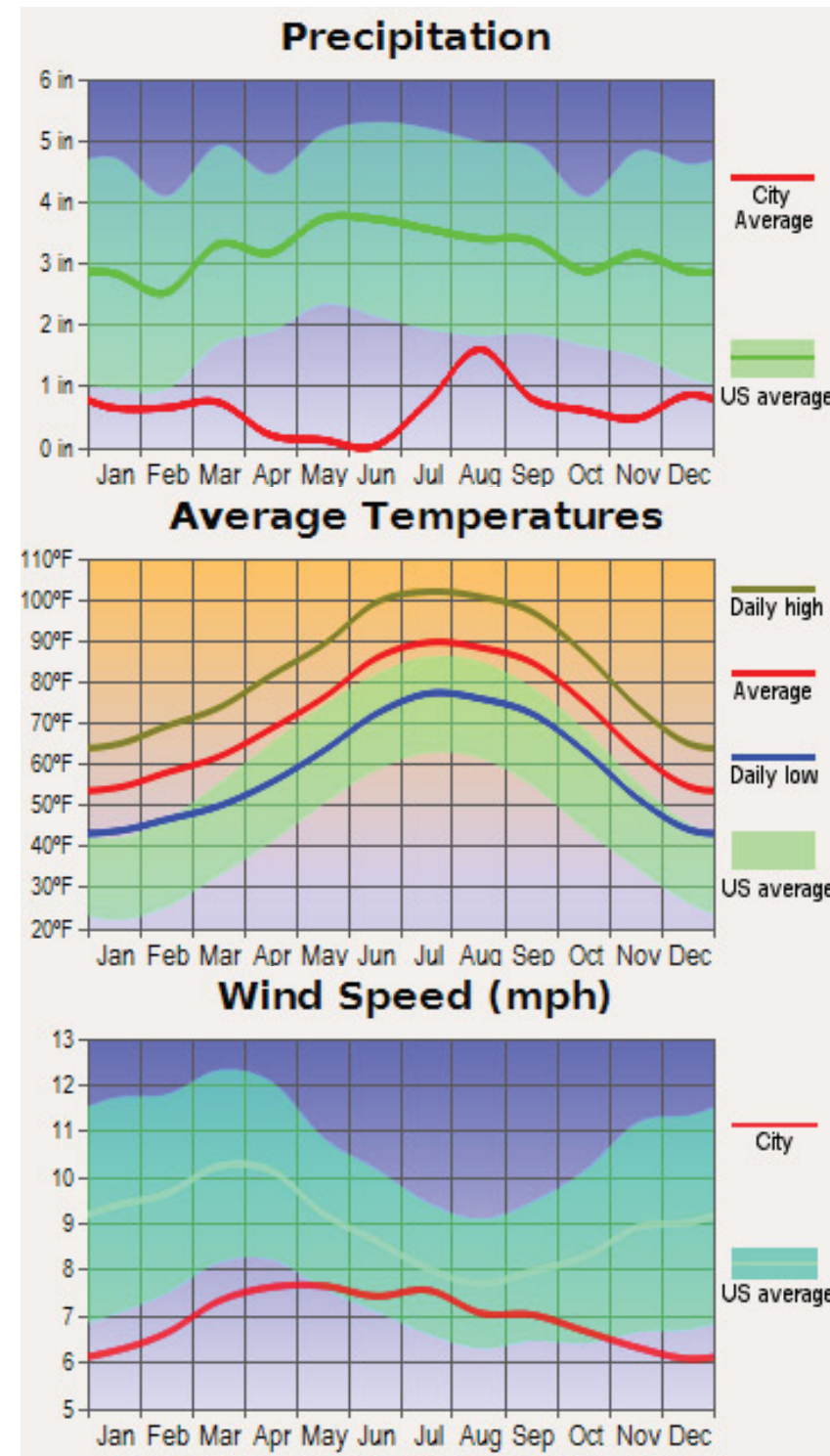
Tohono O’odham Nation Rainfall Distribution Map for the 2009 Calander Year



Rainfall Distribution Map: Tohono O’odham Nation Water Resources Department

The Hia-Ced O’odham Land Base is indicated above by the star. Unfortunately rainfall data collected from the site for the 2009 calendar year lacks data from the month of January. Excluding any rain accumulation that occurred during the month of January, the site received 3.74 inches of precipitation in 2009.

Ajo, Arizona Weather Data



Ajo Climate Data Charts: (<http://www.city-data.com/city/Ajo-Arizona.html>) 29 Jan, 2010.



Creosote, *Larrea tridentata*



Crucifixion Thorn, *Castela emoryi*



Desert Wolfberry, *Lycium marcodom*



Saguaro, *Carnegeia gigantea*



Ironwood, *Olneya tesota*



Ocotillo, *Fouquieria splendens*



Desert Broom, *Baccharis sarothroides*



Velvet Mesquite, *Prosopis velutina*



Palo Verde, *Parkinsonia spp.*

Plant images to the left represent many of the larger plant species found on the site. Other smaller species include various forms of cholla, fishhook barrel cactus, prickly pear, brittle bush, and an assortment of grasses.

Images:

Ironwood: (<http://www.delange.org/IronwoodTree/Dsc00001.jpg>) 26 Jan, 2010.

Velvet Mesquite: (http://upload.wikimedia.org/wikipedia/commons/5/5c/Velvet_mesquite.jpg) 26 Jan, 2010.

Palo Verde: (http://www.marietta.edu/~biol/biomes/images/desert/palo_verde_6115.jpg) 26 Jan, 2010.

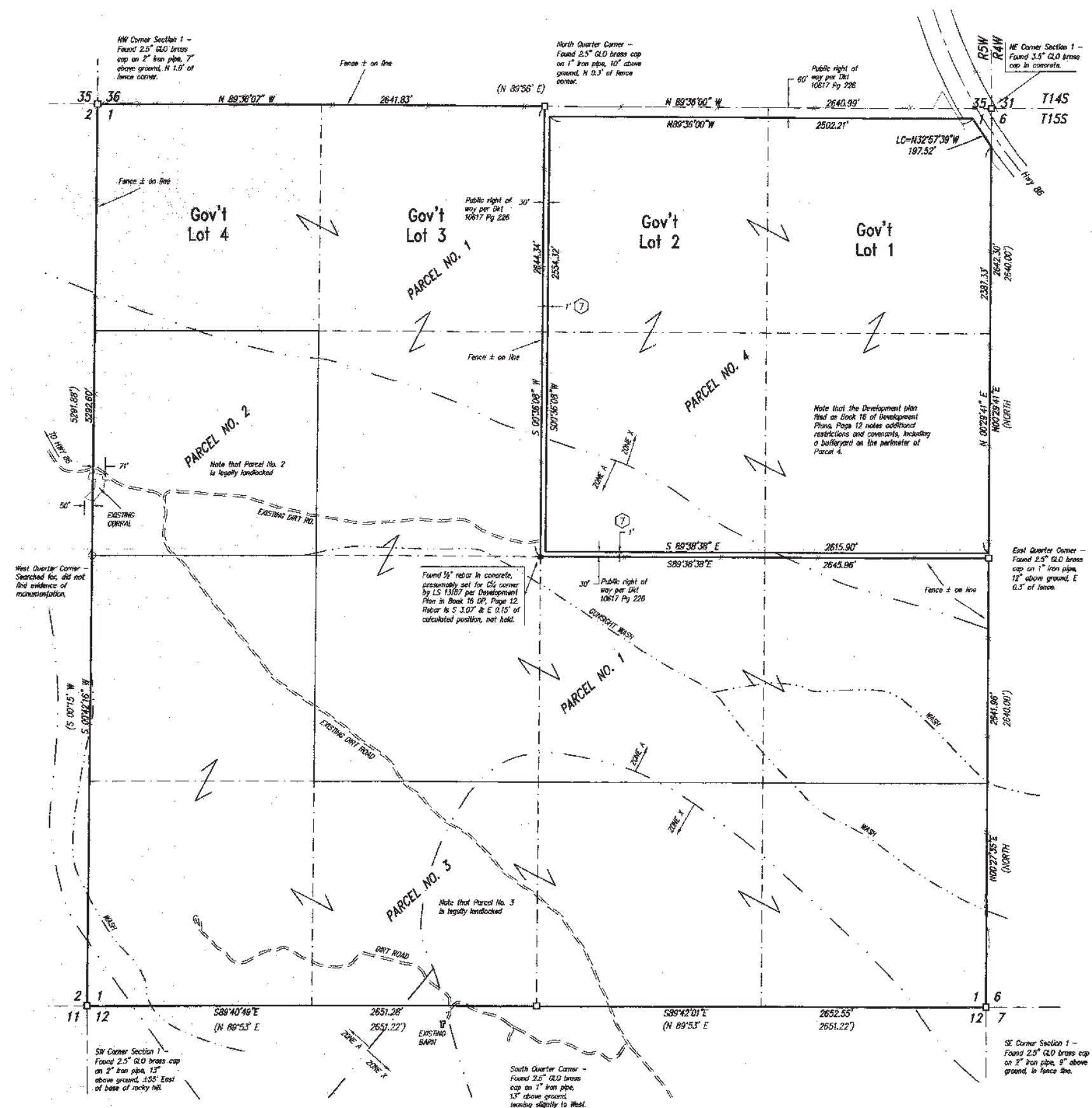
Project Context

Site Maps

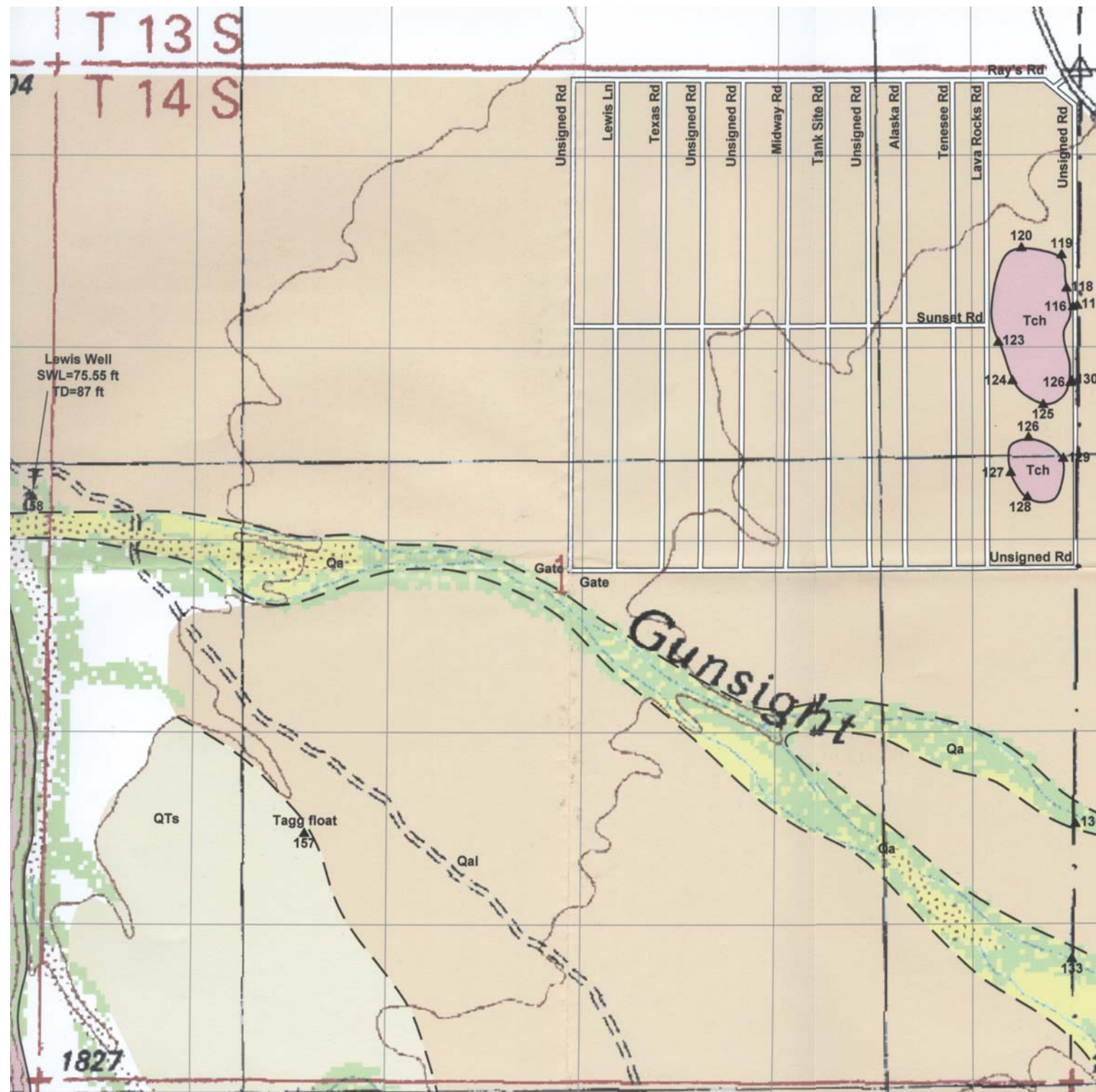
The land survey conducted April 28, 2006 by Stantec Consulting of Tucson, Arizona for the Tohono O’odham Nation is based on title commitment #4634869 prepared by First American Title Insurance Company with an effective date of January 17, 2006. The land survey (shown right) identifies and locates parcel boundaries, roads, easements, and other site features.

The Road Map (opposite left) highlights the RV park’s original streets.

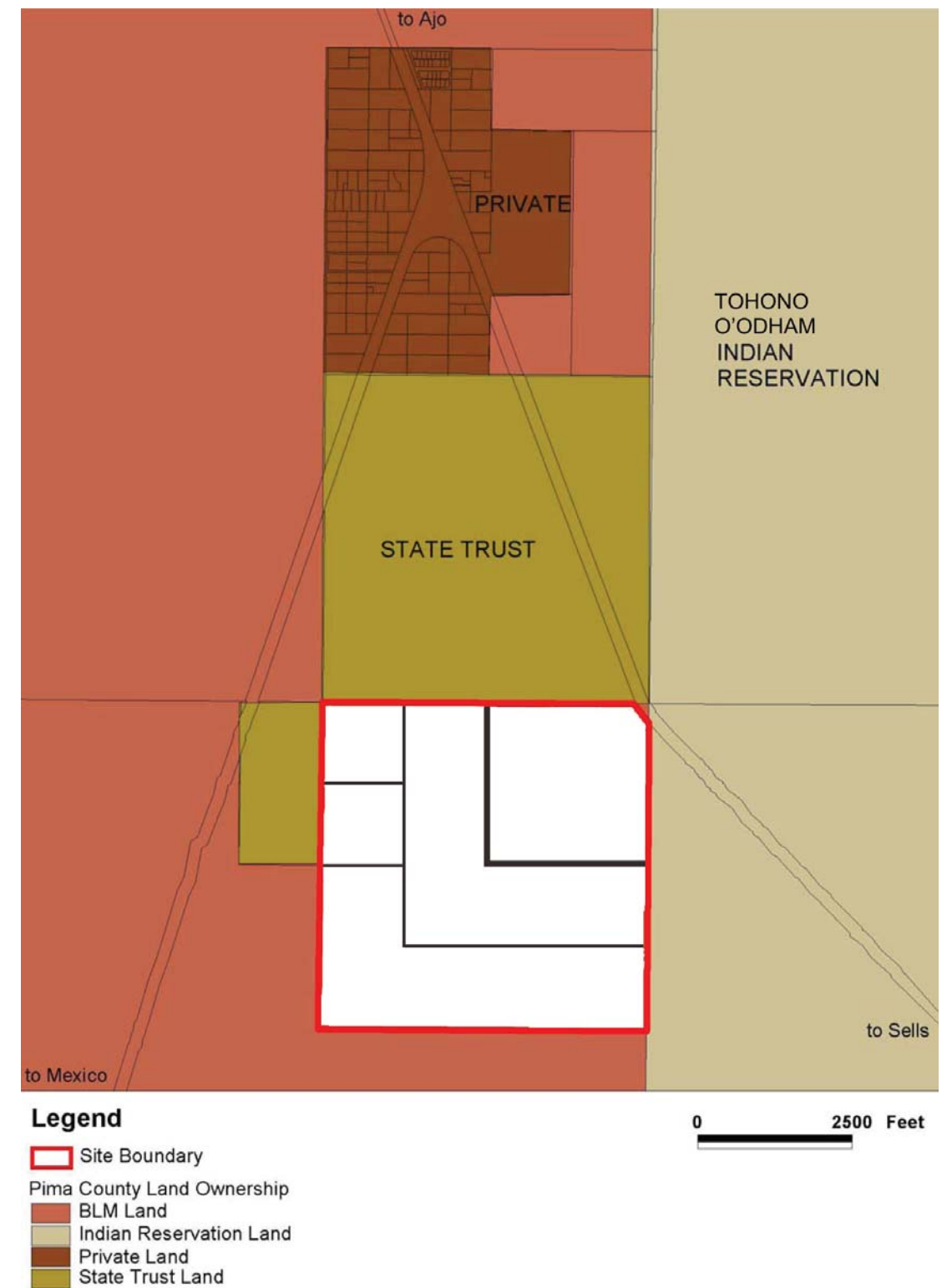
The Adjacent Property map (opposite right) indicates ownership of adjacent parcels of land. Any access to Highway 85 from the site would need to be coordinated and conducted on State Trust Land.



Site Land Survey,
Stantec Consulting 2006



Road Map, Hia-Ced O'odham Master Land Use Plan 2005



Adjacent Property, Hia-Ced O'odham Master Land Use Plan 2005

Project Context

Cultural Context

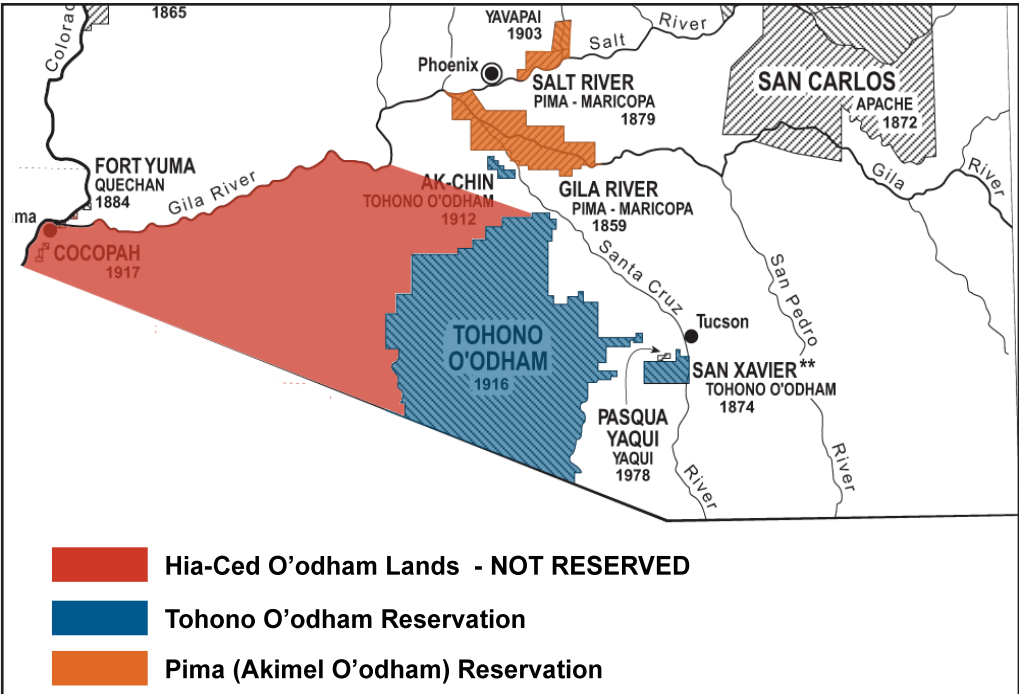
Hia-Ced O’odham - The Sand People

There are three distinct O’odham cultures in southern Arizona: the Akimel O’odham (River People), the Tohono O’odham (Desert People) and Hia-Ced O’odham (Sand People). While the three groups have much in common, including creation stories and language, they have distinct and different cultures and lifestyles. The Hia-Ced O’odham, because of their complex lifestyle and forced assimilation, were mistakenly thought to be extinct in the 20th century. With the efforts of the Hia-Ced O’odham Alliance and the Hia-Ced O’odham Program Office, it is hoped that the unique culture and traditions of the Hia-Ced O’odham can be preserved.

Note: Much of the information specific to the Hia-Ced O’odham comes from: The Extinct Tribe. Eiler, Lorraine Marquez and David E. Doyel. Fragile Patterns: The Archaeology of the Western Papagueria. Altschul, Jeffrey H. & Adrienne G. Rankin Ed. Tucson, Az – SRI Press. 2008. Information and images cited to Eiler refer to this publication.

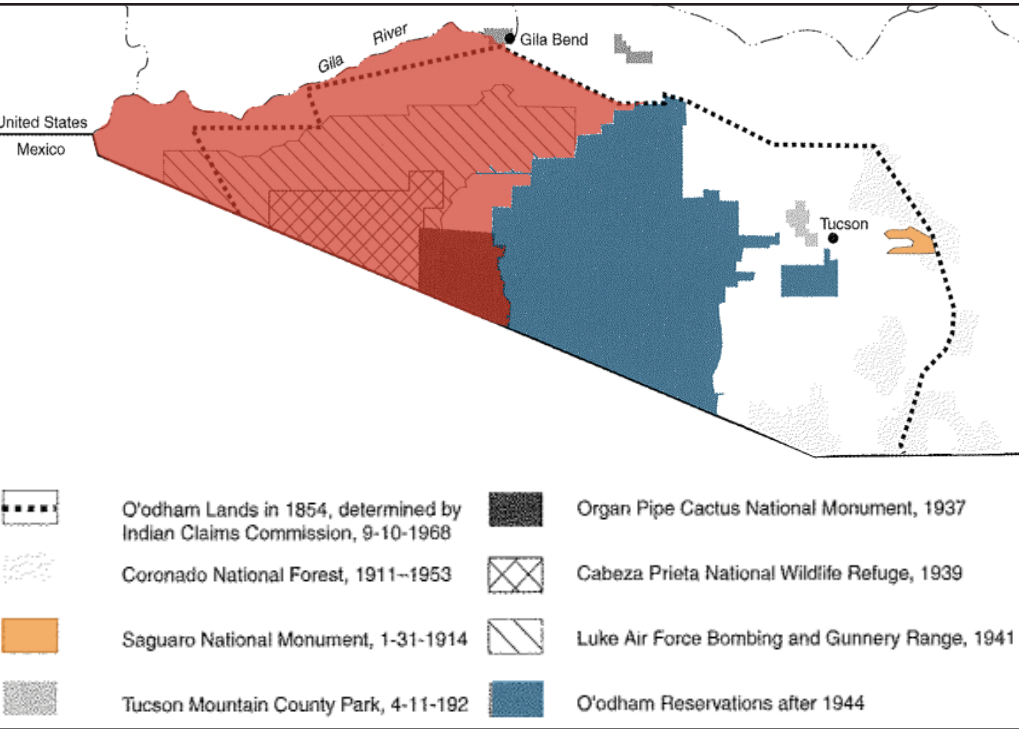
The O’odham Lands

Because the Hia-Ced O’odham lifestyle involves frequent relocation to take advantage of seasonal crops and water flow, there are few “permanent” settlements as understood by westerners, other than Dome Valley and Quitobaquito. As a result, in the early 1900s when the Papago Indian Reservation (now the Tohono O’odham Nation) was established, the governing bodies believed the Hia-Ced O’odham to be extinct and did not set aside land for their use.



Altered: Map of Arizona Native American Reservations from Arizona Geographic Alliance (<http://alliance.la.asu.edu/maps/AZ-RES3.PDF>). 13 Jan 2010.

The Hia-Ced O’odham lands were eventually taken over by the US government (including the Organ Pipe Cactus National Monument and the Cabeza Prieta National Wildlife Refuge), by the Bureau of Land Management, Luke Air Force Base Gunnery Range, Mexico, or lost to private ownership.

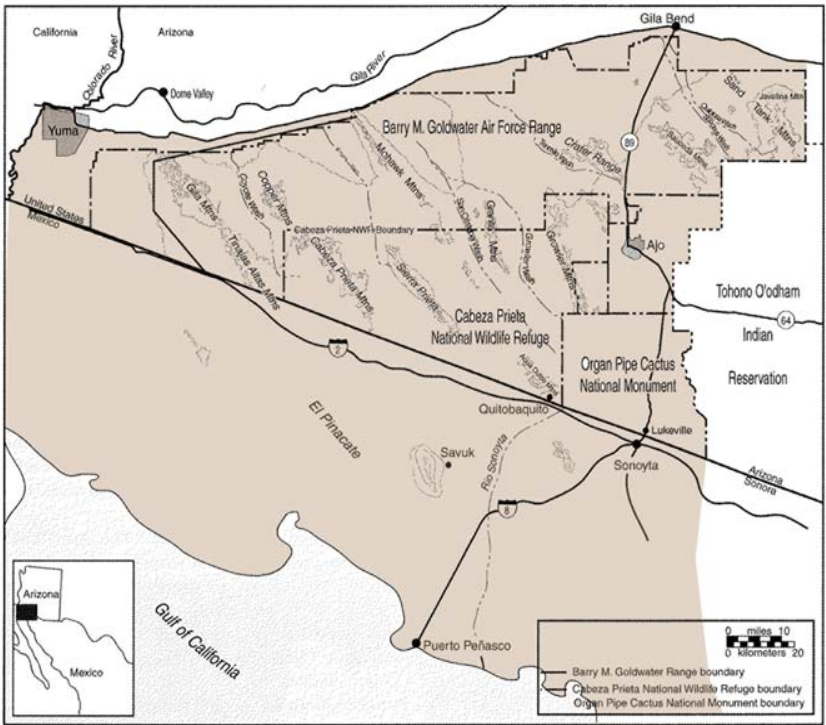


Altered: Map of O’odham Lands Reserved by the United States. Eiler, p 625.

Hia-Ced O’odham Lands

The traditional homelands of the Hia-Ced O’odham comprise about 10,000 square miles of land in southwestern Arizona and Northern Sonora, extending north from Schuk Toak (of Pinacate Mountain) to the Gila River, and from the Colorado River and Sea of Cortez on the West to the boundaries of the Tohono O’odham lands to the East.

Archaeological evidence suggests some 10,000 years of occupation on the O’odham lands. Research shows that an indigenous people of this area may have had interactions with the Hohokam, Patayan, and Trincheras groups and may be ancestors to the Hia-Ced O’odham (Eiler, p 607-608).



Northern Hia-Ced O’odham Homelands. Eiler, p 608.

Origin

O’odham mythology is rooted in the native people’s close relationship with the desert, starting with their legend of origin, which describes how they were brought forth from the earth by l’itoi. While the legends are similar, each O’odham tribe has its own place of origin.

For the Hia-Ced O’odham, their l’itoi Ki (Sacred Mountain and Place of the Creator) is located in the volcanic fields and lava tubes of the Sierra Pinacate. The story of the creation tells how l’itoi led the ancestors up from the underworld at Schuk Toak, the sacred place, and made them from the sand to which they will return. l’itoi gave the Hia-Ced O’odham *himdag*, their way of life. He taught them how to live in the desert, how to make food, medicine and materials, and how to use the songs and ceremonies (Eiler, p 607).

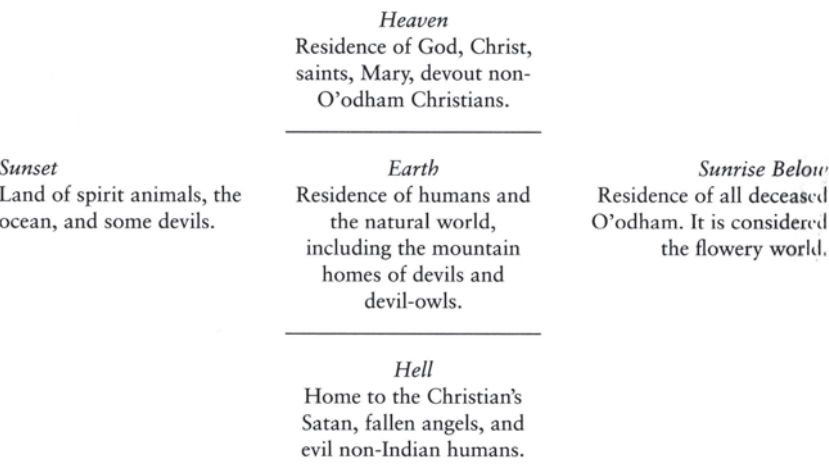


Depiction of l’itoi as the Man in the Maze. Tohono O’odham Community Action. (http://www.tocaonline.org/Basketry/Entries/2008/6/7_Visit_TOCAs_Gallery.html) 20 June, 2009.

l’itoi is most commonly portrayed as the man in the maze. This symbol is meaningful in all O’odham cultures. Although the meaning varies slightly, the man in the maze represents life’s journey, through hardships and tests, twists and turns, until the traveler reaches the center.

Religious Background

The introduction of Catholicism by early missionaries did affect the O’odham religious practices. Catholic beliefs did not replace traditional religion, rather, the O’odham supplemented their beliefs with aspects of Catholic faith that fit. For the Tohono O’odham, for example, St. Francis Xavier is considered a source of supernatural healing power similar to their own revered figures. The diagram below depicts the Tohono O’odham notion of heaven and hell, a hybrid of traditional and Christian beliefs.



Tohono O’odham diagram of Heaven and Hell. Kozak, Davil L and David I Lopez. *Devil Sickness and Devil Songs: Tohono O’odham Poetics*. Smithsonian Series in Ethnographic Inquiry. Washington DC and London: Smithsonian Institution Press, 1999.

Project Context

Cultural Context

Himdag

Himdag is the O’odham way of life. It includes the community, the land, the language, stories, food, etc. Himdag is what defines the O’odham and is the root of their culture.



Residents of Darby Wells with friends. Easter Sunday, 1942. Eiler, p 628.

Autochthonous Culture

Autochthonous is an adjective, meaning “originating where found; indigenous.” Autochthonous people live by being chthonic (in close harmony with the earth). Autochthonous culture is expressed in the spiritual beliefs, cultural activities, social organization, lifestyle, language, games, food, and structures of a community.

Zuni Cruz, Christine. “Chthonic law – overview” Community Land Specialist Training. Community Land Specialists. Albuquerque, NM. Nov 1-3, 2002. Lecture.

The O’odham cultures are based deeply in their relationship with the land.

“We don’t own the land;
we belong to the land and are part of the land”
-Eiler, p 624

The O’odham believe in a circle of life; that all plants, animals, minerals, climate, and human behaviour are part of an interrelated system. Their land, spirituality and culture are inseparable.

Traditional Lifestyle

The Hia-Ced O’odham lands are some of the harshest in the Sonoran Desert. Hot, arid summers with temperatures exceeding 100 degrees fahrenheit are countered by cold winters. With an average of only three inches of annual precipitation on the western edge, survival in the desert was very complex. The Hia-Ced O’odham relied on multiple residences to take advantage of seasonal crops, rains, and springs.

While they changed residences often, the term “nomadic” is insulting to many Hia-Ced O’odham “because of the implication that they had not ‘evolved’ into a sedentary agricultural society and were not ‘civilized’” (Eiler, p 623). A great deal of planning and hard work were required to make use of the limited and constantly shifting resources in the challenging environment.



Hia-Ced settlement at A'al Waipa (Quitobaquito), Organ Pipe Cactus National Monument, in May 1942. The site was later bulldozed by the National Park Service. Eiler, p 623.

The Hia-Ced O’odham villages were smaller than those of the Tohono or Akimel O’odham and generally had less than 100 members. When villagers relocated for a time, it was customary that one member stay behind to watch the village. This was a great responsibility and the task was usually bestowed upon an elder member (Eiler, p 614).

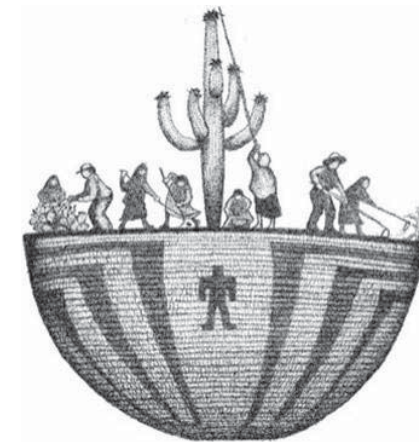


Rare Photograph of Francisco Suni Sr. on horseback, date and place unknown. Suni cared for the village at Bates Well after his tribe had moved on. Eiler, p 624.

Traditional Ceremonies

O’odham culture revolves around the recognition that all elements of nature have spirits which must be respected. Traditions and cultural practices are the result of the need to live in harmony with the environment and maintain the health of the community.

The Hia-Ced O’odham share many traditions with other O’odham tribes. For instance, the Hia-Ced O’odham are the stewards of the Vi:gida ceremony, which consists of the sacred rites of renewal and is attended by both Tohono and Akimel O’odham (Eiler, p 609).



Above: Tohono O’odham Harvest Basket. Tohono O’odham Community Action (<http://www.tocaonline.org/Home.html>). 20 June 2009

The Vi:gida, the most important event of the year, takes place each summer. It is preceded by the preparation of saguaro wine, which is consumed (by the men only) over 4 days of dancing, singing, and story-telling in order to bring about the summer rains.

One tradition unique to the Hia-Ced O’odham was the ritual cremation of food animal bones and horn cores. This was done to pacify the spirits of the dead so they wouldn’t interfere with hunting (Eiler, p 617-620).

Traditional Foods

Food came from a variety of sources including agriculture, plant-gathering, hunting, and trade. Under normal environmental conditions, trade with the Seri, the Akimel O'odham in the Gila Valley, and other neighboring tribes provided a fairly balanced diet.

Ak-chin farming methods used *temporales* (flood runoff), *tinajas* (wells) and springs to water crops. Based on oral histories and texts, around 30 fields are known of on Hia-Ced O'odham lands. Most fields were near settlements, although some, such as those associated with Darby Wells, were located miles from the village (Eiler, p 615).



Temporal (old fields) located on Cabeza Prieta. Eiler, p 616.



Left: Edward Wesley showing methods of gathering Sahuaro fruit. Edward H. Davis. 1919. Smithsonian National Museum of the American Indian.

When conditions made farming impossible and trade scarce, the Hia-Ced O'odham relied on plants (including fruits, cacti, mesquite, roots, and a unique plant known as sandfood, which grows in the sand dunes) and small mammals, reptiles (lizards, desert turtles, etc), insects and shellfish. (Eiler, p 615)

Language

Language is considered one of the most important ways to be O'odham. There are 11 different dialects of the traditional language, but its use is waning. Most O'odham speak English or Spanish, although many make an effort to preserve their culture through learning and teaching the language.

The Hia-Ced O'odham have the most distinctive of the O'odham dialects. It is faster than the others and uses a distinct lexicon. The difference may be due to the Hia-Ced O'odham's relative isolation from other O'odham and the frequency of trade with non-O'odham tribes. (Eiler, p 609)

Material Culture

The material culture of the Hia-Ced O'odham is very similar to that of other O'odham tribes, such as clothing, ornaments, housing, tools, utensils, shrines, and other paraphernalia. Some of the items unique to the Hia-Ced O'odham include limberbush baskets and footwear made with marine mammal skin (acquired through trade with the Seri) (Eiler, p 610).



O'odham Coiled Basketry. <http://www.statemuseum.arizona.edu/artifact/coilbasket.shtml>

Traditional Housing

"O'odham architecture, moreover, was a practical consideration in an arid land. Mesquite, grass, ribs of saguaro cacti, and similar plant materials were used in building structures. ... To build them was not labor intensive and to give them up, either permanently or temporarily, caused no great sacrifice to individual or community. O'odham, who slept and cooked out of doors except in inclement weather, rested lightly upon their landscape."

Quote from Bernard Fontana. Messina, John. *Architecture and Urbanism of the Southwest*. University of Arizona. March 2002. Web. 23 Sept, 2009.

While little documentation of traditional Hia-Ced O'odham housing is available, the houses were similar to those of the Tohono and Akimel O'odham. Since most living was done outdoors, the houses were minimal structures. Stick frames (either bent to form a sort of dome or post-and-beam construction) were covered with mud and brush to protect from the elements, such as is seen in the ki house to the right.



Right: 2 Men Making a Kee or Brush House. Dinwiddie, William. 1894. ArtStor (http://library.artstor.org/library/welcome.html#3js_earch11papagoMultiple20Collection20Search||||type3D3126kw3Dpapago26id3Dall26name3D) 29 Oct, 2009.



Above: Akimel O'odham House with Ramada. Edward H. Davis. 1919. Smithsonian National Museum of the American Indian.

