VISTOSO TRAILS NATURE PRESERVE MASTER PLAN

PARKS AND RECREATION ADVISORY BOARD, MAY 9 2023

PREPARED BY:

SITES SOUTHWEST

The Acorn Group

contents

1. EXECUTIVE SUMMARY

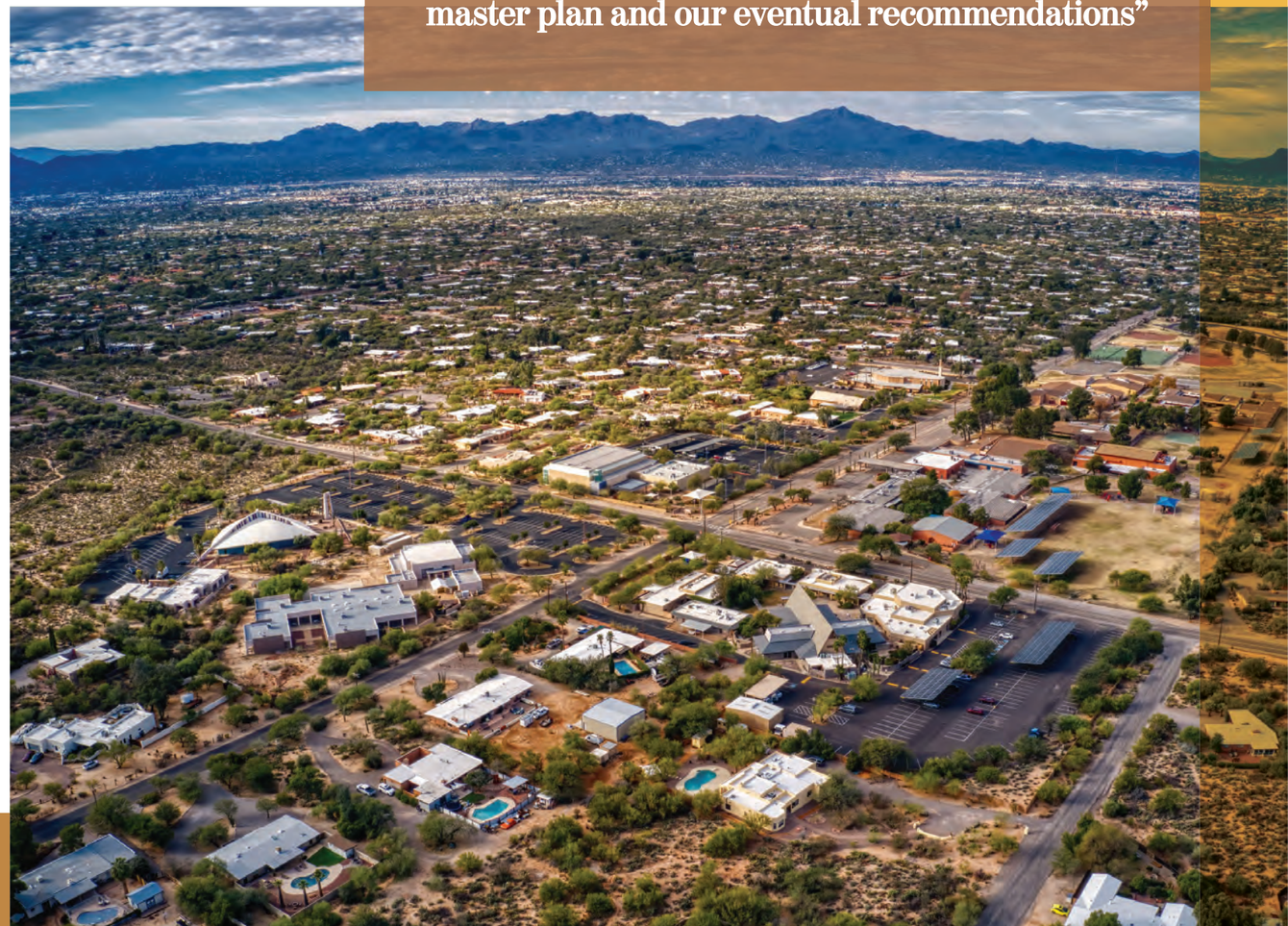
The executive summary will be included upon final approval of the Master Plan for the Vistoso Trails Nature Preserve.

2. CONTEXT

The Master Plan for Vistoso Trails Nature Preserve was developed first through investigating the environment on which it was built and secondly by review of past planning documents that relate to its development. Public interactions also provide context for the master plan (see chapter 3). The goal for this stage of planning was to collect as much data about the Preserve and its surrounds as possible in order to provide a good basis for the master plan and our eventual recommendations.

Below offers a view of our work and its conclusions.

“The goal for this stage of planning was to collect as much data about the Preserve and its surrounds as possible in order to provide a good basis for the master plan and our eventual recommendations”



AERIAL VIEW OF TOWN OF ORO VALLEY

HISTORICAL PERSPECTIVE

The Tucson and Oro Valley region was the homelands of Indian settlements. From the older beginnings of the Hohokam Indians to the more modern tribes of Tohono O'odham and Yaqui, the valley below the Catalina's drew desert natives for thousands of years before the Spanish came. The Tucson area's old days have come and gone and today more than a million people live in the valley. Fast forwarding to recent history, the Golf Club at Vistoso was founded in 1995 in Oro Valley. It was developed as an amenity for the neighborhoods surrounding it, and while in operation it even attracted some tournament notoriety. When its ownership decided it was no longer financially viable, it was eventually closed in 2018. The course fell into disrepair as water costs rose and environmental issues like drought battered this desert community. As it closed, a local movement in Oro Valley took hold, and the Vistoso Trails Nature Preserve was founded. Through the hard work of a dedicated group of townspeople who were concerned about the site becoming developed for housing and through Oro Valley's efforts, the golf course came to the town as dedicated open space partnering with The Conservation Fund.

REPRESENTATION OF SPIRAL PETROGLYPH ATTRIBUTED TO THE HOHOKAM PEOPLE ON SIGNAL HILL IN SAGUARO NATIONAL PARK, ARIZONA

CLIMATE AND ENVIRONMENTAL CONTEXT

The climate of the Sonoran Desert is as extreme as it gets in the United States, and Mexico for that matter. The rainfall in the vicinity of Vistoso Trails Nature Preserve is from 10 to 14 inches annually, depending on the year, and the heat can reach as high as 115 degrees Fahrenheit in summer. The beautiful Sonoran ecoregion and its spectacular wildlife and flora create a setting for the Preserve that is rich in plant diversity and fauna such as bobcats, coyotes, Harris Antelope Squirrel, Black-Tailed Jackrabbit, Javelina, and Grey Fox. Avian Species observed include Great Roadrunner, Gambel's Quail, Ladder-Backed Woodpecker, Cactus Wren, Owl species, Cooper's Hawk and others. Lastly, reptiles noted include the Zebra-Tailed Lizard, Western Rattlesnake, Regal Horned Lizard, Desert Spiny Lizard, and others.

Plant species include velvet mesquite (Prosopis velutina), foothill paloverde (Parkinsonia microphylla), cholla (Cylindropuntia sp.), burrobush (Ambrosia dumosa), prickly pear cactus (Opuntia sp.) and saguaro cactus (Carnegiea gigantea). Other species not native to this desert include the hedgehog cactus (Echinocerus triglochidiatus), various barrel cacti, tree cholla (cylindropuntia imbricata), purple prickly pear (Opuntia Santa-Rita), and the Soaptree Yucca (Yucca elata). There are also a substantial number of invasive species such as Buffalo grass (Cenchrus ciliaris/ Pennisetum ciliare) and Fountain Grass (Cenchrus setaceus/ Pennisetum setaceum).

The southern portion of the Preserve is perhaps the most intact example of Sonoran Desert, the northern extent of the preserve is less treed particularly, likely because of golf course amenities like the driving range, the old clubhouse area, the old pond location, and the perimeter shared with Stone Canyon.

The communities, subdivisions and neighborhoods that surround the Preserve include Vistoso Resort Casitas, Fairfield, Stone Village, and Center Pointe, among others. The roadways that surround the Preserve and the subdivisions wind around past remnants of the golf course's old amenities and the homes providing glimpses of native landscapes intermixed with developer created streetscapes and subdivision entries. Very few community facilities are located around the Preserve with the exception of the Innovation Academy, and the adjacent Hohokam Park. This marks the need for a facility like the open Space that the Vistoso Trails Nature Preserve supplies. Future development opportunities appear to be minimal. It should also be noted that many of the streets and the subdivisions that flank the Vistoso Trails Nature Preserve have openings and access points to it that are not sanctioned trails. Most of these access points (trails and roads) are private and not intended for Preserve access to the general public and will not be shown as access in the Master Plan.





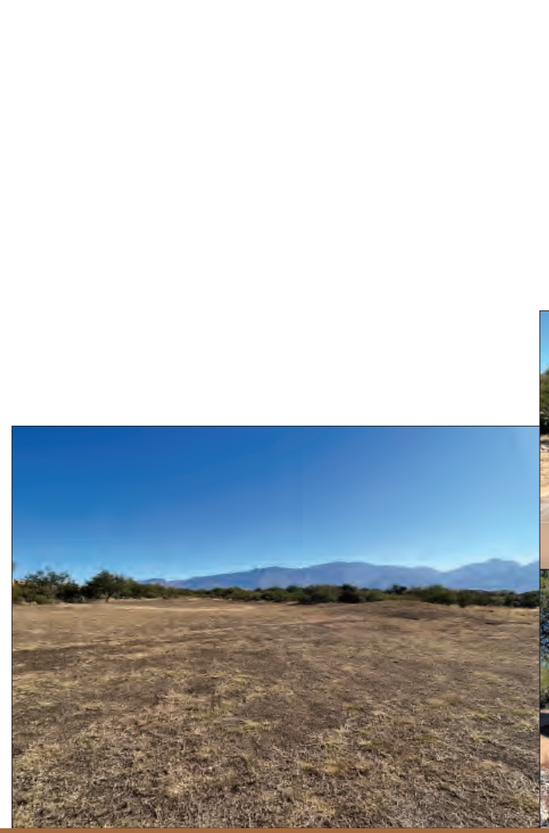


PHOTOS LEFT TO RIGHT: MULE DEER, JAVELINA, DESERT SPINY LIZARD, PALOVERDE TREE, MESQUITE TREE, SAGUARO AND BARREL CACTUS

EXISTING SITE AND FACILITIES

The current conditions on Vistoso Preserve itself include:

» **Dormant Golf Landscape** – the fairways, tees, and greens of the old golf course still exist albeit in dormant form. While the predominant Bermuda Grass that made up the bulk of the turf grasses on the course are dormant, if irrigation begins again, they will return.
» **Existing Cart Path** – the existing cart path still winds its way down the old corridors of the golf course however its condition is impacted by washes and other drainageways. It is also not ADA compliant in any way – see below in this chapter the ADA study that Oro Valley commissioned. The path also includes three underpasses below the roads in the community.
» **Restrooms** – there are three working restrooms in the Preserve that were recently reconditioned. The one near the old driving range has some potential for meeting/ gathering space.
» **Maintenance Yard** – the old maintenance building and yards for the golf course are in fair condition and could be used for either the Preserve or other Oro Valley facilities.
» **The Pond** – the pond from the old golf course located on West Vistoso Highlands Drive has fallen into extreme disrepair and is a danger for any visitors at this time. The water is gone except for the drainage water from precipitation and the waterfall is not working.
» **Driving Range** – the old driving range also has dormant Bermuda Grass and will need to be reclaimed and potentially rethought with newer uses related to the Preserve.



PHOTOS LEFT TO RIGHT: DORMANT GOLF LANDSCAPE, EXISTING CART PATH, RESTROOMS, MAINTENANCE YARD, THE POND, DRIVING RANGE

PREVIOUS PLANS, REPORTS AND POLICIES

There are a number of plans, guidelines, reports, legal documents and agreements that have enabled the Vistoso Trails Nature Preserve. The most important include:

» **Vistoso Preserve Settlement Agreement** – signed by representative of the Town of Oro Valley, Romspen Vistoso LLC (the developer), The Conservation Fund, and Ross Rulney (a developer)
» **Conservation Easement** – the Town of Oro Valley partnered with The Conservation Fund to protect Vistoso from development through this conservation easement grant.