Another kind of house, the Hia-Ced O'odham pit house (right), was partially dug into the ground to allow the occupants to benefit from the cool earth (Eiler, p 620).



Process

- 2005 Master Land Use Plan Summary •

- First Community Presentation •

- Site Concepts
- Housing Concepts
- Wastewater Management
- Housing Densities
- Community Design Activity
- Community Feedback

- Community Survey Summary •

- Second Community Presentation •

- Cultural Influences
- Site Concepts
- Housing Cluster Concepts
- Housing Concepts
- Community Feedback

- Third Community Presentation •

- Site Principles
- Housing Cluster Principles
- Housing Principles
- Community Feedback



Left to right: Colleen Cummings, Peter McBride, Scott Stephens, Dustin Robles, Rosalynd Alexander, and Brandy McLain. June 03, 2009. Photo: Gary Antonio

2005 Master Land Use Plan

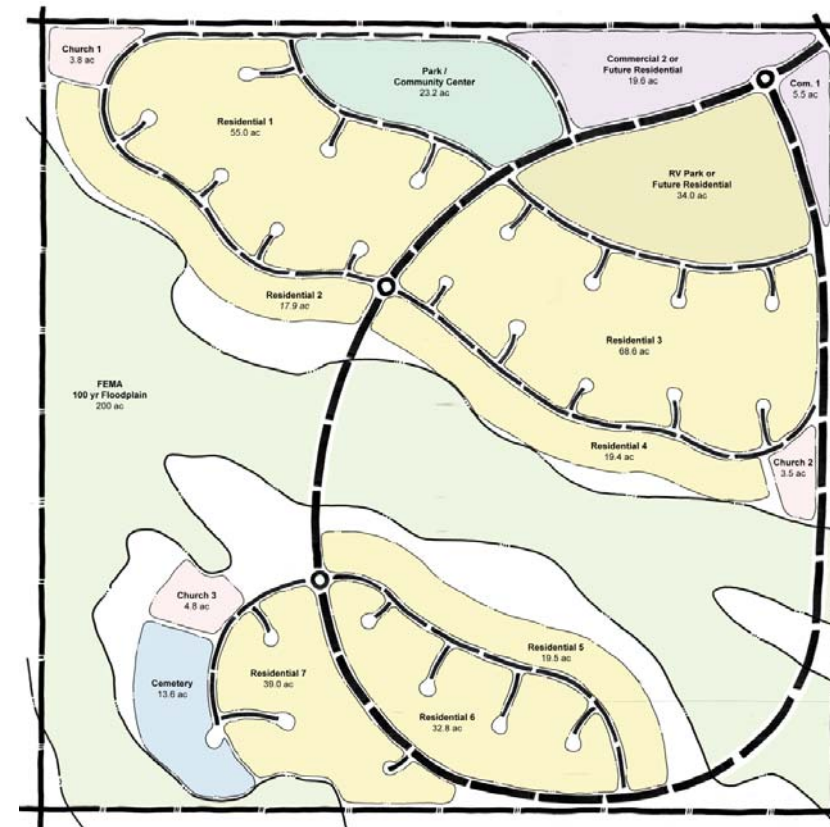
In 2005, a Master Land Use Plan for the Hia-Ced O'odham was prepared by Brandy Billingsley, a graduate planning student at the University of Arizona, with the Drachman Institute.

"The Master Land Use Plan summarizes a twelve-month planning process aimed at defining a vision for the Hia-Ced O'odham. The planning process included community meetings, field inventories, case studies, preliminary site design, and the review of existing documents and studies." (Billingsley)

The purpose of the 2005 Master Land Use Plan was to engage the Hia-Ced O'odham in a participatory effort to plan their community and to ensure that future growth proceed in a manner consistent with the vision of the whole community.

The 2005 Master Land Use Plan includes:

- brief history of Hia-Ced O'odham
- timeline of events
- extensive site analysis
- comparison of regional demographic data
- description of elements of plan (concepts)
- goals, objectives and guidelines for future development



Eight land uses were established (see map above):

	Residential - 252.2 acres
	RV Park or Future Residential Development - 34.0 acres
	Commercial Development - 25.1 acres
	FEMA 100 Year Floodplain - 200.0 acres
	Park/Community Center - 23.2 acres
	Church - 12.1 acres
	Cemetery - 13.6 acres
	Circulation - 75.1 acres

Development concepts were established to guide future design and community planning.

Neighborhood Concept:

Self-sufficient neighborhoods; homes clustered around gathering areas; linkages to places of work/socialization/recreation; emphasis on walking; similar lot sizes to create sense of equality.

Housing Concept:

High quality housing design that evokes a sense of place; safe and affordable while addressing the diverse needs of the Hia-Ced O'odham; energy efficient and emphasizes water harvesting.

Open Space/Park Concept:

Balanced, accessible, and integrated; open spaces, parks, trails, and recreational opportunities; provide linkages within the site; protect watershed, washes, wildlife habitats and other such resources.

Community Center Concept:

The focus point of the community; community services/facilities (cultural center, elderly care, health services clinic, outdoor cooking area, expanded education (ex. library), childcare opportunities, etc.); connectivity to community.

Agricultural Uses Concept:

FEMA Floodplain designated for agricultural uses (storing or grazing of animals, growing seasonal crops, recreational uses); agriculture on-site provides an educational opportunity for youth.

Church Concept:

2-3 religious buildings to serve different faiths; placement throughout community encourages walking.

Cemetery Concept:

Secluded grounds; sense of culture and tradition where the generations can connect.

Commercial Concept:

Become a vital economic center through encouraging a range of services, fostering innovation in start-up business ventures, and generating capital.

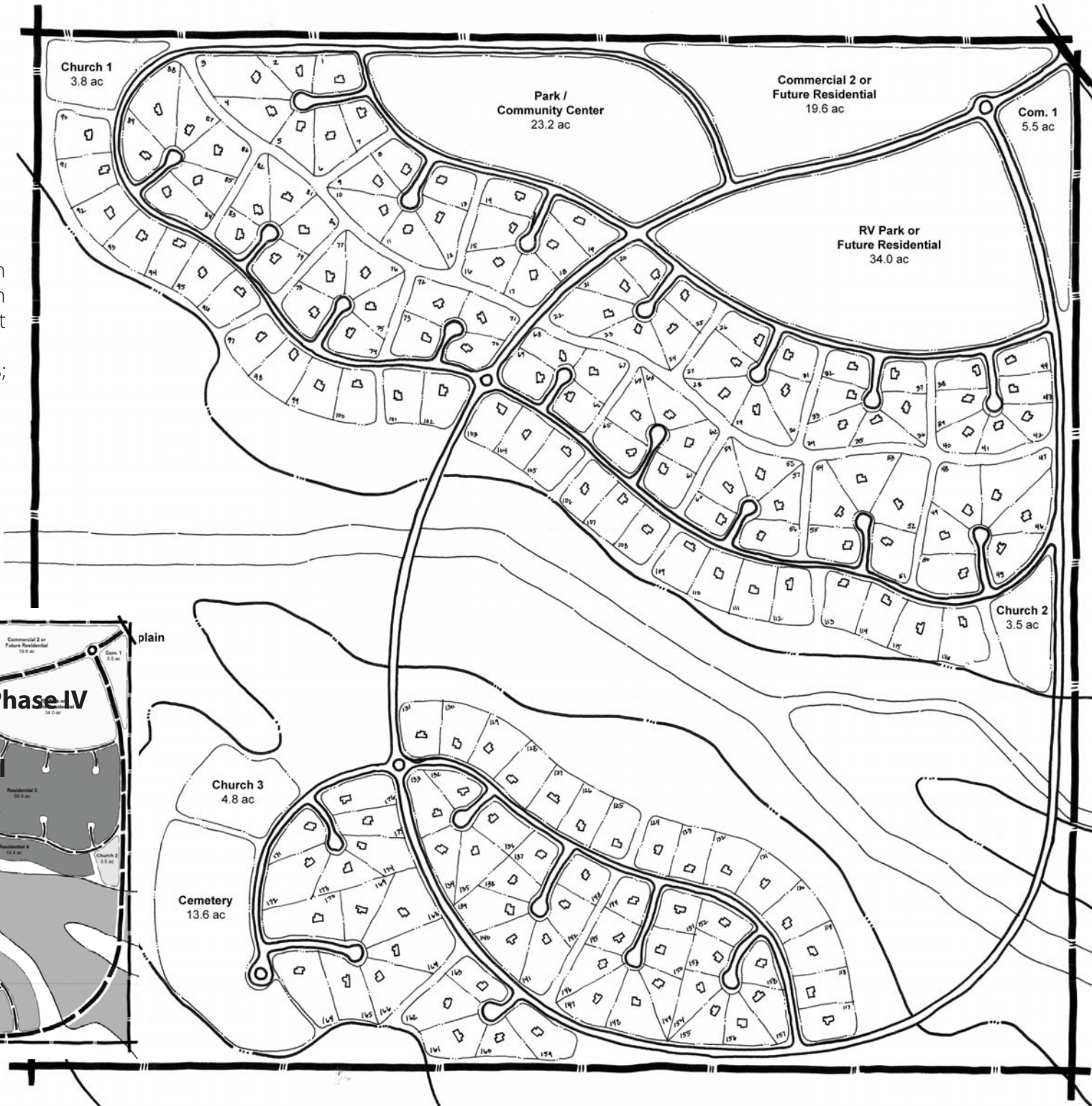
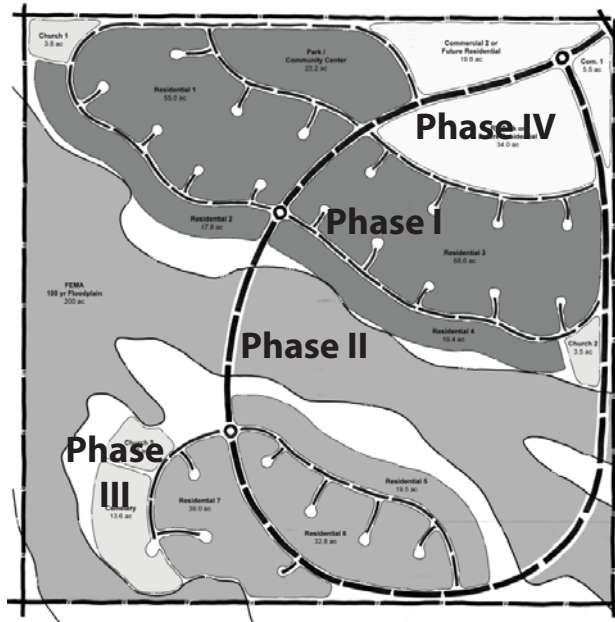
Existing RV Park:

Possibly re-open the RV park as part of the economic development of the site, but reduce the size and implement appropriate buffers to discourage interference with residential uses.

The 2005 Master Land Use Plan includes 176 lots, each between one and two acres., as seen on the right

The 2005 Master Land Use Plan was designed to be completed in 4 phases (from darkest to lightest areas, shown below).

- Phase I: 116 residential lots; park/community center
- Phase II: 60 residential lots; linear park
- Phase III: cemetery; churches
- Phase IV: economic development of commercial parcels/ additional residential lots



2005 Master Land Use Plan Summary

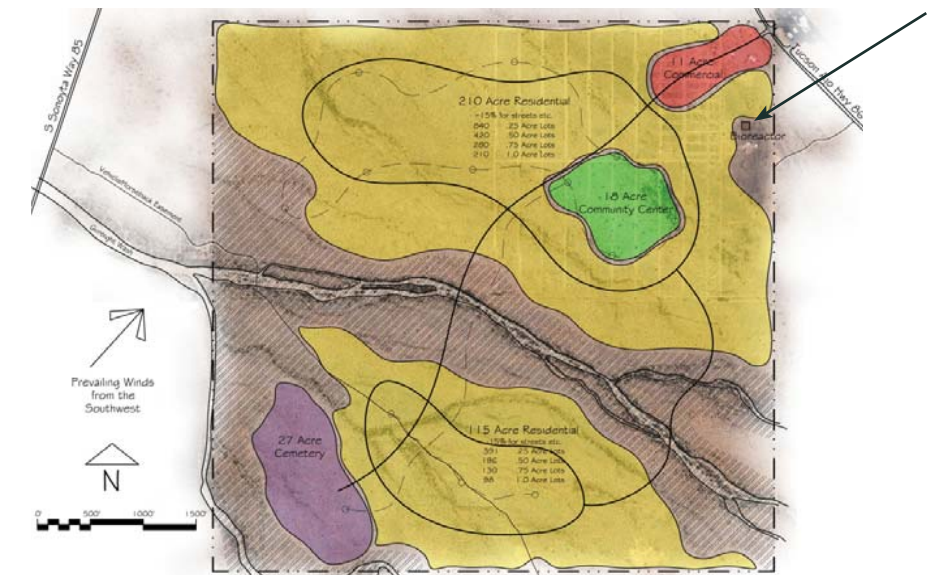
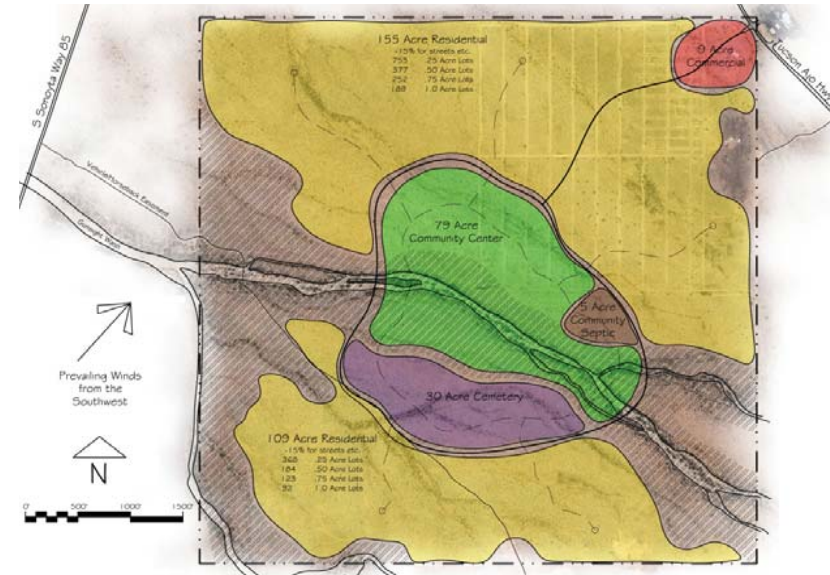
Goals for the development of Hia-Ced O'odham Community:

- Residential uses are the main priority of the property and should be adequately separated from commercial land uses.
- Lots are designed to encourage the clustering of extended families with shared sacred, cooking, and ceremonial spaces to encourage family interaction.
- Commercial uses to be introduced as an amenity to the residents after residential uses are fully established on-site. Additionally, commercial uses shall be located close to Highway 86 and are not to disturb the primary residential use of the property.
- Open space / parks should buffer residential lots from commercial uses, provide interactive amenities to residents, and preserve the Gunsight wash / riparian area.
- The cemetery should be located in a very secluded area to allow for quiet meditation.
- The existing RV Park will remain un-operational until the residential uses are fully established on-site. At that time, it may reopen as an economic development opportunity. However, the original site of the RV Park should be reduced to sixty acres.
- Streets are to be curvilinear in design to eliminate the grid layout of modern tract home communities and provide flexibility of housing setbacks. The roadways should also provide a balance of traffic between pedestrian, bicycles, and automobiles.
- Combination of streets, pedestrian and bicycle-friendly paths, and open space / parks encourage interconnectivity of the whole property.
- One all-weather crossing and one secondary crossing should be incorporated over the Gunsight Wash to provide safe access to the southern portion of the site.
- Complimentary mixed land uses are provided within a comfortable walking distance and include appropriate landscape buffers.
- Promote a sense of neighborhood.
- Preserve cultural and natural resources.

First Community Presentation

On June 27, 2009, the Drachman Institute presented a series of analysis and concepts to the Hia-Ced O'odham Advisory Committee and community members for their review and feedback during their monthly committee meeting at the land base. To elicit community feedback, the following issues were presented and discussed:

- Site design concepts
- Housing design concepts
- Wastewater management systems
- Housing density



Site Concepts

Five site concepts were developed as an analysis and for discussion about possible configurations of land uses. The land uses were chosen based on needs outlined in the 2005 Master Land Use Plan and are as follows:

	Residential Use
	Community Use
	Cemetery
	Commercial Use
	Wastewater Treatment
	Floodplain (not buildable)

Site Concept 1:

Pros: Utilizes floodplain; Centrally located community center; Network of trails; Smaller wastewater facility maximizes available land for other uses (residential)

Cons: Cemetery is less secluded

Wastewater Treatment: Central septic system

Land Use:

Residential: North - 155 acres; South - 109 acres

Cemetery: 30 acres

Community: 79 acres

Commercial: 9 acres

Wastewater Treatment: 5 acres

Site Concept 2:

Pros: Cemetery in scenic and secluded spot; Extremely small wastewater facility (↙) maximizes available land for other uses (residential)

Cons: Cemetery within the 500 year floodplain; Minimal use of the 100-year floodplain

Wastewater Treatment: Membrane bioreactor

Land Use:

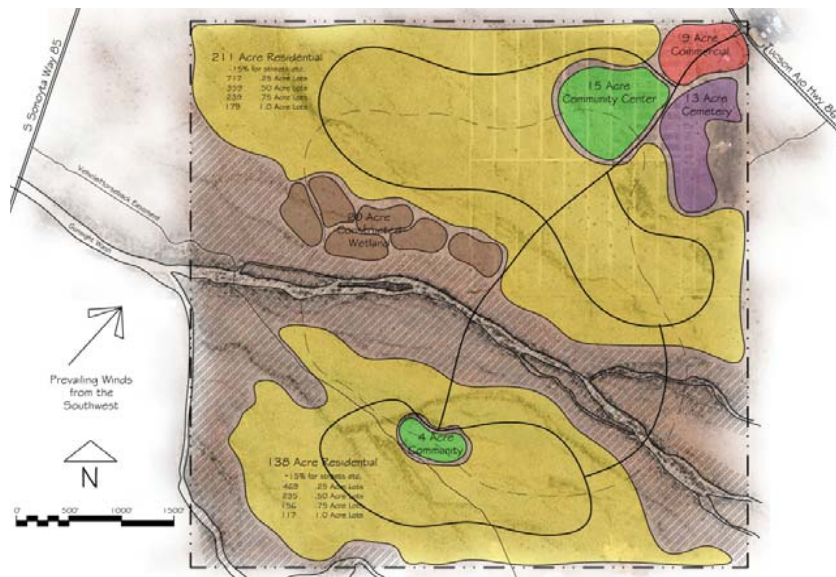
Residential: North - 210 acres; South - 115 acres

Cemetery: 27 acres

Community: 18 acres

Commercial: 11 acres

Wastewater Treatment: 1/8 acre



Site Concept 3:

Pros: Two community gathering areas; Layout is ideal for phasing (all uses are located north of the wash)

Cons: Minimal use of the 100-year floodplain

Wastewater Treatment: Constructed wetland

Land Use:

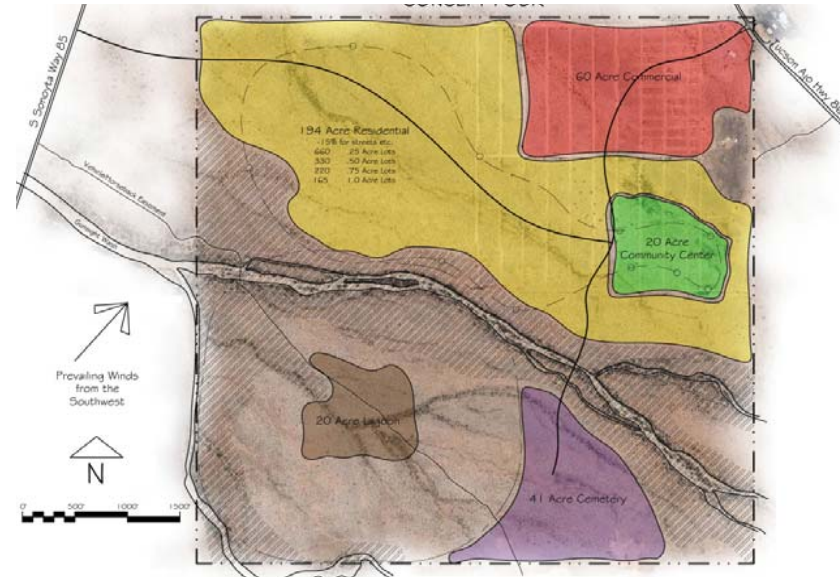
Residential: North - 211 acres; South - 138 acres

Cemetery: 13 acres

Community: 19 acres

Commercial: 9 acres

Wastewater Treatment: 20 acres



Site Concept 4:

Pros: 60 acres of land dedicated to RV park; Additional entrance from State Route 85; Only one bridge needed

Cons: Prevailing winds; Large wastewater facility reduces available land for other uses (residential)

Wastewater Treatment: Lagoon

Land Use:

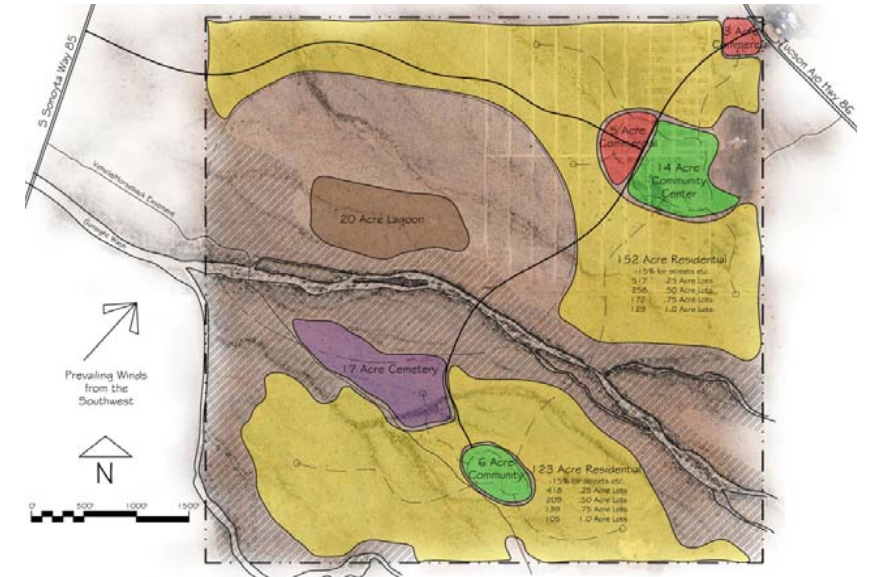
Residential: North - 194 acres; South - 0 acres

Cemetery: 41 acres

Community: 20 acres

Commercial: 60 acres

Wastewater Treatment: 20 acres (+ setback = ~198 acres)



Site Concept 5:

Pros: Activity hub created where the main streets intersect; Commercial development within the site; Additional entrance from State Route 85

Cons: Prevailing winds; Large wastewater facility reduces available land for other uses (residential)

Wastewater Treatment: Lagoon

Land Use:

Residential: North - 152 acres; South - 123 acres

Cemetery: 17 acres

Community: 6 acres

Commercial: 8 acres

Wastewater Treatment: 20 acres (+ setback = ~198 acres)

Process

First Community Presentation


Housing Concepts


In response to ideas discussed in the 2005 Master Land Use Plan and to the traditional settlement patterns of the O’odham, neighborhood planning for the Hia-Ced O’odham Community was approached in a unique way. Traditionally, houses of O’odham family members were clustered in compounds, where outdoor space, dining, and living areas were shared. Approaching housing design in the Hia-Ced O’odham community in a similar way presents many benefits, such as:


- consolidating used outdoor space, leaving more undisturbed desert
- consolidating parking which reduces costs and total infrastructure while lessening the developmental impact on the existing landscape and ecosystems
- fostering closeness in neighbors by sharing the desert
- provides opportunities for elder family members to live near family while maintaining their independence or privacy


The following concepts for housing clusters were presented at the first community meeting.

Key

 Desert

 House

 Shared Ramada

 Road



Concept A: Paved, Shared Driveway with Shaded Parking

Pros: Parking area becomes habitable space shared by families; Infrastructure is reduced; Organization of housing around parking is flexible

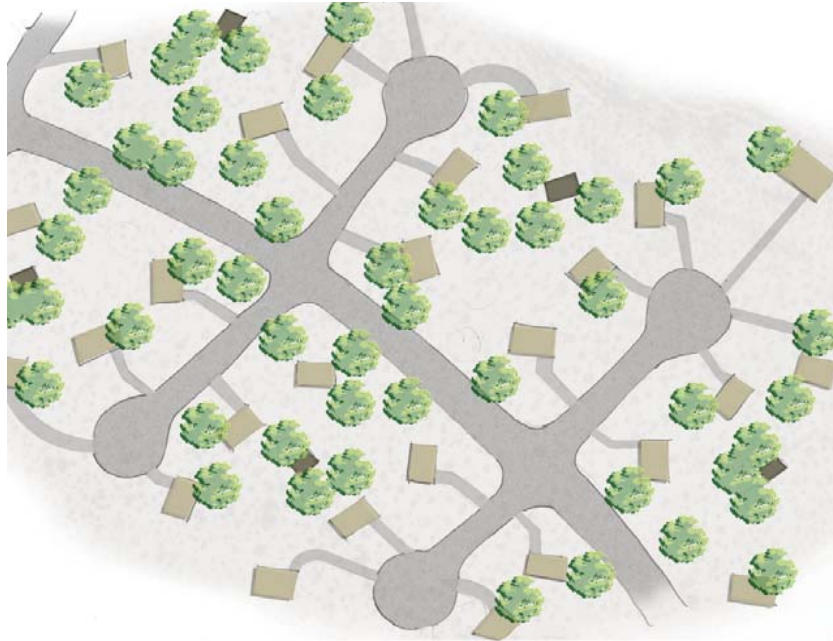
Cons: Distance to walk from car to front door is increased; Central space is shared with cars



Concept B: Un-paved Shared Drives

Pros: Infrastructure is reduced; Dirt/gravel drive slows traffic; Houses have access to shared outdoor space in front and private space in back

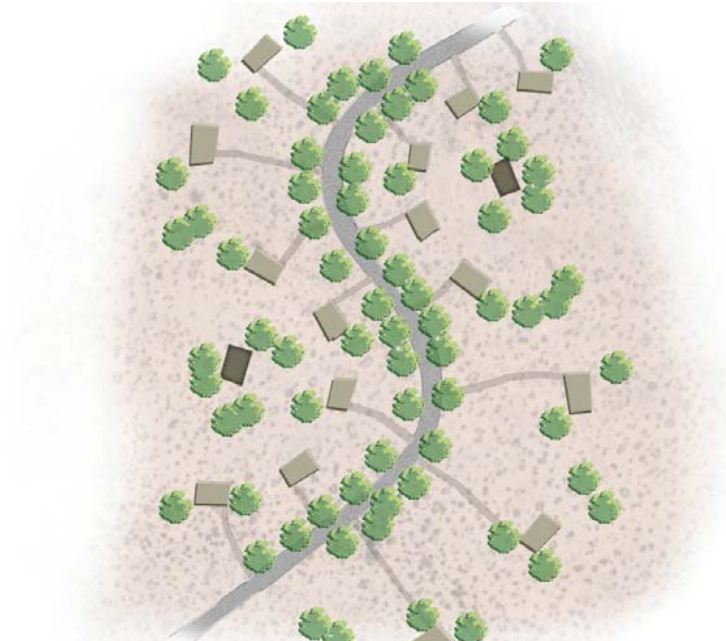
Cons: Central outdoor space is shared with cars



Concept C: Paved Cul-de-sac

Pros: Drives approach houses from rear; Shared outdoor space in front; Paths connecting cul-de-sacs favor pedestrians over vehicles and provide linkages to community; Cluster size and house placement are flexible

Cons: Required infrastructure is increased



Concept D: Varying Densities Around Curves

Pros: Both clustered and individual family housing are accommodated; Clusters on inside of curves, separate houses on outside; Arrangement is flexible

Cons: If solely employed, would lead to lots of meandering roads



Concept E: Major Pedestrian Paths, Minor Streets

Pros: Drives approach houses from the rear with shared outdoor space in front; Pedestrian paths link community, encourage social interaction; Pedestrian and vehicular traffic are separate; Infrastructure is reduced

Cons: Streets become secondary, similar to alleys

First Community Presentation

Wastewater Management

Included here is an overview of the wastewater management options covered in the first presentation. For more information see **Wastewater Management** in the Design Principles chapter and **Wastewater Treatment Options** in the Appendix.



Lagoon:
Cost: moderate (high install, low maintenance)
Size: ~20 acres + setback = 198 acres
Maintenance: low
Aesthetics: berms, chain link fence, black liner
Odor: high (it stinks)



Communtiy Septic:
Cost: moderate (low install, moderate maint.)
Size: approximately 5 acres
Maintenance: moderate
Aesthetics: natural, can be planted over
Odor: none if maintained properly



Constructed Wetlands:
Cost: moderate
Size: 20 acres +
Maintenance: low-moderate
Aesthetics: semi-natural
Odor: moderate



Biomembrane Reactor:
Cost: high
Size: 1/8 acre
Maintenance: high
Aesthetics: industrial
Odor: none

Housing Densities

The following graphics were presented to help community members get a feel for different housing densities and what they might look like at the neighborhood scale. In conjunction with the community design activity described on the next page, this aided in the communication of desired housing densities and relationships.

.25 acre/house



.75 acre/house



.5 acre/house



1.0 acre/house



.65 acre/house



1.25 acre/house



Community Design Activity

Community members were invited to participate in a design activity, to help establish a desirable housing density for the community. Participants placed scale models of housing and other neighborhood elements on a base to communicate the desired relationships between houses.



Community Feedback:

Based on generally positive feedback, it was clear that the community was excited about the project and eager to move forward. Many suggestions and concerns arose during the discussions following the presentation. Some members expressed a desire for a re-assessment of community needs to reflect the opinions of those currently involved in the project.

Some of the questions and concerns expressed:

- provision of small, affordable housing for elders and single people.
- "going green" - building a sustainable community
- community center should have outdoor cooking, a rec center for kids (indoors and outdoors), a feast house
- "we don't need more churches, there are enough churches in Ajo"
- need to think about drainage - can't build over the washes
- desire to go back to adobe buildings and more traditional housing types
- "One-third of an acre is enough for a family with three kids, but when the rest of the family comes, it's too crowded."
- The older generation probably prefer more traditional housing types, but the younger generation may want more modern housing.

Community Survey

The Hia-Ced O’odham Program developed (with input from the Drachman Institute) and administered a community survey to help determine the housing and community amenity needs and preferences of Hia-Ced O’odham community members. This survey was sent through mail and also administered at the first community meeting. Over 48 surveys were completed and analyzed.

The results of this survey helped the Drachman Institute establish guidelines for developing housing and define a program for the residential, commercial, and public spaces.

Key survey results are shown here. The full survey and comprehensive results are provided in the Appendix.

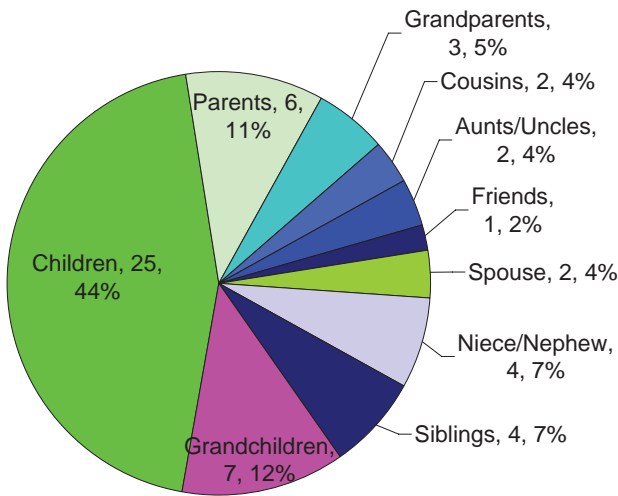
Housing

Survey results show that the majority of future residents:

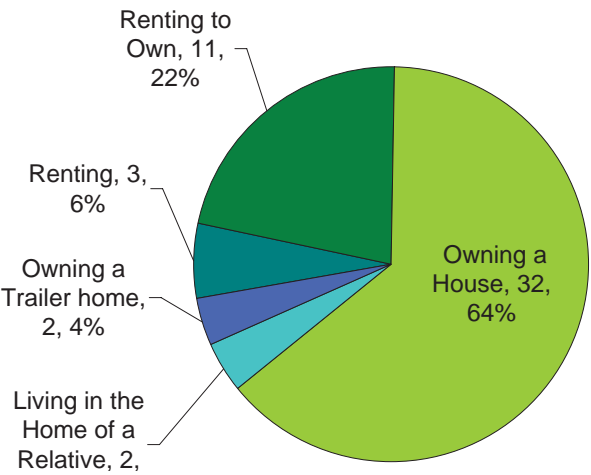
- live in households with 1-5 inhabitants
- desire 2-4 bedrooms
- live with children/parents
- have 1-2 cars
- wish to own or rent-to-own their homes.

However, housing for elderly members is also a concern. Plans for housing must take the range of needs into account.

Household Members



Home Tenure Preference

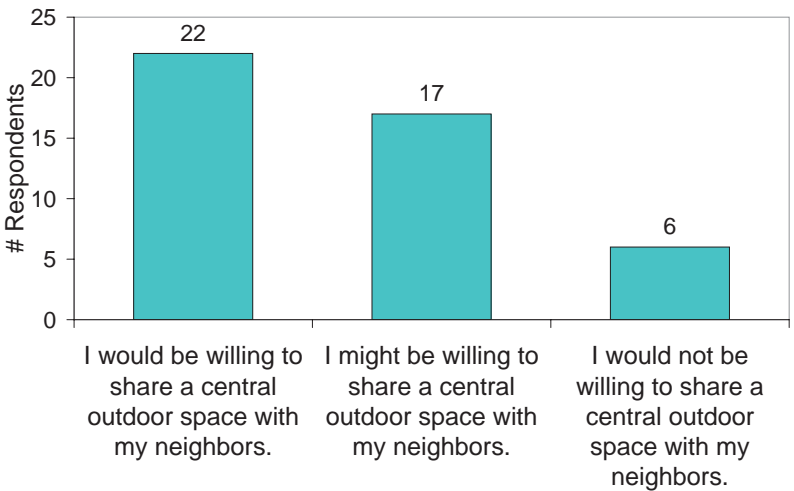


Shared vs Individual Outdoor Space

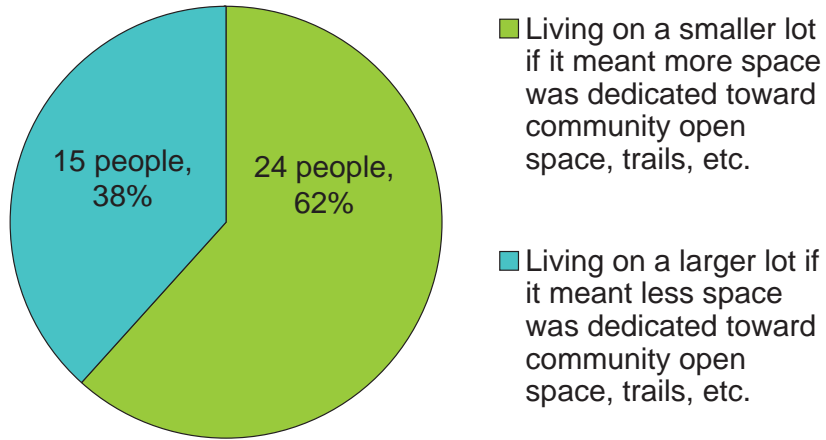
The survey results show that future residents would be willing to share community space with their neighbors and most would not mind living in close proximity to 1-2 other houses.

However, while the majority of respondents favor community space over individual lot size, 38% would prefer to have a larger lot if it meant less shared community space, such as open space, trails, etc. This suggests that a variety of lot sizes and situations should be considered.

Willingness to Share Outdoor Space with Neighbors



Lot Size vs. Community Space Preference



Community Space and Activities

Establishing and sustaining a sense of community, unity, and longevity are important, according to the survey responses. It is desirable to have commuunity space designated for shared activities. The most important community spaces revolve around fitness and cultural events. The most desired spaces include:

- Fitness Center/Gym/Rec Center
- Playground
- Walking paths/trails
- Places of worship
- Ramadas
- Outdoor BBQ
- Ceremonial space
- Basketball court
- Baseball diamond

Circle your level of interest in the following to be located within the Hia-Ced O’odham Community:

	Strongly Interested	Somewhat Interested	Neutral	Somewhat Opposed	Strongly Opposed
Baseball Diamond	32	14	14	14	0
Basketball Court	30	24	10	2	0
Cemetery	20	11	13	6	8
Ceremonial Space	33	10	15	0	2
Community Garden	18	18	24	2	0
Open Space	24	22	16	0	2
Outdoor BBQ/Cooking Area	38	22	6	0	0
Playground	50	10	4	0	0
Fitness Center/Gym	48	10	8	0	0
Horse Corral	10	10	30	4	8
Places of Worship	36	8	14	4	2
Ramadas	36	16	8	4	0
Recreation Center	48	12	6	2	0
Swimming Pool	28	14	16	4	0
Volleyball Court	28	12	22	2	0
Walking Paths/Trails	44	22	2	0	0

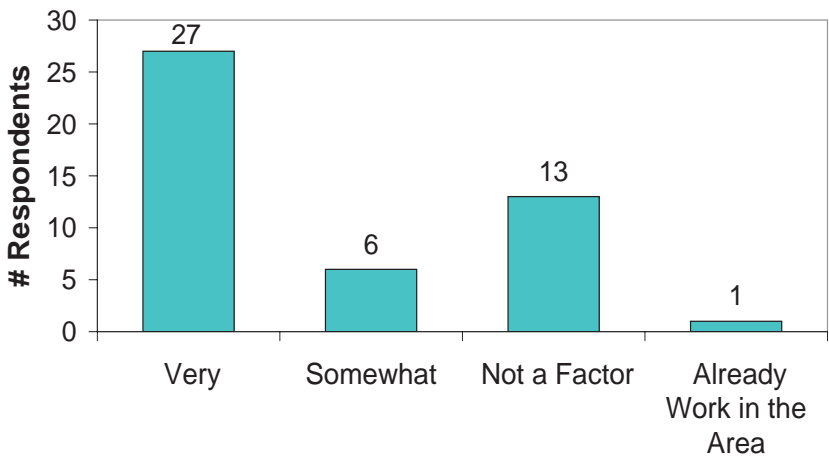
WRITTEN ANSWERS:

Other	3
Recreation Hall	2
Amphitheater	1

Commercial Development

The survey results show that having employment opportunities near the site is very important to most future residents.

Importance of Nearby Employment



Developing a commercial center on-site is one way to provide services to the residents as well as creating jobs. Some commercial possibilities, listed in order of importance according to the survey results, are:

- Grocery Store
- Post Office
- Hardware Store
- Arts and Crafts Shop
- Restaurant
- Gas Station
- Laundromat
- Child Care Center

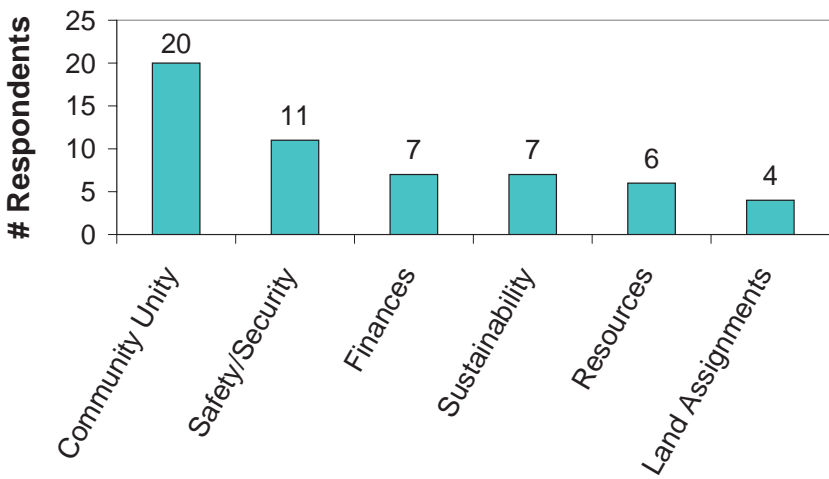
Cares and Concerns about the Community

Survey results indicate that community members care strongly about the health and safety of their future community.

What is most important to you about the development of the Hia-Ced O’odham Community?	
Community Unity	9
That is Continues/Longlasting	7
Self-Sufficiency	4
No Gangs/Alcoholism/Vandalism	4
Safety	4
Housing Elders	3
Green	2
Land Assignment and Ownership	2
Water/Wastewater	2
Schools/Education	2
Community Image	2
Starting ASAP	2
Solar	1
Water Recycling	1
Quality of Houses	1
Space for Mobile Home	1

The main concerns voiced in the community survey were: that community members live and work in unity to perpetuate a healthy and safe community; that the community be financially viable; and that sustainable methods of living such as water harvesting and solar power be employed.

Main Concerns Regarding the Community



Second Community Presentation

On August 22, 2009 the Drachman Institute made a second presentation to the Hia-Ced O'odham Advisory Committee and community members for their review and feedback during their monthly committee meeting at the land base.

The following issues were presented and discussed:

- Results from the community survey
- Drachman Institute's understanding of Hia-Ced O'odham culture and traditions that influence the design
- Site Design Concepts
- Cluster Design Concepts
- Housing Design Concepts

Upholding Traditions

The Hia-Ced O'odham have a long history in the desert. Their deep connection with the land has tendered a unique lifestyle and culture. The preservation of important traditions and the continued expression of their culture is vital for health of the Hia-Ced O'odham community.

The plan for their new community must embody the spirit of the Hia-Ced O'odham and reflect the people's relationship with the desert.



The Parents of Maria Garcia, Lorraine Eiler's paternal great-grandmother (photograph taken by A. D. Lee, Moik Vahia [Ajo], 1906). Eiler, Lorraine Marquez and David E. Doyel. Fragile Patterns: The Archaeology of the Western Papagueria. Altschul, Jeffrey H. & Adrienne G. Rankin Ed. Tucson, AZ – SRI Press. 2008

Traditional Lifestyle

Traditionally, the O'odham spent most of their time outdoors. Except in inclement weather, all activities took place outside, including sleeping. Ramadas (porch structures in front of the houses) provided shade for the days activities, including cooking, eating and sleeping. The daily interaction with nature reinforced the people's spiritual connection to the land and fostered respect for the desert.



Left: Multi-use space under a ramada.

Teiwes, Helga. July 1970, Saguaro National Monument, AZ. Arizona State Museum, University of Arizona, Tucson: neg. no. 27541 (http://www.statemuseum.arizona.edu/exhibits/helga/reservation_life09.php?ver=&startp=p5wait) 27 Oct 2009

Right: Four Men Playing Reed Game.

Dinwiddie, William. 1894. ArtStor (<http://library.artstor.org/library/welcome.html#3|search|1|papago|Multiple20Collection20Search|||type3D3126kw3Dpapago26id3Dall26name3D>) 29 Oct 2009



In these modern times, it is clear that most people want modern homes. However, this does not have to mean an end to outdoor living. Sleeping porches, outdoor kitchens and other useful outdoor spaces can help the Hia-Ced O'odham to maintain their spiritual connection with the land.

Living Locally

Local Food - The Hia-Ced O'odham traditionally ate locally found and harvested foods. They also traded with neighboring tribes. Seasonal fields were used to grow crops and many native plants provided forms of nourishment. Unfortunately, the traditional diet of the Hia-Ced O'odham has been replaced almost completely by the typical western diet, which is neither healthy nor sustaining for the Hia-Ced O'odham.

The benefits of growing and buying food locally today are many.

- First, eating traditional, locally grown foods encourages a healthy diet and promotes overall health.
- Second, money spent on local food stays in the local economy and can provide jobs for community members, improving the economic status of the area.
- Finally, locally grown food is cheaper and fresher, since it doesn't require transport over long distances.



Above Left: Elder and youth harvesting cholla buds. **Below Left:** Ripe Saguaro Fruit. **Right:** Harvesting Saguaro Fruit. (<http://www.yesmagazine.org/multimedia/yes-photo-essays/harvesting-the-sonoran-desert>) 18 Jan, 2010.

Local Materials - Traditional Hia-Ced O'odham buildings were built entirely of local materials, including adobe, grasses, and wood. These buildings, made of the desert, speak about their environment and create a sense of place.

In addition, traditional building methods have proven that the desert provides many of the materials necessary for building comfortable, beautiful, and affordable houses.

Local Labor - Traditionally, O'odham houses were built by the community members. The construction of the community was a shared experience and, once built, was cared for by all. In this way, the structures represented more than just protection from the elements; they were symbols of a shared experience, communal knowledge, and pride in the community.



Left: Making Adobe Bricks. Danube, Romania. (<http://www.pinales.com/programs/wq/Barbara/WebquestRoughdraft%20final.htm>) 18 Jan, 2010. **Right:** Building Adobe Wall (http://www.somosprimos.com/adobe_wall.jpg) 18 Jan, 2010.

Traditionally Sustainable Design

The lifestyle of the Hia-Ced O'odham is inherently sustainable, focusing on aspects such as water-harvesting, building with local materials, and adapting life to the changes of the seasons.

The following elements, often on contemporary checklists for sustainable design, were integral parts of traditional Hia-Ced O'odham structures:

- proper solar orientation
- natural ventilation
- natural lighting
- recycled materials
- locally available materials
- water harvesting
- thermal mass
- buildings that relate to the climate and place



Left: Adobe House. Edward H. Davis. Smithsonian National Museum of the American Indian. 1919 **Right:** Baboquivari District Office Building. Richard G. Brittain. Toward A Responsive Papago Dwelling. Research Paper for the College of Architecture, University of Arizona, Tucson, Az. 1981)

Second Community Presentation

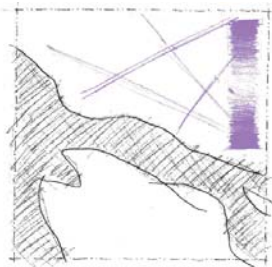
After a full site analysis and receiving feedback from the first community meeting, site development was strategically focused on the northern half of the site. This reduced the overall impact on the site, provided large areas of untouched open space, and reduced the need for extensive and expensive infrastructure including bridges and utility crossings at Gunsight Wash.

Three alternative site concepts were developed for the second community presentation. Each concept shared similar fundamental components, but each showed different arrangements and sizes. The pros and cons for each concept are based on general conclusions from interaction and feedback from community members.

Site Concept A:

- 63 Single Family Lots
- 180 Single Family Clustered
- 16 Single Bedroom Duplexes
- 24 Multi-Bedroom Duplexes

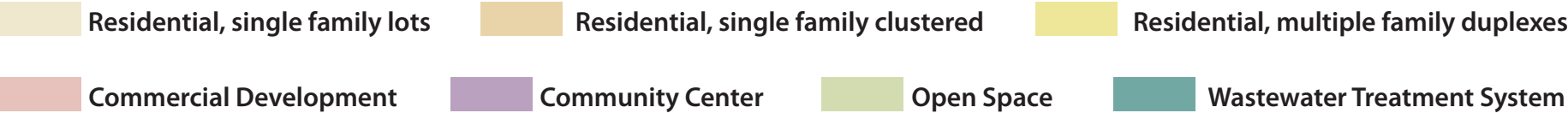
283 Total Homes

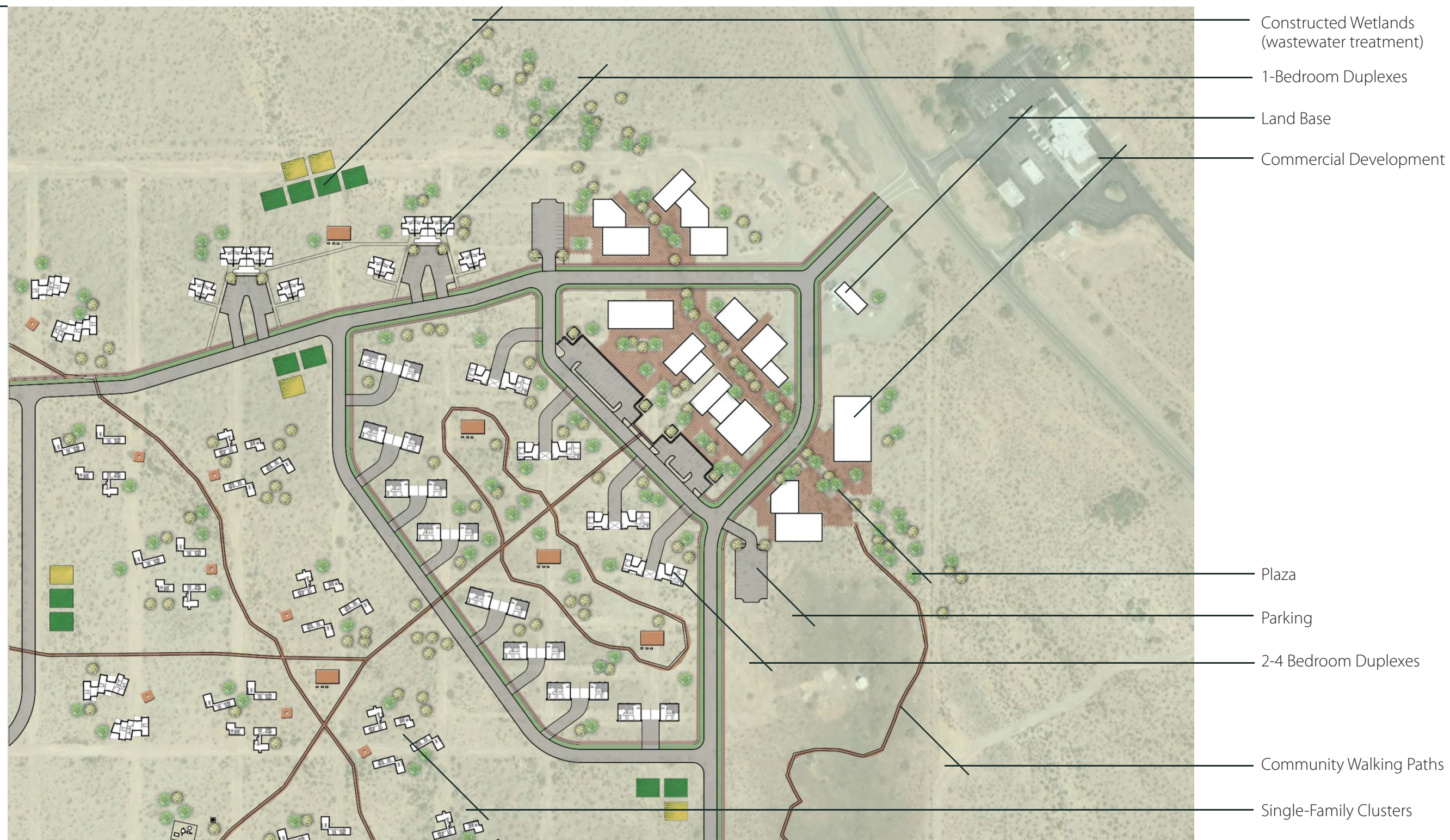


Commercial and community areas are located along the eastern boundary of the site.

Pros: Community center is located at the convergence of greenways/washes; street layout maintains some of the existing road infrastructure; design is accommodating of the existing land base office

Cons: Community center is located on the edge of the property



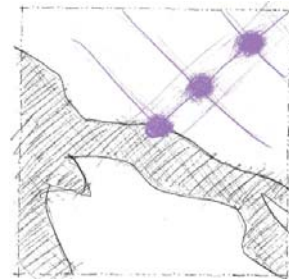


Site Concept A: Entry

Second Community Presentation

Site Concept B:

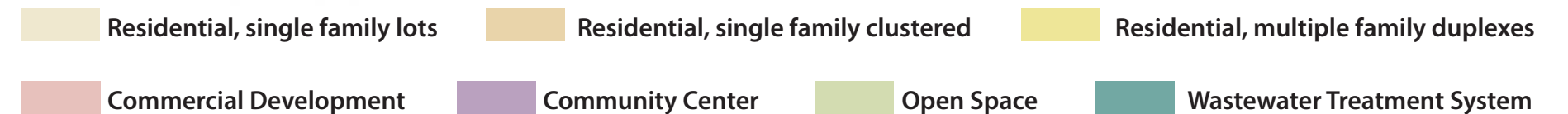
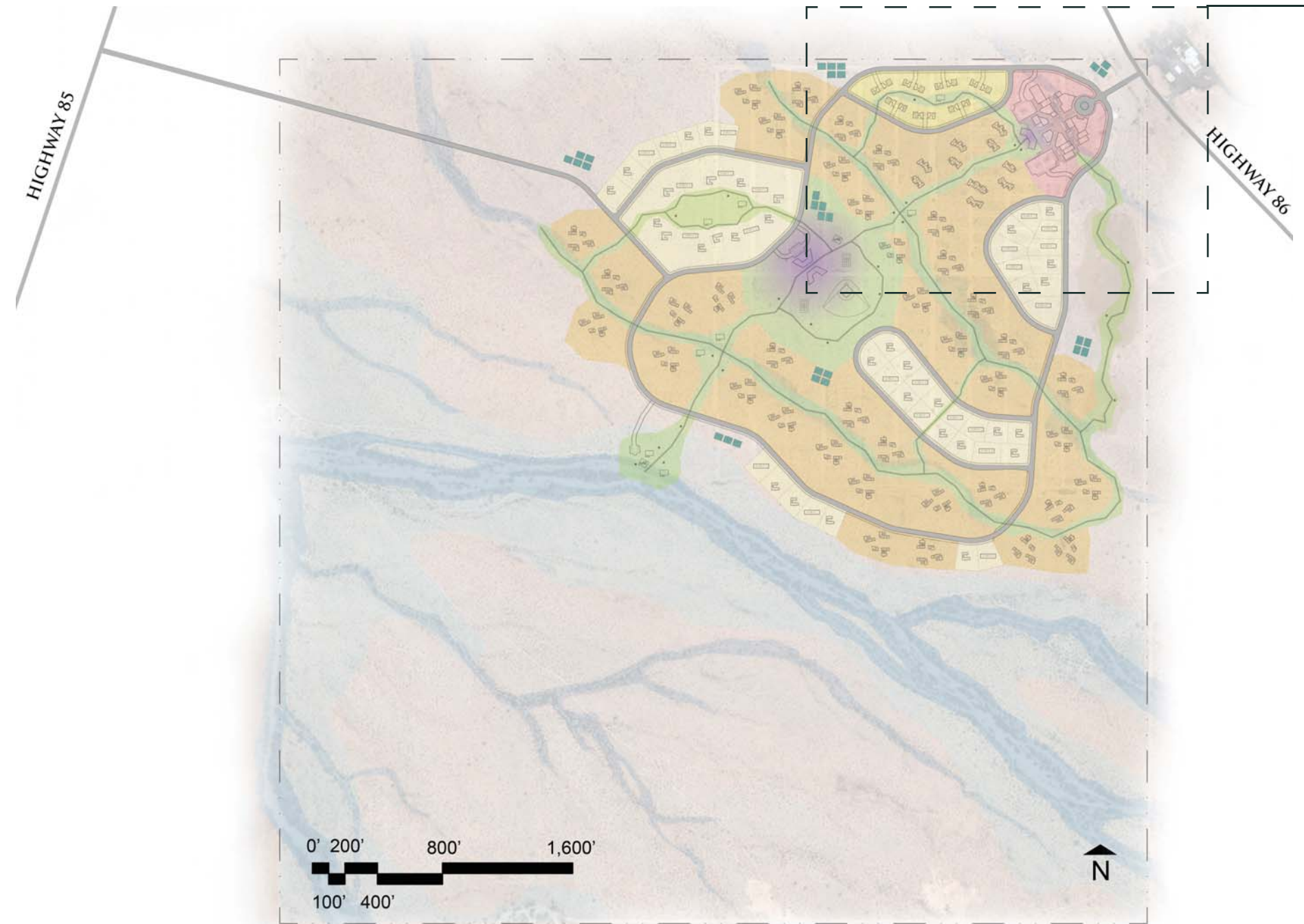
- 56 Single Family Lots
- 172 Single Family Clustered
- 14 Multi-Bedroom Duplexes
- 242 Total Homes**

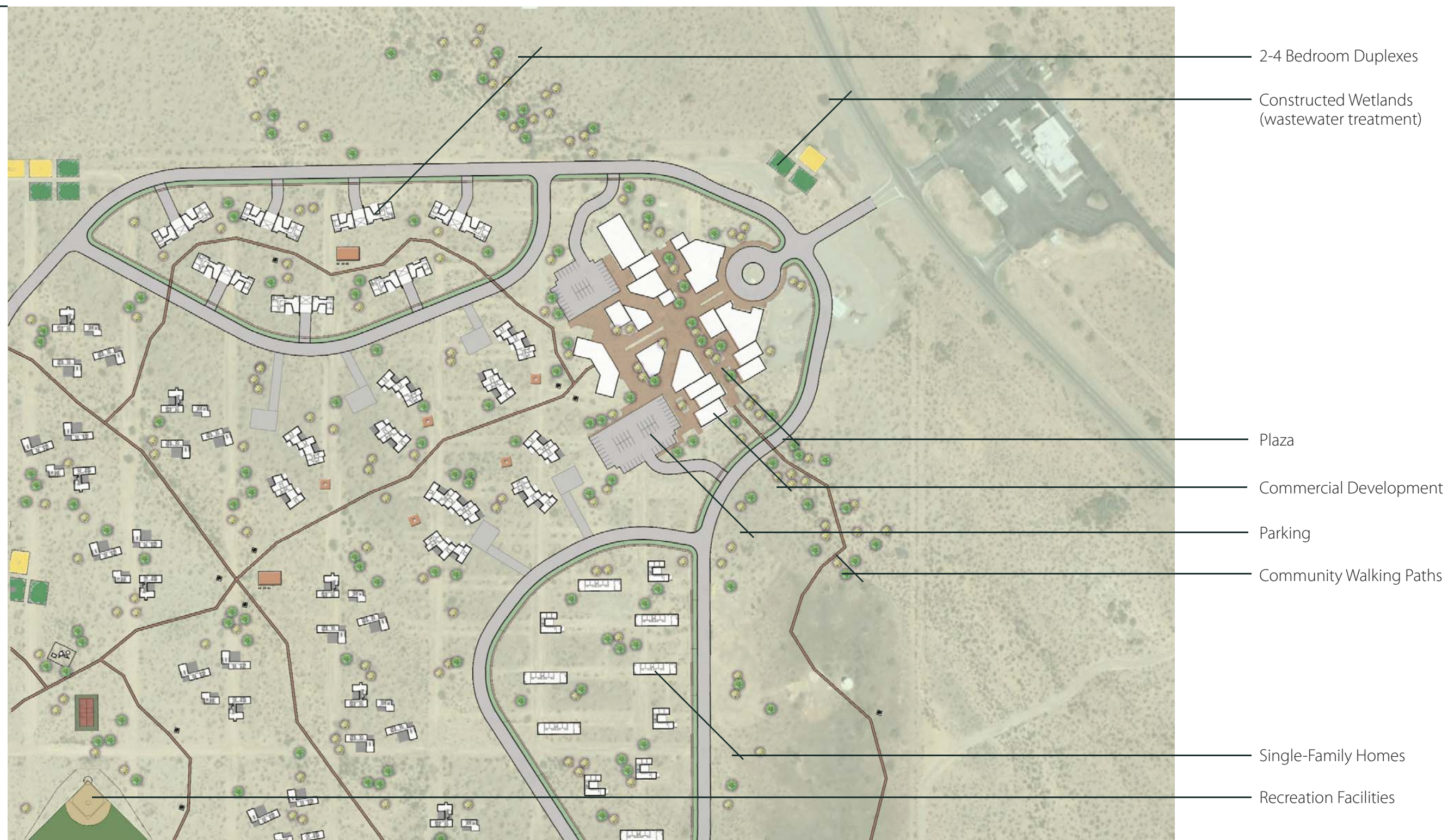


Commercial and community areas are developed along a central axis that runs through the development.

Pros: Community is designed primarily for pedestrians with roads located along the perimeter of the site leaving the center open for paths without the need for road crossings

Cons: Minimal transition between commercial and residential spaces near the entry makes it difficult for visitors to differentiate between public and private spaces, commercial development doesn't fully function unless built-out



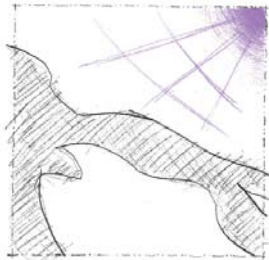


Site Concept B: Entry

Second Community Presentation

Site Concept C:

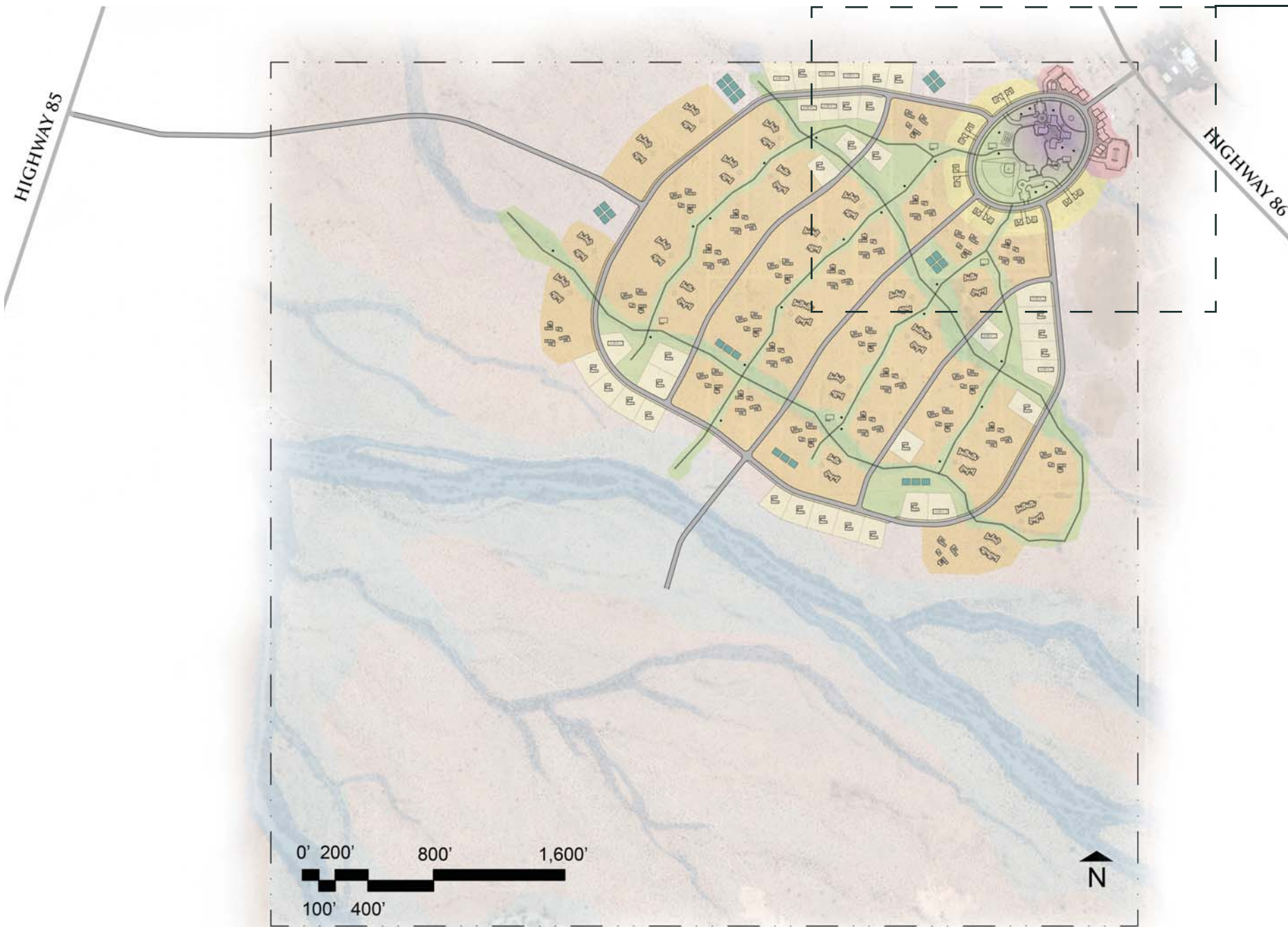
- 35 Single Family Lots
- 180 Single Family Clustered
- 12 Multi-Bedroom Duplexes
- 227 Total Homes**



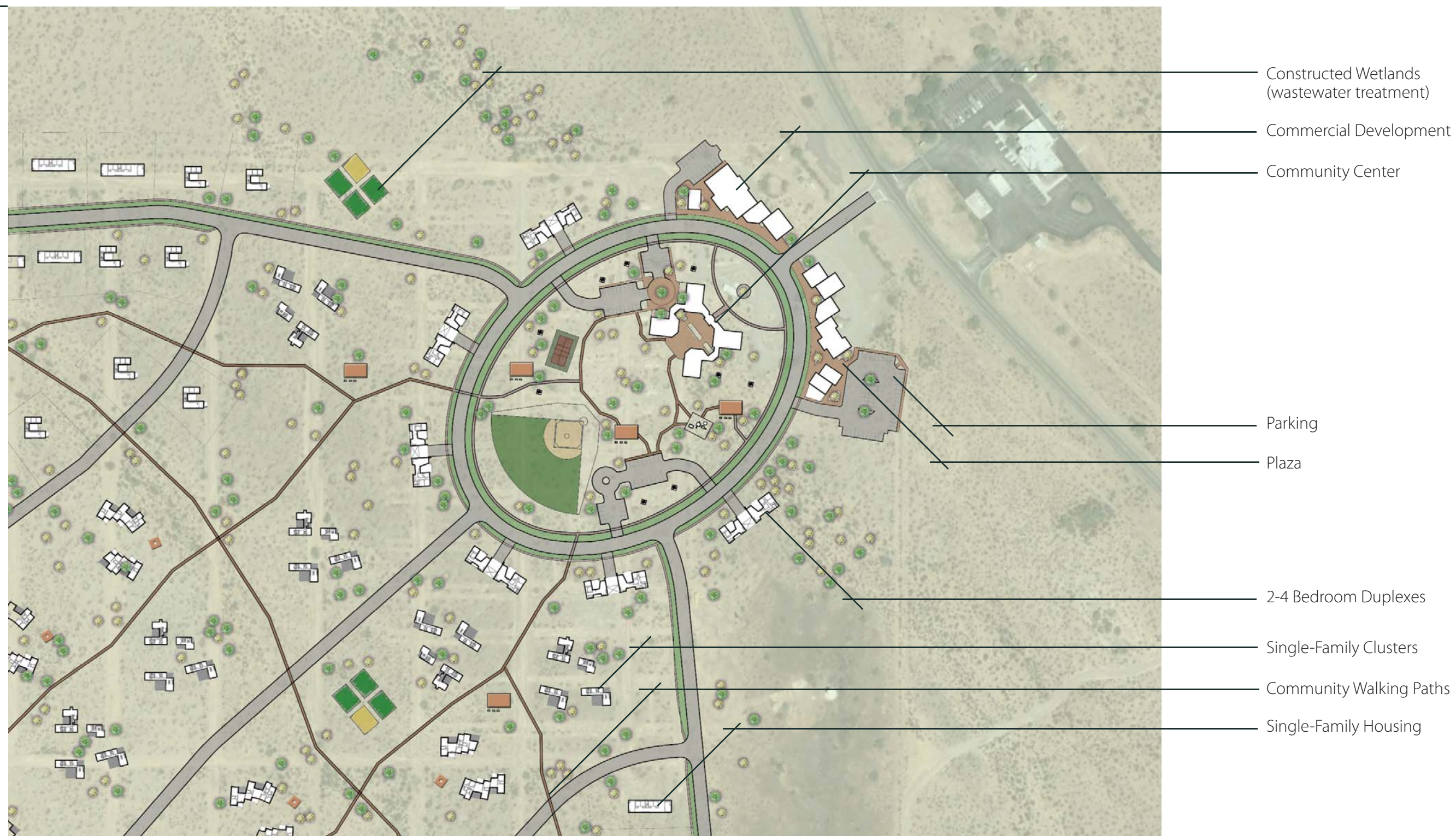
Commercial and community areas radiate from the entry off Highway 86.

Pros: Entire community radiates from the community and commercial areas at the northeast corner of the site, duplexes that may be occupied by elderly are with in close walking distance of both community and commercial spaces

Cons: Resulting street layout is very linear, less emphasis is placed on connections to the washes. Perceived as too formal, and less responsive to site features.



- | | | | |
|---------------------------------|--------------------------------------|---------------------------------------|-----------------------------|
| Residential, single family lots | Residential, single family clustered | Residential, multiple family duplexes | |
| Commercial Development | Community Center | Open Space | Wastewater Treatment System |



Site Concept C: Entry

Second Community Presentation

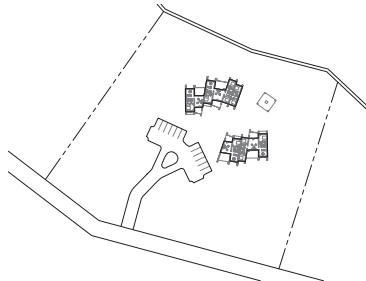
Housing Cluster Concepts

Houses may be clustered to facilitate close community relationships and to minimize the impact of building on the land.

Radial Cluster:

Pros: Centrally located gathering space for cluster family

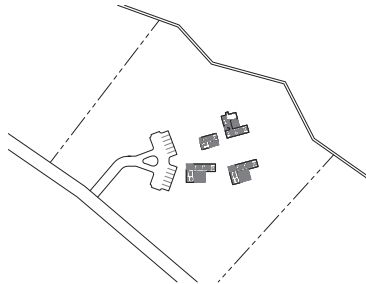
Cons: Shared walls



Courtyard Cluster:

Pros: Family members homes are within close proximity of each other with shared spaces; shared lot gives more access to all

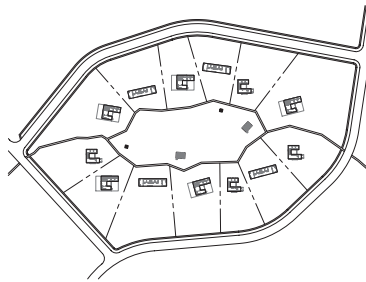
Cons:



Park Cluster:

Pros: Combines the privacy of a single family home with a shared central park with paths and ramadas; homes are located toward the back of lots

Cons: More land required for individual driveways



Housing Concepts

Home designs are focused on the integration of indoor and outdoor space, long-term affordability, and ease of expansion and renovation. In the following diagrams, spaces are colored as indicated:

- Living Space
- Bedroom Space
- Outdoor Space

Park Homes

These single-family homes incorporate lots of outdoor space and ease of expansion through addition of bedrooms.

One- to three-bedroom



Four-bedroom



Radial Homes

These homes can be built separately or share walls. The design accommodates growth through the easy addition of bedrooms.

One-bedroom



Three-bedroom



Five-bedroom



Courtyard Homes

A large outdoor space adjacent to the main living space is central to the design of these homes.

One-bedroom



Three-bedroom



Three-bedroom, split plan



Duplexes

The duplexes are designed to offer privacy and distinctive living space with the space-saving and energy-efficiency benefits of sharing a wall.

One-bedroom



Two-bedroom



Three-bedroom



Community Feedback: (see the Appendix for full feedback responses)

Following the presentation, members of the community were given the opportunity to identify what they felt were the pros and cons for various aspects of the presented concepts. Information gathered indicated the following:

Site

Having the community centrally located is important

“no worry to cross roads”

“everything is walkable”

Clusters

Resident parking should be within close proximity to homes

“cars parked away from house are easier to steal”

“too long a walk for an elder”

Housing

Housing options need to be diverse and flexible for an array of needs and preferences

“granny’s house separate good”

“detached homes (create a) sense of ownership”

“separate bedrooms from rest of house”

“don’t want to share a wall”

Additional Analysis:

Drachman Institute staff also met to reevaluate the design and identified the following:

- Areas frequented by visitors should be distinct from areas of residential development
- Commercial development should be designed so that it functions well with a few tenants or many
- While efforts to hide commercial parking are aesthetically pleasing, it is nonetheless important for parking to be visible from the highway to draw people into the site

Third Community Presentation

The third and final community presentation to the Hia-Ced O'odham Advisory Committee and community members was held on October 24th, 2009. While final design proposals were shown and discussed, this presentation focused primarily on the establishment of specific design principles that community members have requested, supported, and/or intend to implement. This establishes a design standard that will govern any future development.

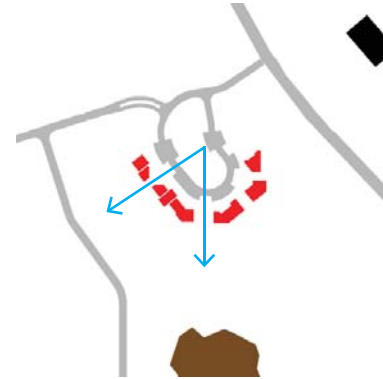
The following issues were presented and discussed:

- Community Development Timeline (past and future)
- Final Site Design Principles
- Final Housing Cluster Design Principles
- Final Housing Design Principles

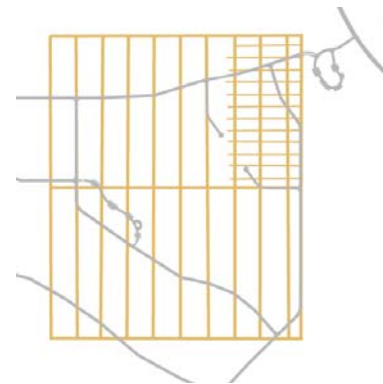
See the Design chapter for a detailed review of the final design proposal. Also, more details of the principles can be found in the Design Principles chapter of this book.