Baseline Conditions Report for the Vistoso Golf Course, Oro Valley, Arizona, 2022

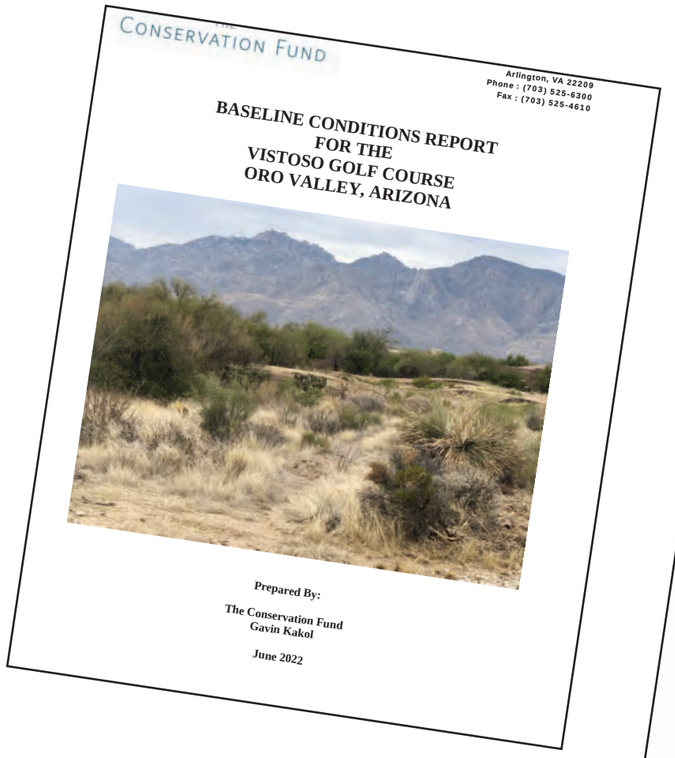
The Conservation Fund

» Detailed inventory of conditions, easement area improvements, description and conservation resources through text, photos, maps, site drawings, legal documents
» Used as primary document to establish the conservation easement

Golf Cart Path Accessibility, 2022

Town of Oro Valley Park and Recreation, WT Group

» Analysis of the existing cart paths on the preserve
» Conditions assessment, determining if the existing cart paths meet ADA standards
» Identifying areas where an ADA trail would work best
» Identifying areas that would need the most work to make accessible
» Providing recommendations to improve the system overall


CONSERVATION FUND

Arlington, VA 22209
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BASELINE CONDITIONS REPORT
FOR THE
VISTOSO GOLF COURSE
ORO VALLEY, ARIZONA

Prepared By:

The Conservation Fund
Gavin Kakol

June 2022


WT Group
Engineering + Design + Consulting

June 8, 2022

Kristy Diaz-Trahan, CPRP
Director
Parks and Recreation Department
Town of Oro Valley
10555 North La Canada Drive
Oro Valley, AZ 85737

Dear Kristy:

Thanks for the opportunity to evaluate the old golf car paths for their accessibility if used as pedestrian trails. In this report, we identify and discuss the applicable requirements of the Americans with Disabilities Act (ADA), and the process we used to evaluate the golf car paths. We then review our findings, and close with recommendations for your consideration.

APPLICABLE ADA REQUIREMENTS

The Americans with Disabilities Act (ADA) became effective January 26, 1992 (see 42 U.S.C. § 12101). The statute prohibits discrimination on the basis of disability. It affords similar protections against discrimination as the Civil Rights Act of 1964 does for race, religious belief, gender, and other circumstances.

Americans with Disabilities Act (ADA) General Mandates

The ADA has three principal chapters or titles.

Title II applies to the Town of Oro Valley and the more than 89,000 other units of state and local government across the country. It requires the Town to make parks, facilities, policies, communications, and programs accessible to and usable by people with disabilities.

There are other ADA requirements that are not within the scope of this study. Title I prohibits private employers of 15 or more, or any unit of state or local government regardless of the number of employees, from discrimination on the basis of disability in regard to employer and employee interactions. Additionally. title III prohibits privately owned places of public accommodation of all size, such as restaurants, fitness centers, hotels, and nonprofit agencies that are open to the public, from discrimination on the basis of disability.

Related Title II Requirements Affecting Parks and Park Assets

The title II requirements for existing facilities begin with a requirement that the **programs** within those facilities and parks are what is to be made accessible. DOJ title II at 35.149

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Town of Oro Valley Parks and Recreation Master Plan, 2021

Town of Oro Valley Parks and Recreation

- The Town of Oro Valley Parks and Recreation Master Plan conducts an inventory of existing facilities and provides a long-term recommendations to help the maintain and expand the park systems for the next 10 years
- Identifies current and future recreation needs in the Town of Oro Valley to help decision makers distribute resources as needed
- In the plan, preserving the golf course in Vistoso as open space was rated as a high priority

Town of Oro Valley, Arizona: Rancho Vistoso Golf Course Feasibility Study, 2020

Town of Oro Valley Parks and Recreation

- Feasibility study to explore possibilities of including the property into the Oro Valley parks and recreation system
  - Evaluate condition of existing facilities
  - Identify major maintenance/facility replacement needs
  - Provided general assessment of facilities
  - Analyze system circulation conditions
  - Create concept for redevelopment
  - Provide cost estimate
  - Develop operations and maintenance plan

Arizona Trails 2015: A Statewide Motorized & Non-Motorized Trails Plan, 2015

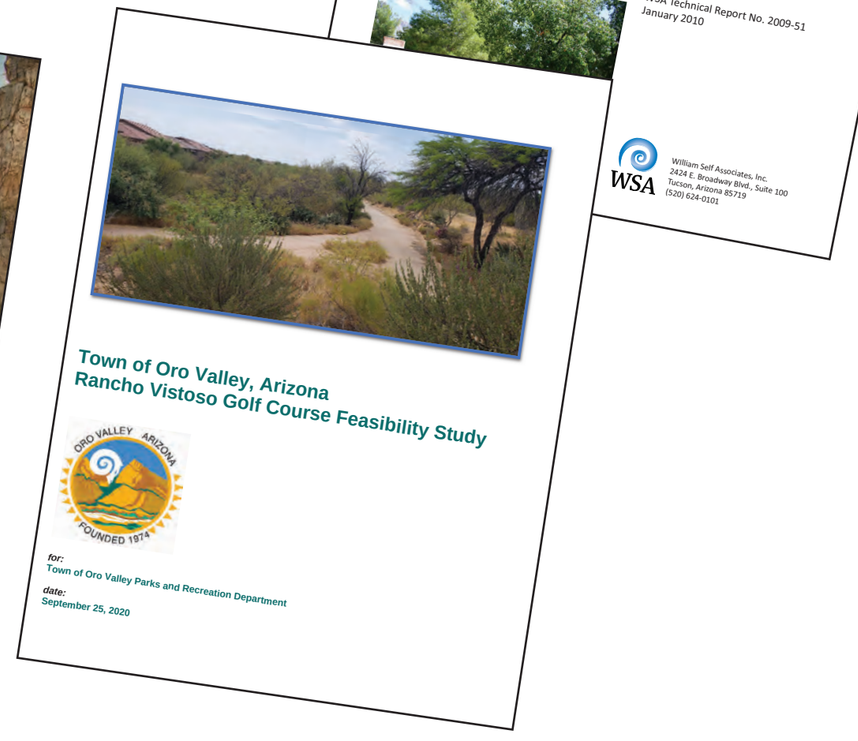
Arizona State Parks

- Trail plan for the entire state
- Provide guidance for potential funding sources through Arizona State

Rock Art, Ranch, and Residence: Cultural Resources in the Town of Oro Valley and Its Planning Area, 2010

Town of Oro Valley Planning and Zoning Department

- Provides an inventory of cultural resources in the Town of Oro Valley and the larger planning area
- Conducts an inventory and an historical record of cultural inventories that have happened in the area
  - Cultural resources and archaeological sites
- Provides recommendations for long-term planning in the area and identifies sensitive areas near the site



3. PROCESS

Initial site analysis and community engagement occurred over the course of the fall of 2022 and spring of 2023. During this process, the planning team used multiple methods to investigate the site and reach out to stakeholders to ensure that the plan was well vetted and that the plan was effective. The community planning process involved a series of interviews, meetings, workshops, and written engagement activities to engage community members throughout the process. Specific activities included:

» **Site Analysis**
- Field Study and Documentation
- GIS and Aerial Imagery Analysis
- Ecological Research and Case Study Review
- Document Review

» **Community Engagement**
- Community Workshop
- Public Meeting
- Stakeholder Meeting
- Community Survey
- Parks and Recreation Advisory Board (PRAB) Meetings
- Town Council Meetings
- Emails and comment cards from community members

Throughout this process, recommendations for the site evolved based upon input from the community and city officials to reflect the vision of the Vistoso Trails Nature Preserve.

“Throughout this process, recommendations for the site evolved based upon input from the community and city officials to reflect the vision of the Vistoso Trails Nature Preserve”

SITE ANALYSIS

A series of site visits were conducted by Sites Southwest representatives from November 14, 2022, through November 18, 2022. The purpose of the field reviews was to develop a thorough understanding of the existing conditions and operational needs of the Preserve. During these investigations, the following observations were documented.

Listing of Current Site Uses

The current uses at the Preserve include the following:

» The existing 6.2 miles of concrete cart path, which ranges in width, is being used as a multi-use trailway. User types observed included:
  - A wide range of recreational bike types, including electric bikes
  - Electric scooters
  - Walkers
  - Joggers
  - A range of baby/kid stroller types, including jogger, double and bassinet styles

» The parking area adjacent to the former golf course clubhouse is being used as a trailhead.
» The parking area adjacent to the former golf course maintenance yard is being used as a trailhead.
» Preserve Vistoso prepared a 174-page field guide that is available to the public and documents the plants, birds and mammals that inhabit the Preserve. The site is being used by individuals and organized groups for habitat viewing and photography.
» The site is being used by individuals and organized groups for dark sky viewing and photography.
» Innovation Academy is developing programs that incorporate the Preserve.

Listing of Current Site Maintenance Operations

Maintenance of the facility is currently outsourced to Brightview who's responsibilities includes keeping the path, the 2 feet edges, tree limb overhangs, and underpasses tidy and clear of debris, and they are responsible for mowing fairways. They are also responsible of the on-going treatment and removal of invasive species and bermuda grass throughout the driving range, fairways, greens, and tee boxes.

Listing of Current Site Conditions

During the initial review of the site, our team observed the following:

Cart Path

» The cart path is being used as multi-use trail and is constantly occupied with a wide range of users.
» Sections of the cart path are cracked and missing expansion joints.
» Portions of the cart path have elevated curbing.
» There are many sections adjacent to the cart path that have been filled with rock to address erosion concerns.
» There does not appear to be shoulders along much of the cart path.
» Sections of the cart path do not appear to meet ADA requirements for multi-use trailway use.
» Sections of the cart path that cross existing washes are showing signs of erosion and undercutting.
» The sightlines into and out of the cart path tunnels are narrow and the height of the tunnel is low. Additional signage may be needed to address safety concerns.
» Sections of the cart path are located very close to residential lots and view fences.
» At grade road crossings of the cart path were noted. Additional safety signage should be placed in these locations.

THE EXISTING 6.2 MILES OF CONCRETE CART PATH IS BEING USED AS A MULTI-USE TRAILWAY

» Trail rules and regulation signage have been installed along sections of the cart path.

Access
» Several social trails connecting the surrounding neighborhoods to the cart path were noted.
» Users are accessing the Preserve from the neighborhood social trails and the parking lots located at the former golf course club house and maintenance yard.
» A few “volunteer” mountain biking trails have been developed and mountain biking use was observed. Based on the conservation easement language, this is not a permitted use.

Facilities & Infrastructure
» The existing restrooms are currently under renovation (the renovations were completed in Spring 2023).
» Portions of the existing irrigation system appear to have been damaged. Further information will be needed to determine if any of the system can be reused to establish future plantings throughout the Preserve.
» The former pond area was observed and based on community input, suggestions for this area include refilling with reuse water, filling with dirt, and/or creating a constructed wetland for wildlife habitat. A few dead trees were observed between the road and pond location.
» The former maintenance yard was observed, and it is recommended that this area, which is secured by walls and fencing, continue to be used to support future restoration and maintenance needs of the Preserve and Town operations. This area could also feature a trailhead.

Surrounding Residential
» Bird feeders within the Preserve and adjacent to residences were observed in several locations.
» Site furniture, signage, real estate brochure boxes and accent lighting have been placed within the Preserve adjacent to residential areas.
» Clearing of portions of the Preserve adjacent to residents was observed in several locations.

Vegetation
» The site is being maintained and no areas of debris, trash and/or dumping were observed.
» Invasive species and bermuda grass treatment and removal was observed at the driving range, fairways, tee boxes and greens. The maintenance of these invasives will be ongoing until these species are removed from the Preserve.

Based on the conservation easement language and our team’s field observations, improvements to the site will need to address:
» The long-term protection of the sites ecological and cultural resources
» Providing education opportunities for a wide range of user groups that is inclusive of all ages
» Creating site-sensitive passive recreational attributes

PHOTOS LEFT TO RIGHT: EXISTING SITE PHOTOS

MAP REVIEW

In addition to site visits, the planning team used Geographic Information Systems (GIS) analysis to analyze current conditions, provide a basis for site analysis, and provide initial site planning scenarios using maps.

The Town of Oro Valley staff provided the team with numerous datasets including aerial imagery, site boundaries, parcel data, topographic data, floodplains, washes, and existing cart paths. Then, based on these datasets, the planning team was able to create datasets including, categorized vegetation zones, existing visitor facilities, site boundary buffer, and proposed trail alignments.

GIS datasets assisted the planning team in identifying opportunities with site recommendations.

Figure 1. One of the existing conditions maps used for the community workshop

COMMUNITY INTERACTION

Community Workshops

During the community outreach and public participation phase of the Vistoso Trails Nature Preserve Master Planning process, the Town of Oro Valley hosted a community workshop meeting for the purpose of receiving comments and programming input from community members. The meeting was held at the Oro Valley Public Library from 10:00 AM to 4:00 PM on Wednesday, November 16, 2022. This meeting had multiple opportunities for attendees to learn and provide input, including one of the two (2) programming stations manned by representatives from the consulting team, information boards. A presentation was also conducted.

The image board station was comprised of a series of presentation boards that outlined the master planning process and schedule, and included photographs of the following potential programming elements:

- Trail types - (including nature trails, walking trails and multi-use paved trails)
- Trail amenities - (including impervious parking areas, rest areas, site furniture, signage, and public art)
- Site structures - (including pavilions, shade structures, overlooks and wildlife viewing blinds)
- Nature play spaces - (including natural structures that are woven into the existing terrain)
- Passive open spaces - (including outdoor classrooms)

An existing conditions base map of the project site was located at each of the two (2) programming stations, which were manned by representatives from the consulting team. The workshop format allowed attendees to review the initial Preserve base map, ask questions and offer suggestions for proposed Preserve improvements and desired amenities. Most comments received were focused on preserving the character of the site and creating amenities that would allow users to enjoy and engage with the natural environment. Many of the attendees proposed the following improvements/ amenities:

- Provide separate trails for walking and biking
- Provide loop trails for walking and biking
- Provide neighborhood connection trails
- Keep the area natural and protect the mountain views
- Revegetate the site with native plant material
- Provide limited parking
- Provide environmental education opportunities for the community
- Turn the former pond into a site amenity
- Create shaded resting areas along the trail(s)
- Create a volunteer network to assist with funding, maintenance, and planting
- Create guidelines to prevent the clearing of Preserve property that lies adjacent to residential areas

IMAGE BOARD FROM COMMUNITY MEETING

It should be noted that there were also requests for the inclusion of a disk golf course, a dog park and mountain biking trails. Participants were informed that these uses are not permitted in the Preserve based on the conservation easement agreement. It was further clarified that while the easement does not support a mountain biking park and that changing the landscape for an intensive use does not comply to the spirit of the easement, it does allow for passive recreational biking that includes the use of road bikes, mountain bikes, e-bikes, etc. on trails. Additionally, comments regarding potential traffic safety and impacts to the adjoining residential communities were received.

The information collected from this community workshop will be incorporated into the Vistoso Trails Master Plan and will be used to assist with the development of the Preserve's programming.

Public Meeting

A public meeting was held at the Oro Valley Town Council Chambers on Thursday, November 17, 2022. The purpose of the meeting was to provide a project overview and schedule for the master planning process of the Vistoso Trails Nature Preserve and to receive comments regarding the future programming for the facility. Sites Southwest introduced the consulting team, master planning process, community and stakeholder input so far, and project timeline.

At the conclusion of the presentation, comments from the community emphasized a minimalist approach to the Preserve's trails and facilities, with a major emphasis on natural desert vegetation and a photo opportunity as it had been in the past. There was also a desire to restore the pond to some capacity, potentially as a wetland for wildlife. Finally, there were concerns with interactions between user groups, especially between walkers and bicyclists. Educational elements are strongly desired. There were several comments concerning appropriate amounts of parking in the area, especially off of West Vistoso Highlands Drive, leaning towards minimal new parking near the Preserve.

Community Survey

The Town of Oro Valley invited the community to participate in the master planning process for the Vistoso Trails Nature Preserve. The Parks and Recreation department administered the survey to gather input from community members to help plan and design this community-focused space to reflect the needs of Oro Valley residents. The survey gathered input on future site improvements, visitor experience and land-use management that was used to help develop this Master Plan.

Key findings of the survey include:

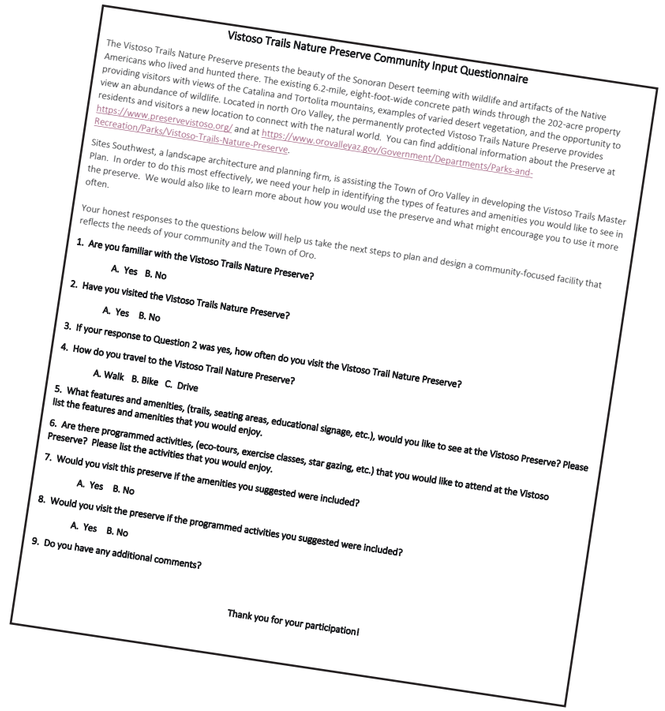
- The survey showed that the community is very aware of the Preserve. However, there is some sign of a self-selection bias inherent in the opt-in nature of the survey.
- Given the high response rate among those who frequently visit the Preserve (75 percent of respondents visit at least once a month), the survey should be considered skewed towards current users.
- There is broad agreement about the amenities sought at the Preserve.
- Frequent visitors tend to be pedestrians. Less frequent visitors tend to drive a vehicle to the Preserve.
- Those who have never visited the Preserve may be drawn in with a greater number of dirt trails, shorter distance loops and trailheads.

Methodology

The survey was available both online and via paper copy.

Overall, 622 surveys were completed over the course of November 2022. The overall results have a precision of at least +/- 3.9 percent at the 95 percent confidence level (meaning we can be 95 percent confident that the survey results reflect the overall opinions of Oro Valley residents to within plus or minus 4 percentage points on any answer).

However, participants were able to choose whether to participate in this survey, thus introducing a possibility of self-selection bias. Self-selection bias occurs when the group that chooses to participate is not equivalent to the group that opts out. We can generally assume that individuals that took time to respond to a survey regarding the Vistoso Trails Nature Preserve are more likely to be users of the Preserve than those who chose not to participate.



Vistoso Trails Nature Preserve Community Input Questionnaire

The Vistoso Trails Nature Preserve presents the beauty of the Sonoran Desert teeming with wildlife and artifacts of the Native Americans who lived and hunted there. The existing 6.2-mile, eight-foot-wide concrete path winds through the 202-acre property providing visitors with views of the Catalina and Tortolita mountains, examples of varied desert vegetation, and the opportunity to view an abundance of wildlife. Located in north Oro Valley, the permanently protected Vistoso Trails Nature Preserve provides residents and visitors a new location to connect with the natural world. You can find additional information about the Preserve at https://www.preservevistoso.org/ and at https://www.orovalleyaz.gov/government/Departments/Parks-and-Recreation/Parks/Vistoso-Trails-Nature-Preserve.

Sites Southwest, a landscape architecture and planning firm, is assisting the Town of Oro Valley in developing the Vistoso Trails Master Plan. In order to do this most effectively, we need your help in identifying the types of features and amenities you would like to see in the preserve. We would also like to learn more about how you would use the preserve and what might encourage you to use it more often.

Your honest responses to the questions below will help us take the next steps to plan and design a community-focused facility that reflects the needs of your community and the Town of Oro.

1. **Are you familiar with the Vistoso Trails Nature Preserve?**
   A. Yes B. No
2. **Have you visited the Vistoso Trails Nature Preserve?**
   A. Yes B. No
3. **If your response to Question 2 was yes, how often do you visit the Vistoso Trail Nature Preserve?**
4. **How do you travel to the Vistoso Trail Nature Preserve?**
   A. Walk B. Bike C. Drive
5. **What features and amenities, (trails, seating areas, educational signage, etc.), would you like to see at the Vistoso Preserve? Please list the features and amenities that you would enjoy.**
6. **Are there programmed activities, (eco-tours, exercise classes, star gazing, etc.) that you would like to attend at the Vistoso Preserve? Please list the activities that you would enjoy.**
7. **Would you visit this preserve if the amenities you suggested were included?**
   A. Yes B. No
8. **Would you visit the preserve if the programmed activities you suggested were included?**
   A. Yes B. No
9. **Do you have any additional comments?**

Thank you for your participation!

Select Survey Results

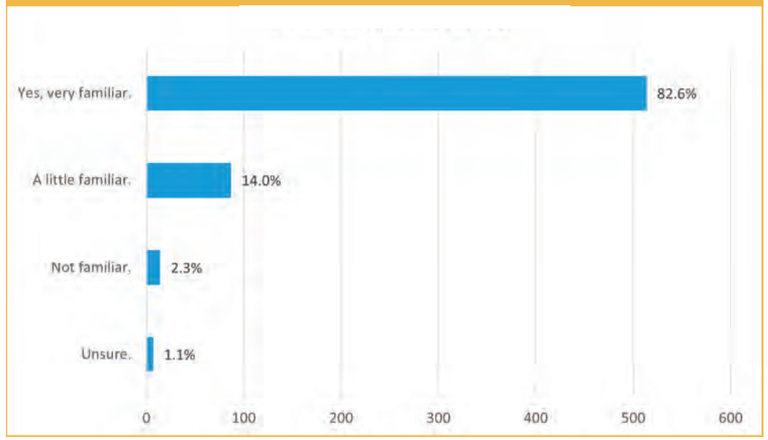
169 respondents took the time to submit an open-ended response as well. Among open-ended responses, including restrooms was a priority along with refilling the lake/pond, minimally disturbing the natural desert landscape and having regular pet waste receptacles.

Other Open-Ended Amenity Responses

Other Amenities	Respondents
» Restrooms	31
» Lake/pond (large natural water feature with wild plants/ animals)	22
» Natural vegetation (minimal investment and disturbance of native plants/animals)	21
» Trash receptacles	18
» Signage (mile markers, maps, keep dogs leashed, rules of the trail, land acknowledgment)	16
» Event space (amphitheater, community space, education facility, beer garden)	12
» Accessible trails (paved or hard-packed trails for people of all abilities)	10
» Potable water stations	8
» Separated bike paths	7
» Disc golf	6
» Gardens: Community, cactus, butterfly, rock, Zen, botanical	6
» Shaded areas	6
» Improved aesthetics around the dry lakebed and boulevard	6
» Public art	5
» Feeder trails (park is accessible from multiple points and is easily accessible from surrounding neighborhoods)	4
» Parking	4
» Food and beverage options	4
» Pump track or other mountain bike infrastructure	3
» Dog park	3
» Water feature (separate from lake/pond, e.g. fountains)	3
» Exercise stations	2
» Children's playground/nature play space	2
» Mini golf	2
» Bike racks	1
» Sundial	1
Grand Total	**169**

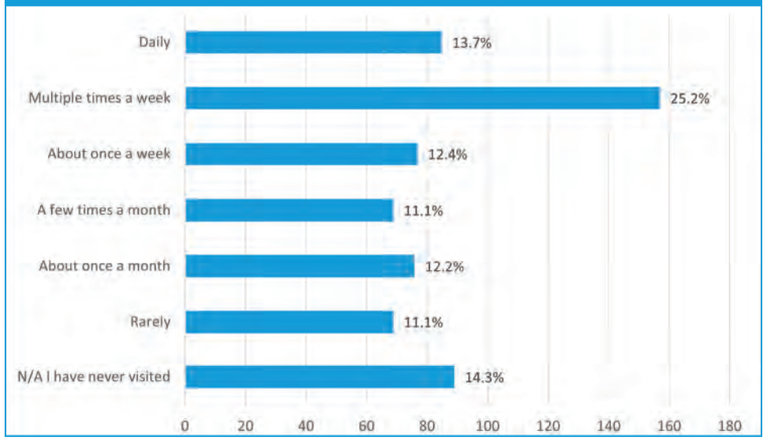
Familiarity with Preserve

Respondents to the survey were very familiar with the Preserve – nearly 97 percent of respondents were very or at least a little familiar with the Preserve.