Site Principles

Preserve and Enhance the Site's Natural Features- particularly as they relate to washes and viewsheds so that the natural character of the site can be enjoyed for generations to come.



Rehabilitate Scarred Land- in areas disturbed by previous development.



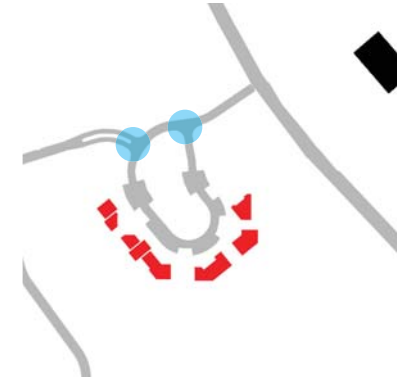
Manage Water Responsibly- by minimizing the amount of water drawn from the aquifer through responsible water management practices.



Emphasize Walkability and Connectivity- by creating a community that encourages pedestrian activity through a network of trails and paths.



Create a Hierarchy of Public and Private Spaces- so that both visitors and residents can easily and intuitively orient themselves.



Provide Community Amenities- that meet the basic needs of residents, draw visitors to the site, and provide jobs for local residents.



Incorporate Flexibility in Phasing and Development- so that the community can smoothly transition as it grows and develops.



Final Site Concept

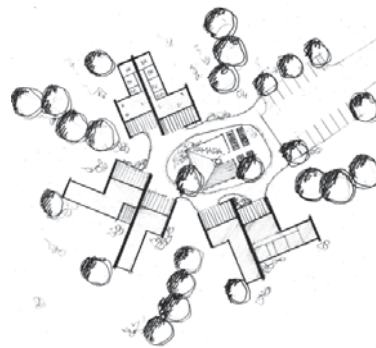


Housing Cluster Principles

Reinforce Traditional Living- in housing clusters that embrace the heritage, lifestyle, and culture of the Hia-Ced O’odham.



Minimize the “Footprint” on the Land- by consolidating development to increase the effective amount of open space.



Create Spaces for Family Gathering and Social Interaction- where families can relax together and enjoy the outdoors.



Housing Principles

Create Durable, Easy to Maintain Houses- that residents will be able to enjoy for years to come.



Above: <http://upload.wikimedia.org/wikipedia/commons/5/51/Milyanfan-adobe-brick-house-8039.jpg>

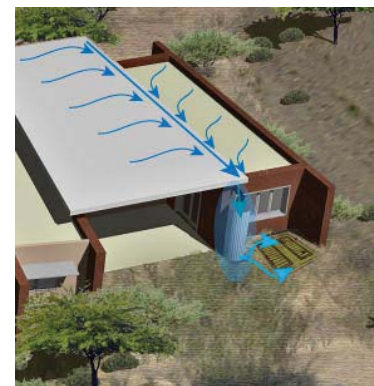
Accommodate Changing Families- with designs that make it easy for owners to add bedrooms, bathrooms, and secondary living spaces.



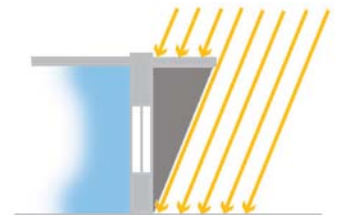
Enhance Outdoor Living- through outdoor extensions of the home that allow residents to experience and enjoy the desert on a daily basis.



Implement Water Conservation- through rainwater harvesting to supplement irrigation, water-efficient appliances, and appropriate landscape design.



Incorporate Energy Conservation- through designs that are adapted to utilize seasonal solar angles.



Establish a Connection to the Land and People- through the use of local materials and local labor.



Above: <http://burundietclaire.files.wordpress.com/2009/07/david.jpg>

Community Feedback:

The Director and staff of the Tohono O’odham Planning Department who were in attendance expressed excitement for the project and support to help move it forward.

Other community members comments:

“Let’s build it!”

“It would be nice to have parking closer to the home.”

“Will the streets have lights?”

Design Principles

• Site •

- Site Rehabilitation
- Site Enhancement
- Site Connections
- Site Water Management
- Site Wastewater Management
- Safety and Lighting
- Site Program and Phasing

• Housing Clusters •

- Benefits of Housing Clusters
- Guidelines for Housing Clusters

• Home Design •

- Connection to Land and People
 - Outdoor Living
- Variation in Housing Types
- Building Materials
- Ease of Construction and Maintenance
 - Water Conservation
 - Energy Conservation



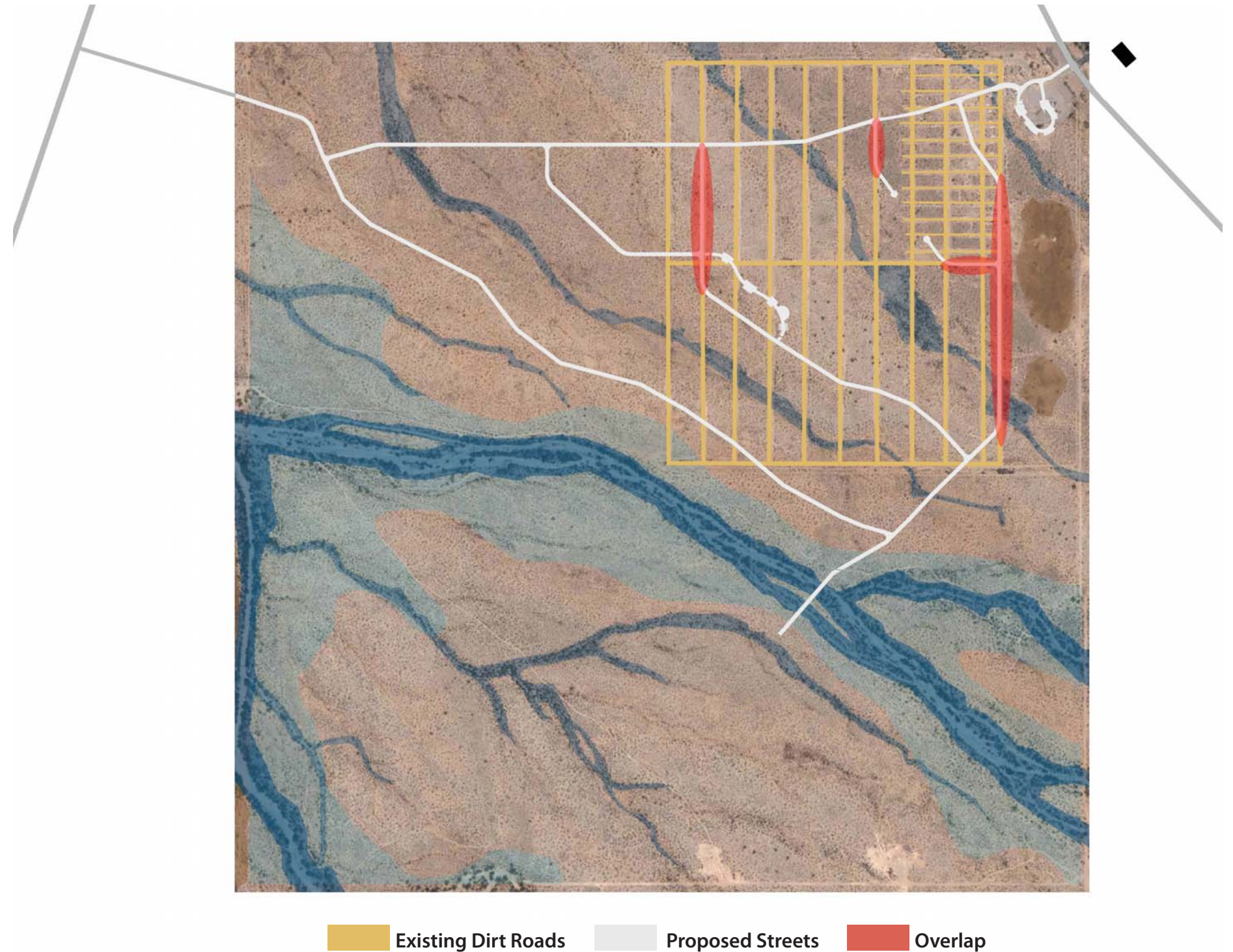
Left to right: Peter McBride, Scott Stephens, and Dustin Robles. July 29, 2009. Photo: Gary Antonio

Design Principles

Site Rehabilitaiton

Utilize Existing Footprint

Dirt roads were graded in the northeast corner of the site under the tenure of the previous RV park owner and remain in existence today. While the dirt roads don't meet all the needs of the Hia-Ced O'dham community, when possible, new streets should utilize the footprint of the existing dirt roads to minimize disturbance to the land. Areas where existing roads may be incorporated into the new design are highlighted in red.





Rehabilitation of Scarred Land

Left alone long enough, human disturbances at the northeast corner of the site would gradually heal, returning the land to its natural state. There are however several measures that should be taken to quicken the natural processes so that residents are able to enjoy the beauty of the site without the unsightly scars. Steps include:

- removal of any unwanted built elements including utility enclosures, concrete pads, septic tanks, and street signs
- spot grading to smooth out any abrupt elevation changes from blading of the land
- tilling of compacted roadways
- revegetation of barren areas through planting and native seed dispersal



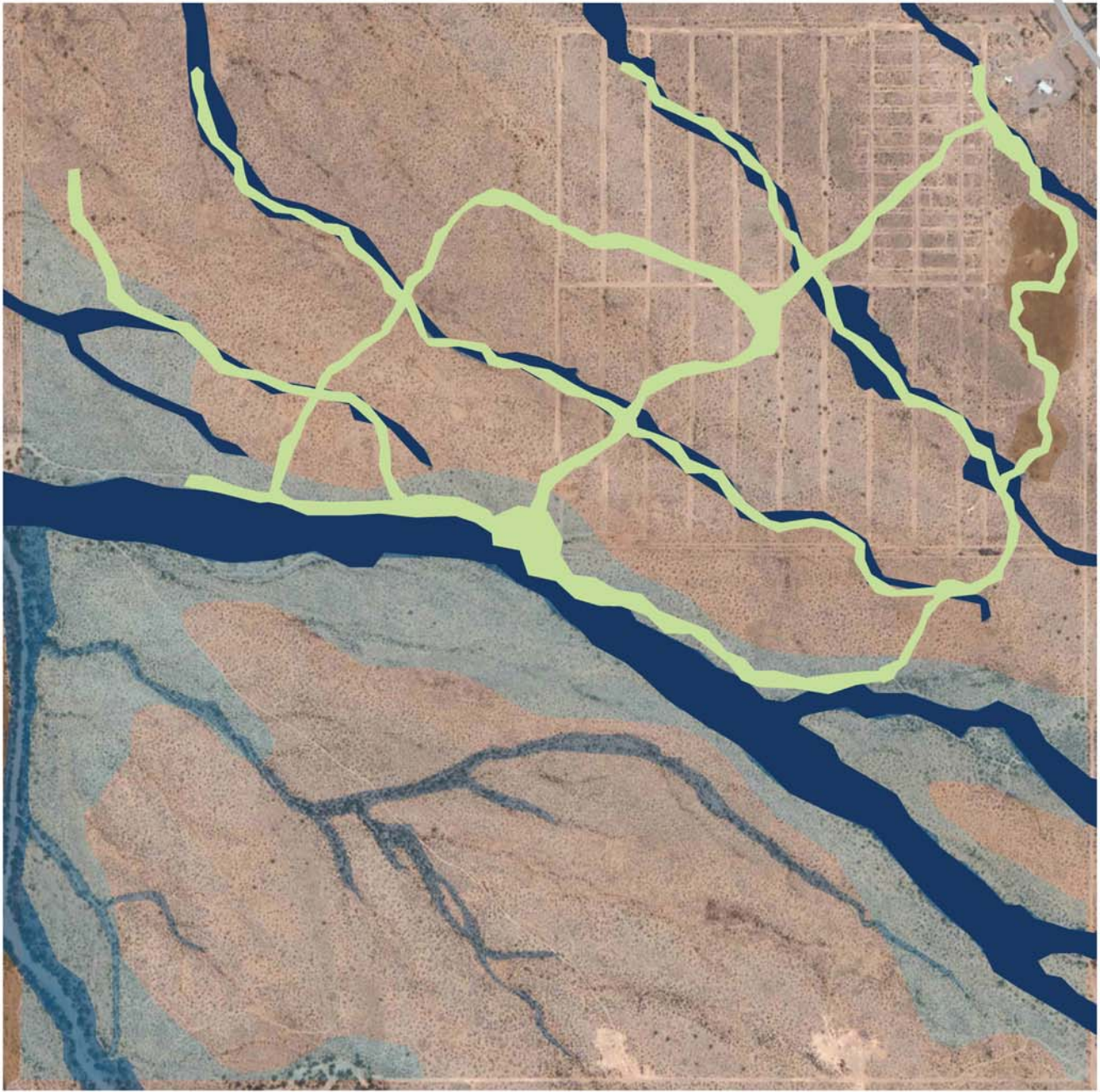
Design Principles

Site Enhancement

Enhance Washes with Greenways

The site has many washes ranging in size from the large Gunsight wash to a series of small unnamed washes. These washes convey water through the site in a eastward direction and include some of the site’s greatest biodiversity. Any construction that disturbs these washes interrupts the flow of water and can cause significant collateral damage particularly in the event of a large storm.

Using the washes as a network of greenways for pedestrians protects the washes and gives pedestrians a naturally shaded environment for walking. Paths may be developed along side existing washways. Water harvesting (discussed later in this book) can be employed to increase the size and density of vegetation along the greenways.



Existing Washes Proposed Greenway Enhancements



Preserve and Enhance Natural Views

The site has several natural features which rise above the landscape and can be seen from a distance. Notably there is a rock outcropping along the eastern property line and hills along southern and western property lines. These features provide quality views and should not be blocked by new development. Framing views either architecturally or with plants can enhance their value.



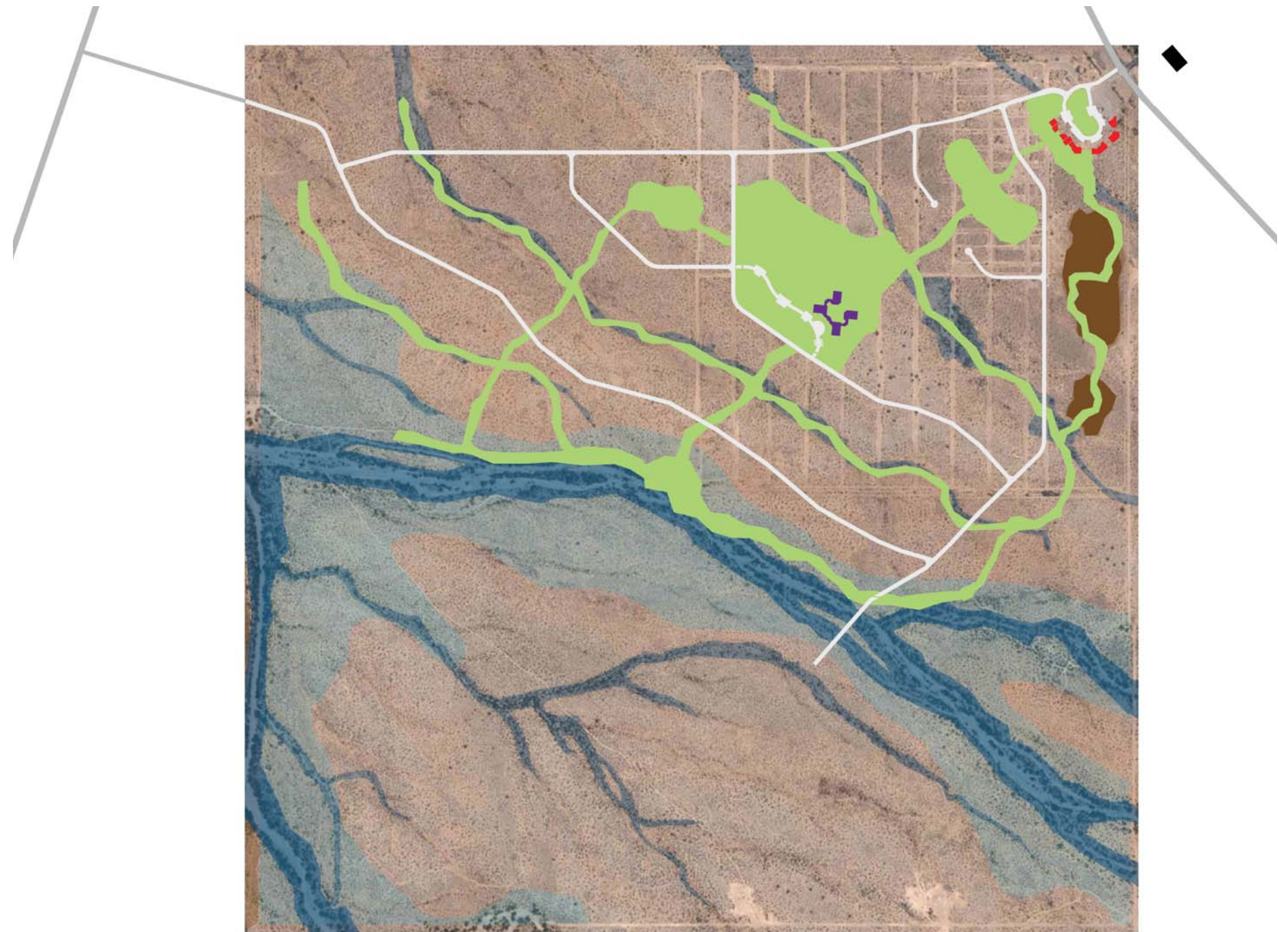
Design Principles

Site Connections

Walkability

It is important to design the community so that travel is not limited to the automobile. Creating opportunities for walking can foster an appreciation of the land while improving the health of residents and the environment alike. Pedestrians are drawn to walkways that provide direct, pleasant, and safe routes to local amenities .

The layout of paths should link homes to the community center and commercial development in an efficient and direct manner. In most instances, well designed walkways can create pedestrian linkages that are more direct than streets. Paths should be accentuated by natural features including washes and the rock outcropping. Street crossings should be kept to a minimum.



Paths/Open Space Community Center Commercial Development Streets

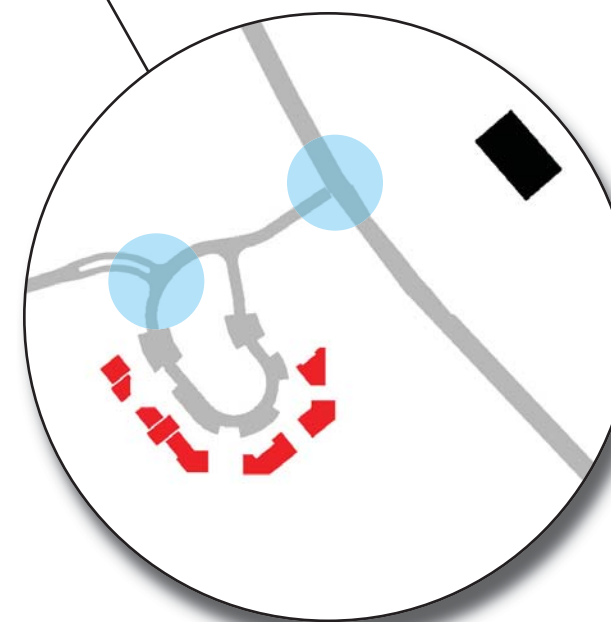


Hierarchy of Public and Private Spaces

Because the community will be competing with other businesses and communities for visitor dollars, the entrance must be inviting, able to attract travelers and passers-by into a site they may know little about. Since the site serves as the eastern boundary the to the Tohono O'odham Nation, the northeast corner is not only responsible for welcoming visitors to the Hia-Ced O'odham land base, but also to the entire Tohono O'odham Nation.

It is also important for visitors or customers at commercial areas to recognize the difference between the public and the private spaces. They should feel comfortable in the public spaces, and perhaps awkward if the venture into the private residential community.

Design cues such as intersections, plantings, changes in pavement, and signage can all be used to communicate to visitors and residents changes between public and private spaces.
















Design Principles

Site Water Management

With an on site annual rainfall of only eight inches, and the availability of water uncertain, it is important to minimize dependence on limited groundwater reserves. Responsible water management should help limit the amount of water drawn from the local aquifer. This can be accomplished by decreasing the amount of water needed (low flow faucets, desert adaptive plants, native species), and by increasing the amount of available water (rainwater harvesting, greywater, treated wastewater).

WATER SOURCES

WATER USES				
	Drinking	Garden	Landscape	Recharge
Well Water				
Rainwater Harvesting: collected in cistern				
Rainwater Harvesting: retained by basin				
Greywater: laundry/shower				
Treated Wastewater				

Rainwater Harvesting

Rainwater harvesting helps to reduce the demand placed upon wells by utilizing rainfall for landscape watering needs. There are two main forms of water harvesting: active and passive.



Rainwater Cistern (<http://www.bae.ncsu.edu/stormwater/images/rainwater.jpg>)

Active water harvesting is the collection of rain from roofs, streets, and other impervious surfaces for storage and use at a future date. Water is typically stored in a cistern where rainfall accumulates during wet periods. Stored water can then be used to water the landscape during dry periods.

Passive water harvesting is a cheap and simple way to increase the amount of water available to plants. It involves subtle grade changes in the land through the creation of berms and swales to



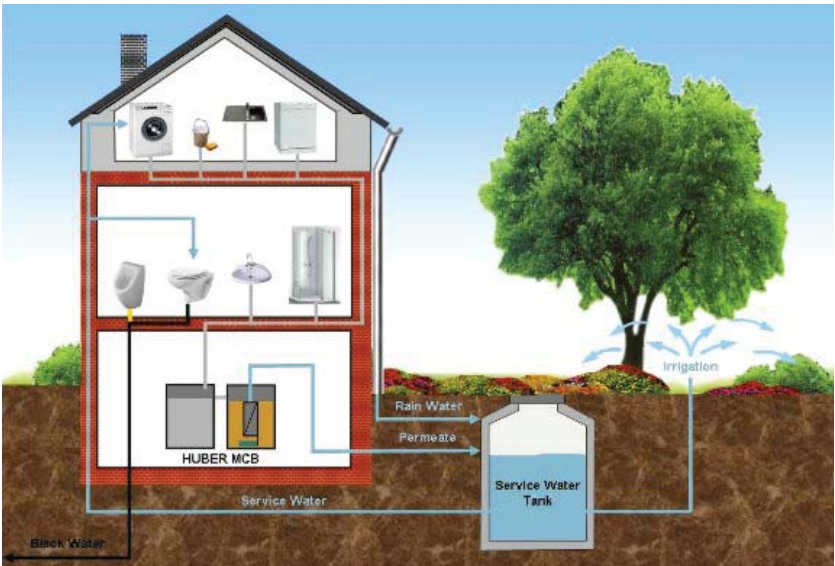
Bioswale (<http://www.windsorheights.org/Images/colby%20park%20bio%20swale.JPG>)



Curb Cut (<http://heckeranddecker.files.wordpress.com/2009/03/green-in-portland-cmp1.jpg>)

retain water on site that would otherwise be lost as runoff. Curb cuts may also be used to utilize water from the streets that would otherwise stormwater. Basins are created around plants to capture rainwater and in effect increase the amount of water delivered to a plant in each storm event. Passive water harvesting can be cheaper and easier to install and maintain than active water harvesting.

Greywater



Greywater Diagram (http://ourgreenmaui.files.wordpress.com/2009/04/greyuse_concept.jpg)

Greywater is wastewater generated from daily household activities such as doing laundry, bathing, or washing dishes. While this water is unfit for drinking, it is still a valuable resource for irrigating gardens and landscapes so long as biodegradable detergents are used and the water is free of chemicals.

As with rainwater, greywater water can be collected and stored for a future date, or released immediately into the landscape. For healthy plants soils need a chance to dry out between waterings. For this reason greywater that is collected from a source with regular drainage such as a kitchen sink is best stored in a cistern.

Treated Wastewater

Treated wastewater is limited in its possible uses, but is a viable option depending on the quality of the wastewater and local regulations and restrictions. Both the constructed wetlands and the compact membrane bioreactor wastewater treatment options (discussed later in this book) generate high-quality effluent that would provide the opportunity to use treated wastewater for irrigation uses on site.

Site Wastewater Management

Wastewater management can be a large obstacle in sustainable development, particularly for a relatively small site.

In selecting the ideal wastewater treatment option there are several important factors that need to be considered. Choosing the most appropriate treatment option is about balancing financial investments, maintenance costs, and appropriate land use. Additional considerations include aesthetics, odor, and water re-use.

The four wastewater treatment options discussed in this section are:

- Wastewater Lagoon
- Community Septic System
- Constructed Wetland
- Compact Membrane Bioreactor



Wastewater Lagoon

Wastewater lagoons are the most commonly used method of wastewater treatment employed by the Tohono O'odham Nation. They are used principally because of their low maintenance requirements and because of the large amount of land available.

A wastewater lagoon usually contains two or three excavated basins with a black synthetic liner (usually polyethylene or hypalon). Wastewater first travels through a septic system which removes large solids from the water. Smaller solids and dissolved solids are then released into an open lagoon or series of lagoon cells where they undergo a combination of chemical, physical, or biological treatment processes before being released as effluent.

The largest drawback to a wastewater lagoon is the amount of land which they claim. Additional deterrents to using a wastewater lagoon include the unsightly liner, berms, and chain link fence, as well as odor issues.



Community Septic System (http://kchengineering.com/yahoo_site_admin/assets/images/Photo_1.105124627_std.JPG)

Community Septic System

Community septic systems function similarly to residential septic systems, but at a larger scale.

In a community septic system, wastewater is directed to an underground chamber where solids and scum are separated from wastewater. Solids are anaerobically reduced, while the liquid component proceeds to a second chamber where additional settling takes place. Excess liquid drains to an underground leaching field where it is allowed to percolate into the ground. Occasional pumping of the system is required.

Most of the land required for a community septic system is used for the underground leaching field. While structures cannot be placed over the leaching field, it is possible to revegetate.



Constructed Wetland (<http://www.wetlands.com.au/images/bluehills2.jpg>)

Constructed Wetland

Constructed wetlands recreate the treatment processes of natural wetlands to remove pollutants and break down waste. Both surface-flow and subsurface-flow treatments are available. Plants play a part in the filtration process and help make constructed wetlands visually appealing.

In a subsurface-flow system, wastewater goes through a septic tank where solids are removed. Bacteria in the tank then begin the digestion process, and the liquid component proceeds to a lined, underground treatment bed with plants. Treated effluent is then allowed to percolate into the ground or can be used for subsurface irrigation. As with the community septic system, occasional pumping is required.

Constructed wetlands are an appealing wastewater treatment option because they take up only a small portion of land, are relatively affordable, require little maintenance, are aesthetically pleasing, and remain odorless if properly maintained.



Compact Membrane Bioreactor (http://newproducts.raishows.com/aquatechtrade/uploads/0001042150_001430_DSC00150.JPGv)

Compact Membrane Bioreactor

Compact membrane bioreactors are built off-site and can be constructed to meet desired specifications. They are used when available land is minimal and the budget allows.

Wastewater is processed inside the unit where membrane processes like microfiltration and ultrafiltration are combined with a suspended growth bioreactor to treat wastewater. Effluent from the system is of a very high quality.

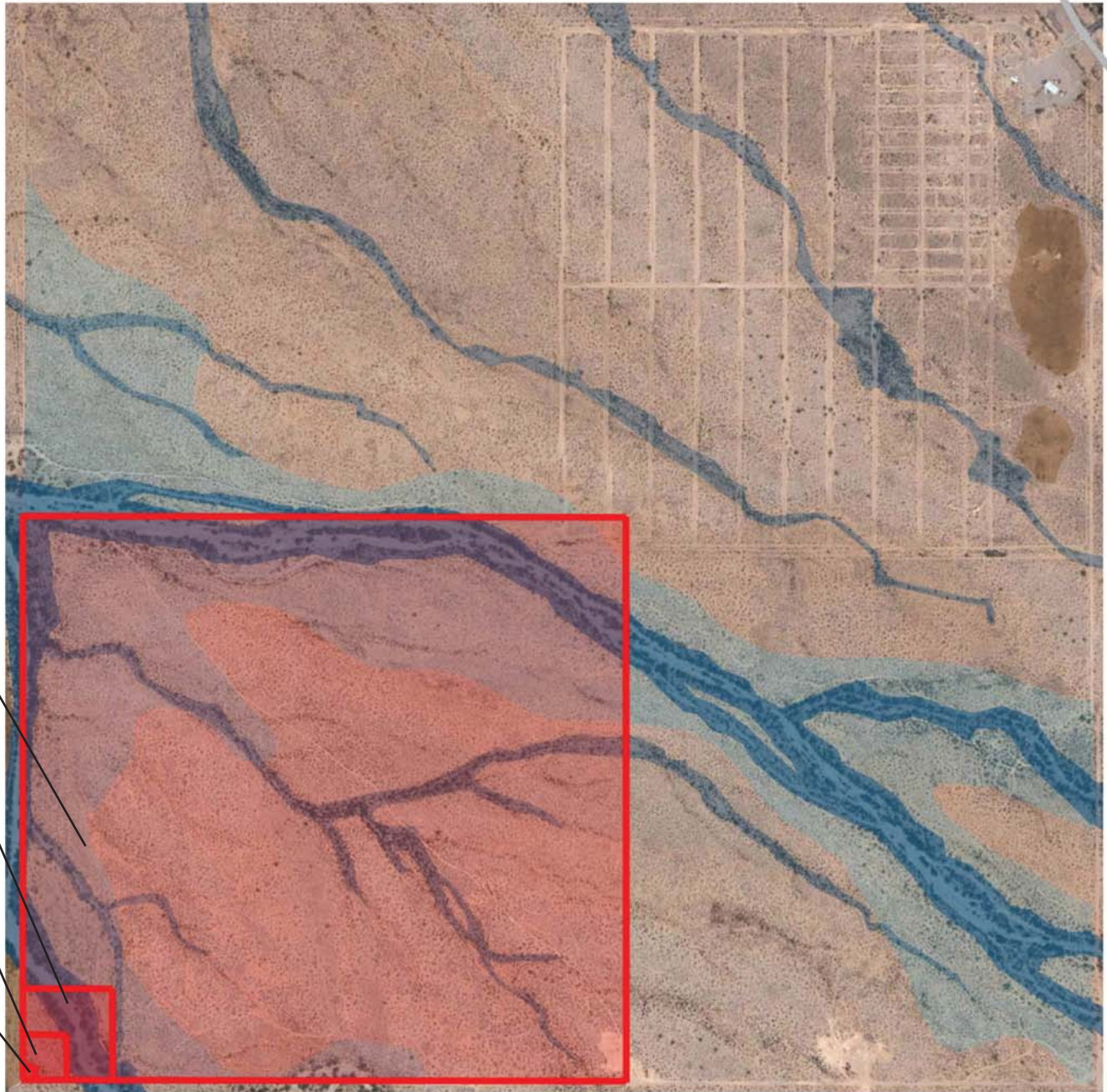
While membrane bioreactors are small and efficient, the costs of both the initial investment and subsequent maintenance can be cost prohibitive.

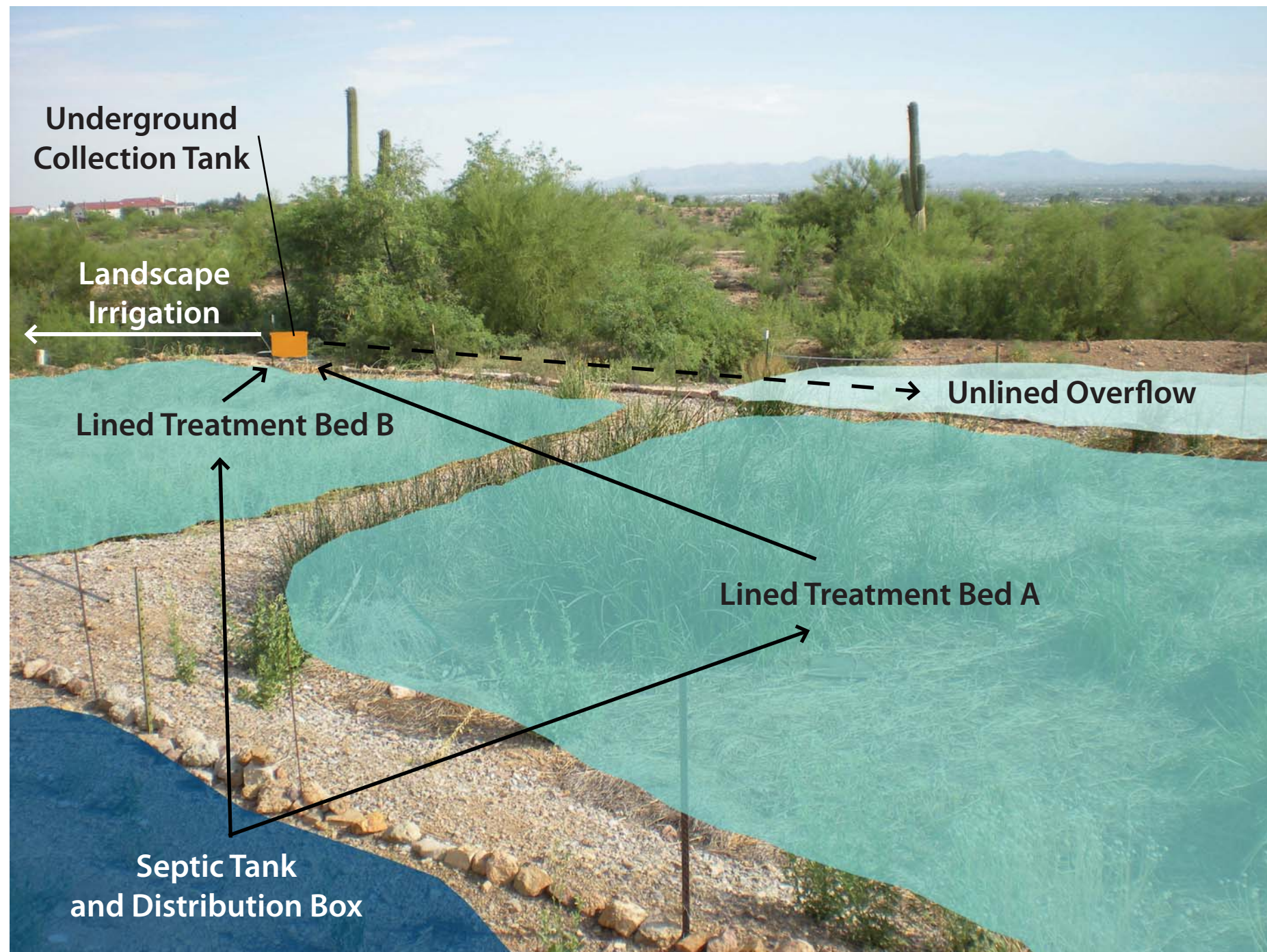
Design Principles

Site Wastewater Management

One of the most important considerations in selecting a wastewater treatment system is the amount of land each option requires. A wastewater lagoon requires significantly more land than any of the other options.

For a community of 200 homes, a wastewater lagoon requires roughly 20 acres of land for the basin itself. With the recommended 1000 feet buffer surrounding the lagoon, the amount translates to approximately 198 acres, or roughly one acre of land for every home in the community.

- 
- Wastewater Lagoon**
approx. 198 acres
 - Community Septic System**
approx. 5 acres
 - Constructed Wetland**
approx. 2 acres
 - Compact Membrane Bioreactor**
approx. 1/8 acre



Case Review

Milagro is a community in west Tucson with 28 homes. All wastewater from the community is treated on-site through a subsurface-flow constructed wetland.

Wastewater from the community first passes through a septic tank which removes solids and begins the digestion process. After passing through the septic tank, wastewater is dispersed to one of two (40 ft. x 40 ft.) treatment beds for biological filtration. Treated effluent then flows to an underground collection tank before being pumped for use in subsurface landscape irrigation.

In the event that more water flows into the collection tank than is removed from it, treated water is allowed to overflow into an unlined treatment bed where it can then percolate into the ground. Milagro's wastewater treatment beds work so well for the community that during the heat of summer only one treatment bed is needed due to increased evapotranspiration rates. Approximately once every five years the septic tank requires pumping to remove waste accumulation.



Design Principles

Safety and Lighting

Crime Prevention

Research into crime prevention has shown that criminal activities tend to focus on areas that are dark, isolated, unwatched, and unprotected. Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach to deterring criminal behavior primarily through design strategies intended to reduce fear of crime and opportunities to commit crimes. Reducing the opportunity to commit crimes makes a neighborhood feel safer and more inviting, contributes to quality of life, and can help lower costs for public safety, victim services, and private insurance.

CPTED focuses on eliminating unsafe features of the environment such as poorly lit or isolated areas, areas with blocked sightlines, or with no access to help, and spots that might allow criminals to hide or entrap victims. CPTED also builds on the idea that crime prevention is a community-wide effort, not solely a Police responsibility. As such, CPTED asks residents to participate in their own well-being and safety by focusing on these four principles:

1. Expressing Territoriality, or showing that you and the neighborhood care about the place you live in by keeping both public and private areas clean and well maintained, as well as beautified with trees, gardens, murals, and other expressions of ownership and care.



2. Allowing Natural Surveillance by keeping sight lines and watchful eyes open.

3. Controlling Access to private areas such as yards and homes. Use walkways and landscaping to direct visitors to the proper entrance and away from private areas.



4. Supporting Positive Activities in the Neighborhood such as walking, biking, picnics, gardening, playing sports and getting to know your neighbors.





Lighting

Lighting design needs to balance the benefits of the dark night skies with the elements of safety and security. Lighting also needs to serve both pedestrians and vehicles.

Night lighting should provide enough light for the use or need. For example, path lighting should put the light near the ground where people walk rather than full area flood lights. The strategy of knowing your need and designing lighting to meet that need reduces light pollution, increases energy efficiency, and reduces overall installation costs.

Lighting should also be kept to a minimum in public places near residences to avoid light intrusion into resident properties.

Practical Actions

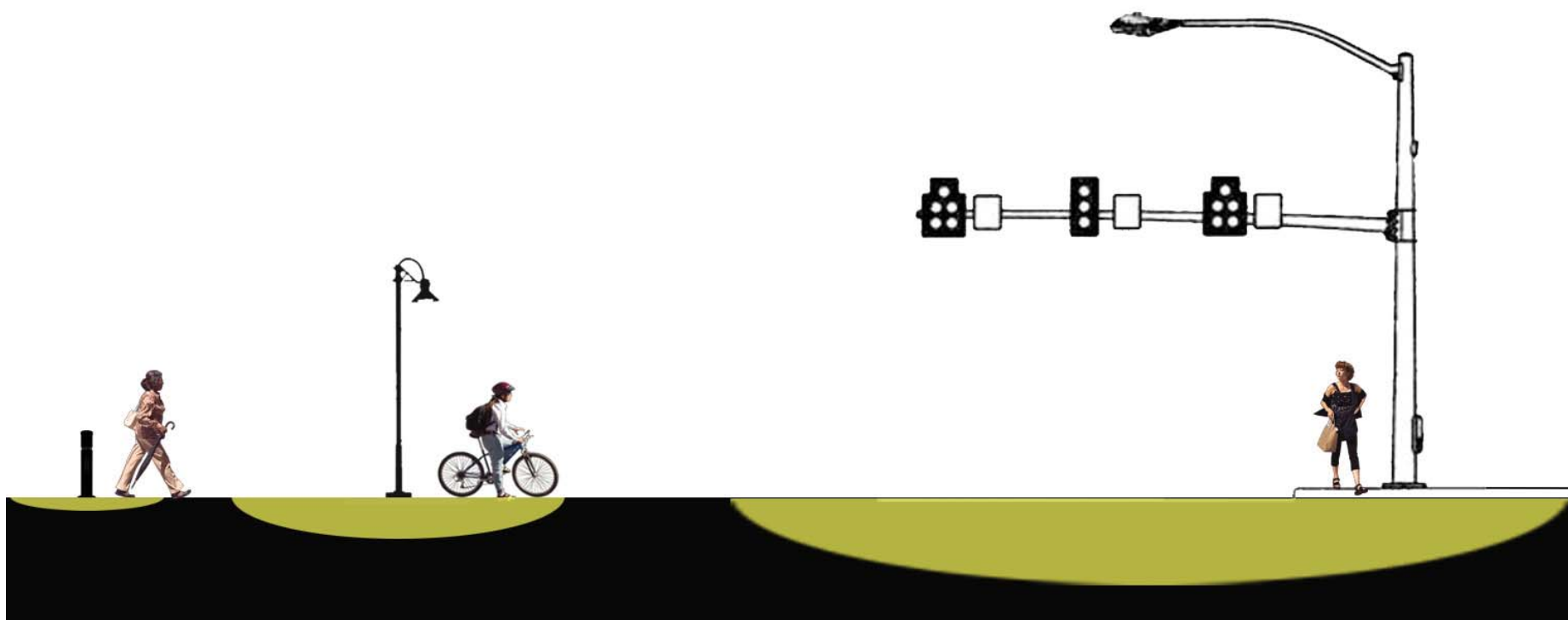
Use light only when and where it is needed. Turn off lights when they are not needed and create a curfew for lights-out. Minimize interim light use with timers and motion detectors.

Use only as much light as needed. Over lighting reduces the eye's ability to see outside of the lit area. In addition, excess light can produce glare, which also reduces visibility. Selecting the correct lamp wattage for your needs increases safety and reduces costs.

Shine lights down, not up. A well-designed fixture will direct the light where it is needed most - at the ground. Select new fixtures that are fully shielded; retrofit or replace poor quality fixtures.

Use efficient light sources for outdoor lighting around homes and businesses. Consider a compact fluorescent for good, energy efficient, economical lighting - a low-wattage lamp gives plenty of light for most properties and applications, and in a fully shielded fixture, it makes an excellent choice. When higher wattage lamps are necessary, be sure that they are fully shielded and energy efficient.

source: IDA Practical Guide, Topic: Introduction to Light Pollution - What's the Problem? International Dark-Sky Association. www.darksky.org.



Site Program and Phasing

The main programmatic focus of the Hia-Ced O'odham community is residential development. Residential life however, must be supported by a vibrant community and economy. A combination of residential, commercial, and community services must be brought together to create a healthy and balanced community.

How and when the elements of the program are constructed is equally important to the success of the community. Development plans should take into account the slow process of building a community and allow for it to grow in phases.

Program

Residential Development:

Providing affordable residences for the members of the Hia-Ced O'odham community is paramount in the development of the site. A variety of housing options should be offered to accommodate different lifestyles and family situations.

- Single-family houses on individual lots
- Grouped houses where family members can live close to one another and share outdoor space
- Housing for elders and singles

Community Center/ Open Space:

The community center brings the residents together by providing a common venue for meetings, events, classes, and celebrations. It is a place where residents can remember the past, live in the present, and plan for the future.

As the heart of the community, the community center should be easily accessible to all residents. Paths and trails, in addition to vehicular access, should be provided, connecting residents to open space and the community center.

The traditional O'odham lifestyle is deeply rooted in community values. It is important that the Hia-ced O'odham development includes space devoted to the gathering of people and to traditional community activities.

- Outdoor spaces should provide opportunities for fitness and recreation. Ramadas, plazas and parks can be used for cooking, family events, playing games, gardening, ceremonial events, etc.
- Indoor spaces should be provided for holding community meetings, workshops, elder and children's activities, and more.
- Designated open space is a way to preserve the natural landscape while providing access to trails, washes, and other natural sites to the community members. A network of trails can be used for equestrian riding, biking, or walking. It can serve as a way to get around the neighborhood or simply to experience and connect with the desert environment.

Commercial Center

Economic stability is vital to the success of any community. Commercial development creates opportunities for jobs, a key component for many community members to be able to move to the site.

Commercial development should be located near Highway 86 so that it is within close proximity of passing travelers and can potentially draw them into the site. Commercial development has the potential to not only serve the local community with amenities and employment opportunities, but also to give visitors a glimpse into the Hia-Ced O'odham way of life.

A portion of the community survey was dedicated to gathering feedback as to what retail spaces the commercial center might house. The following are some of the recommendations:

- grocery store
- restaurant
- arts and crafts store
- hardware store
- laundromat
- community commercial kitchen
- mechanic
- gift shop

Given the nature of the site's rural location, a commercial development is something that is likely to be developed over time. For this reason it is important that the commercial development is planned in a way that can be constructed in phases ensuring that it functions well with one building or many buildings.

Site Development Phasing

It is likely that the Hia-Ced O'odham community, with 200+ homes, a community center, and commercial development, will not be built in a single phase, but will be built over a period of time as needs and funding allow. The design needs to allow for flexibility in phasing to ensure that the community can be a success with 20 homes or 200 homes.



Phase 1



Phase 2



Phase 3



Phase 4



Phase 5

Design Principles

Housing Clusters

The arrangement of housing into clusters draws from the traditional housing patterns of the O’odham: within family groups, houses were built in close proximity and the family shared outdoor space for cooking, sacred events, etc.

This can be used as a model for the Hia-Ced O’odham community in order to conserve land and natural resources and to foster closer relationships between the residents of the clusters.

While it is understood that not all future residents want to live in a housing cluster, many members of the community have expressed a desire to return to a more traditional lifestyle; one that enhances their culture and way of life. A variety of housing configurations should be offered to best serve the community.

Benefits of Housing Clusters

Single family houses on individual lots may be the ubiquitous response to housing needs in most situations, but this isn’t always the best or most desirable solution. By grouping houses together, both the community and nature benefit.

Foster a Sense of Community

Separate living with fenced yards is not the O’odham way. To bring this scattered community together in a healthy and culturally nurturing way, the desert should be shared and fences eliminated except where necessary.

Minimize the ‘Footprint’ on the Land

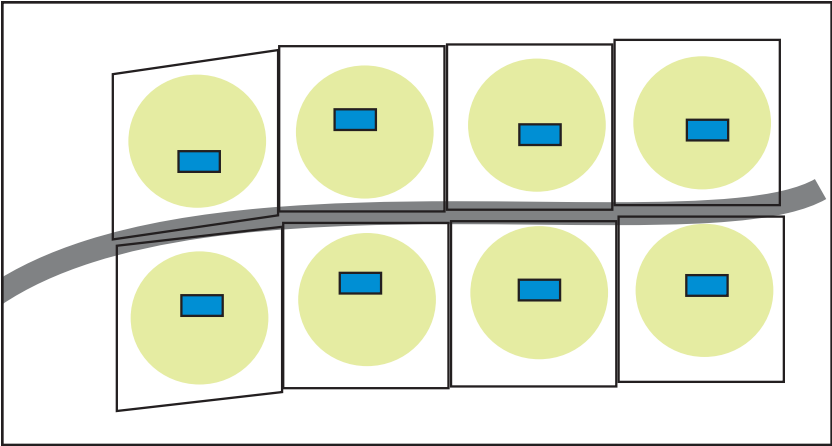
Clustered houses with shared open space give each home access to larger areas of natural desert without using up more land. Shared parking allows for reduced infrastructure, which means less impact on the natural desert and lower cost.

Reinforce Traditional Living

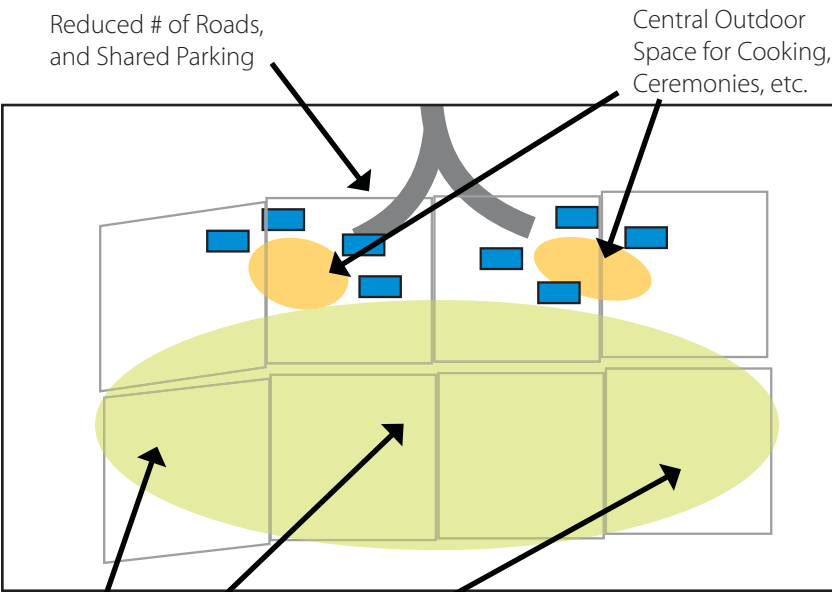
Central outdoor spaces used for cooking, ceremonial events, and daily activities bring the residents closer together and reinforces their traditional culture.

Preserve the Desert

Shared open space can be used for riding horses, for agriculture, or other minimally invasive uses, or left untouched for all to enjoy.



Each house on an individual lot with private drive; land for individual use.



Shared Open Space for Equestrian Riding, Agriculture, Preservation, etc.

Reduced # of Roads, and Shared Parking

Central Outdoor Space for Cooking, Ceremonies, etc.

Guidelines for Housing Clusters

1. Clusters should facilitate interaction between residents, but must also offer privacy to all homes.
 - Each home should have a private outdoor space (see plan).
 - Windows should be placed such that one cannot easily view into the house from another house, from a path or from the parking area.
 - Paths to and from each house should not view into the private space of another resident.
 - Each home should have a distinct and separate entry (see plan).
 - Shared walls are acceptable between family members, but may be undesirable between unrelated residents.



2. Central outdoor space should include:
 - a ramada
 - space for outdoor cooking
 - gathering and eating space for large families and visitors
 - garden plots (either shared or separate)
 - water-harvesting for garden and landscape irrigation
 - accessible paths from each home
 - flexibility to be used for various purposes



3. Parking need not be adjacent to each home, but should be easily accessible. However, homes for elders or people with disabilities should be directly adjacent to parking. While adjacent parking would require additional infrastructure, some clusters may want to incorporate the notion of “universal design” by having the infrastructure in place to accommodate people as they age or become disabled.



4. Large families should be accommodated in clusters that are designed to grow and expand with family activities and needs.



Design Principles

Home Design

The traditional lifestyle of the Hia-Ced O'odham is inherently sustainable. Life adapts to the changing of the seasons and to the particular landscape. Structures are small, built with local, natural materials, and use properties of thermal mass and shade to stay cool. While modern civilization offers new amenities and technologies, the principles that have made life and building sustainable in the past should not be ignored.

The Hia-Ced O'odham community must offer safe, affordable housing options for its members. Designing affordable homes for the desert should be an exercise in material applications, passive solar strategies, and creating indoor/outdoor spaces. The homes should be expressive of the Hia-Ced O'odham culture and appropriate to the place.

The design of buildings for the Hia-Ced O'odham community should include these elements.

Connection to Land and People

Offering affordable housing does not mean sacrificing quality, cultural relevance, or environmental responsiveness. The Hia-Ced O'odham community homes should evoke a sense of place, reflecting the uniqueness of this community.

The Hia-Ced O'odham culture is expressed in the language, the crafts, and the spirituality of the people. It should also be expressed in their homes. Distinctive aesthetic and material choices should serve to create a sense of place and allow for individual expression in the home. Designs should facilitate family gatherings and ritual ceremonies in order to facilitate the further expression of culture and traditions.

Right: Two examples of environmentally and culturally responsive houses designed for the Navajo community in Northern Arizona. These houses reflect the cultural values of their inhabitants in the form, spatial planning, and material choice. They also create a dialogue with the character of the landscape.



Left: *Sweet Caroline Interior*. Right: *Benally House*. Both houses designed and built by DesignBuildBluff for the Navajo Community in Northern Arizona. Source: www.DesignBuildBluff.com

The Hia-Ced O'odham are culturally and spiritually tied to their homelands. The desert is an integral part of their culture and should play an integral role in the design of their homes. The architecture should respond distinctly and appropriately to the desert environment.

Right: Drachman Institute design solutions for the Hia-Ced O'odham community aim to reflect the character of the site by using local, natural materials, by integrating outdoor spaces, by providing shade and thermal mass, and through energy-efficient design that will accommodate the lifestyle and traditions of the people.



Outdoor Living

Traditionally, most of the daily activities in the O’odham lifestyle take place outside, including sleeping. This lifestyle allows people to connect with their environment, both physically and spiritually. Many O’odham still long for a lifestyle that allows them to connect with the desert in this way.

Houses for the Hia-Ced O’odham should encourage outdoor activity and interaction with nature. Exterior spaces should be designed for cooking, gathering, sleeping, and ceremonial activities.



Outdoor spaces such as traditional outdoor kitchens and dining spaces designed for daily use allow residents to experience and enjoy the desert.

Right: Outdoor kitchen in a house designed by Amanda Spear.

In the southern Arizona climate, sleeping outdoors comfortably can happen most of the year. Sleeping porches provide convenient and safe outdoor sleeping.



Tucson Home, Design Build Collaborative. Source: Rock, Steel and Earth. Nannini, Loni. Tucson Home, Summer 2002. Photos by Terrence Moore. (<http://www.dbcarchitectbuilder.com/publications/tucsonhome.pdf>) 28 Jan, 2010.

When designed well, courtyards become outdoor living rooms that allow inhabitants to enjoy the desert while maintaining a sense of privacy.



Above: Tucson Mountain Rammed Earth Residence, DesignBuild Collaborative. Source: A Tale of Two Hats. Consaul, Sheila A. Tucson and Southern Arizona Builder/Architect Jan2005. (http://www.dbcarchitectbuilder.com/publications/builder_architect.pdf) 28 Jan, 2010.

Indoor spaces should bring the outside in through views, ample natural light and natural ventilation through well-placed windows and doors.



Left: Tucson Mountain Rammed Earth Residence, DesignBuild Collaborative. Source: A Tale of Two Hats. Consaul, Sheila A. Tucson and Southern Arizona Builder/Architect Jan2005. (http://www.dbcarchitectbuilder.com/publications/builder_architect.pdf) 28 Jan, 2010.



Design Principles

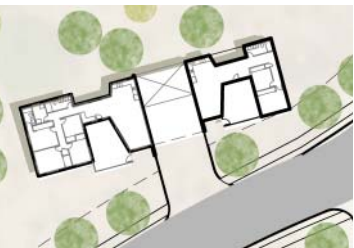
Home Design

Variation in Housing Types

The Hia-Ced O’odham comprise a diverse community. Therefore, a diverse range of housing options must be available:



Detached, single-family houses should be offered for families who wish to live apart from others.



Attached houses are an option that is less costly to build, more energy efficient, has lower heating and cooling costs, and lowers the impact on the desert for those families who wish to live near relatives



Smaller multi-family units can provide private, independent living near amenities for elders and single-residents



One Bedroom

Two Bedroom

Three Bedroom

Families change over time. In order to facilitate long-term use, houses, too, must be able to change. Designs should make it easy for owners to add bedrooms, bathrooms, or secondary living spaces as needed to accommodate a growing or changing family.

Building Materials

Traditional Native American buildings were the first example of “green” building in the desert. Their adobe and wood dwellings responded to the environment in a sustainable and economic way using available materials.

The materials with which a building is constructed have an enormous effect on the sustainability of the building. The use of appropriate materials can extend the life of a building and make maintenance simple.

For the Hia-Ced O’odham community, houses should be built for long-term affordability. This means being energy efficient, low-maintenance, durable, and adaptable. The materials for the homes should therefore be chosen for their economy, durability, and ecological sustainability.

Some materials that meet this criteria:

Adobe brick - made from locally obtained dirt, adobe can be long-lasting and aesthetically beautiful while providing thermal mass. Additionally, this material has cultural significance in the southwest.

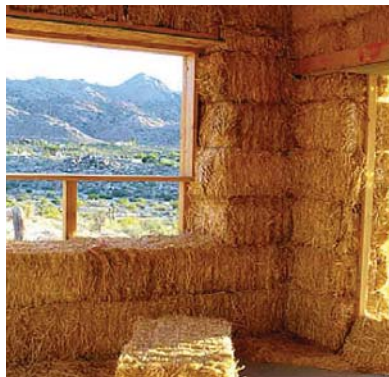
Right: Adobe wall. (Source: http://www.aznativeproperties.com/RooPho_new/Featured_Listings/10620_W_Montecito/10620_W_Montecito.htm) 29 Jan, 2010.



Rammed Earth - although it has a stigma of high cost, rammed earth does not need to be a pricey endeavor. The labor-intensive construction of rammed-earth homes can provide jobs in the community, and the result is a beautiful, ecologically friendly, thermal mass structure which expresses both the land and the process from which it is made.

Right: Rammed Earth Wall. (Source: <http://designshrine.net/2008/03/23/rammed-earth-bathroom-walls/>) 1 Jan, 2010.

Strawbale - the bales used in construction are made from a waste-product of the farming industry. Strawbale homes have high insulation values, are simple to build, and their thick walls are a valued design feature.



Right: Unfinished Strawbale Interior. (Source: <http://www.inhabitat.com/2007/12/29/sacred-sands-a-strawbale-bb-guest-retreat/>) 1 Feb, 2010.



Insulated Concrete Forms (ICFs) - a more modern option, these come in many forms and from many companies, such as RASTRA, Mikey Block, and Smart Block. ICFs, styrofoam blocks filled with reinforced concrete, have a high insulative value and can be covered with a number of exterior treatments.

Left: Mikey Block Corner. (Source: http://cplcustomhomes.com/icf_construction) 29 Jan, 2010.

Additional material choice criteria:

- If possible, buildings should use structural systems (such as adobe brick or rammed earth) that don’t require additional material finishes to reduce costs and maintenance requirements.
- Reflective roofing lowers cooling costs by reducing the heat absorbed by the roof.
- Metal roofing is durable, economic and naturally reflective.
- Painted exteriors require frequent maintenance. Consider an exterior material that doesn’t require as much upkeep, such as masonry or protected metal.
- Other earth-based materials to consider include compressed earth blocks (CEBs) and gabion construction (wire frame filled with rock).



Right: Corrugated Metal Detail. Source: *A Tale of Two Hats*. Consaul, Sheila A. Tucson and Southern Arizona Builder/Architect Jan2005. (http://www.dbcarchitectbuilder.com/publications/builder_architect.pdf) 28 Jan, 2010. **Middle:** Big Johnson House detail. (www.designbuildbluff.com) 18 Jan, 2010. **Right:** Marie Short House Detail. Glenn Murcutt. (<http://josegenao.wordpress.com/category/arquitectura/>) 3 Feb, 2010.

Ease of Construction and Maintenance

Traditionally, O'odham houses were built by the community members. This made building easier and supported the sense of unity. Houses that are simple to build and maintain can re-ignite this tradition, providing jobs for local residents and fostering a sense of pride and community in the Hia-Ced O'odham.

Construction: Adobe, rammed earth, and strawbale construction are three types that do not require skilled craftsmen and can be learned in a reasonable amount of time.



Left: Strawbale Construction. (<http://www.celebratebig.com/pacific-northwest/ellensburg-strawbale-plastering-workshop/strawbale-construction-plasteringw-workshop-half-north-wall.jpg>) 18 Jan, 2010. **Right:** Rammed Earth Construction by Gila River Indian Community with the help of the Drachman Design-Build Coalition. (<http://ddbc.arizona.edu/projgila.php?pid=3>) 18 Jan, 2010.

Maintenance: Hia-Ced O'odham houses should be easy to maintain and repair. If residents are able to maintain their own homes, they are likely to be in better condition and pose less of a financial burden on the community. The following should be considered:

- Residents should be able to easily access electric wires, mechanical systems, and plumbing when repairs are needed.
- Details such as flashings and trim should be simple.
- Exterior elements should be durable and easy to repair, especially roofing and walls.
- Monolithic or simple wall assemblies make repairs and renovations easier for the occupants.

Water Conservation

The O'odham understand the importance of water in the desert. In an environment that receives only 8 inches of precipitation annually, it is the most precious resource. There are a number of ways to conserve water, including rainwater harvesting, greywater reuse, and the installation of low-flow appliances.



Building rooftops are a great tool for water collection. Water collected from roofs can be used for irrigating gardens and landscaping. If run through the proper filtration system, the water can be used for potable purposes.



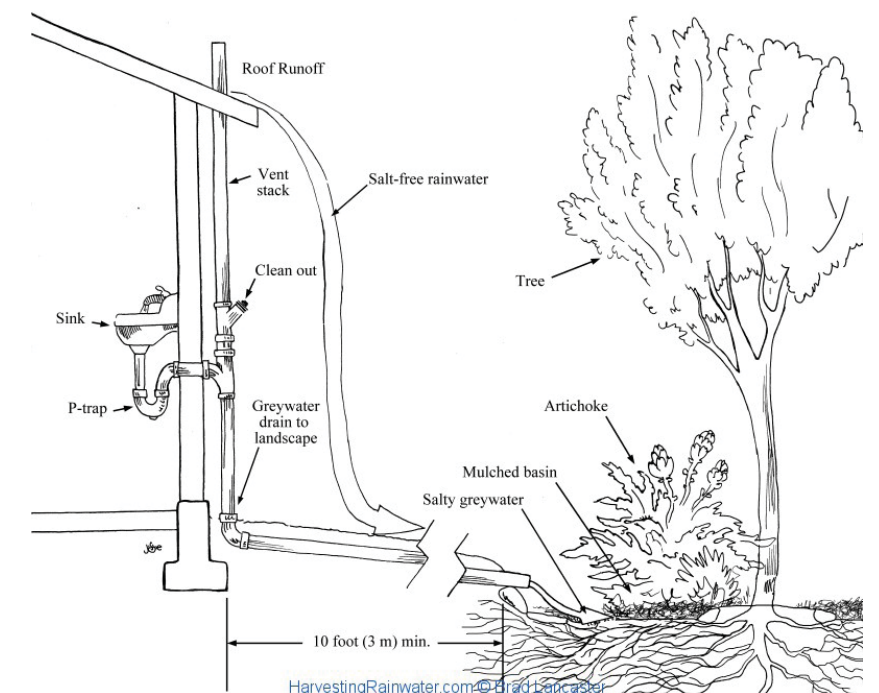
Above Right: Drachman Institute house design incorporating a water catchment system.

Above Left: Waterharvest Slimline catchment cistern. (http://www.gulfcoastrenewableresources.com/rainwater_harvesting) 29 Jan, 2010.

Left: Diagram: re-directing water to landscape. Lancaster, Brad. (<http://www.harvestingrainwater.com/imagesvideoaudio/image-gallery/assortment-of-water-harvesting-images/>) 29 Jan, 2010.

Greywater is residential wastewater that contains no chemical toxins or biological waste (feces, food products, etc). Sources of greywater include the shower, bathroom sink, laundry water, hose runoff, etc. (Kitchen sink wastewater is not greywater because of the high concentration of bacteria resulting from food preparation and cleanup).

Greywater is relatively benign and can be used for irrigating landscape and other non-potable uses (car-washing, etc.) after a simple filtration process.



Greywater Harvesting Diagram. Source: Lancaster, Brad. (<http://www.harvestingrainwater.com/imagesvideoaudio/image-gallery/greywater-harvesting-image-gallery/>). 29 Jan, 2010

Design Principles

Home Design

Energy Conservation

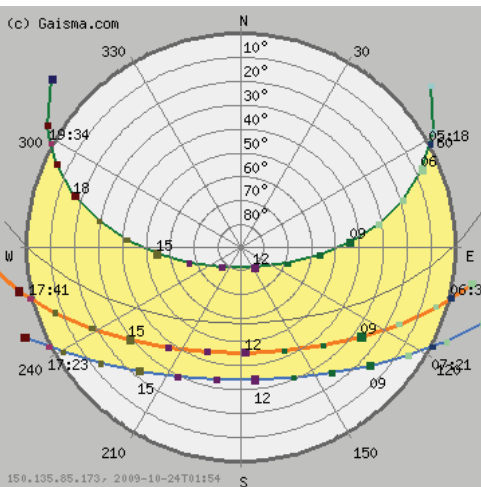
Passive Solar Strategies:

The sun is both friend and foe in the harsh desert of southwestern Arizona. Homes should be designed to keep heat out in the summer and take advantage of the sun's warmth in the cold months.

Solar Orientation:

In the summer, the hot sun rises and sets north of east and west and stays high in the sky during the day. In cooler months, the sun rises and sets further south and remains lower in the sky.

Homes should be designed to take advantage of the path of the sun. If possible, buildings should be oriented with their shortest walls on the east and west sides. Courtyards and patios should be placed to maximize comfort.



Window Placement:

Windows should be avoided on the east and west walls, as they are the hardest to shade from direct sun exposure in the summer. If windows must be placed on the east and west sides, trees or other shading devices should be placed to block the early and late summer sun.

Windows on the north side should have vertical shades to keep out the early morning and late afternoon sun.

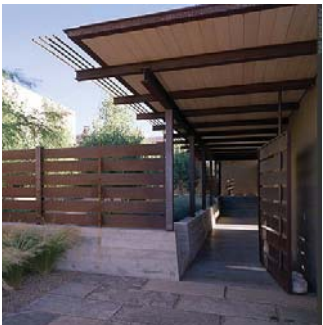
Windows placed on the south walls of a house can be shaded with horizontal elements, such as roof overhangs or awnings, to receive little to no summer sun, but lots of low winter sun.

Shade:

It need hardly be said how welcome shade is in a hot desert environment. One of the simplest and most effective ways to reduce cooling costs in a home is to shade the walls and windows using porches and roof overhangs. In the winter, however, it is desirable to have direct sunlight in spaces, heating up the walls and floors, reducing heating costs.



Above Left: The roof of the Hill Country Jacal house is oriented to the south to provide shade. The west side of the house (seen here) is protected from the sun by a massive wall with minimal openings. Photo: Lake-Flato Architects. (<http://www.lakeflato.com/projects/jacal/01.asp>) 28 Jan, 2010.



Above Right: The overhanging roof of the Dunnung Residence protects inhabitants from the weather and shades the wall of the house. Photo: Lake-Flato Architects. (<http://www.lakeflato.com/projects/jacal/01.asp>) 28 Jan, 2010.

Below Left: The Drachman Institute housing designs incorporate south-facing porches to provide a comfortable outdoor space year-round as well as to protect the windows from summer sun. All windows in this design face north or south.

Below Right: Overhangs on the south are sized to shade windows in the summer and let in the sun in the winter.



Active Solar Strategies:

Technology allows us to transform solar energy for many uses in the household. This helps to reduce the use of fossil fuels and reduce utility costs. Some active solar strategies include:

Photovoltaic panels transform solar radiation into electricity. The electricity can be used in one of three ways:



Above: Home with solar panels. (<http://lions-wing.net/solar/pv-roof.html>) 3 Feb, 2010.

- Direct Use:** after being run through an inverter, the power produced by the panels can be used immediately in the house. However, there should be another source of power for night-use and on

cloudy days.

- Battery-Powered:** the energy produced by the panels can be stored in batteries. If these are sized correctly, all of the house's electric needs can be met by the energy created on sunny days.

- Grid-Tied:** the solar panels can be connected to a larger electric grid. If the panels aren't creating enough energy for the house, electricity can be pulled from the grid. If more energy is being created than used, it is fed back into the grid. Many power companies will buy energy from private sources, meaning even lower electric bills!

Solar collectors are panels of tubes that sit on the roof. The tubes are filled with water or refrigerant and are used to bring heat into the house in order to:

- heat water for domestic use (bathing, washing, etc)
- heat spaces through radiant under-floor systems
- pre-heat air used in a central heating system

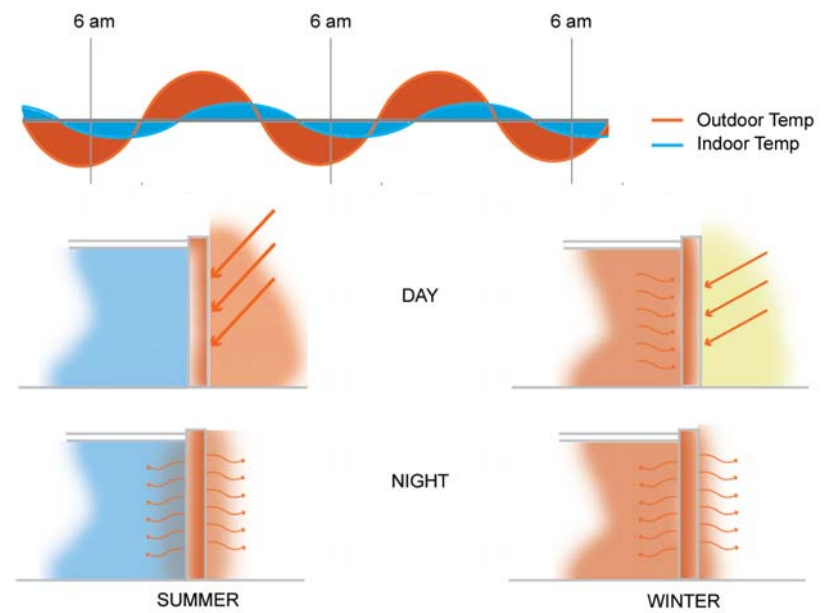


Above: Solar Collector Diagram (<http://www.earthwindfire.co.uk/Panels/panels.html>) 1 Feb, 2010.

Thermal Mass:

Thermal mass is a familiar concept to any designer in the desert. Essentially, a massive material (concrete, adobe, rammed earth, brick, etc) is used to absorb the heat of the day slowly and release it hours later. This levels out the severe temperature spikes and can help keep a house cool in the summer and warm in the winter:

- Summer - Mass absorbs heat during the day, natural ventilation allows cool air to offset the release of heat at night.
- Winter - Heat stored by the mass during the day is released at night and warms the interior of the house.



Above Left: Rammed earth is used for the west wall of this Tucson home to soak up the heat of the afternoon sun. Photo: Drachman Design-Build Coalition, Residence 1 (<http://ddbc.arizona.edu/projddbcres1.php?pid=2>) 28 Jan, 2010.
Above Right: In a Drachman Institute housing design, the north-south running walls are thick adobe to mitigate the effects of solar gain on the east and west.

Natural Lighting:

There are many reasons to incorporate natural lighting into the design of a home.

- Lower Energy Bills: replacing or supplementing interior lighting with daylight reduces the amount of energy used during daily activities.
- Increased Comfort: Lighting is an important element in making a space comfortable. Good use of natural light achieves this easily, making rooms feel warm and welcoming.
- Increased Connection to Land: Homes designed to let daylight in can also let people see out to enjoy the desert while washing dishes, eating dinner, or doing homework.



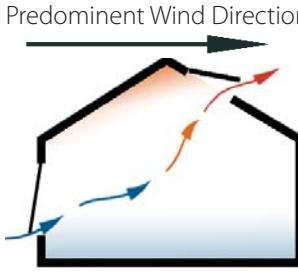
Above Left: Naturally lit living room, adobe home in Montecito, Will Bruder. Source: http://www.aznativeproperties.com/RooPho_new/Featured_Listings/10620_W_Montecito/10620_W_Montecito.htm 29 Jan, 2010.
Above Right: Dining room, Tucson Home, Paul Weiner. Source: *Rock, Steel and Earth*. Nannini, Loni. Tucson Home, Summer 2002. Photos by Terrence Moore. (<http://www.dbcarchitectbuilder.com/publications/tucsonhome.pdf>) 28 Jan, 2010.
Right: Kitchen, Tucson Home, Paul Weiner. Source: *Rammed Earth Compound*. Fine Home Building Magazine. Issue 101, Spring, 1996.



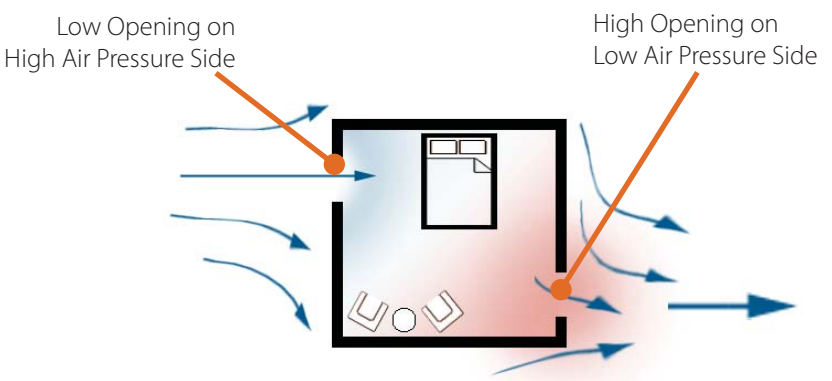
Natural Ventilation:

The more the occupant can adjust the building envelope to control his/her own environment, the more comfortable and energy-efficient the house will be. Well-placed elements such as sliding doors, screens, windows and skylights are important elements for providing natural ventilation to a house.