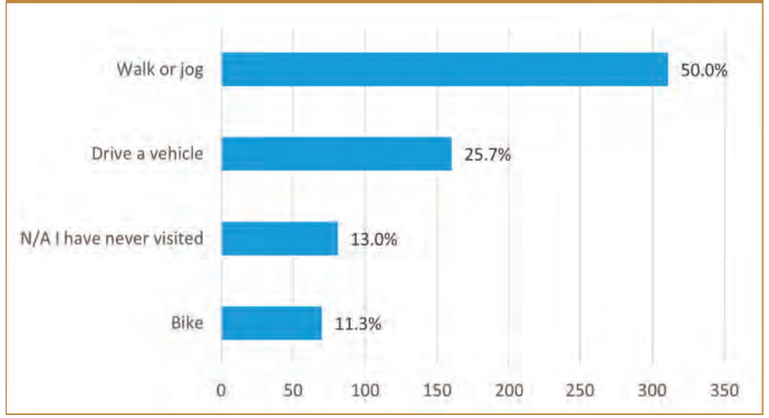
Frequency of Visits

Over 51% of respondents were frequent visitors to the Preserve (visiting at least once a week) and nearly 75% of respondents are at least occasional visitors to the Preserve (visiting at least once a month). However, over 14% of the participants had never been to the Preserve.



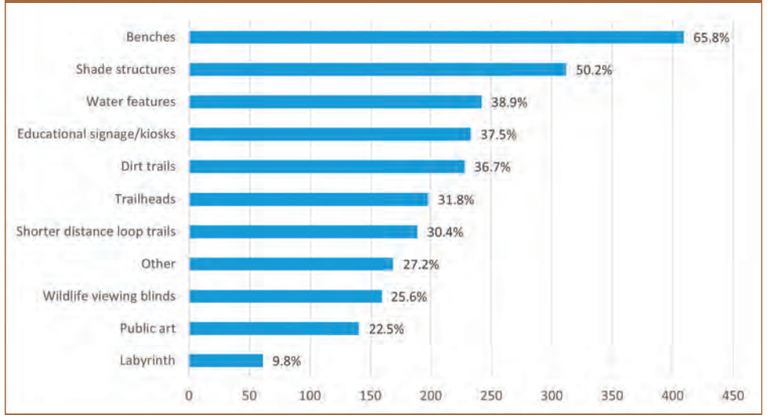
Means of Travel

Most respondents visit the Preserve on foot, with a quarter visiting by vehicle.



Desired Amenities

A majority of respondents favored two types of amenities. 65 percent of respondents indicated that they would like to see benches at the Preserve. 50% of respondents would like to see shade structures.



Survey Conclusions

Key findings and conclusions of the survey include:

» The survey showed that the community is aware of the Preserve. However, we should be cautious of a self-selection bias inherent in the opt-in nature of the survey. It is difficult to assess the amount of self-selection bias in a survey, yet we can be reasonably sure it exists. Other outreach methods may reflect the opinions of different groups within the Town. Use of the Town's Flashvote survey instrument may offer the opportunity to benchmark the results of this survey.
» Given the high response rate among those who frequently visit the Preserve (75 percent of respondents visit at least once a month), we should consider this survey skewed towards current users.
» It may be determined that serving those who already utilize the Preserve is the wise strategic direction in a limited funding environment.
» There is broad agreement on the amenities sought at the Preserve.
» Benches, shade structures, water features, educational signage and dirt trails were all popular amenity choices and were favored by all respondents, frequent uses, and those who have never visited the Preserve.
» Frequent visitors tend to be pedestrians. Less frequent visitors tend to drive a vehicle.
» We can likely assume that frequent visitors are also more likely to be from the neighborhoods that border the Preserve.
» Those who have never visited may be drawn in with greater number of dirt trails, shorter distance loops and trailheads.

Parks & Recreation Advisory Board

A presentation was made to the Town of Oro Valley Parks and Recreation Advisory Board on Tuesday, November 15, 2022. The Parks & Recreation Advisory Board (PRAB) acts in an advisory capacity to the Town Council in matters pertaining to parks and recreation, parks design, open space and trail use (prior to the review comments being submitted to other Boards, Commissions or the Council). The purpose of the presentation was to provide a project overview of the scope of work and schedule for the master planning of the Vistoso Trails Nature Preserve and to receive suggestions and comments regarding the future programming for the facility. The intention of this presentation was to introduce the Sites Southwest consulting team, the Master Plan and the process, and provide context for previous recommendations.

At the conclusion of the presentation, the following comments were received from meeting attendees.

» One blue card was presented from a resident who wants pollinator propagation to be considered as part of the master plan. This should include adding plants that will help sustain the Monarch population and bring other pollinators to the area.
» The Master Plan should include a phasing plan for implementation.
» The Master Plan should include a habitat management plan.
» The Master Plan should provide access to variety of users.
» The Town has posted a questionnaire on its website and already received 230 responses as of November 15, 2022.
» Seventeen residential communities have easy access to the Preserve.

Town Council Meeting Summary

A presentation was made to Oro Valley's Mayor and Council on Wednesday, November 16, 2022. Oro Valley's Mayor and Council are committed to providing high-quality municipal services and responsible development. The Town Manager, the Mayor and Council provide policy direction by adopting rules, regulations, and procedures to meet community needs. The purpose of the presentation was to provide a project overview of the scope of work and schedule for the master planning of the Vistoso Trails Nature Preserve and to receive comments regarding the future programming for the facility.

At the conclusion of the presentation, the following comments were received from Mayor and Council:

» Council member Solomon expressed concerns regarding the future/unknown costs to maintain the Preserve and asked what it would cost to maintain the Preserve on an annual basis. Oro Valley Park and Recreation Director Kristy Diaz-Trahan explained that the maintenance costs will be addressed in the annual park and recreation department budget and that these costs will be determined based on the approval of the final master plan document. Currently, maintenance of the Preserve is being outsourced. The current fiscal year has $220,720.00 identified for general landscaping, which is outsourced to Brightview Landscape for general maintenance. There is an additional $350,000.00 for capital improvement work that includes the Master Plan, restroom, and cart path repair. During the next fiscal year funds will be spent to fix the cart path, washes, and additional areas of erosion. The consultant team has been directed to create a Master Plan that can be developed in phases as funds and grants become available. Issues concerning future implementation and maintenance funding and budgeting will be addressed during the budget approval process with the Town Council.
» Vice-Mayor Barrett asked for more information on the services that Acorn will be providing. It was explained that Acorn is working with local schools to develop curriculum that incorporates the Preserve. Additionally, it was stated that there is tremendous potential for biology classes and projects to be connected to the Preserve including the mapping of plant material and measurement of plant growth.
» Vice-Mayor Barrett stated she thought it was very important that the site be revegetated.
» Council member Bohen asked if there is a cost estimate for the improvements and maintenance. Oro Valley Park and Recreation Director Kristy Diaz-Trahan explained that this information will be included in the Master Plan.
» Council member Nicolson asked what grants were available. Sites Southwest stated that grant sources will be identified based on the master plan programming and will be included in the final document.
» Council member Jones-Ivey stated that she had meet with Sites Southwest and is looking forward to the development of the Master Plan.
» Oro Valley Parks and Director Kristy Diaz-Trahan stated that standards need to be developed for improving the Preserve buffer zones that are adjacent to residences and that the process for submission, approval and execution will need to be established.

Survey Conclusions
The survey showed that the community is aware of the Preserve. However, we should be cautious of a self-selection bias inherent in the opt-in nature of the survey.

4. MASTER PLAN

There are very few precedents for Vistoso Trails Nature Preserve. While golf courses have been losing popularity for many years, most of them have been converted into subdivisions, not preserves for connecting with nature. Not so in Oro Valley, Arizona; the land of a former golf course will be converted over time to an excellent urban open space park reclaimed for the use of the town and its residents, which will provide exceptional examples of Sonoran Desert with its inherent wildlife and landscape, along with other opportunities.

The Vistoso Trails Nature Preserve will offer residents and visitors with setting for hiking, running, cycling, birding and other wildlife viewing, contemplation, exercise, and education. It will also provide habitat for a wide range of mammals, birds, reptiles, and other animals, and it will foster the regeneration of desert forests that will help positively control environmental conditions and climate change while providing the residents and visitors of Oro Valley with passive recreational opportunities.

Within this section of the Master Plan we propose ideas and strategies for the future of this Preserve that will provide guidance for its trail development, landscape regeneration and habitat creation, and its programmed activities. The goals presented in this Master Plan will ultimately provide Oro Valley with an exemplary nature preserve.

“Within this section of the Master Plan report we will propose ideas and strategies for the future of this Preserve that will provide guidance for its trail development, landscape regeneration and habitat creation, and its programmed activities.

They include:

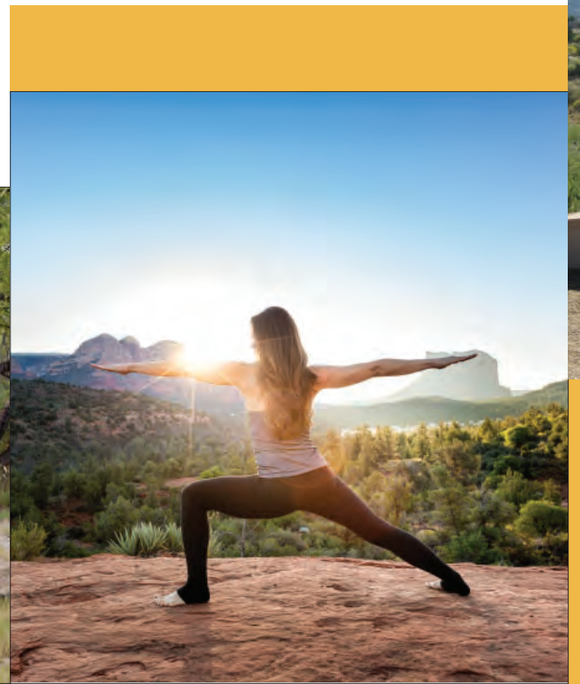
» The long-term protection of the site's ecological and cultural resources.
» Inclusive and accessible educational opportunities for a wide range of user groups of diverse ages, abilities, and backgrounds.
» Site-sensitive passive recreational attributes that tastefully integrate the built environment within the natural surroundings.