The phenomenon of hot air rising is known as the *Stack Effect*. Designers can take advantage of the stack effect to cool buildings. such that warm air can escape out the high window or skylight and draw cooler, fresh air in from outside.



The effect is amplified if high and low windows are properly placed such that the wind blows cool air in through the low window or door, causing an increase in air pressure inside the house and forcing the hot air out of a high window or skylight.



Design

• Site Concept •

Final Site Concept
Commercial Development
Community Center

• Cluster Concepts •

Courtyard Cluster
Radial Cluster
Park Cluster
Parking Concepts

• Homes •

Courtyard Cluster Homes
Radial Cluster Homes
Single-Family Detached Homes
Attached Housing



Left to right: Gary Antonio, Karia Lee Basta, Peter McBride, Dustin Robles, Colleen Cummings, and Marilyn Robinson. July 31, 2009.

Site Concept

Final Site Concept

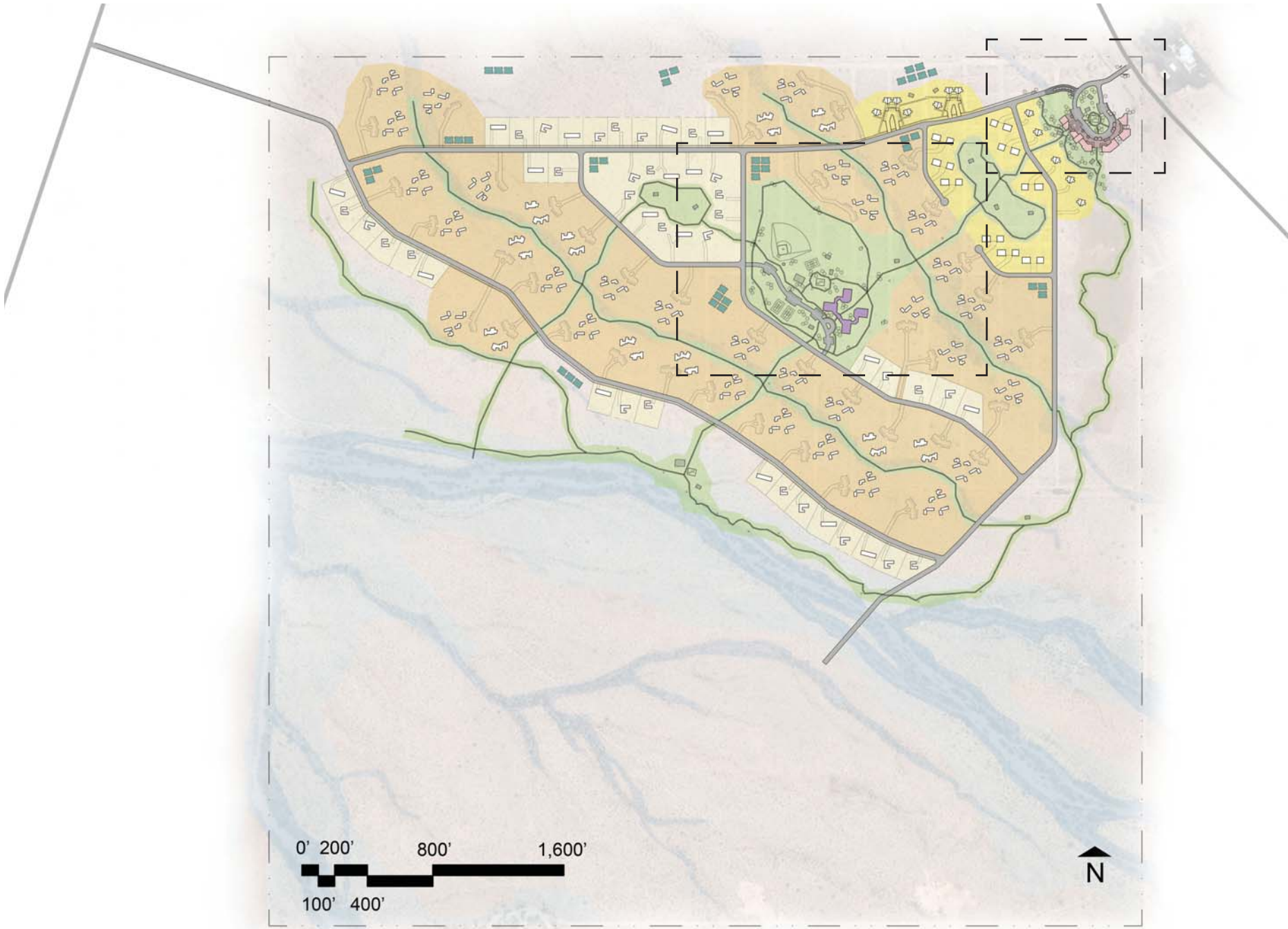
- 46 Single Family Lots
- 172 Single Family Clustered
- 24 Single Bedroom Duplexes
- 18 Multi-Bedroom Duplexes

260 Total Homes

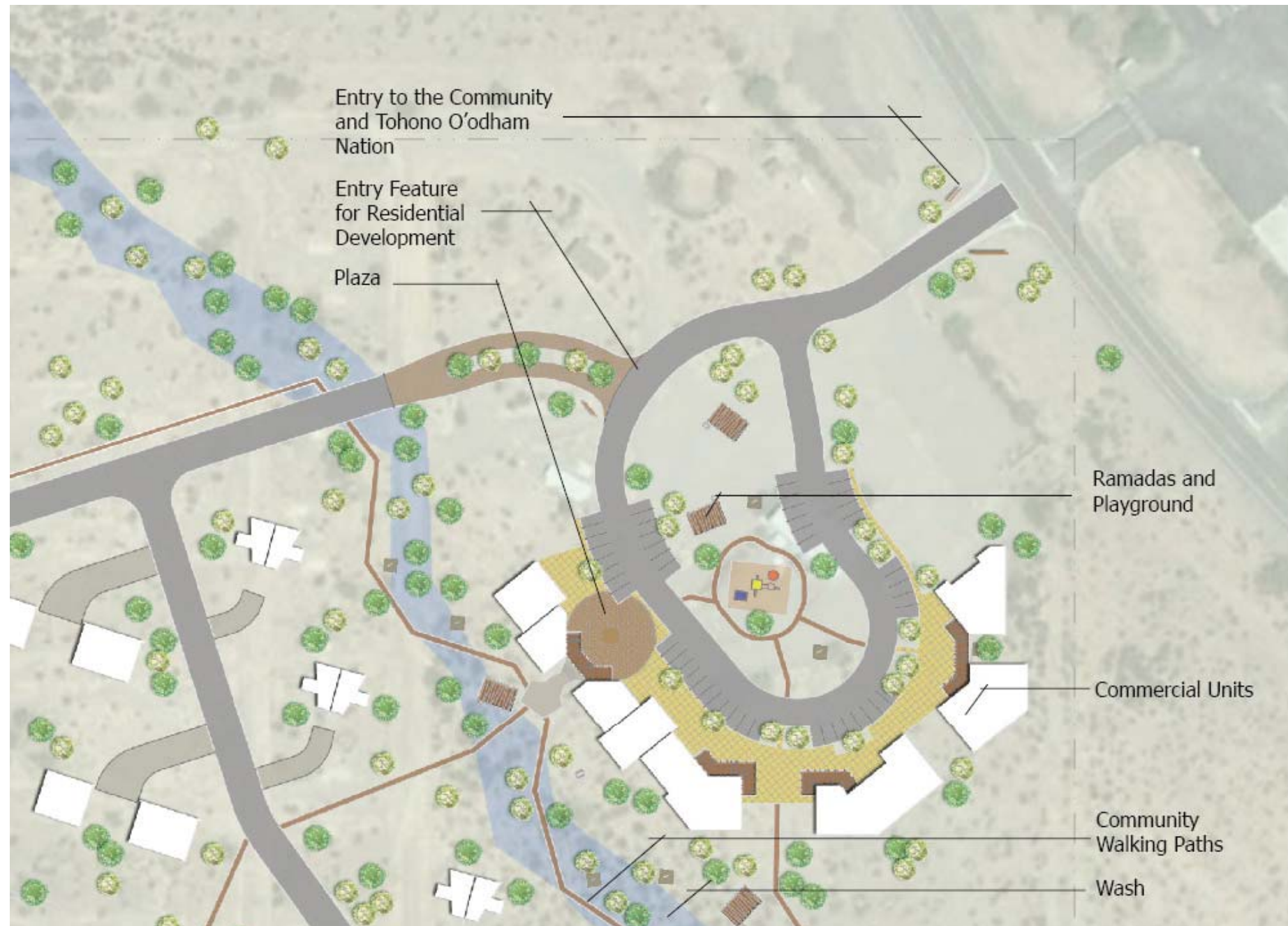
The final site concept incorporates an array of housing alternatives for the diverse needs of residents. Commercial development is located at the northeast corner of the site and the community center is centrally located.

The site responds to the natural features of the land with minimal disturbance to washes. Pedestrian linkages are a focus of the design with a strong effort made to connect community members through an extensive path network.

Wastewater treatment for the site is managed by constructed wetlands which can be implemented as the site requires. This form of wastewater treatment is ideal for phasing and reduces disturbance to the land.



- | | | | |
|---------------------------------|--------------------------------------|---------------------------------------|-----------------------------|
| Residential, single family lots | Residential, single family clustered | Residential, multiple family duplexes | |
| Commercial Development | Community Center | Open Space | Wastewater Treatment System |



Commercial Development

The site's commercial development is visible from Highway 86 where visitors passing by can see the amenities of the site as well as ramadas and a playground where travelers can take a break from their journey.

The buildings are architecturally united by shade structures that protrude from the buildings' facades. Views into the site are framed by the buildings. These views serve as trailheads for the site's extensive path network.

Parking is compartmentalized into small lots interspersed with vegetation so as to not give the feeling of a massive parking lot. Water runoff from the streets and parking lot is collected and supports plant life.

A small wash is located behind the commercial development affording residents and visitors alike with shade areas for eating and relaxing.

Entry to the residential portion of the site is indicated by a change in paving materials and median plantings.

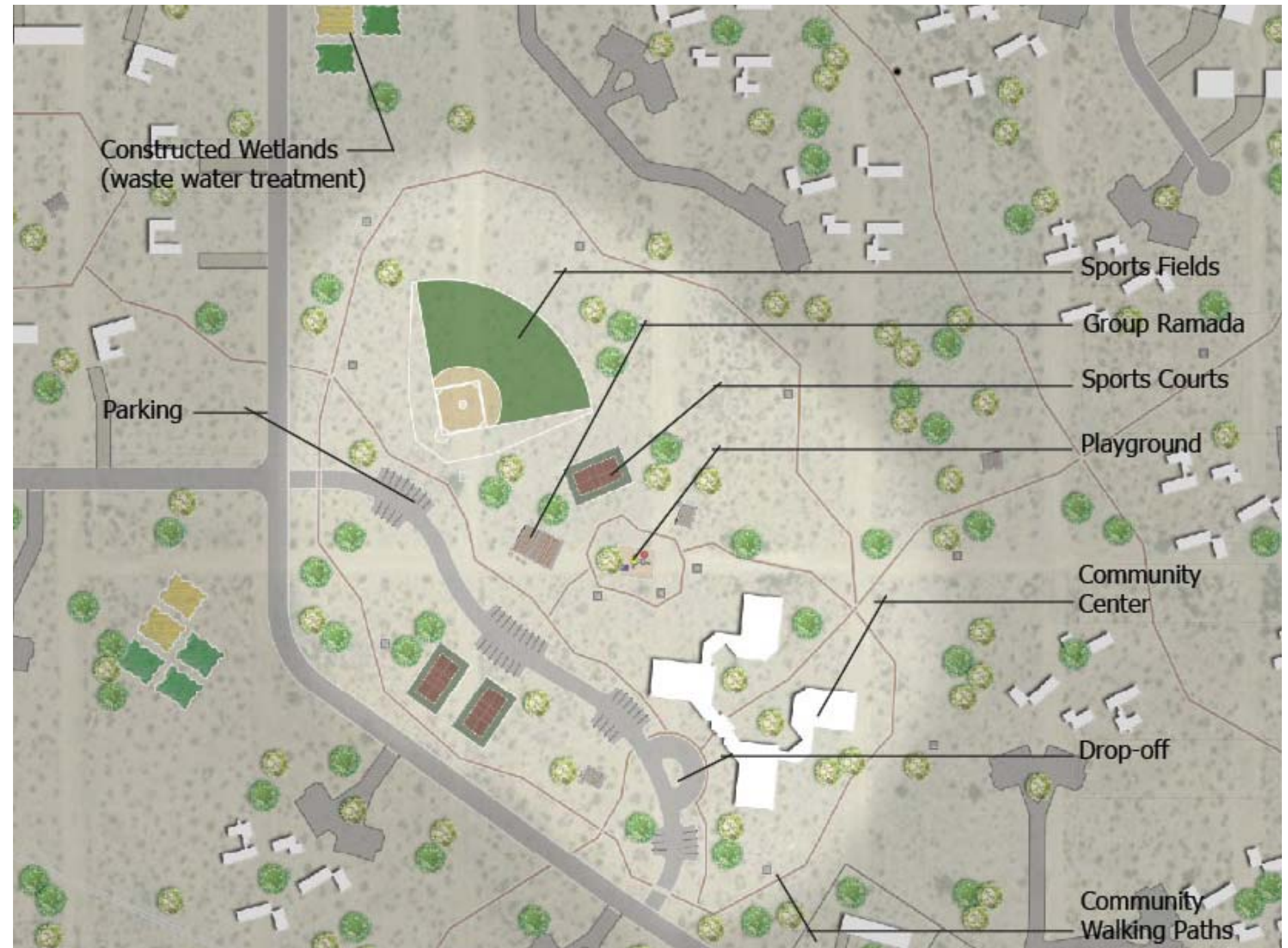


Design Site Concept

Community Center

The community center is located in the center of the community where it can be most easily accessed by residents and visitors. Trails connect the community center to commercial development and to the homes of residents. A series of ramadas both large and small host family and community gatherings.

The community center can be easily phased and expanded over time as wings are added to the main structure, fields and courts are incorporated in the park, and additional parking is constructed.



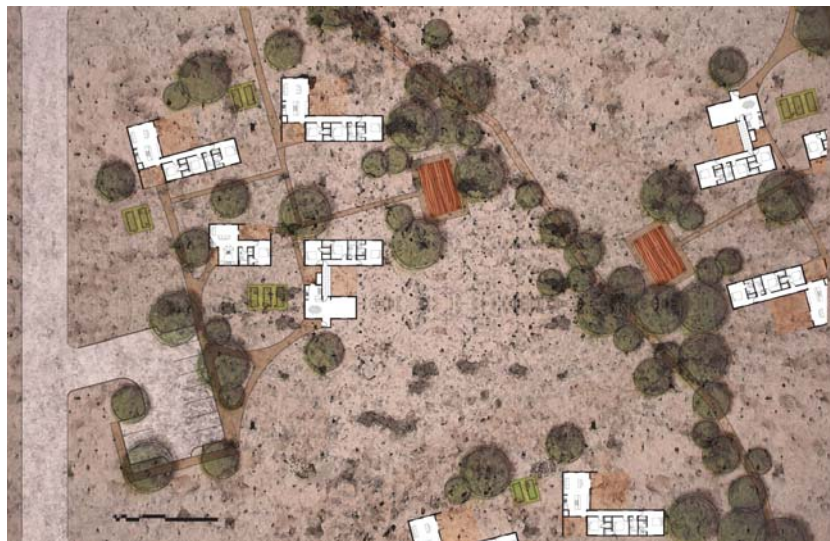


Design Cluster Concepts

Courtyard Cluster

The courtyard housing cluster is designed to bring individual housing units together around a shared community space. Homeowners have the privacy and comforts associated with a private home along with increased access to open space.

This layout may be ideal for extended family situations, and can be expanded as a family grows. Clusters are situated along the washes which act as connections to the rest of the community.



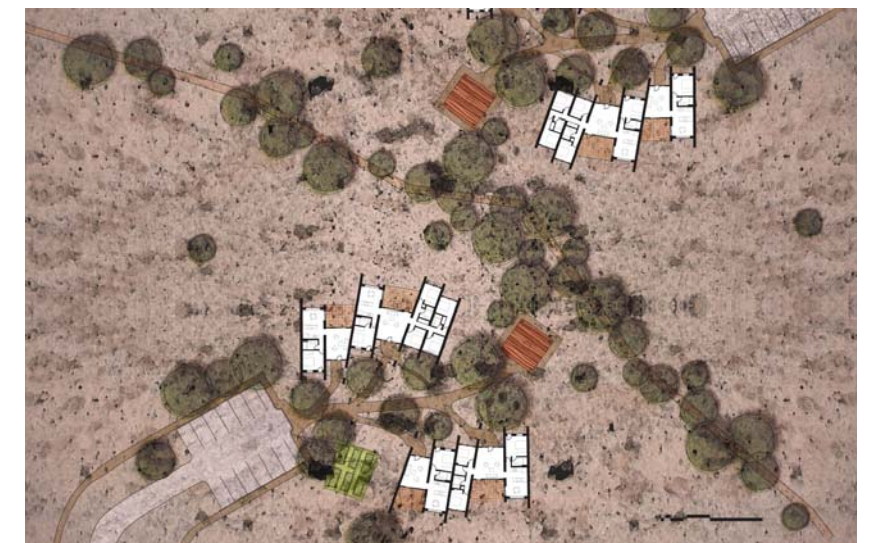


Radial Cluster

The radial housing cluster is designed to minimize the building footprint and increase energy efficiency through the use of shared walls. The cluster consists of two buildings each with two or three units.

A common courtyard is shared between the buildings and incorporates elements of outdoor living including an outdoor kitchen, shade ramada, and garden. The buildings are arranged to maximize privacy. Each home has a private walk and entry porch, a private back porch, and open space designated through views and the suggested extension of walls.

The clusters are situated along the washes, which act as connectors to the rest of the community.



Design Cluster Concepts

Park Cluster

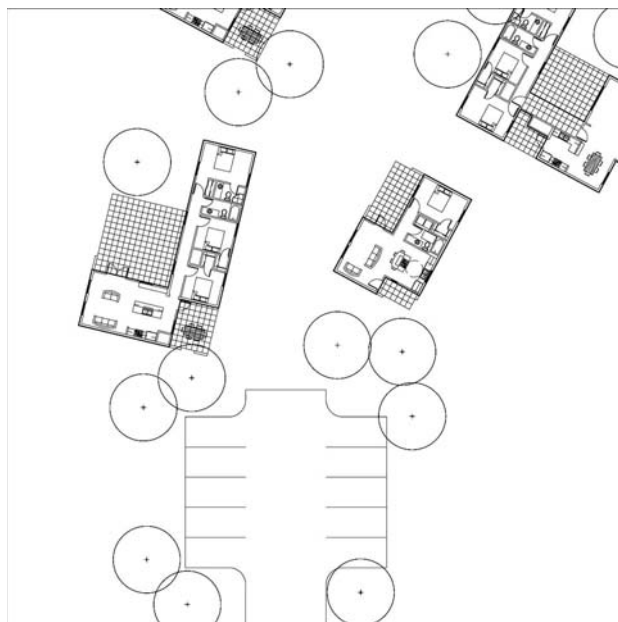
The park cluster groups homes around shared communal areas as with the other cluster options, but gives residents an increased level of privacy with private drives and greater separation between homes.

At a glance the park cluster might look like a typical neighborhood, but there are a few key differences. Unlike traditional neighborhoods where homes are oriented toward the road, the park cluster has homes built facing away from the road toward a shared park-like open space. The park is the center of activity with paths linking to the rest of the community along with outdoor living and recreation spaces. The street becomes purely utilitarian and serves as a rear entry to the home.



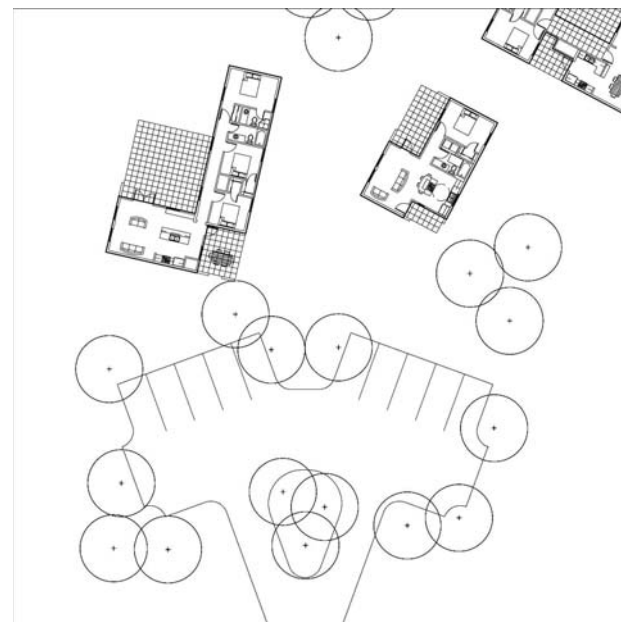
Parking Concepts

Feedback from the presentations suggested that some potential residents would prefer to park in lots shared among cluster members to minimize the footprint on the land, while other potential residents said they would prefer private drives due to health and safety concerns. Several options were explored.



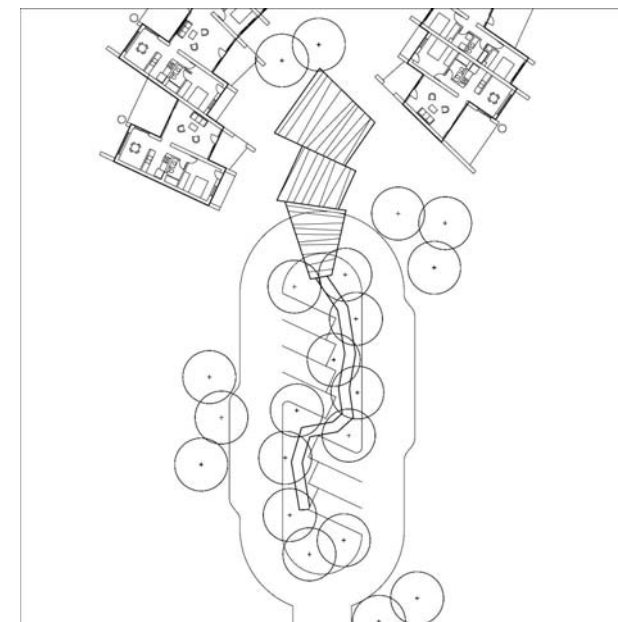
Basic Parking Concept

A double loaded parking lot requires the least amount of land. Disadvantages to this layout include limited drop-off accessibility and poor aesthetics.



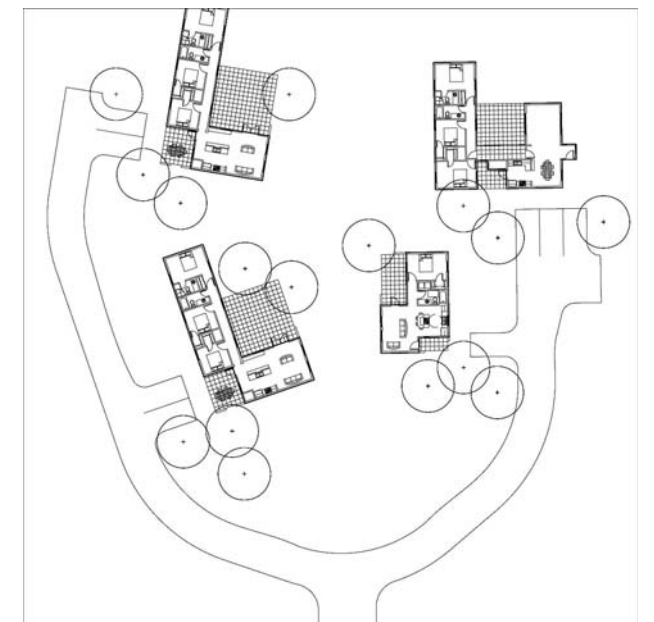
Split Parking Concept

While this concept requires more space, a vegetated island screens views from the road, and roundabout improves drop-off accessibility.



Island Parking Concept

Parking is oriented around a vegetated island with a pedestrian path running up the center leading the homes. Ramadas reflect the architecture of the surrounding buildings and provide a covered drop-off point. Visitor parking can be accommodated by the two pullouts located just off of the looped drive.



Individual Parking Concept

Individual parking spaces allow residents to park close to home, but require longer driveways and can be less accommodating for visitors.

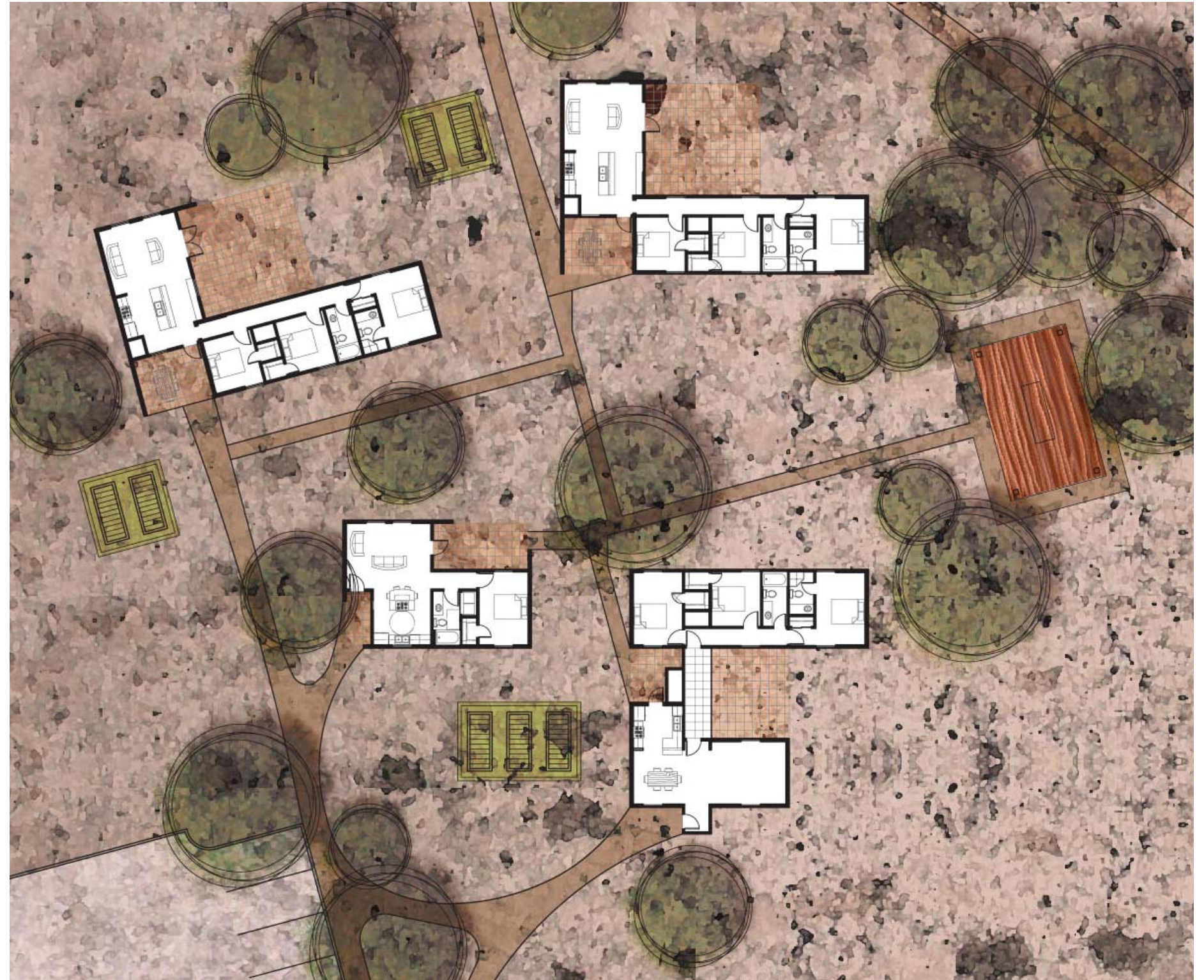
Design Homes

Courtyard Homes

These homes are economical, energy efficient, and simple to construct. Each individual home design incorporates a large outdoor space for family activities, located off the main living room. The larger homes include an outdoor dining space as well. The outdoor spaces are typically oriented on the north and east side of the home to provide self-shaded areas in the summer afternoons.

Narrow modules are designed with windows or openings on opposite walls of each room to allow for natural cross-ventilation. Almost all windows and openings are north or south facing with no west facing and only a few on east walls. This allows optimal control of solar gain and quality natural light.

A range of durable exterior finishes (including corrugated metal and adobe brick) and variation in roof heights create an interesting and dynamic aesthetic. Roof overhangs and porches shade windows from unwanted sunlight, but are oriented to maximize solar gain in the winter.



One-Bedroom



Three-Bedroom, Connected



Three-Bedroom, Courtyard



Radial Homes

These homes are designed to provide a maximum in privacy and exterior space while taking advantage of all of the benefits of sharing a wall.

The orientation of the plans provides shade to the north and south porches in the summer and allows winter sun to penetrate and warm up the spaces. The oblique angle of the main living space orients neighboring houses away from one another, increasing privacy; each room looks out on its own piece of desert.

Thick adobe walls run north-south, providing thermal mass and an earthen aesthetic. Interior partitions are thinner and more suited for utility access and easy renovation. There are no windows on the east and west facades, reducing solar gain and making additions to the house easier.





One-Bedroom



Three-Bedroom



Five-Bedroom



Design Homes

Single-Family Detached Homes

The detached, single-family homes are designed to accommodate growing families through the easy addition of bedrooms and bathrooms.

Both of these designs emphasize outdoor living by integrating shaded, secure outdoor spaces into the floorplan of the house: outdoor kitchen and dining areas are comfortable spaces to be on a daily basis.

By allowing the main living areas and hallways to be exterior spaces, there will be less house to heat and cool, which means lower bills for the occupants. Private spaces, such as bedrooms and bath, are conditioned and secure.



The shaded courtyard of this house catches the southwest breezes, cooling the space. Deep overhangs to the south protect the patio and rooms from summer heat. The use of natural materials, in this case rammed earth, helps ground the house to its site and provides vital thermal mass (see Design Principles: Homes). The linear design can start with two bedrooms and easily accommodate additional rooms as needed.



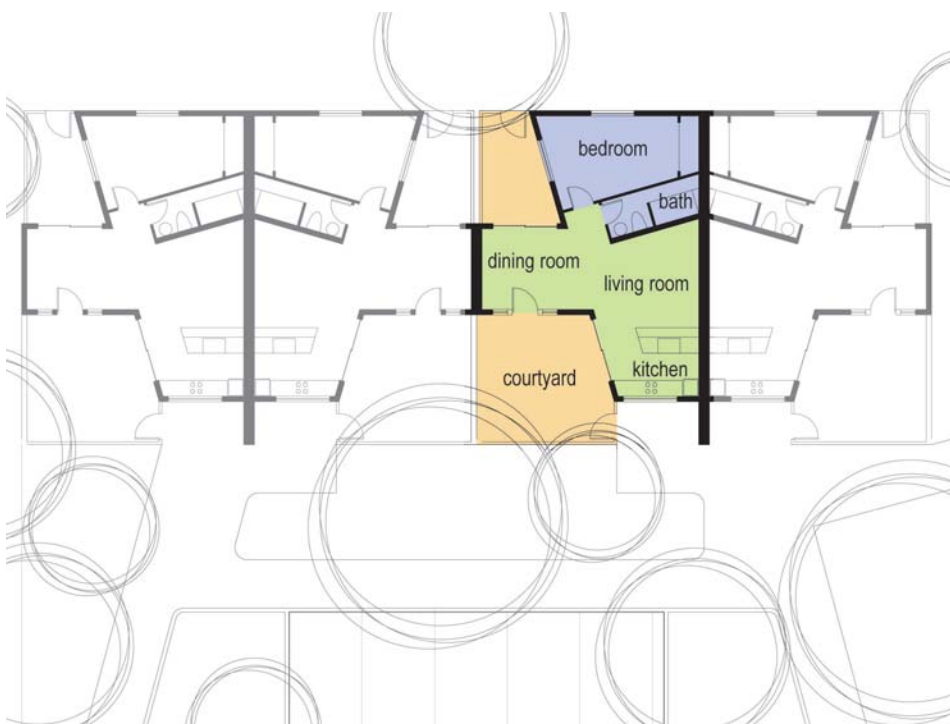
This house is designed around the outdoor living space. The kitchen opens up to the outdoors, creating one fluid room for living, cooking and dining. The bath is separate from cooking and sleeping spaces, but conveniently located. The bedroom wing can easily be extended and the wide hallway to the north can be used as a sleeping porch. The large patio to the west protects the house from the afternoon sun and accommodates large family gatherings.





This two or three bedroom duplex shares a common carport/ramada that is open on two sides rather than sharing a wall. A patio on the back side is partially enclosed but opens to the desert opposite of the adjacent unit providing privacy. A common bathroom is accessible from both the interior and from the outside.

A south-facing rammed-earth wall provides a thermal mass while highly insulated conventional framing construction is used for the remainder of the structure maintaining affordability and energy efficiency.



The one-bedroom attached housing was designed for single elders or couples. Parking is adjacent to the building for convenience and the homes are of manageable size.

A small private porch off the back bedroom allows the resident to quietly enjoy the desert, while a larger front porch can be a gathering place for neighbors and family.

Attached Housing

The attached homes are located near to the entrance of the community. These homes are ideal for elders who need to be within close proximity of amenities and other residents or for families who prefer to rent, be close to amenities, and not be responsible for land upkeep. The homes are designed to be of manageable size, conveniently located, and come with adjacent parking to accomodate accessibility and increase mobility.



Appendix

- Scope of Work •
- Public Announcements •
- Presentation Handouts •
 - Images •
- Community Survey •
- Community Survey Results •
- Wastewater Treatment Options •

Appendix

Scope of Work



ADOH
Hia-Ced O’odham

March 2, 2009

The following constitutes the Scope of Work and general Project Schedule for completion of tasks for the Hia-Ced O’odham project to be conducted by the Drachman Institute under contract with the Arizona Department of Housing for 2008-2009.

The Drachman Institute will provide assistance in the planning and housing design for a 642.27 acre parcel near Why, AZ for the Hia-Ced O’odham Affordable Housing Project. A Master Use Plan was previously developed in 2005 through the Drachman Institute and a Masters Report of a University of Arizona Planning student. The Drachman Institute will evaluate this previously completed Master Plan based on current conditions and program requirements and develop two alternate site designs.

The first design will provide possible housing options for property that was previously designed for non-residential use. The second design will reflect smaller residential lot sizes than previously proposed that will provide a higher total number of housing units for the site.

In addition to the site designs, the Drachman Institute will develop four separate single-family schematic housing prototype designs for different sized homes (two-bedroom, three-bedroom, four-bedroom, and five-bedroom). While sustainability and “green” design is an inherent principle in all the work that the Drachman Institute does, we will specifically research and apply both passive and active design principles and/or systems to this project that provide long-term affordability through water and energy conservation. Concurrently, the design of the homes will be based on an affordable up-front cost, while providing a durable and sustainable product. The Hia-Ced O’odham Program-designated contact person and representatives and the Drachman Institute will work together to develop a budget and final design based on these principles.

The Hia-Ced O’odham Program-designated contact person and staff will provide updated site engineering information to the Drachman Institute, as conditions have changed since the previous study was completed in 2005. Community surveys shall be administered and conducted by parties other than the Drachman Institute, although the Drachman Institute may assist in recommending questions for preparation of the questionnaire and may provide some analysis of survey results.

The Hia-Ced O’odham Program-designated contact person and staff will be responsible for arranging community meetings and charrettes (design workshops) that provide a forum for community input and feedback. They will assist in coordination of appropriate dates and times for such presentations and community meetings and will assist in obtaining all reasonable information requested by the Drachman Institute in a timely and efficient manner. If any information requested is not available, the Hia-Ced O’odham Program-designated contact person shall notify the Drachman Institute.

The official contact person from the Hia-Ced O’odham Program for this project is:
Gary Antonio, Program Manager
Hia-Ced O’odham
PO Box 837
Sells, AZ 85634
520.383.3439 (phone)
520.383.3799 (fax)
gary.antonio@tonation-nsn.gov

Project Schedule Overview

Item	Projected Completion Date
Kick-off Meeting and Initial Site Visit	April 2009
Site Evaluation and Alternative Sites Development	May 2009
Community Survey (completed by Hia-Ced O’odham Program-designated contact person and staff)	May 2009
Community Meeting 1 (present alternate site options)	May 2009
Site Development and Conceptual Housing Design	June 2009
Community Meeting 2 (present alternative site designs and conceptual housing designs)	July 2009
Schematic Housing Design	August 2009
Community Meeting 3 – Final (present site designs and schematic housing designs)	September 2009

Scope of Work Overview

Kick-off Meeting and Initial Site Visit

- Drachman Institute staff will meet with the Hia-Ced O’odham Program staff to review and finalize the Scope of Work and identify issues and priorities of the project development.
- Drachman Institute staff will become familiar with the site and obtain site/context photos and additional resources as needed.