The greater concepts that emerged through the process of extensive stakeholder and public involvement are::

» Create a system of walking/biking trails
» Create areas for wildlife viewing
» Connect the Preserve trail system to the town pedestrian system
» Provide dispersed parking areas and directional signage
» Re-purpose the former pond for habitat, education and wildlife viewing
» Provide an area for family gatherings by the former pond area
» Re-purpose the former driving range area to include educational gardens
» Provide educational opportunities, minimally at K-6 grades
» Provide interpretive opportunities to enhance trail experiences, such as dark sky viewing
» Address wash area erosion and safe crossing concerns
» Create natural structures and water features to support habitat
» Re-establish native vegetation throughout the Preserve
» Provide shade and seating areas
» Develop operations and management protocols

CONCEPTS

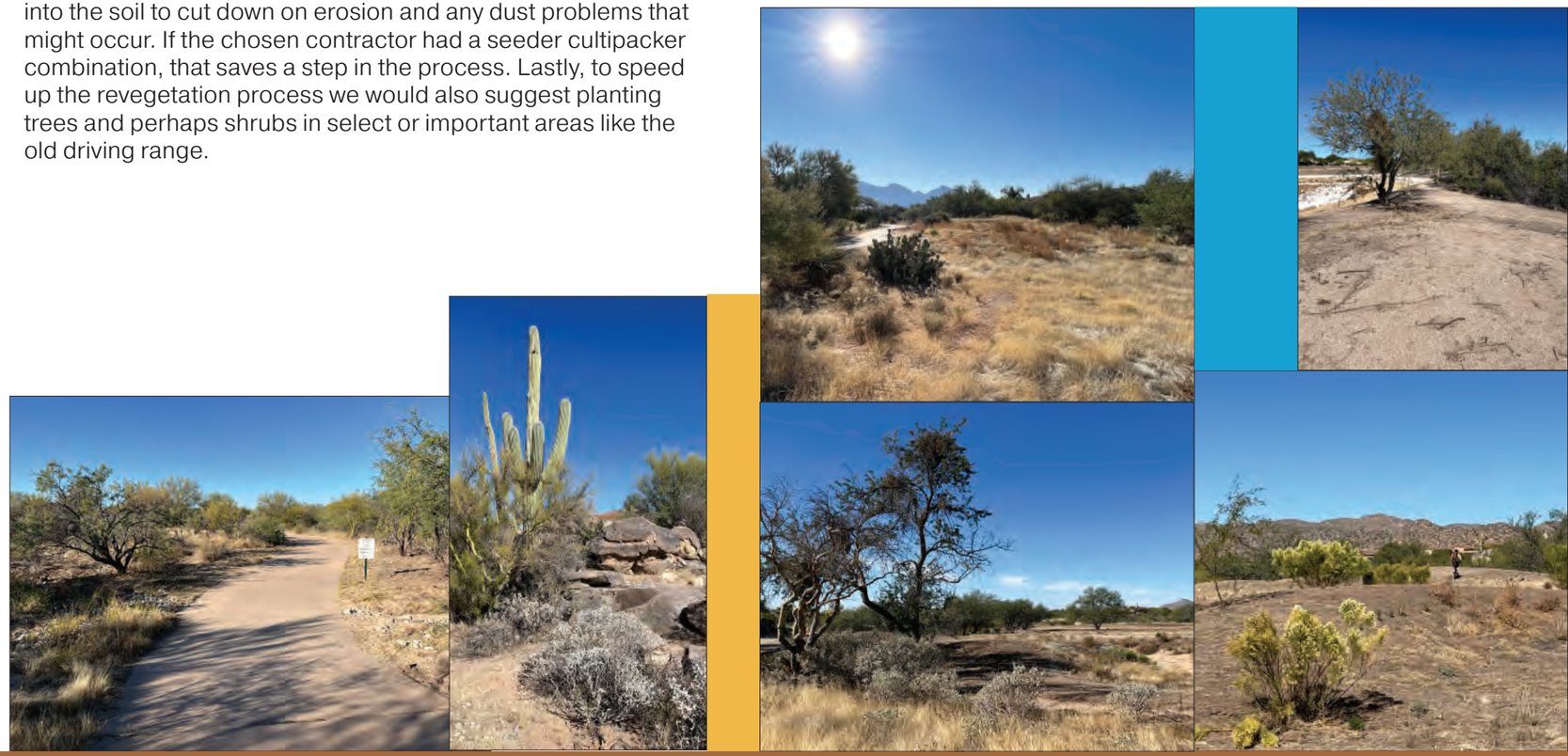
The Vistoso Trails Wildlife Preserve will become a well planned and cultural resource for the town of Oro Valley. The former cart path will become the primary access corridor for the Preserve, albeit with some modifications to provide safety and accessibility. The landscapes will be regenerated to supply both human and wildlife benefits though revegetation methodologies that will repair this former Sonoran Desert Ecosystem and convert it from golf course relics to healthy open space. The amenities that will be provided in the Preserve will enable visitors to comfortably use this town resource including more seating and shade, more ability to observe its natural resources while providing habitat for wildlife, and restored wetland opportunities for community activities. Below we have provided more specific information to describe this Master Plan.



LANDSCAPE REGENERATION

Restoring the landscape in the areas within the Preserve that supported a golf course to native Sonoran Desert landscape will likely be among the most difficult improvements to the land. The landscape of the Preserve is really two or three different landscape typologies, there is the native landscape that was minimally touched as part of the golf course construction; the native landscape that was more heavily affected by the construction of the golf course; and then there is the landscape that was the golf course and its ancillary features (tees, fairways, greens, pond). The approach would therefore be threefold:

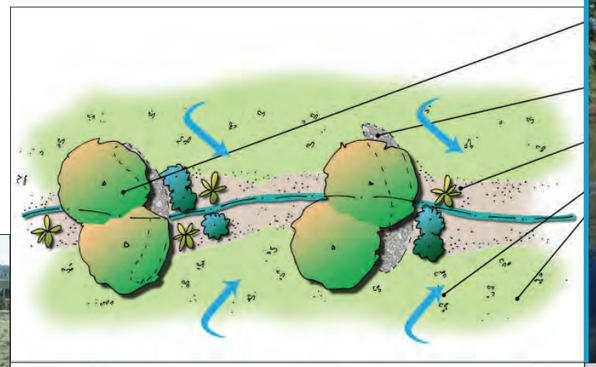
- **Minimally Touched Native Landscape** – the approach for areas that are for the most part good examples of Native Sonoran Desert Landscape will require protection and revegetation of social paths. The protection will come in the form of temporary fencing that shields native landscape from further destruction from both visitors and from contractors improving other parts of the Preserve. The social trails that exist should be reclaimed and potentially obstructed by fencing, boulders, or other means, to stop further landscape degradation.
- **Degraded Native Landscape** – areas that were impacted in more severe ways include the edges of fairways that were driven over by maintenance or other vehicles, areas that were cleared for viewsheds or golf drivesheds, and areas that were used for staging events when the Preserve was a golf course. These areas should be revegetated with a combination of small plants and potentially large plants and seed to bring back these places to a healthier desert ecosystem.
- **Former Golf Course** – the areas that were formally golf course such as tees, fairways and greens will take a more aggressive approach to restoration. This will include more intense soil ripping, perhaps along with grading, and revegetation. It will likely also include the use of glyphosate primarily because of the Bermuda grass that grew there for upwards of 25 years. The first step will be to rip or cultivate the Bermuda into the soil after it has been sprayed with glyphosate, and after the monsoon season greening of the Bermuda to increase seed to soil contact. Then the seed would be broadcast over the soil and a cultipacker would be used to press the seed into the soils and ruffle the soil. Finally straw (not hay) would be crimped into the soil to cut down on erosion and any dust problems that might occur. If the chosen contractor had a seeder cultipacker combination, that saves a step in the process. Lastly, to speed up the revegetation process we would also suggest planting trees and perhaps shrubs in select or important areas like the old driving range.

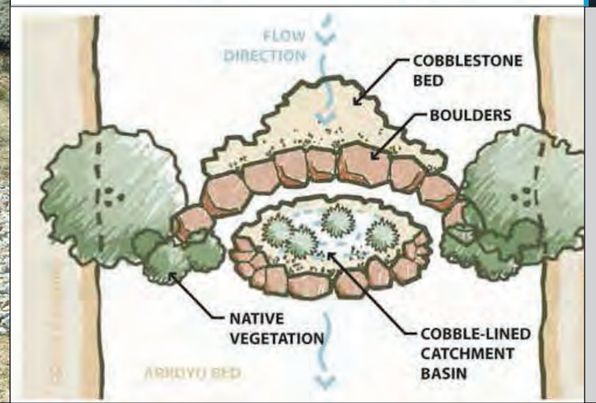


PHOTOS LEFT TO RIGHT: MINIMALLY TOUCHED LANDSCAPE DISTURBED LANDSCAPE, FORMER GOLF COURSE LANDSCAPE

Regarding the plants that would be used for the landscape regeneration, we have included a plant list in the appendix that should be drawn from.

As far as water is concerned, another important tool in the arsenal of treatments for regeneration of the landscape is water harvesting and green stormwater infrastructure (GSI). As is predicted by the majority of leading scientists and meteorologists in the southwest, climate change for us will mean hotter and drier conditions in the future. While the Colorado River has good snow fed years and bad ones the preponderance of low precipitation and low river runoff will continue to have effects on southern Arizona, and it is important that the region consider every alternative to try to reach parity with our environment. The washes and the smaller drainage flows should be harnessed to feed landscape regeneration, this should include strategies to not only direct water but to reserve it as subsurface storage to increase the resilience of the landscape. Strategies include using contour swales on hillsides to capture water and calm erosion; use of check dams like Zuni Bowls along washes to slow drainage water velocities and allow infiltration without scouring the earth. Other strategies include the use of subsurface reservoirs of gravel or straw to increase the length of time that desert plants can tap into these protected water resources to make to increase landscape sustainability. One final word about harvesting stormwater, there are a number of small and one large wash that flow through Vistoso Trails Preserve. These water sources are ephemeral streams and could also be tapped for water to divert, harvest and utilize.





PHOTOS LEFT TO RIGHT: CONTOUR SWALE, CHECK DAM, ZUNI BOWL DAM, SUBSURFACE RESERVOIR, WASH

GOLF COURSE BUNKERS

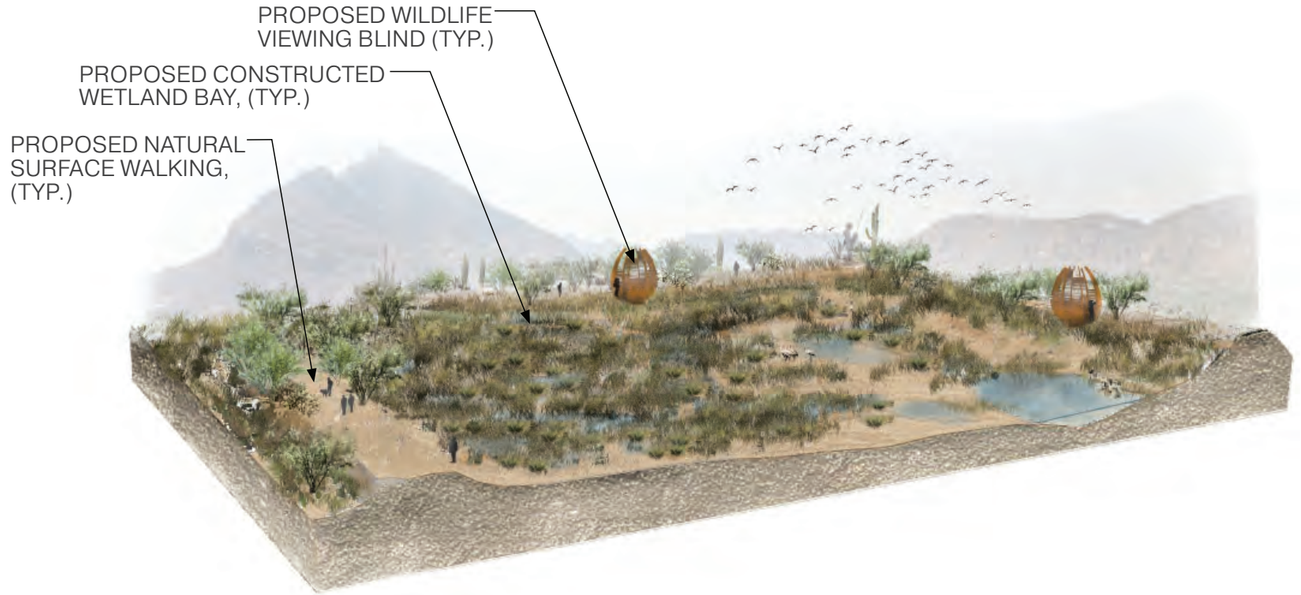
Golf course sand traps (bunkers) punctuate the landscape of the Preserve throughout. These remnants of the old golf course will be treated in one of two ways; they should either be eradicated and the edges feathered into the land surrounding them, and then reclaimed or some of them could be re-purposed as wildlife drinkers with substantial modifications. The later idea would require bladders to be installed to abate the fast percolation rates and evaporation rates of sandy soils in the desert. It may also be possible to harvest water from the surrounding topography and then to install subsurface reservoirs to make them more resilient.