Site Evaluation and Alternative Sites Development

- Drachman Institute will review and evaluate the “Hia-Ced O’odham Master Use Plan” that was previously developed in 2005.
- Drachman Institute will develop two alternative site plans that will reflect changes to the original plan that show: 1) change of some uses to residential, and 2) higher density residential areas.

Community Survey

- The Hia-Ced O’odham Program staff, with selected assistance from the Drachman Institute, will develop a questionnaire covering topics such as housing needs, housing type preference, finance preference, public use areas, cultural perspectives, outdoor uses, special needs, etc. A group other than the Drachman Institute will administer and collect the information from the local Hia-Ced community.

Community Meeting 1

- Presentation of existing and two alternative site plans to the Hia-Ced O’odham community for review and feedback.
- Presentation of the community survey results.

Site Development and Conceptual Housing Design

- Drachman Institute will develop the two alternative site designs based on comments and feedback from the community meeting.
- Drachman Institute will develop conceptual designs for four housing prototypes.

Community Meeting 2

- Presentation of two alternative site plans to the Hia-Ced O’odham community for review and feedback.
- Presentation of conceptual housing prototype designs and their integration with the site to the Hia-Ced O’odham community for review and feedback.

Schematic Housing Design

- Drachman Institute will develop schematic designs for four housing prototypes based on the conceptual designs and feedback from the community meeting.
- *Schematic designs are not intended to be construction documents; schematic designs serve the purpose of communicating to the architect who will be doing construction documents the full intentions of the project.* Schematic designs will include overall site features, circulation, housing plans, material palettes, and intentions for construction.

Community Meeting – Final

- Final Presentation of site plans to the Hia-Ced O’odham community.
- Final Presentation of schematic housing prototype designs and their integration with the site to the Hia-Ced O’odham community.

Deliverables:

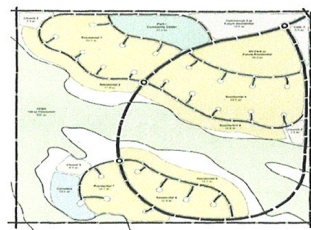
The Drachman Institute will deliver a series of final schematic presentation-quality printed drawings (24x36 or as appropriate) along with digital copies of the final designs and presentations as generated throughout the project.

Appendix Public Announcements

Drachman Institute

The Drachman Institute is working in Collaboration with the Hia-Ced O'odham Program in help to develop a plan for the Hia-Ced O'odham Land Base for an future Community.

Land Base
Bring your
idea's



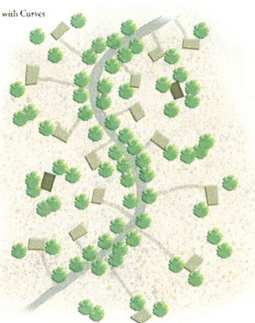
Housing
Designs

**Bright Idea's Needed for the development
for your Future Hia-Ced Community.**

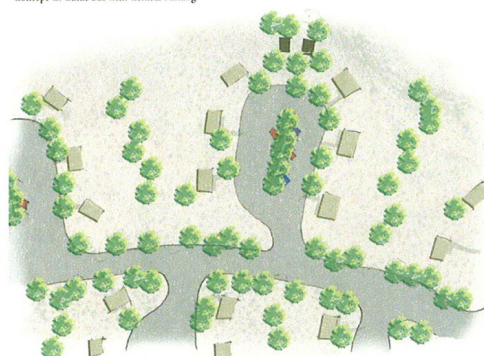
*The Drachman Institute
Will be at the HOAC meeting*

*On June 27, 2009 @ the Hia-Ced Land Base in Why, AZ
to get idea's to Discuss the Housing Arrangements and Designs*

Concept D: Varying Density with Curves



Concept C: Cul-de Sac with Central Parking



Announcement for the first Drachman Presentation
on June 27, 2009

Drachman Institute

The Drachman Institute is working in Collaboration with the Hia-Ced O'odham Program in help to develop a plan for the Hia-Ced O'odham Land Base for an future Community.



The Drachman will be presenting the Final Project
for the LandBase on...

On September 24, 2009 @ the Hia-Ced Land Base in Why, AZ



Announcement for the second Drachman
Presentation on September 24, 2009



The Drachman Institute is working in collaboration with the Hia-Ced O'odham Program to develop a plan for a future community on the Hia-Ced O'odham Land Base.



The Drachman Institute will be making a *final presentation* of a master plan concept for the Land Base on...



**October 24, 2009 @
10:00 am at the
Hia-Ced Land Base in
Why, AZ.**

**Announcement for the third Drachman Presentation
on October 24, 2009**

First Presentation Handouts

Site Concepts

Hia-Ced O'odham Advisory Committee Meeting
Saturday June 27, 2009

Five alternative concepts were developed to explore various configurations and relationships between the following components:

- Residential Development
- Community Center
- Cemetery
- Commercial Development
- Wastewater Treatment Facility

Residential Community Cemetery Commercial Wastewater

CONCEPT 1



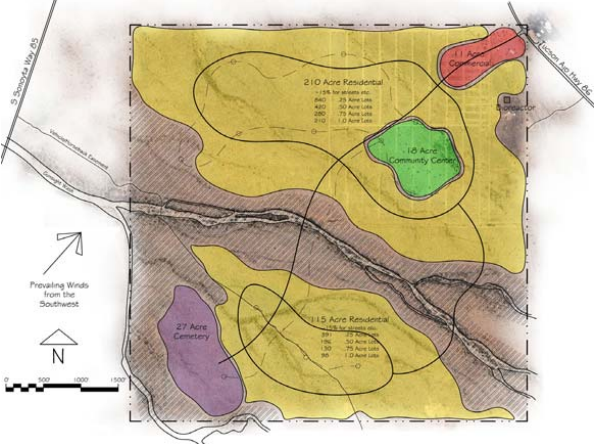
- Pros:**
- Utilizes floodplain
 - Centrally located community center
 - Network of trails
 - Smaller wastewater facility maximizes available land for other uses (residential)

- Cons:**
- Cemetery less secluded

Method of Wastewater Treatment:

- Central septic system

CONCEPT 2



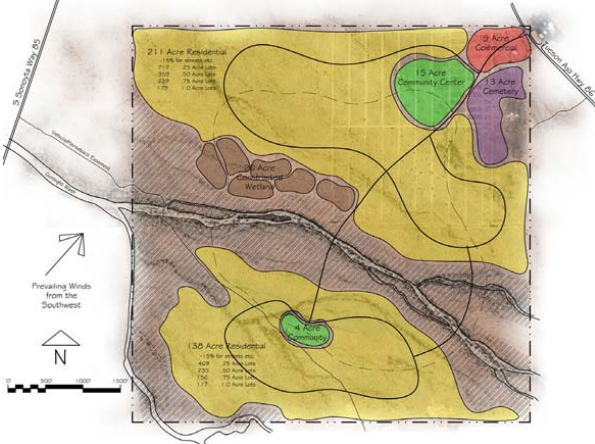
- Pros:**
- Cemetery in scenic and secluded spot
 - Extremely small wastewater facility maximizes available land for other uses (residential)

- Cons:**
- Cemetery within the 500 year floodplain
 - Minimal use of the 100 year floodplain

Method of Wastewater Treatment:

- Membrane bioreactor

CONCEPT 3



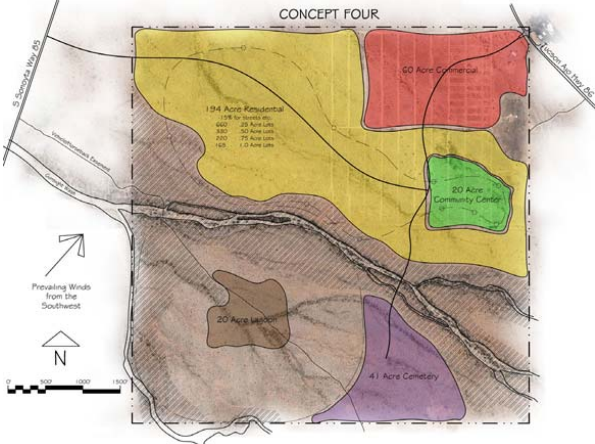
- Pros:**
- Two community gathering areas
 - Layout ideal for phasing (all uses are located north of the wash)

- Cons:**
- Minimal use of the 100 year floodplain

Method of Wastewater Treatment:

- Constructed wetland

CONCEPT 4



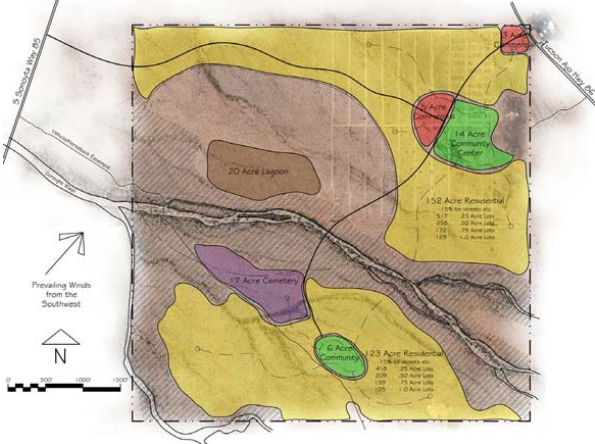
- Pros:**
- 60 acres of land dedicated to RV park
 - Additional entrance from State Route 85
 - Only one bridge needed

- Cons:**
- Prevailing winds
 - Large wastewater facility reduces available land for other uses (residential)

Method of Wastewater Treatment:

- Lagoon

CONCEPT 5



- Pros:**
- Activity hub created where the main streets intersect
 - Commercial development within the site
 - Additional entrance from State Route 85

- Cons:**
- Prevailing winds
 - Large wastewater facility reduces available land for other uses (residential)

Method of Wastewater Treatment:

- Lagoon

Housing Configurations

Hia-Ced O’odham Advisory Committee Meeting
Saturday June 27, 2009

The residential land use in the 2005 Master Land Use Plan is based on the following concepts:

- Homes clustered around family and community gathering areas
- Linkages to places of work, socialization and recreation within a self-contained community
- Hia-Ced O’odham lifestyle, where walking, not driving, was the way for neighbor to visit neighbor
- Plazas, ramadas and parks are the focus of community life

(Hia-Ced O’odham Master Land Use Plan Sec.III, P5)

Some of the benefits of clustered housing are:

- Shared outdoor space enables each home to have access to more space without increasing lot sizes.
- Close groups of family homes allow for more space between families, offering greater privacy.
- Shared outdoor spaces encourage social interaction, pedestrian travel, and physical activity.

CONCEPT A: Paved Shared Driveway with Shaded Parking



- Pros:**
- Parking area becomes habitable space shared by families
 - Infrastructure is reduced
 - Organization of housing around parking is flexible
- Cons:**
- Distance to walk from car to front door is increased
 - Central space is shared with cars

CONCEPT B: Un-paved Shared Driveways



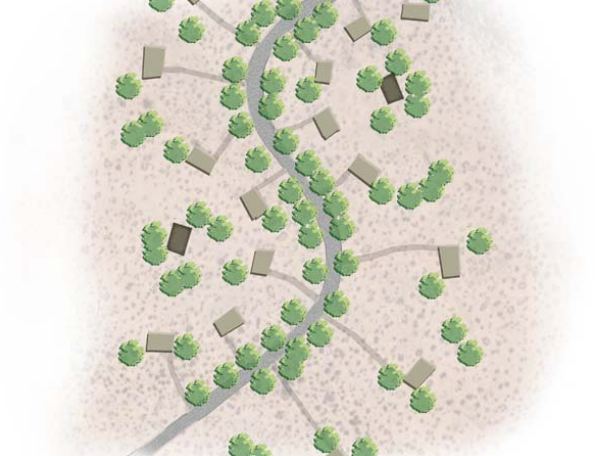
- Pros:**
- Infrastructure is reduced
 - Dirt/gravel drive slows traffic
 - Houses have access to group outdoor space in front and private space in back
- Cons:**
- Central outdoor space is shared with cars

CONCEPT C: Paved Cul-de-sac



- Pros:**
- Separate drives approach houses from the rear with shared outdoor space in front
 - Paths connecting cul-de-sacs favor pedestrians over vehicles and provide linkages to destinations in community
 - Placement of houses and size of clusters are flexible
- Cons:**
- Required infrastructure is increased

CONCEPT D: Varying Densities Around Curves



- Pros:**
- Both clustered and individual family housing are accommodated - clusters on inside of curves, separate houses on outside
 - Housing arrangement fits well in spaces created by curving streets
 - Arrangement is flexible
- Cons:**
- If solely employed, would lead to lots of meandering roads

CONCEPT E: Major Pedestrian Paths, Minor Streets



- Pros:**
- Separate drives approach houses from the rear with shared outdoor space in front
 - Pedestrian paths link destinations in community and encourage social interaction
 - Pedestrian and vehicular traffic are separated
 - Infrastructure is reduced
- Cons:**
- Streets become secondary, similar to alleys

Second Presentation Handouts

During the second presentation participants were given handouts on which they could write down any comments they had concerning the presented materials.

Hia-Ced O’odham Planning Design Project Presentation Two Feedback

Community Responses

Site Concept A Edge Arrangement



Pros:

Cons:

Site Concept A: Edge Arrangement

- “Shoe”

Pros:

- “Located on eastern edge”
- “New plan, same road infrastructure”
- “Good layout, ideal for range of ages”
- “More open and walk ways away from business area”
- “Separate living area from business area and wet land area”
- “Using existing features”

Cons:

- “Water”

Site Concept B Centric Arrangement



Pros:

Cons:

Site Concept B: Centric Arrangement

- “Bear”

Pros:

- “Center of development”
- “No worry to cross roads”
- “Open space for community”
- “Paths connect”
- “Courtyard homes centrally located to everything”
- “Community in the center”

Cons:

- “Water”

Site Concept C Radial Arrangement



Pros:

Cons:

Site Concept C: Radial Arrangement

- “Homo sapien”

Pros:

- “All community activity from corner”
- “Formal arrangement”
- “Rehabilitate area already existing, etc.”
- “None”

Cons:

- “Water”
- “Too clustered”

General

What additional comments do you have that could influence the design of your community?

General

- “Everything is walkable”

Hia-Ced O’odham Planning Design Project
Presentation Two Feedback (Cont.)

Cluster 1 Radial Homes



Pros:

Cons:

Cluster 2 Courtyard Homes



Pros:

Cons:

Cluster 3 Park Homes



Pros:

Cons:

General

What additional comments do you have that could influence the design of your home?

Community Responses

Cluster 1 Radial Homes

Pros:

- “Sharing walls”
- “Creates private outdoor space”
- “Provides ramada”
- “Like the lay of building plan”

Cons:

- “Don’t want to share wall”
- “Vehicle should be parked at home”
- “Too long a walk for an elder”
- “Don’t want to share wall”
- “Being so close to the border the cars being away from the house may be a hazard”
- “May be too close to neighbors”

Cluster 2 Courtyard Homes

Pros:

- “Central paths- community park”
- “Ramada and trees as buffer”
- “Private courtyard”
- “Windows on north and south”
- “Outdoor cooking areas for tortillas”
- “Separate bedrooms from rest of house”
- “Like this plan”
- “Granny’s house separate good so some privacy needed at times”
- “Detached homes, sense of ownership”

Cons:

- “Parking too far”
- “No cons”
- “Being so close to the border the cars being away from the house may be a hazard”
- “Separate from home (bedroom and living area”

Cluster 3 Park Homes

Pros:

- “Separated and clustered”
- “Private driveway”
- “Front of house faces park”
- “Driveways from the rear”

Cons:

General

- “Affordable, easy access!!!”
- “I like the radial and courtyard homes”

Appendix

Community Survey

The Hia-Ced O’odham Program developed (with input from the Drachman Institute) and administered a community survey to help determine the housing and community amenity needs and preferences of Hia-Ced O’odham community members. This survey was sent through mail and also administered at the first community meeting. Over 48 surveys were completed and analyzed.

Following is the survey as distributed by the Hia-Ced Program.

Hia-Ced O’odham Community Survey

Currently the Hia-Ced O’odham Program Office is working in conjunction with the University of Arizona’s Drachman Institute to develop a planning and housing master plan for a new community near Why, AZ. The community was just recently granted federal trust status, and is expected to become a district of the Tohono O’odham Reservation. Funding for the planning and housing master plan is provided by a grant from the Arizona Department of Housing.

Previous meetings with the Hia-Ced O’odham and Hia-Ced O’odham Program staff have led to the creation of this survey to further define the wants and needs associated with a new development. Information gathered from this survey will be used to create a community plan and housing alternatives that are responsive to the needs of the Hia-Ced O’odham.

Housing/Household:

1. Previous discussion has indicated that a Hia-Ced O’odham development could cluster families together and share outdoor space, ceremonial space, etc. What are your thoughts about this?
 - a. I would be willing to share a central outdoor space with my neighbors.
 - b. I might be willing to share a central outdoor space with my neighbors.
 - c. I would not be willing to share a central outdoor space with my neighbors.
- 1a. If you would be willing to share outdoor space, how many relative’s homes do you anticipate you would want to be close neighbors with?
 - a. 1 other home
 - b. 2 other homes
 - c. 3 other homes
 - d. 4 other homes
 - e. More than 5 other homes
2. Would you be prefer:
 - a. Living on a smaller lot if it meant more space was dedicated toward community open space, trails, etc.
 - b. Living on a larger lot if it meant less space was dedicated toward community open space, trails, etc.
3. How many people are in your household, including yourself? ____
4. How many bedrooms are in your current home? _____
5. How many bedrooms do you feel you need? _____
6. Who lives with you? (Circle all that apply)
 - a. Children
 - b. Parents
 - c. Grandparents
 - d. Cousins
 - e. Aunts/Uncles
 - f. Friends
 - g. Other: _____

7. What is your current housing situation?

- a. Rent an Apartment
- b. Rent a Mobile Home
- c. Rent a House
- d. Own a Condo
- e. Own a Mobile Home
- f. Own a House
- g. Live in the Home of a Relative
- h. Other: _____

8. If you were to move to the Hia-Ced O’odham community, what would you be most interested in:

- a. Renting an Apartment
- b. Renting a Mobile Home
- c. Renting a House
- d. Owning a Condo
- e. Owning a Mobile Home
- f. Owning a House
- g. Living in the Home of a Relative
- h. Other: _____

9. What do you anticipate using your land for? (Circle all that apply)

- a. Chicken Coup
- b. Dog
- c. Gardening (plot less than 25 ft x 25 ft)
- d. Gardening (plot greater than 25 ft x 25 ft)
- e. Horses
- f. Second Home
- g. Storage
- h. Sports: _____
- i. Swimming Pool
- j. Other: _____
- k. Other: _____
- l. Other: _____

10. How many vehicles are typically at your home?

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4 or more

11. How many children do you have between the ages of:

- a. 0-5 years _____
- b. 6-10 years _____
- c. 11-13 years _____
- d. 14-17 years _____

Community:

12. What types of community events are important to you?

13. Circle your level of interest in the following to be located within the Hia-Ced O’odham Community

	Strongly Interested	Somewhat Interested	Neutral	Somewhat Opposed	Strongly Opposed
Baseball Diamond	1	2	3	4	5
Basketball Court	1	2	3	4	5
Cemetery	1	2	3	4	5
Ceremonial Space	1	2	3	4	5
Community Garden	1	2	3	4	5
Open Space	1	2	3	4	5
Outdoor BBQ/Cooking Area	1	2	3	4	5
Playground	1	2	3	4	5
Fitness Center/Gym	1	2	3	4	5
Horse Corral	1	2	3	4	5
Places of Worship	1	2	3	4	5
Ramadas	1	2	3	4	5
Recreation Center	1	2	3	4	5
Swimming Pool	1	2	3	4	5
Volleyball Court	1	2	3	4	5
Walking Paths/Trails	1	2	3	4	5

Other: _____

Economics:

14. How important is finding near-by employment?

- a. Very
- b. Somewhat
- c. Not a Factor
- d. Already Work in the Area

15. Indicate the types of business activities that you think would be particularly suitable to the site:

	Strongly Interested	Somewhat Interested	Neutral	Somewhat Opposed	Strongly Opposed
Arts and Crafts Shop	1	2	3	4	5
Child Care Center	1	2	3	4	5
Fast Food	1	2	3	4	5
Feed Store	1	2	3	4	5
Gas Station	1	2	3	4	5
Gift Shop	1	2	3	4	5
Grocery Store	1	2	3	4	5
Hardware Store	1	2	3	4	5
Laundromat	1	2	3	4	5
Mechanic	1	2	3	4	5
Mexican Insurance	1	2	3	4	5
Motel	1	2	3	4	5
Post Office	1	2	3	4	5
Restaurant	1	2	3	4	5
Self-Storage Rentals	1	2	3	4	5
Swap Meet	1	2	3	4	5

Other: _____

General:

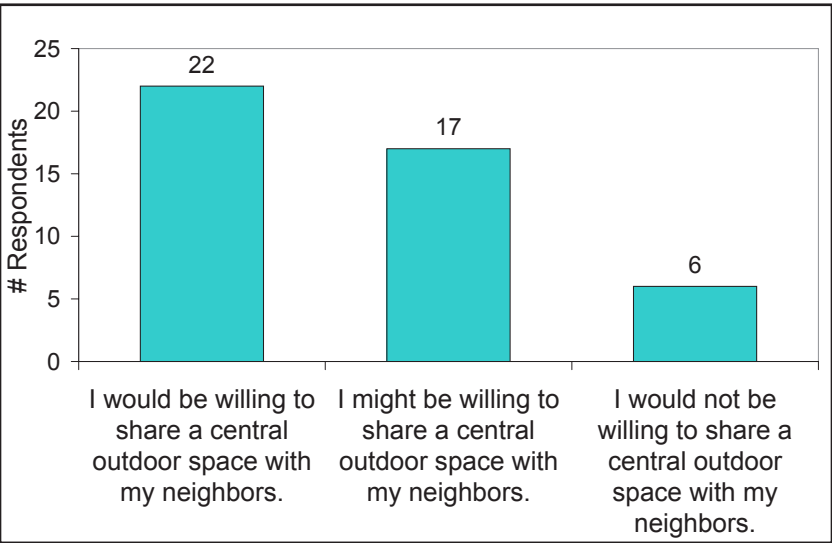
16. What is most important to you about the development of the Hia-Ced O’odham Community?

17. What is your biggest concern about the development of the Hia-Ced O’odham Community?

Appendix

Community Survey Results

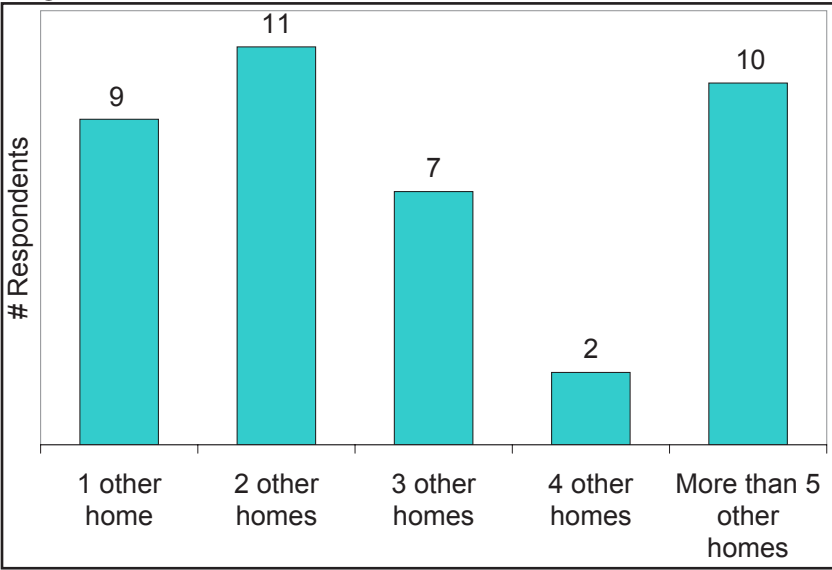
1. Previous discussion has indicated that a Hia-Ced O’odham development could cluster families together and share outdoor space, ceremonial space, etc. What are your thoughts about this?



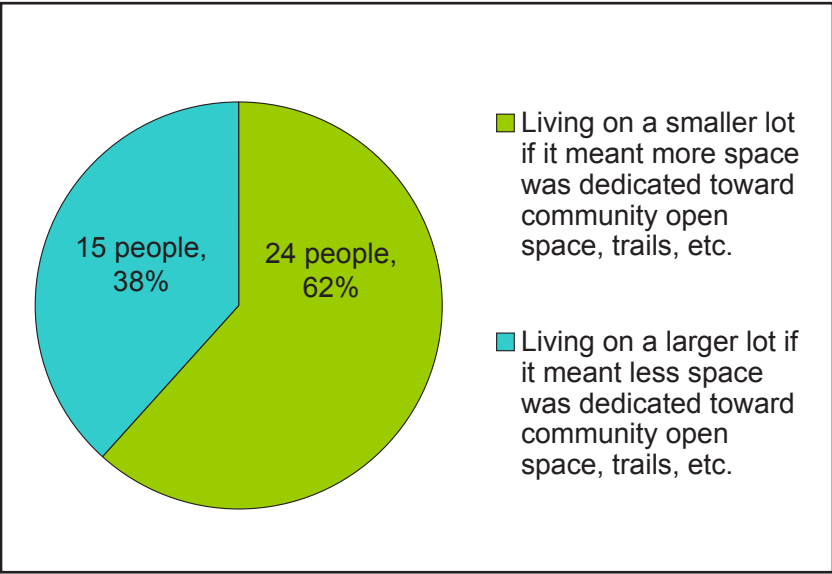
Comments:

"a. I would be willing to share a central outdoor space [community center](#) with my neighbors."

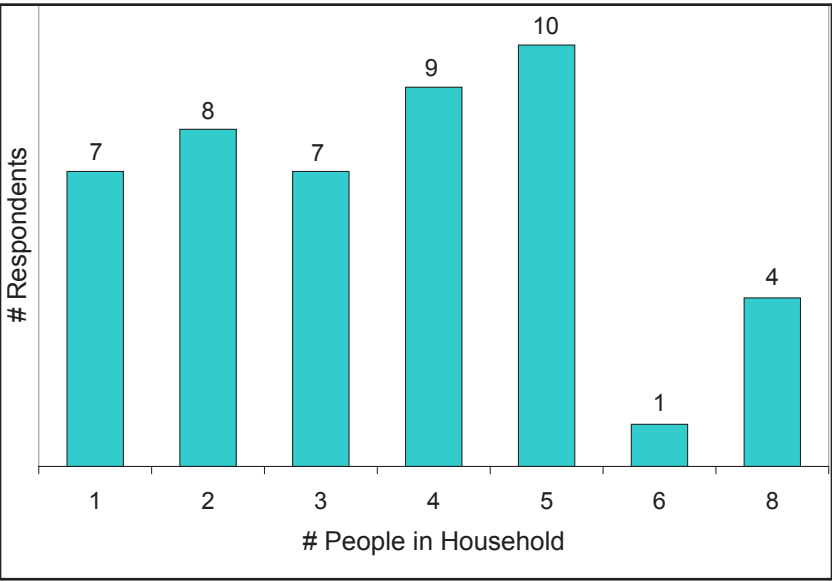
1a. If you would be willing to share outdoor space, how many relative's homes do you anticipate you would want to be close neighbors with?



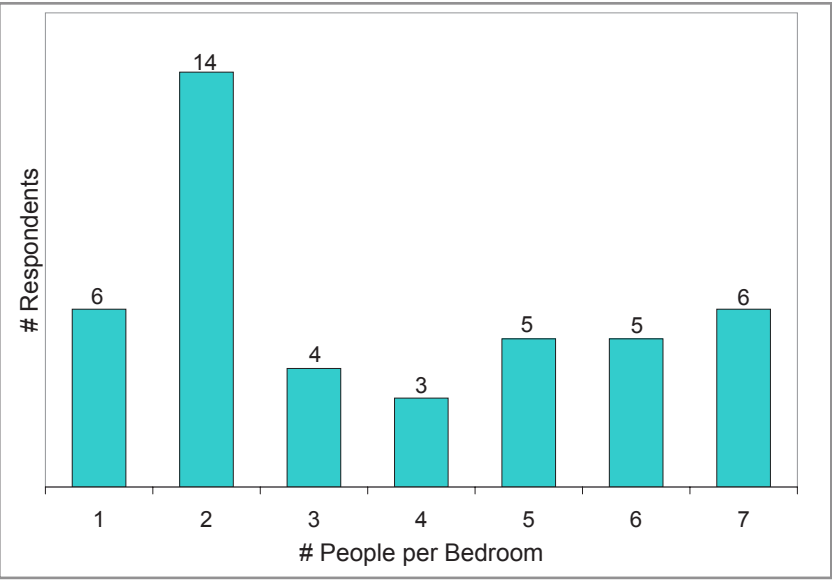
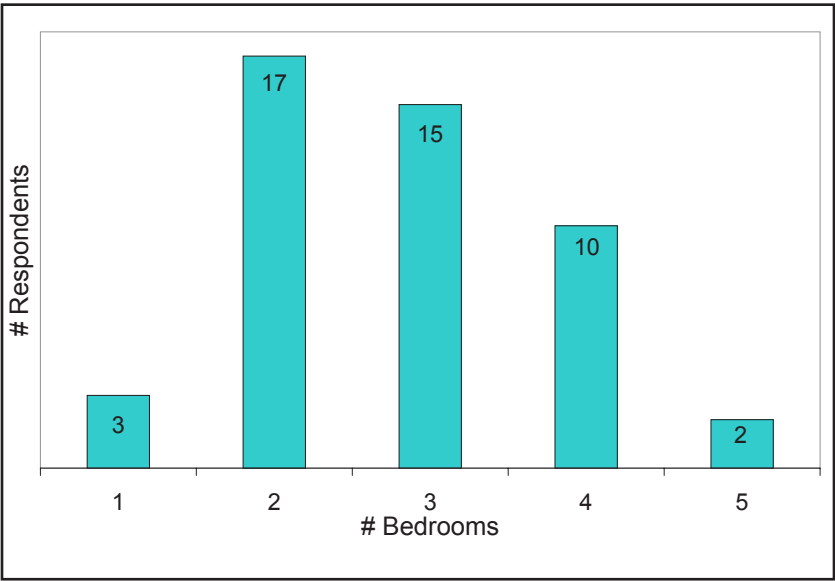
2. Would you be prefer:



3. How many people are in your household, including yourself?



4. How many bedrooms are in your current home?

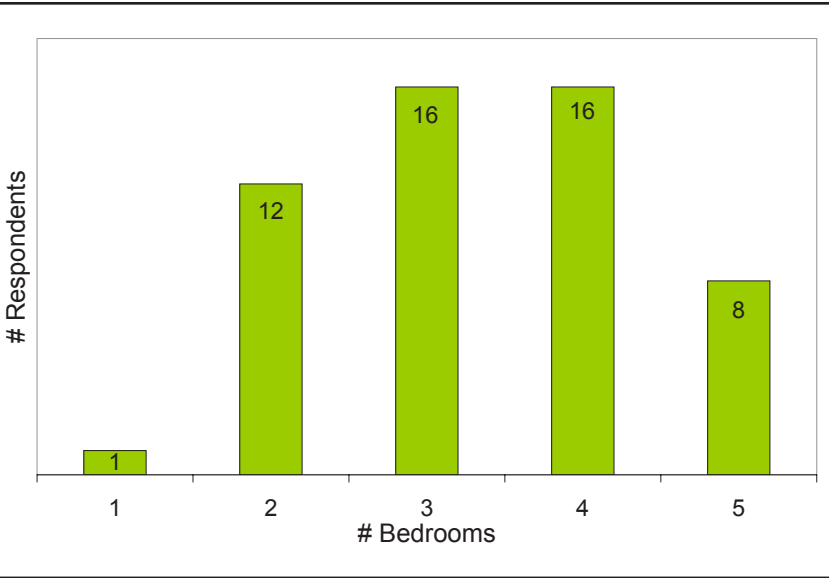


Comments:
"2 Senior" •

Appendix

Community Survey Results

5. How many bedrooms do you feel you need?



Comments:

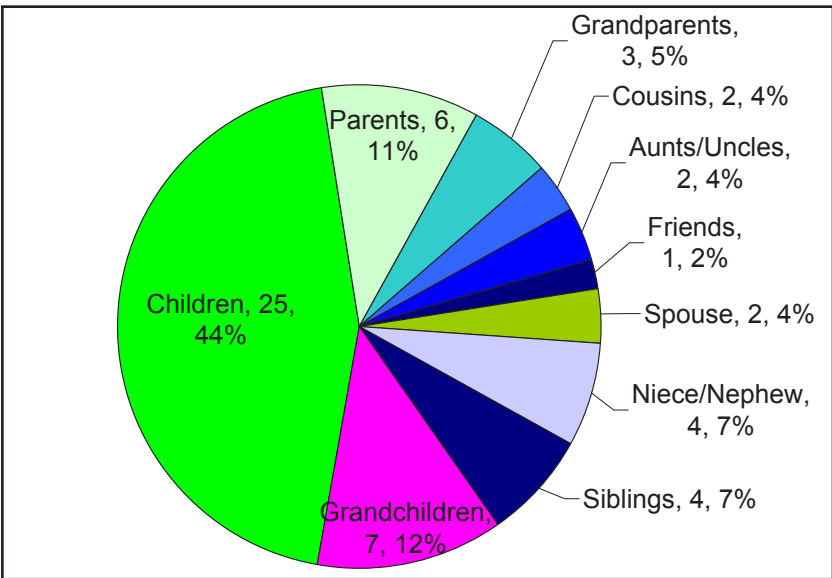
"3 (relatives visiting)" • "4 or 5 and 2 or 3 bathrooms"

6. Who lives with you?



Comments:

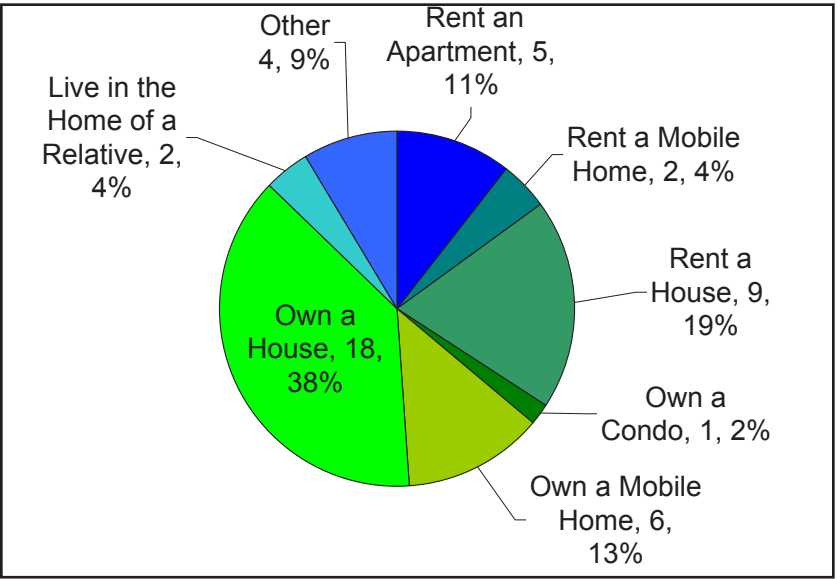
"Mobile home lot, larger lot, for my trailer home" •



Comments:

"Brothers" • "grandson" • "Spouse, 20 yr. old daughter" • "spouse" • "Grand Kids" • "husband" • "grandchildren (2) son in law & spouse" • "nieces" • "spouse" • "1 great" • "granddaughter & her child" • "spouse" • "spouse" • "family" • "brother/nephews" • "sister" • [children circled] "& grandchild" • "grandchildren" • "mother/grandmother" • "nieces, brother" • "single" • "husband" • "hubby" • "grandchild" • "self" • "sometimes children and grandchildren"

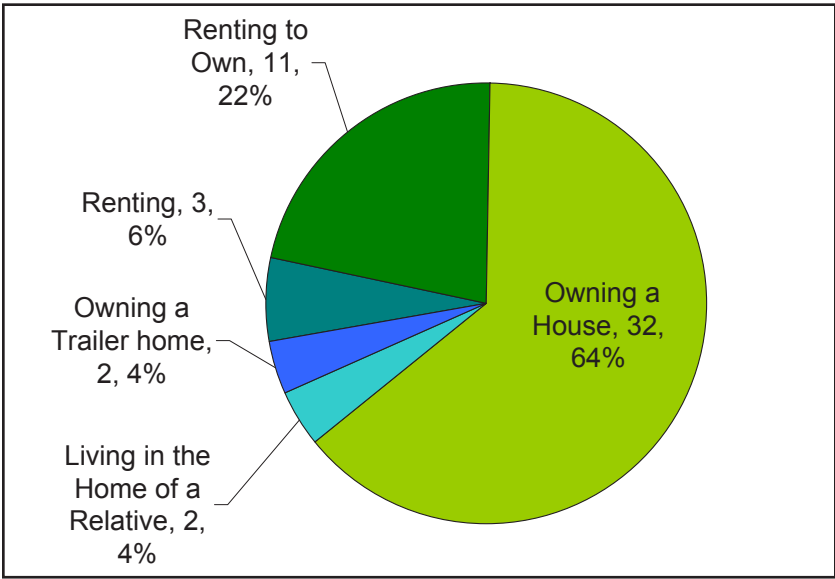
7. What is your current housing situation?