OLD GOLF COURSE BUNKERS

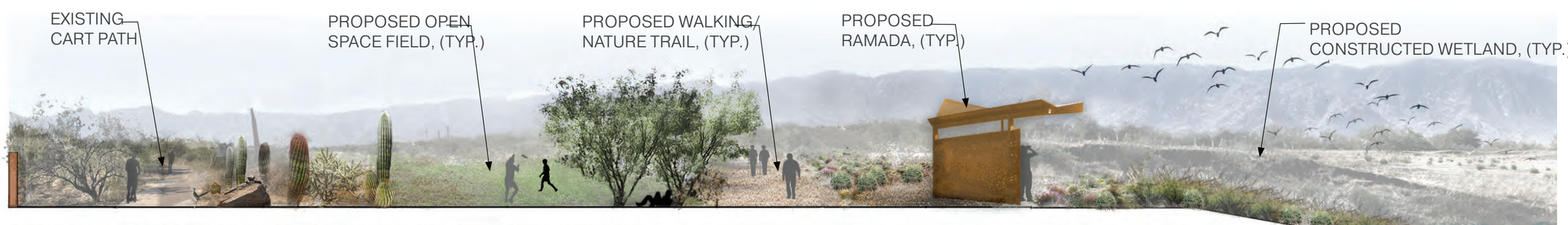
THE FORMER POND

The former pond for the golf course along West Vistoso Highlands Drive has been rethought as part of this master plan. It will retain its signature photo opportunity by retaining the waterfall, but the pond will be much smaller and also include two smaller ponds at the base of the footprint of the old pond. The water system serving the three ponds will be interconnected and it will keep water moving to avoid eutrophication. The old bulkheads of the pond edge will be obliterated, any remnant soil cement removed and then the earth will be sluffed down into the old pond area at about a 1:6 slope. At the bottom of the slope two small wetlands will be built as described above. There will also be a small system of trails built to offer views of the wetlands and the wildlife that will be gathering there. Last, a small handicapped accessible parking lot is planned at the site to allow a short, accessible path to visit and transverse north and east on a looped trail and get a great experience visiting the Preserve. See Graphic on the following page.

The master planning team developed two additional alternatives for rethinking the former pond during the master planning process (see appendices). However, the one depicted here was deemed the most acceptable because it provides a more environmentally appropriate experience with water in the desert than the original pond with wildlife drinkers. It's essentially the same experience, but without the water-related consequences.



BIRD EYE VIEW: PROPOSED CONSTRUCTED WETLAND



SECTION: PROPOSED OPEN SPACE FIELD + CONSTRUCTED WETLAND


PROPOSED REVEGETATION ZONE, (TYP.)
PROPOSED 5' WIDE WALKING TRAIL, (TYP.)
EXISTING CART PATH, (TYP.)
PROPOSED ADA TRAIL, (TYP.)
PROPOSED WILDLIFE VIEWING BLIND, (TYP.)
PROPOSED WILDLIFE DRINKER, (TYP.)
EXISTING WASH, (TYP.)
PROPOSED PICNIC AREA, (TYP.)
PROPOSED OPEN WATER
PROPOSED ADA PARKING - 5 SPACES
W VISTOSO HIGHLANDS DR
EXISTING SIDEWALK, (TYP.)
EXISTING PUMP STATION
NODE: POND ZONE
SCALE = 1" = 150'
0
150'
300'

THE FORMER DRIVING RANGE

The former golf course driving range and its vicinity have also been rethought as part of the educational experience of the Preserve. This large somewhat graded area of the old golf course will be accessed through the trail system but also from West Vistoso Highlands Drive through a trailhead and parking lot. The parking lot and trailhead will be established by the developer of the higher density living where the old clubhouse for the golf course was. The components of the area of the old driving range will include:

» **An Outdoor Classroom** – the small outdoor classroom could be used for daytime classes on native plants, habitat, and native wildlife; as well as for astronomical classes about the solar system and other celestial events. The seating is conceptualized as seat walls that also tell the story of culture and nature, and the small stage area could include an outdoor screen for nighttime classes.
» **Existing Restroom and Serving Area** – directly adjacent to the outdoor classroom and the Moon Sun Demonstration Garden is the refurbished restroom with serving counter (from old golf course days). While the serving counter and "back bar" are no longer in use they could be used temporarily for small events to distribute water or snacks.
» **Science Education Trail** – this demonstration trail for young people will offer displays of night blooming cacti and other plants, locations to observe the night sky, and math and science workstations with nature themes.
» **Moon / Sun Demonstration Garden** – the Moon / Sun Garden will display ideas like water harvesting and green stormwater infrastructure, a shade arbor to illustrate how shade can reduce temperatures in natural areas, a colony of pollinator plants to discuss their importance to productive landscapes, and wildlife drinkers. The entire garden will be replete with interpretive signage to discuss the features.
» **Sonoran Desert Ecosystems Education Zone** – the old driving range will be transformed into a demonstration of the Sonoran Desert ecotones that envelop the area of Oro Valley. These will be offered partially as an education node, but also to reclaim the area. The three ecotones identified and demonstrated include the Low Desert, the Grasslands Zone and then the Hillside Zone typically found in the lower elevations of the Catalinas. We have also suggested that the education zone include a demonstration of the Hohokam's old Ak Chin water collection zones to provide a glimpse into the way that these ancient natives farmed using water harvesting techniques. The Ak Chin is placed in a small pond that is fed by three drainageways.

OUTDOOR CLASSROOM EXAMPLE AT BACHECHI OPEN SPACE


PROPOSED MOON / SUN DEMONSTRATION GARDEN
• WATER HARVESTING
• SHADE ARBOR
• POLLINATOR PLANTS
• EDUCATIONAL SIGNAGE
• WILDLIFE DRINKERS
• OUTDOOR CLASSROOM
PROPOSED SOLAR SYSTEM / EDUCATIONAL TRAIL
• NIGHT BLOOMING PLANTS
• MATH/SCIENCE STUDENT WORK STATIONS
W VISTOSO HIGHLANDS DR
PROPOSED WILDLIFE DRINKERS, (TYP.)
PROPOSED 5' WIDE NATURAL SURFACE WALKING TRAIL, (TYP.)
EXISTING RESTROOM
P
EXISTING WASH, (TYP.)
PROPOSED REVEGETATION ZONE, (TYP.)
EXISTING CART PATH
PROPOSED ADA TRAIL, (TYP.)
PROPOSED SONORAN DESSERT ECOSYSTEMS DEMONSTRATION / EDUCATION ZONE
• AK CHIN
• LOW DESERT ZONE
• GRASSLANDS ZONE
• HILLSIDE ZONE
NODE: DRIVING RANGE NODE
SCALE = 1" = 150'
0
150'
300'

SHADE

As most know, shade is an essential for any outdoor activities in southern Arizona, especially in the hotter months. Shade should be provided through the use of trees, preferably natives or endemics, or through mechanical means through the use of shade structures. Due to the nature of the trail system in the preferred option, both techniques should be planned close to the cart path trail or one of the ancillary trails near either the pond or the old driving range, in this way further disturbance of the ecosystem will be abated and no new trails will be built. Where shade structures and wildlife viewing blinds are constructed, they will be placed close to the path to lessen the environmental costs of adding more pathways to the Preserve.

PHOTOS LEFT TO RIGHT: MESQUITE TREE WITH SITTING AREA, SHADE STRUCTURES

TRAIL SYSTEM

Currently, the trail system consists of over 6 miles of 8-foot-wide pigmented concrete cart path from the preexisting golf course. These cart paths were constructed prior to the establishment of the Preserve and are now being used by the community for recreational purposes. The linear path follows along the undulating golf tees, greens and fairways and returns back to the former club house location near the old driving range. Social trails have also been cut into the ambient desert but as aforementioned these will be reclaimed.

The cart path narrows to underpasses under existing roadways using concrete underpasses in three locations – West Vistoso Highlands Drive, North La Canada Drive, and West Pebble Creek Drive. These tunnels are constructed to accommodate a single golf cart which makes it difficult for multiple users to pass each other. It also makes them susceptible to flooding and sand accumulation. However, these underpasses make it safer for pedestrians and cyclists to cross roadways by separating them from vehicular traffic. Also, as noted in the feasibility study for the Preserve there may be ways to install “skylights” in these tunnels to light them up better and make them feel safer.

The current condition of the cart path varies throughout the preserve as noted in the Context section of the report. Due to natural shifting of the concrete, separation of concrete slabs, cracking, pitching, and crumbling, especially around washes and drainage paths has been observed in the cart path. This brings up concerns with the overall accessibility of the trail as it exists.

EXISTING CART PATH CRACKING

ACCESSIBILITY

The town of Oro Valley authorized an accessibility report be conducted for the existing cart path to determine how it meets the national Americans with Disabilities Act (ADA) standards. After identifying key areas of concern, the report provided recommendations on how to make this cart path network accessible for all. They included making changes to the cart path to meet ADA as follows:.

» Trails must provide a firm and stable surface.
» The longitudinal (running) slope must not exceed 5% and the cross slope must not exceed 2.08% unless a flat resting area is provided for resting zones.
» “When nonstructural alternatives are not effective in making the program (trails) accessible,35.150(b) requires the Town to make alterations to existing parks, facilities, and assets, and when doing so, to treat the alternation as new work and comply with title II 35.151”.

However, because of the length of the path and the cost of ADA improvements on 6 miles of concrete, we are recommending two ADA loops be constructed to provide those with accessibility challenges a like experience to the existing cart path. We are also recommending that improvements to the existing cart path be constructed over time as the path breaks down to allow the town to make the improvements as it can afford them. The town will though take care of issues along the existing path like at drainageways where the path has been undercut, and in portions of the path that are heaved due to trees and other influences. In these locations the existing concrete path will be ground down to create a smooth path and where the heaves are too great, that those concrete pads be replaced. Our recommendations also include adding 2’ of gravel to each side of the path for safety and that the vegetation be trimmed accordingly to provide a safe condition for walking, running and hiking and to make the path safer for able bodied users.

Other than running and cross slopes, the golf cart path has non-compliant elements that can be amended with maintenance and repair, again over time. There are some areas with tread obstacles like tree roots and crooked concrete slabs which can be removed or repaired. Sand, dirt, and gravel cover the trail in places but can be remedied with regular maintenance. Finally, existing facilities like restrooms and parking lots would only need minor repairs to be ADA-compliant.

With accessibility in mind, it is recommended that smaller segments and loops are designated as ADA-compliant trails in order to provide opportunities for all pedestrians to have the capacity to use the proposed cart path. Based upon analysis of existing cart paths and facilities, ADA trail loops are recommended at the driving range and near the lake. ADA compliant loops are recommended in all trail alternatives proposed in this plan.

THE TOWN OF ORO VALLEY AUTHORIZED AN ACCESSIBILITY REPORT BE CONDUCTED FOR THE EXISTING CART PATH TO DETERMINE HOW IT MEETS THE NATIONAL AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS

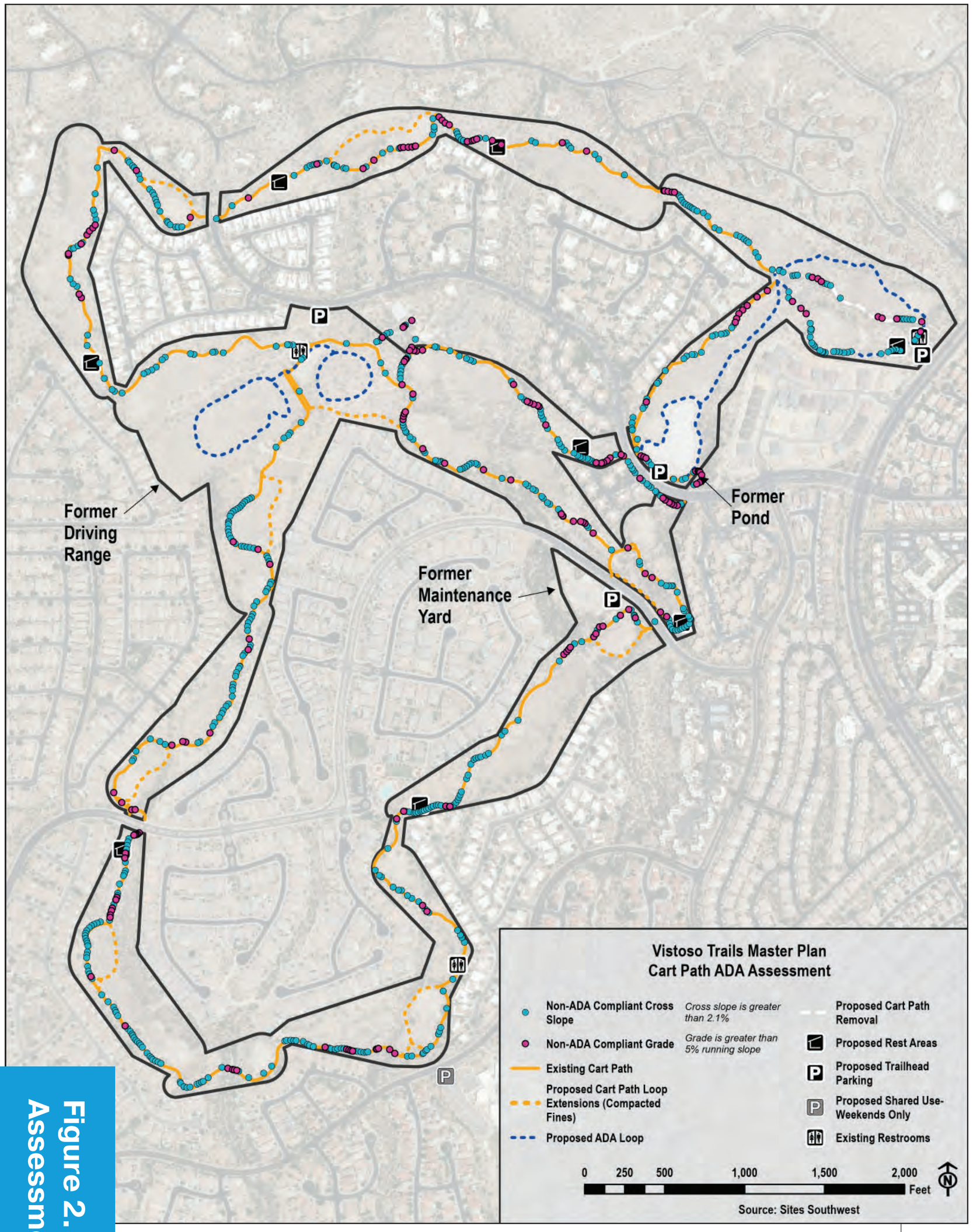


Figure 2. Cart Path ADA Assessment Map

THE PREFERRED MASTER PLAN FOR TRAILS

Based on trail system analysis and community outreach, three alternatives or options were developed during the master planning process. The alternatives were posed to the public, and both the Parks and Recreation and Advisory Board (PRAB), and the Mayor and Council. The alternative illustrated on the following pages was selected by all as the final and preferred Master Plan for the Trails at the Vistoso Trails Nature Preserve. The highlights of the Preferred Alternative include:

- Using the existing cart path as the primary trail path for the Preserve. In specific areas it will need to be improved due mostly to the damage from small washes.
- Creating new ADA friendly trails in two specific areas of the Preserve; one, near the former pond, and the second at the former driving range.
- The addition of small parking areas at N Rancho Vistoso Blvd, the Former Pond on W Vistoso Highlands Dr, W Pebble Creek Dr (at the Former maintenance facility), and one on the Developer project being built at the old country club. There will also be an agreement for shared parking with the Innovation Academy along W Desert Fairways Dr.
- Some new soft surfaced trails limited to already disturbed places.
- The addition of shade structures and seating locations adjacent to and along the existing cart path.

The preferred alternative will retain the existing experience of the trail network while providing walking path opportunities for trail users with mobility issues. This will retain the existing experience of the Preserve, prevent loss of habitat, and reduce construction costs associated with new trail construction. The cart paths will have to be maintained throughout their lifespan and, in some areas, it is highly recommended that the cart path be improved and/or reconstructed to improve trail accessibility and sustainability.

Portions of the cart path that are segments of the ADA Trail will need the most improvements to meet ADA standards. Recommended improvements are detailed in Appendix E. In addition to cart path improvements, additional rest areas should be included in the ADA trail loops to provide adequate rest intervals for walkers. These include:

- Rest areas should be placed every 0.5 mile and include at least one 6-foot-long bench on a minimum 30 x 48-inch clean space next to each bench.
- Supporting facilities including parking lots, restrooms, shade structures, and signage should be designed to meet ADA standards.
- Signage provides information on trail length, surface types, typical slope and cross slope, and list of accessible features should be readily available at trailheads and near facilities.

TRAIL	FT	MI
Existing Cart Path	32,736	6.2
ADA Trail—Driving Range	4,360	0.8
ADA Trail—Pond	5,445	1

The preferred alternative will retain the existing experience of the trail network while providing walking path opportunities for trail users with mobility issues

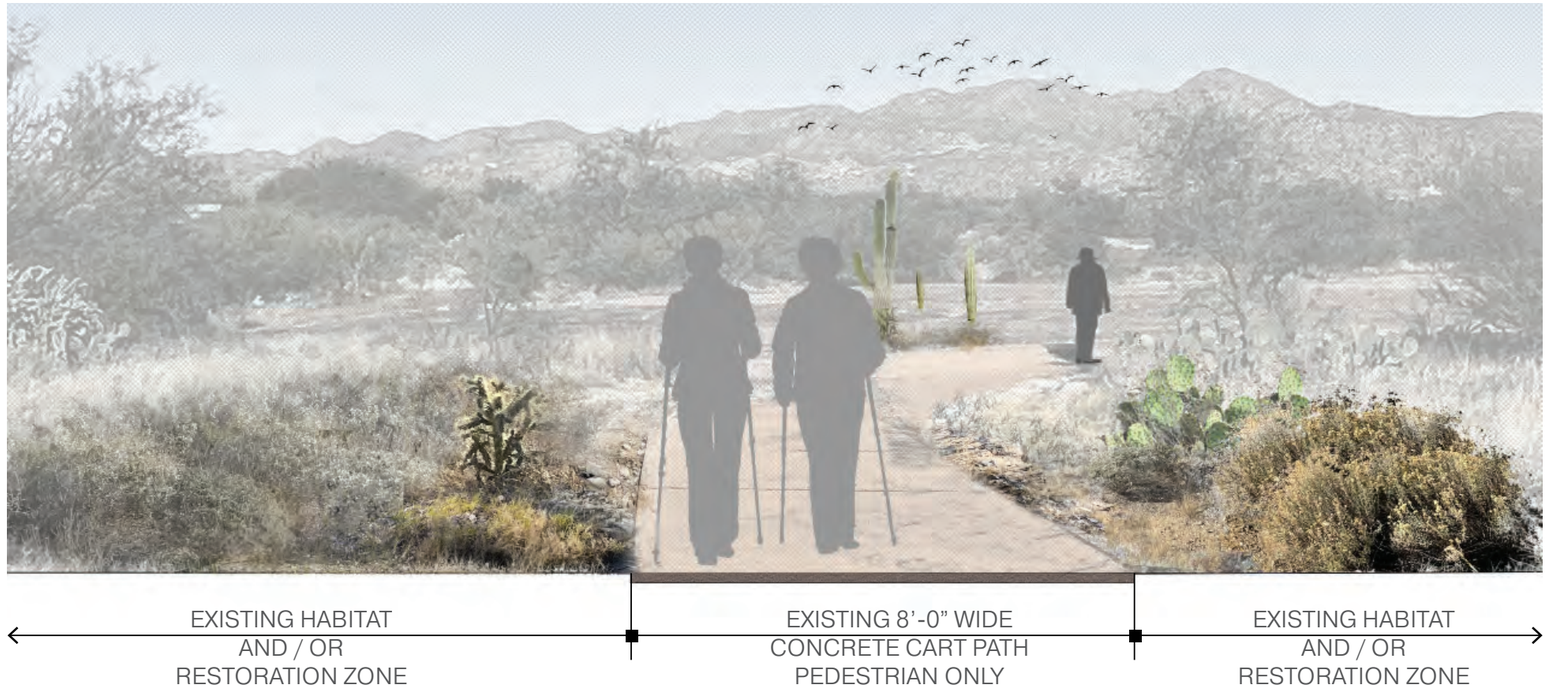


Figure 3. Final Illustrative Master Plan

INTERPRETATION & EDUCATION

Role of Interpretation and Education at Vistoso Trails Nature Preserve

The work of The Acorn Group has focused on both interpretive and educational opportunities at this remarkable site. The former addresses strategies to connect with non-formal visitors who arrive voluntarily. The latter addresses strategies to connect with formal education audiences who seek out-of-classroom experiences that augment the curriculum. While the first group will benefit directly from new interpretive media and experiences at the Vistoso Trails Nature Preserve (Preserve), the second group will additionally benefit from new programs that lend meaning and authenticity to classroom learning. This requires alignment with grade-specific academic content standards and careful coordination with target schools. The interviews we conducted with school administrators have informed our programming recommendations, which are summarized in this section as well.

Interpreting for visitors

The interpretive summary we created is a foundational tool for interpretation. It summarizes the content underlying new interpretive media. It establishes a framework that helps focus the Preserve's features as a means to convey conservation messages. And by establishing goals, it reveals outcomes of the visitor's experience and holds interpretation accountable.

While the complete interpretive summary is provided as an appendix in this master plan, the message hierarchy is highlighted below. Consisting of an overarching theme, subthemes, and subtheme-specific key concepts, the message hierarchy is a foundational tool that should guide future work at the Preserve.

The theme is the "take-home message" we want visitors to grasp and remember. It is not the subject of the Preserve's narrative. Rather, it is the unifying idea that pulls everything together and causes pause and reflection in the audience. The subthemes further develop the central theme, allowing for a logical progression into storylines. Key concepts in turn support the subthemes and form the foundation of the hierarchy. They keep the information "in check," ensuring that we cover important material accurately, keep the interpretive goals in mind, and avoid straying from the messages.

Theme

Once a golf course and now a Preserve, this site demonstrates nature's resiliency. Plants and wildlife of the Sonoran Desert continue to "take back" the land, increasing the richness of both the Preserve and the visitor's experience.

Subthemes

Thanks to residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley, the Vistoso Golf Course was purchased and repurposed as a nature preserve.

Vistoso Trails Nature Preserve is a remarkable piece of the Sonoran Desert. Spanning over 200 acres, it is home to cacti, trees, shrubs, and wildflowers, as well as a dazzling array of wildlife.

Nature is resilient, but still, it can benefit from human intervention. Removal of invasive weeds and revegetation with native desert plants are ongoing projects at the Preserve.

The Hohokam and other Indigenous People have lived on this land for thousands of years. Resilient and resourceful, the Hohokam were sophisticated desert farmers.

Subthemes and key concepts

Subtheme one

Thanks to residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley, the Vistoso Golf Course was purchased and repurposed as a nature preserve.

- **Key concept**: The Preserve is situated on the former Vistoso Golf Course which was established in 1995-1996 and shuttered in 2018.
- **Key concept:** The Preserve lies adjacent to the Rancho Vistoso development within the Town of Oro Valley. The combined efforts of Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley ensured that the Golf Course property was purchased as a nature preserve.
- **Key concept:** The Preserve is a significant asset to the Town of Oro Valley. Not only does it offer prominent recreational and educational value, but also ecological value.
- **Key concept:** The Preserve is framed by the Tortolita Mountains to the north and Coronado National Forest to the east. The Preserve's vistas are expansive; its landscape beckons both people and wildlife.
- **Key concept:** Dark skies are particularly noteworthy from the Preserve's high points.
- **Key concept:** The Preserve is part of the Sonoran Desert which contains globally remarkable biological diversity. Plant communities that are present on the Preserve are in the process of being restored.

Subtheme two

Vistoso Trails Nature Preserve is a remarkable piece of the Sonoran Desert. Spanning over 200 acres, it is home to cacti, trees, shrubs, and wildflowers, as well as a dazzling array of wildlife.

» **Key concept:** The Sonoran Desert covers roughly 120,000 square miles across five states and two countries. On a global scale, both its pollinator diversity and reptile diversity are renowned. The Vistoso Trails Nature Preserve "returns" 200 acres to this remarkable desert.
» **Key concept:** A snapshot of the Sonoran Desert, the Preserve is home to numerous mammals, birds, reptiles, amphibians, and invertebrates, as well as plants. As sections of the Preserve become restored, more wildlife will likely be attracted to it.
» **Key concept:** The Preserve's wildlife is generally subdued and shy, with the exception of the javelinas, cottontails, and some of the birds. Calls and songs often announce the presence of birds before they are seen.
» **Key concept:** The Preserve features plants native to the desert scrub and mesquite bosque communities. Shrubs (jojoba, creosote, chuparosa, acacia), cacti, and succulents form medium-height clusters of scrub, while taller trees, including palo verde, mesquite, and ironwood form taller woodlands, or bosques, especially near intermittent streambeds.

Subtheme three

Nature is resilient, but still, it can benefit from human intervention. Removal of invasive weeds and revegetation with native desert plants are ongoing projects at the Preserve.