Comments:

"Farm" • "NEW rental Ki:ki" • " rent a duplex" • "barn??? Home"

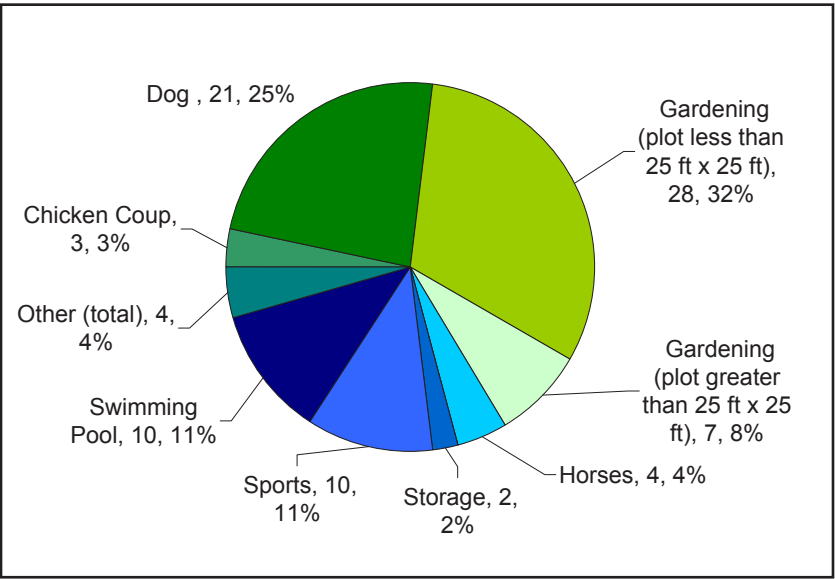
8. If you were to move to the Hia-Ced O’odham community, what would you be most interested in:



Comments:

"Trailer home" • "Live in my own mobile home" •

9. What do you anticipate using your land for?



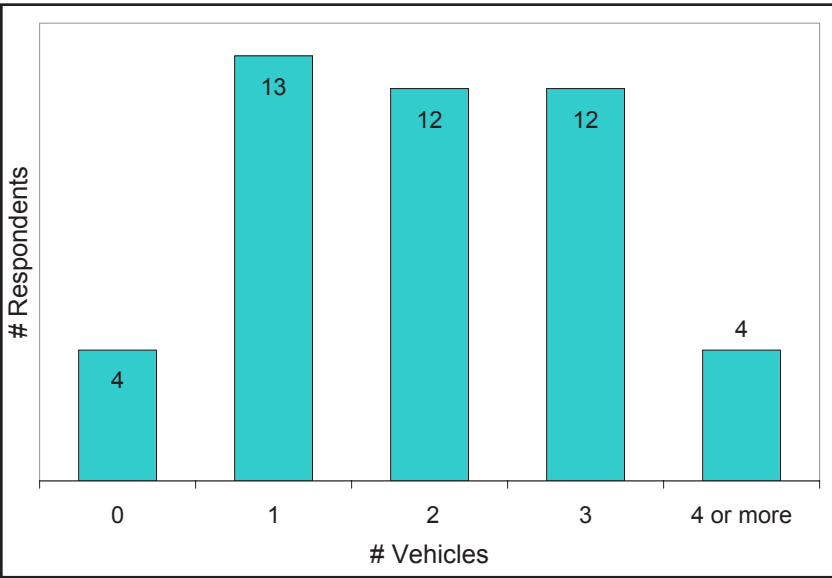
Comments:

" Home for myself; Home for my children." • "Hiking" • "Storage" • "Basketball for kids, Outdoor Cooking BBQ, above ground small pool, RV parking" • "some storage" • "horse shoes pit" • "play yard for grandchildren" • "trailer" • "Dojo (martial arts)" • "basketball" • "planting trees; flowers; bushes" • "don't know" • "sweat lodge" • "doings" • "Gardening (plot less than 25 ft x 25 ft); Gardening (plot greater than 25 ft x 25 ft) community garden"

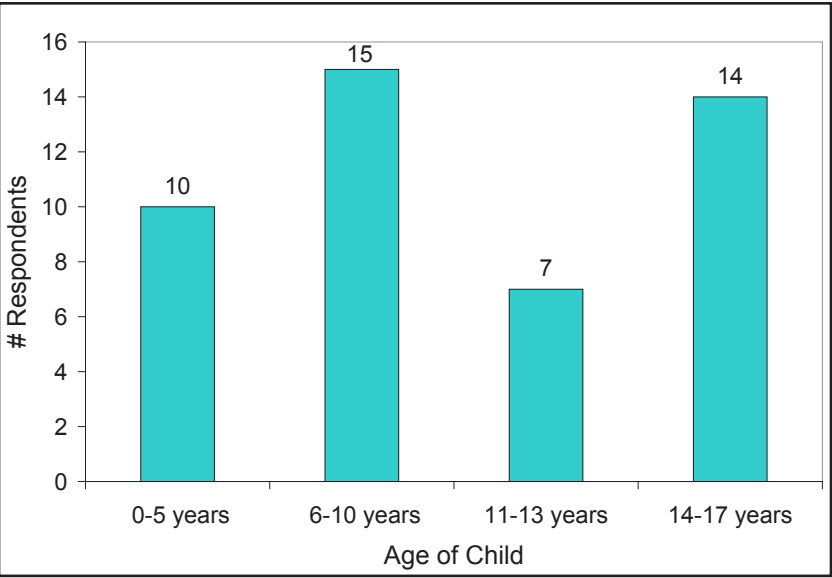
Appendix

Community Survey Results

10. How many vehicles are typically at your home?



11. How many children do you have between the ages of:



Comments:

"2 gran[d]children" • "1 great grandson" •

12. What types of community events are important to you?

What types of community events are important to you?	
Ceremonial Events	14
Community events	9
Sports	9
Holiday events	9
Children's Activities	8
Community forum	8
Elder events/ Senior activites	7
Feasts	4
Dances	4
church	4
schools	2
run/walking	2
job fairs	1
bazaar events	1

Comments:

"Authority - All that applies" • "Meetings to discus[s] events of community, maybe set aside a time for a pot luck - for a gathering together - meeting other O'odham" • "All events that strengthen Hia-Ced O'odham Culture & community ties." • "ceremonial, sports, concerts" • "church, running" • "celebrations of history, promoting health and wellness, serving the developmentally disabled" • "community forums and holiday events" • "softball, Golf" • "a place to play, school, recreation center" • "horse corral" • "family type events" • "ceremonial, church, community activities for the children" • "any type of events" • "walking, cer[e]monial, community meeting" • "family, cultural, faith and health events" • "sports" • "social events, traditional, community involvement" • "family gatherings" • "dancing wihe [with?] the community and having fun and good times" • "is going to community meeting" • "varies" • "holiday events on the weekend" • "All Souls Day, St. Francisco's pigrimage, celebration of getting land back" • "ckicken scratch; meeting; community events" • "bazaar events. ceremonial. Community events. town meetings, job fairs; SCHOOLS" • "Anything that is traditional; catering to the youth and elders" • "don't know" • "ceremonial events" • "The general/regular ones; church anniversary, district mtg's, and all other community social events." • "Games: Ball, Basket B. rec. center/community" • "community forum" • "ceremonial, feasts, childrens activities, senior activities" • "dances, sports" • "holiday events, sport events, elder events"

13. Circle your level of interest in the following to be located within the Hia-Ced O’odham Community

	Strongly Interested	Somewhat Interested	Neutral	Somewhat Opposed	Strongly Opposed
Baseball Diamond	32	14	14	14	0
Basketball Court	30	24	10	2	0
Cemetery	20	11	13	6	8
Ceremonial Space	33	10	15	0	2
Community Garden	18	18	24	2	0
Open Space	24	22	16	0	2
Outdoor BBQ/Cooking Area	38	22	6	0	0
Playground	50	10	4	0	0
Fitness Center/Gym	48	10	8	0	0
Horse Corral	10	10	30	4	8
Places of Worship	36	8	14	4	2
Ramadas	36	16	8	4	0
Recreation Center	48	12	6	2	0
Swimming Pool	28	14	16	4	0
Volleyball Court	28	12	22	2	0
Walking Paths/Trails	44	22	2	0	0

WRITTEN ANSWERS:

Other

Recreation Hall

Amphitheater

3

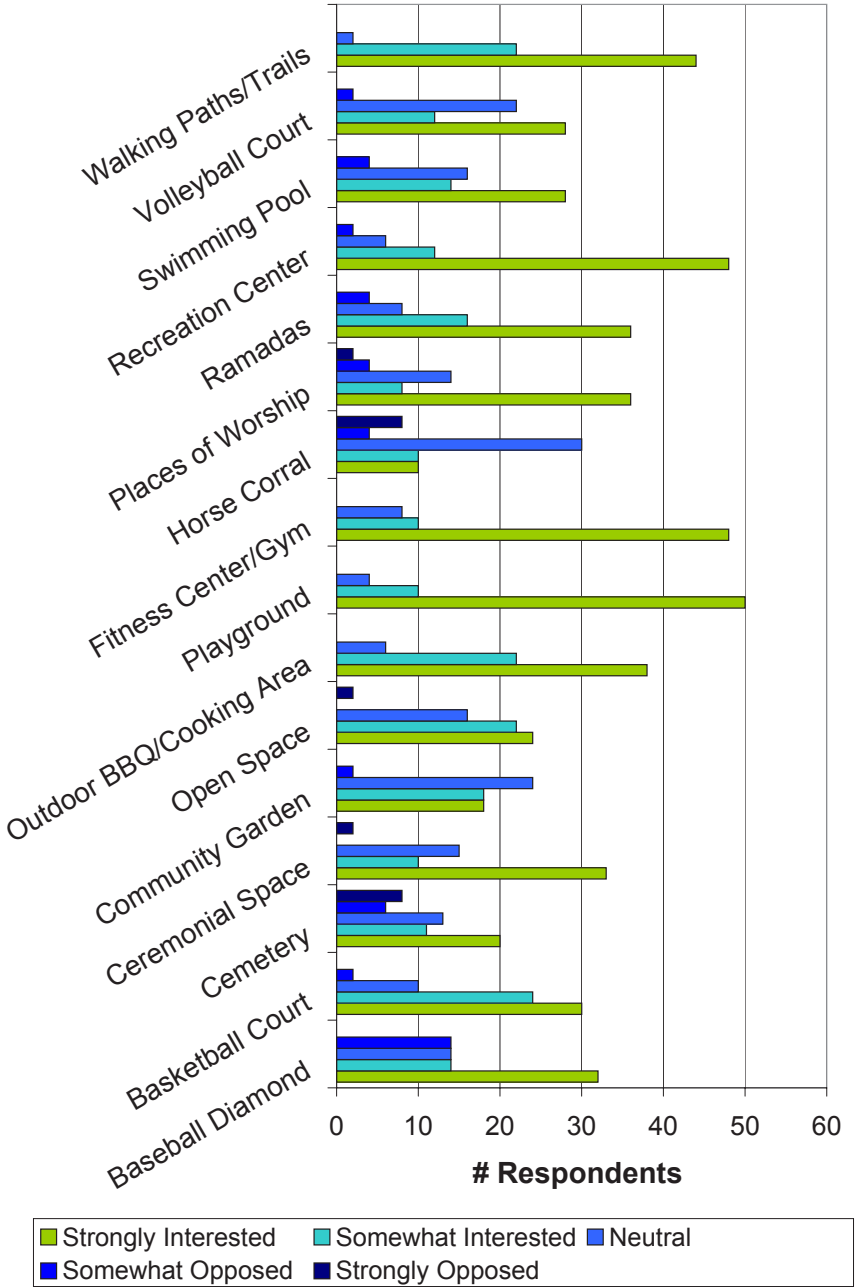
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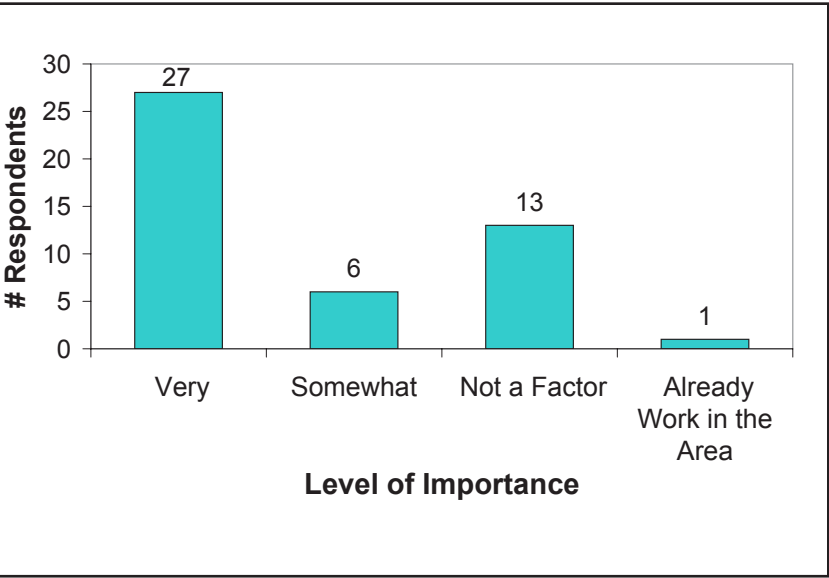
Comments:

“Gathering Area’s” [Areas] • “Theater, cinema” • “Cultural Arts Center, Head Start program - childcare, O’odham Language Classes, Education Center, library and Youth Intervention Programs. Elder Care” • “fishing lake” • “computer center/library” • “community center” • “rec. hall” • “amphi theater” • “no, maybe later” • “store, restaurant, arts & crafts center, hospital, police and fire station”

Community Spaces



14. How important is finding near-by employment?



Comments:

“retired”

Appendix

Community Survey Results

15. Indicate the types of business activities that you think would be particularly suitable to the site:

	Strongly Interested	Somewhat Interested	Neutral	Somewhat Opposed	Strongly Opposed
Arts & Crafts Shop	14	1	5	0	0
Child Care Center	3	7	0	0	0
Fast Food	3	3	5	1	1
Feed Store	3	2	9	2	0
Gas Station	8	4	6	1	0
Gift Shop	10	2	5	1	0
Grocery Store	16	3	2	0	0
Hardware Store	13	4	2	0	0
Laundromat	11	5	1	0	1
Mechanic	10	4	6	0	0
Mexican Insurance	2	2	7	1	2
Motel	5	1	8	0	2
Post Office	14	4	1	0	0
Restaurant	11	3	6	0	0
Self-Storage Rentals	4	4	8	1	2
Swap Meet	6	4	5	2	1

WRITTEN ANSWERS

Other

Car Wash

Traditional Food Court

Clinic/Hospital

4

2

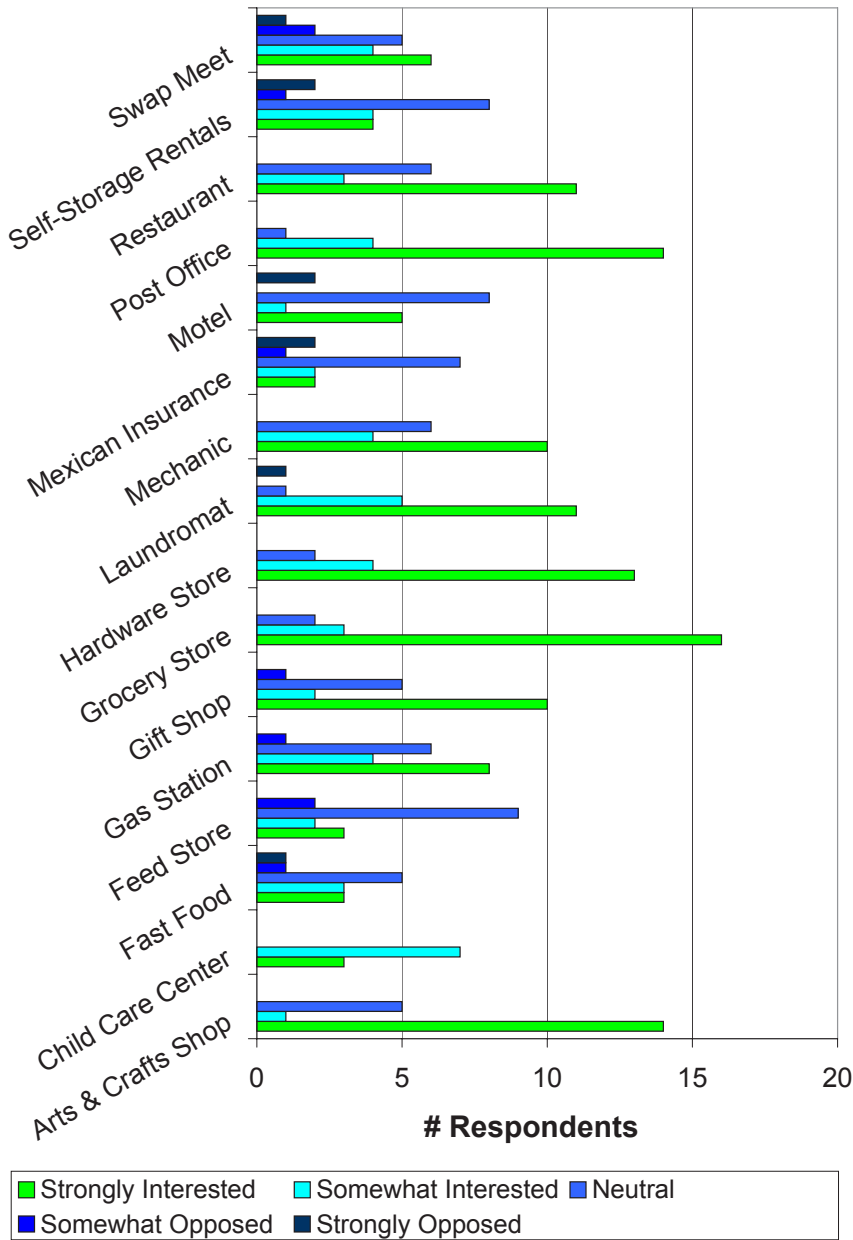
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1

Comments:

"Community Building" • "High School" • "Solar Energy, clinic, spa-beauty salon, water park, moto-cross track" • "clinic" • "car wash" • "Schools; Hospital" • "Housing more essential to begin" • "Traditional Hia-Ced O'odham Food Court." • "Car Wash Lot" • "I don't know" • "hospital and school"

Commercial Development Interests



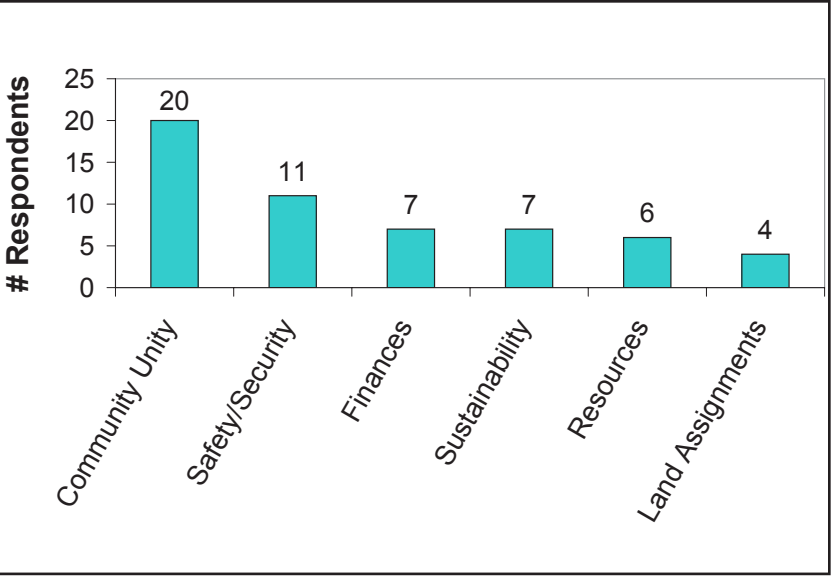
16. What is most important to you about the development of the Hia-Ced O'odham Community?

Community Unity	9
That is Continues/Longlasting	7
Self-Sufficiency	4
No Gangs/Alcoholism/Vandalism	4
Safety	4
Housing Elders	3
Green	2
Land Assignment and Ownership	2
Water/Wastewater	2
Schools/Education	2
Community Image	2
Starting ASAP	2
Solar	1
Water Recycling	1
Quality of Houses	1
Space for Mobile Home	1

Comments:

"I, Valencia Maria Antone is [am] enrolled with Hia Ced O'odham, I am from the Hopi Reservation" • "Culture and Health" • "To grow in our culture knowledge" • "Elder & child welfare" • "safety and community support" • "safety" • "a plan that is long lasting" • "that it is developed with a 'green' design" • "start ASAP" • "Enough work and business activities for all the O'odham people so that we may have a better life" • "IT doesn't permit alcohol in community" • "unity and a place to rais our children in a peaceful area" • "drugfree & crimefree" • "that the community is getting bigger" • "Where elders can live after retirement" • "our right be fully respred, belonging not being nomatar" [nomads?] • "Hospital care" • "have a good road system that is accessible to everything. Well maintained" • "community service, communication, involvement, ethical, public safety, social events, yard, spacious living quarters" • "none" • " family & friends living together as a community under the Hia-Ced O'odham to me that is the most important one to ME" • "store" • "sports, fireworks, carnivals" • "community unity" • "our district be self-sufficient. Good knowledgeable people to serve our community district. Good people not rowdy." • "non gang related activities; no alcohol no tagging; keep yards clean" • That there are schools. Education is the most important factor in our

17. What is your biggest concern about the development of the Hia-Ced O’odham Community?



Comments:

families” • “seeing the end results” • “That the homes and structures are Quality Built. Presentation and loks of the community means a lot.” • “That everyon get along” • “Coming Home. As of now I’m homeless & a drifter. Living here & there & everywhere.” • “A mobile home with large lot. Mobile home trailer park” • “water/wastewater.” “That it continues” • “green & solar infrastructure * *land assignment and ownership” • “green, solar, water recycling” • “home” • “Hia-Ced O’odham will finally have a home site”

• I, Valencia Maria Antone, Would like to ask more concern to information on enrolling my children Boy and Girl into the Hia’Ced O’odham Tribe [I would like to ask for more information on enrolling my children, boy and girl, in the Hia’Ced O’odham tribe] • Agriculture and Community Service • It would be a hold up in our building homes. • Health & Safety & Environment • crime • up keeping • longevity of the natural resources • rental vs ownership • cost • Enough housing for the O’odham people that don’t have a house now and need one before they get old so that they may[???] a place to stay because some of us don’t have one now. • no concerns • crime • housing funds, payments, etc. • not enough jobs • Keeping the community up to par in the appearence • We respect one another & property, No gangs • Isolation due to age • people[?]s need[s] will not be met • gangs, drugs, violence, gr[a]ffiti, vandalism, greed • none • is protecting all family from gang members • financial burden on community • The type of people who will be living there. No drugs, alcoholic or gangs. reputable members. • My concern would be with today’s youth breaking in home - Hia Ced O’odham would need security patrol 24-7 • We need medical necessities for all and the best. We also need police & fire houses for our safety & the communities

• Not seeing the end results • Our biggest concern is Time we would like to enjoy our home soon. • That certain people over use or abuse their power • It’s all in the survey. I hope that everythign will fall in place for our children/grandshildren. All 11 districts have been known to embassel [embezzle?] their fundings, so I hope we can detour from that also. And that is my main concern about our new development. • Will there be any space for a mobile home • “working and living in unity” • “That responsible people receive the homes so that the community always remains an asset” • “wastewater impact” • “water supply, law enforcement” • “Building by floodplain, water, electric”

Appendix

Wastewater Treatment Options

WASTEWATER TREATMENT OPTIONS

There are many options for wastewater treatment that can provide an alternative to lagoons, which can take up large amounts of land. Some of these options are discussed below. These systems are all potentially suitable for the size of the proposed housing development at the Sunrise Hill site.



Lagoons and constructed wetland in Boulder City, NV.

Lagoon

A lagoon, also called a stabilization pond, can be an option for advanced pretreatment of wastewater or for final treatment and dispersal of wastewater. They are generally preceded by a septic tank that removes large solids. A lagoon is a large basin of wastewater that is undergoing a combination of chemical, physical, and biological treatment processes. These processes allow the wastewater to become more acceptable for discharge. Lagoons are categorized in four ways, depending upon the presence and their source of oxygen. The four categories are:

- Aerobic
- Facultative
- Partial-mixed aerated
- Anaerobic

Partial-mixed aerated and anaerobic lagoons are typically used for industrial or agricultural uses, whereas aerobic and facultative lagoons are commonly used in onsite systems.

An aerobic lagoon is characterized by aerobic conditions throughout its entire depth. These lagoons are typically one to three feet in depth to allow

source: Onsite Wastewater Treatment & Reuse, Agri-Life Extension, Texas A&M System, <http://ossf.tamu.edu>.

sunlight to penetrate through the entire water column. Facultative lagoons are comprised of two regions. The top surface region is aerobic, and the bottom subsurface zone is either anoxic or anaerobic.

Design

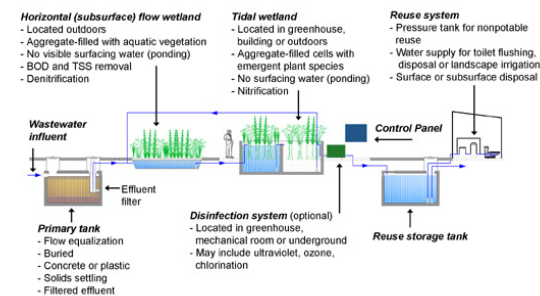
Design of lagoons must conform to and abide by local and state laws which vary by location. A fence, buffer zone, and berms are the most common regulations. To improve efficiency, lagoons can be used in series or in parallel depending on system location, loading rate, size, climate and desired treatment level.

Constructed Wetland

A constructed wetland is used to recreate the treatment processes that occur in natural wetlands. Natural wetlands generally have visible water in the system. (NOTE: Natural wetlands are not to be used to treat wastewater. Constructed wetlands are sized and designed specifically to treat wastewater.)

However, for those at homes, the wastewater flows beneath the media surface, which limits contact between residents and wastewater. The constructed wetland is a basin or cell containing microorganisms, media, and plants that provide treatment of incoming effluent. In subsurface flow wetlands, the cell is filled with graded gravel media or other porous material that is resistant to the corrosive and dissolving properties of wastewater.

These cells have an influent distribution device and an effluent collection device. The effluent to be treated flows through the bed contacting the media and attached organisms. It is important to maintain an even cross-sectional flow throughout the wetland to assure proper treatment. The wetland has the possibility of becoming plugged with debris and organic matter, which will prevent even cross-sectional flow.



The wetland cell is generally an earthen basin lined with compacted native clay, bentonite clay, concrete, PVC, hypalon, or ethylene propylene diene terpolymer (EPDM) rubber. The plants used in the wetland must be able to survive in a saturated medium. Both soft tissue and hard tissue plants can be used in the wetland. However, some experts believe that hard tissue plants are better, because they may provide a pathway for oxygen to enter the wetland during the winter months.

Septic tanks are used as the precedent treatment process to constructed wetlands. Once the wastewater leaves the septic tank, it enters the wetland. The pathogens and nutrients entering the wetland are believed to be removed from the effluent by microbes living on the surfaces of the media and plant roots.

Other processes such as filtration, nitrification, denitrification, and adsorption also help in removing the pathogens and nutrients. The plants provide oxygen to the bed and remove a small percentage of the nutrients. The longer the detention time in the wetland, the better the quality of the effluent that exits the wetland.

As the wastewater flows through the media, it exits the wetland through a water level control sump. A water level control device allows the water level to be raised or lowered as needed to prevent overflow and maintain enough effluent for plant growth. Wetlands may be gravity-fed or pressure-dosed.

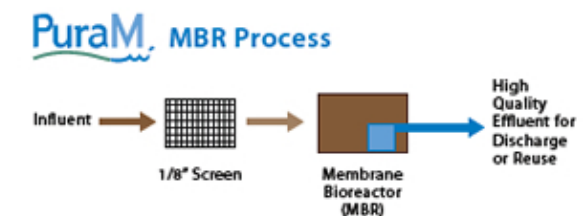
Constructed wetland systems should be designed and built to blend into the home's landscaping. The best way to achieve this goal is to determine where the onsite wastewater treatment system will be located before the house is built. Effective planning before building the house simplifies the system and helps you enjoy it.



Constructed Wetland at Las Vegas Wash, Clark Co., NV.

Membrane Bioreactors

When used with domestic wastewater, MBR processes can produce effluent of high enough quality to be reclaimed for landscape irrigation. Other advantages of MBRs over conventional processes include small footprint, easy retrofit and upgrade of old wastewater treatment plants. Two MBR configurations exist: internal, where the membranes are immersed in and integral to the biological reactor; and external/sidestream, where membranes are a separate unit process requiring an intermediate pumping step.



Source: http://www.bnm-us.com/com_puram.php

Recent technical innovation and significant membrane cost reduction have pushed MBRs to become an established process option to treat wastewaters. As a result, the MBR process has now become an attractive option for the treatment and reuse of industrial and municipal wastewaters.

With the membrane directly immersed into the bioreactor, submerged MBR systems are usually preferred to sidestream configuration, especially for domestic wastewater treatment. The submerged configuration relies on coarse bubble aeration to produce mixing and limit fouling. The energy demand of the submerged system can be up to 2 orders of magnitude lower than that of the sidestream systems and submerged systems operate at a lower flux, demanding more membrane area. In submerged configurations, aeration is considered as one of the major parameters on process performances both hydraulic and biological. Aeration maintains solids in suspension, scours the membrane surface and provides oxygen to the biomass, leading to a better biodegradability and cell synthesis.

While early MBRs were operated at solid retention times (SRT) as high as 100 days with mixed liquor suspended solids up to 30 g/L, the recent trend is to apply lower solid retention times (around 10-20 days),

resulting in more manageable mixed liquor suspended solids (MLSS) levels (10-15 g/L). Thanks to these new operating conditions, the oxygen transfer and the pumping cost in the MBR have tended to decrease and overall maintenance has been simplified. There is now a range of MBR systems commercially available, most of which use submerged membranes although some external modules are available; these external systems also use two-phase flow for fouling control. Typical hydraulic retention times (HRT) range between 3 and 10 hours. In terms of membrane configurations, mainly hollow fibre and flat sheet membranes are applied for MBR applications.

The MBR filtration performance inevitably decreases with filtration time. This is due to the deposition of soluble and particulate materials onto and into the membrane, attributed to the interactions between activated sludge components and the membrane. This major drawback and process limitation has been under investigation since the early MBRs, and remains one of the most challenging issues facing further MBR development.

The control of fouling is primarily undertaken using coarse bubble aeration. The distribution of bubbles around the membranes, the shear at the membrane surface for cake removal and the size of the bubble are greatly influenced by the mixing/hydrodynamics of the system. The mixing within the system can also influence the production of possible foulants. For example, vessels not completely mixed (i.e. plug flow



SMITH AND LOVELESS Model CY, a compact pre-engineered system appropriate for small subdivisions. Source: <http://www.smithandloveless.com/cgi-local/H2O>



Source: http://www.bnm-us.com/com_puram.php

reactors) are more susceptible to the effects of shock loads which may cause cell lysis and release of soluble microbial products. The major suppliers of MBRs all provide ways of handling fouling, but completely submerged MBRs are most effective. The images on this page show examples of pre-engineered or site-modified plants for small developments in place.



Rometec Lift Station for 30 lots. Source: http://www.romtecutilities.com/vim_images/wastewater/custom/Wastewater_Duplex_6x17_Lift_Station_System/s_Wastewater%20Lift%20Station%20Duplex%206x17.jpg

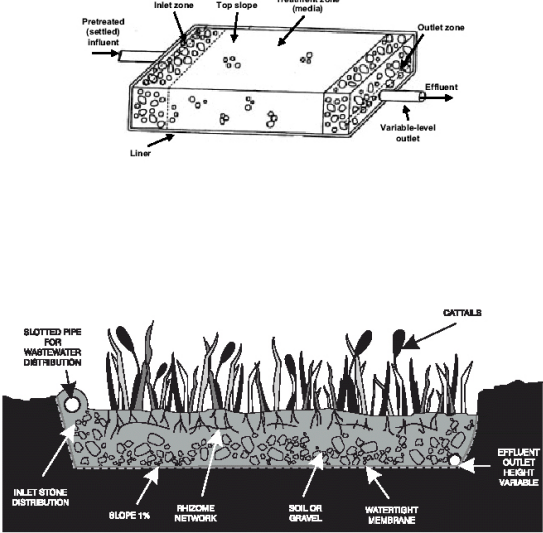
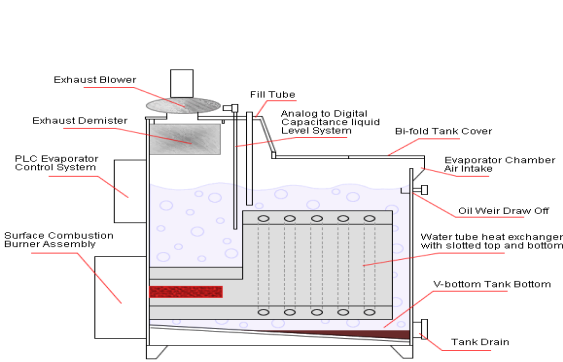


Figure 1: Generic high specific surface anaerobic reactor.

Figure 2: Elements of a vegetated submerged bed (VSB) system

toxic organic compounds may be reduced through these mechanisms and chemical precipitation (e.g., sulfides) at shorter HRTs.

VSBs, as shown in figure 2, usually follow a septic tank and remove most of the suspended and larger colloidal particles, BOD, organic forms of nitrogen, and other particles. Although they are frequently identified as subsurface constructed wetlands, they do not fit the strict definition of a constructed wetland.



Vegetated Submerged Beds and Other High-Specific-Surface Anaerobic Reactors

Description

A high-specific-surface anaerobic reactor (figure 1) is any tank or cavity filled with solid media through which wastewater flows with a high hydraulic retention time (HRT). In onsite treatment the two primary types are vegetated submerged beds (VSBs) and anaerobic upflow filters (AUFs). The first is characterized by horizontal flow and prolific growth of macrophytes on the surface. The second comes in a variety of forms from upflow sludge blanket systems and fixed media anaerobic filters to partially fluidized beds of fine media. Both have long HRTs, produce anaerobic effluents, generally treat either high-strength or minimally pretreated wastewater, and usually require some form of posttreatment to meet surface discharge or water reuse requirements.

The primary removal mechanisms in all of these systems are physical, that is, flocculation, sedimentation, and adsorption. Anaerobic biological reactions are extremely slow and do not have a significant impact on soluble BOD until HRTs become quite long. Some

Evapotranspiration (ET) systems treat and discharge wastewater by evaporation from the soil or water surface or by plant transpiration. These systems are climate-sensitive and require large land areas. ET systems function best in arid climates where there is large annual net evaporation and active vegetative growth year-round. In the United States this generally means only the southwestern states, where humidity is low, rainfall is minimal, and temperatures are warm enough to permit active plant growth during the winter season (figure 5-11). Although the macroclimate of an area might be acceptable for the use of ET systems, evaluation of the microclimate is often required because it can significantly influence system performance. In addition to temperature, precipitation, and pan evaporation data, exposure position and prevalent wind direction should be considered as part of the evaluation process. Southern exposures in the northern hemisphere provides greater solar radiation. Exposure to wind provides greater drying of the soil and plant surfaces. Surface drainage patterns should also be assessed. Well-drained sites have a lower ambient humidity to enhance evaporation than poorly drained sites.

sources: <http://www.epa.gov/nrmrl/pubs/625r00008/html/tfs5.htm>
<http://www.wastewaterevaporators.com/model-specs.php>