» **Key concept:** Plants that are native to this region are adapted to the desert's growing conditions. Native wildlife recognizes them as sources of food. Exotic species, such as the remnant Bermuda grass are not necessarily adapted to the desert's growing conditions or controlled by or recognized by native wildlife.
» **Key concept:** Volunteers and students engaged in service-learning and community service work, raise native plants in the Preserve's nursery, and weed and revegetate sections of the Preserve.
» **Key concept:** Nature is reclaiming the Preserve. Native desert plants continue to take hold and wildlife continues to frequent the Preserve as residents and as migratory species.

Subtheme four

The Hohokam and other Indigenous People have lived on this land for thousands of years. Resilient and resourceful, the Hohokam were sophisticated desert farmers.

» **Key concept:** The Hohokam were present on this land and left clues of their presence. Both they and their ancestors are known for their sophisticated irrigation systems that watered crops, including maize (corn), beans, and squash.
» **Key concept:** The Hohokam native village of Sleeping Snake covers 99 acres within the Preserve boundaries. Archaeological evidence indicates that a ball court anchored the village, pit houses and terraced gardens surrounded it, and art was produced with imported pottery, obsidian, and shell. Intensive occupation of Sleeping Snake Village occurred between 950 and 1150 AD.
» **Key concept:** Artist-created petroglyphs are found at the Preserve. While not authentic, the petroglyphs nevertheless represent a replication of art created thousands of years ago.
» **Key concept:** A petroglyph is an image that is carved, incised, or scratched into stone. It differs from a pictograph that is painted on stone, using natural pigments.
» **Key concept:** Today, descendants of the Hohokam—citizens of the Tohono O'odham Nation—remain connected to the Sonoran Desert.

Exceeding standards

Throughout the Vistoso Trails Nature Preserve master planning process, we have kept the following interpretive design principles in mind. They are part of a second document, Sign Standards, that appears as an appendix of this master plan.

Principle one:

Visitor experiences follow seven distinct processes in a sequence:

» **Advance planning:** The OVPR website and Town-owned social media channels provide easy-to-access information about the Preserve, including location, parking, amenities, and programs.
» **Arrival:** A clearly defined entry announces the start of the Preserve experience.
» Reception: Prominent welcome signage sets the tone for the experience.
» **Decompression:** An open area directly after the arrival zone allows visitors to rest, take care of necessities, and gather before heading out on the trails or joining a program.
» **Orientation:** Visitors plan their journey and gather the information and tools they need to feel competent with wayfinding. Wayfinding signage includes a site map on the orientation panel and directional signs and confidence markers on the trails.
» **Interpretation:** Throughout the Preserve, interpretive signage anchored in the theme and subthemes presents stories about the Preserve that lend new thought and insight.
» **Transformation:** Visitors have opportunities to manifest changes in behavior, perception, values, and attitude.

Principle two:

Interpretive media must make a personal connection with, or be relevant to, the target audiences.

» Visitors more readily integrate new learning by relating it to what they already know. Interpretive media can use storytelling, metaphors, and humor to make connections with the audience.

Principle three:

Interpretive media should provide or encourage novel and varied recreation-based experiences.

» Interpretation is based first on recreation.
» Thought-provoking questions, hands-on experimentation, and multisensory tips (e.g., what to look for, touch, and listen for) help capture and maintain visitor attention.
» Preserve visitors are voluntary learners who engage with interpretive media in a leisure setting. Visitors make more profound and extended connections with "fun" material than instructional material.

Principle four:

Interpretive media should be based on a theme.

» The interpretive media reflect the overarching theme and subthemes. Focusing interpretation on take- home messaging helps visitors see the big picture and organize new information into an intellectual framework they understand.

Principle five:

Interpretive media should engage visitors in the learning experience and encourage them to take control of their learning.

» Exhibit sequencing remains "free choice" among the visiting public. After arrival and decompression, visitors select the order, degree of involvement, and time spent at each panel. The attracting and holding power of the panels is mainly a function of design.
» Panel content should demonstrate an understanding of and respect for the audience. During weekdays more significant numbers of K-12 students and teachers likely will visit the Preserve as a field trip where they see real-world applications of science, technology, and engineering. During weekends and special events, greater numbers of local residents and visitors will visit. Comprised of multi- generational family groups, couples, and small groups of friends, these people likely will appreciate experiences that encourage conversation and focused attention.

Principle six:

Brevity is critical.

» Word counts on interpretive panels should not exceed 110 words for the main body of text. Panel titles and subtitles should also be brief (one – seven words each). Callouts should not exceed 35 words.

Developing educational programs

Outreach at Vistoso Trails Nature Preserve extends beyond interpretation. Given the proximity of the Preserve to several schools, educational programming becomes an essential component that can not only reinforce understanding of content standards, but also celebrate stories about both the land and the people of the Sonoran Desert.

The following recommendations are part of a third appendix, Education Recommendations, in this master plan. They span grades K-6 and focus on both science and history/social science. Differing from classroom-based learning, they are explicitly place-based, focusing on the Preserve and the greater Sonoran Desert. Cultivating students' sense of place, while expanding knowledge and skills related to science, technology, and engineering are tenets of the programs we recommend.

Best Practices

Adopting and applying best practices will ensure that programs at Vistoso Trails Nature Preserve are relevant and authentic for each target audience, outcome-based, and reflective of Oro Valley Parks and Recreation Department's mission statement1. We offer the following suggestions to help ensure that programs succeed in delivering place-based experiences and cultivating Preserve stewards among an enthusiastic and receptive student audience.

Test the waters

Before an education program is developed, staff will need to more fully assess receptivity among the school audience2 and Town staff. Integration of recommendations in the Preserve's master plan, determining sources of funding for site improvements and teaching supplies, and assignment of Town and District staff to design and pilot-test the program(s) will be critical. Department staff should also assess capacity. Are there adequate numbers of staff and docents to do this work without straining the resources that support the Preserve? What role will Preserve Vistoso play in the recruitment, training, and management of docents? Will these programs complement, not duplicate, programs already taking place in nearby communities? Will these programs celebrate the uniqueness of Vistoso Trails Nature Preserve and help cultivate a sense of place?

Embrace backward design

We recommend using a program development practice championed by curriculum developers Grant Wiggins and Jay McTighe and business strategists, including Stephen Covey. Rather than begin with preferred topics and instructional activities, we suggest beginning with the end—the desired results—in sight. This backwards approach brings content standards, performance expectations, and goals and objectives to the forefront of curriculum planning.

1 The mission statement of Oro Valley Parks and Recreation is to inspire connection through recreation.
2 The school audience consists of traditional K-12 teachers and students, as well as K-12 homeschooling groups.

Typically, backward design encompasses three stages of planning:

- **Phase one:** identify desired results or curriculum expectations. Identify the big ideas (the "enduring understanding") as well as broad goals and specific, measurable objectives.
- **Phase two:** determine acceptable evidence and identify appropriate assessment tools.
- **Phase three:** plan the learning experiences and instruction. Determine what activities, materials, and resources are needed in order to achieve desired results.

Mix It Up

We recommend that the Preserve offer education programs that span grade-group levels, ages, content, time commitments, and experiences. At the same time, we encourage staff to start slowly by pilot-testing a program(s) and refining it (them) based on student/faculty feedback.

For formal programs, flexibility is key to accommodating varying needs of teachers which can be dictated by bus schedules. This could mean offering the field programs and field/classroom lab programs in blocks of 1 hour, 1.5 hours, and 2.5 - 3 hours. Regardless of time spent at the Preserve, the District requires that all students return to school by 1 p.m.

Proposed programs

The Acorn Group recommends that three on-site programs spanning K-6 are developed. Two focus on science; one focuses on history-social science. Each can be academically robust, providing structured opportunities that extend and build upon classroom learning. At the same time, each can be well poised to facilitate student understanding of a "sense of place." This is particularly possible if field trips to the Preserve are spiraled throughout the K-6 curriculum, taught either in traditional classrooms or in homeschools. By focusing on place-based instruction and celebrating the Preserve as a community-based asset, OVPR can promote excitement and appreciation for the Preserve, the broader region, and students' place within it.

Given the class schedules adopted by middle and high schools, field trips are not easily scheduled at these levels. Instead, the Preserve can be considered a site for community service projects taking place on weekdays after school and on weekends. Such work could include habitat care and restoration, as well as interpretation (e.g., leading weekend tours).

Science

Discovering the Desert, grades K-2

We see a K-2 program, called Discovering the Desert, as a primary program dedicated to cultivating student's sense of place. It celebrates the essence of place and answers seemingly basic questions, such as Where am I and What is the nature of this place? As members of the community of Oro Valley, students take stock of the nearby desert, their neighbors (the resident and migratory species with whom they share the desert), and the uniqueness of the setting.

Such a program requires that students fine-tune their observation skills and sensory perception. They take part in a guided walk at the Preserve, learn to record observations in a nature journal, and hon the skills of a naturalist. Led by trained docents, they begin to expand their senses, interpret the language of birds, track wildlife, and negotiate a special "sit spot," likely near the pond, where they each sit quietly and take stock of the desert's activity. After a few minutes, they reconvene and share their experiences.

Discovering the Desert is student-focused. Trained docents serve as facilitators of experiences rather than dispensers of information. The program requires very little equipment—just nature journals and possibly student-grade binoculars and hand lenses.

Exploring the Desert, grades 3-6

This program builds upon the Discovering the Desert program and further reinforces the skill sets of a naturalist. It also introduces the role of technology in science. Students explore the Preserve where they use smartphones to access apps and record their observations. They assume the role of community scientists, taking photographs of the plants, animals, and phenomena they notice during their visit, and recording the time, location, and conditions. Possible apps include iNaturalist, Project Noah, Journey North, Nature's Notebook, Bumble Bee Watch, eBird, eButterfly, and SpiderSpotter.

Journey North, for example, tracks seasons and migrations of such animals as hummingbirds and orioles, both of which are present at the Preserve. Students can submit their observations and teachers can access numerous resources, including suggestions for activities that build vocabulary, enhance comprehension skills related to reading and map-making, strengthen inquiry skills, and explore environmental concepts.

This could be an exciting, authentic way to record observations; however, it comes with caveats. 1. Parents would need to be informed that their children are accessing science-based apps that do not collect or compromise personal information nor lead the user to any other sites. Their written permission would need to be secured for this activity. 2. To ensure equity and inclusion, the Preserve would need to have some spare smartphones available for use by students who do not have such equipment.

Caveats aside, this presents a remarkable opportunity for students to become researchers and contribute to a project that connects their class to a larger community. It also supports STEM and STEAM initiatives.

History and Social Science

Discovering the Past, grades 3-5

The Preserve is home to a former Hohokam native village called Sleeping Snake. Covering nearly 100 acres, it consists of a ball court site that has yielded numerous artifacts that reveal information about community structure, social organization, and trade dating back to 950-1150 A.D. during its most intensive occupation.

While the village site is off limits, we recommend that OVPR consider developing a fabricated archaeological dig site elsewhere at the Preserve for use to teach history. The pit could contain concrete-cast artifact replicas that are secured at various depths. Students on a field trip would learn how to establish a grid, uncover the site, record the location of artifacts, learn about stratigraphy and cross-dating, and generate hypotheses about the artifacts. At the same time, they would also learn about the importance of not disturbing real sites and not removing artifacts when found in the field. We recommend that OVPR discuss the idea of a fabricated archaeological dig site with tribal representatives to ensure that concerns are addressed.

This station could take advantage of an existing sand trap site and therefore avoid disturbing habitat. A shade sail would offer protection from the Sun. Because the materials would be exterior-grade and anchored to the pit's floor and sides, they would hold up against the elements and not "walk away."

While one group would be at the pit, another group would be at the petroglyphs. While created by a modern-day artist, the petroglyphs nevertheless attempt to replicate art created thousands of years ago. Here, students would learn the difference between a petroglyph and a pictograph and the meaning of various symbols. The last activity at this station could be an art project—creating their own rock art on kraft paper using a bleach-dipped cotton swab.

Implications for the master plan

Both the interviews and the recommendations yield a few physical improvements to the site. These include a shaded, solar panel-powered outdoor classroom where students can gather upon arrival, eat lunch, and convene at a program's conclusion. A charging station would be helpful, given smartphones would be used during the Discovering the Desert program. Pullouts along the existing pathways would allow small groups of students, as well as general visitors, to step aside and pause as they view the scenery or wildlife known to frequent a particular location. One additional element is the shaded fabricated archaeo pit (in an existing sand trap).

Both the outdoor classroom and the archaeo pit should be located near Innovation Academy.

PHASING

Phasing for the Vistoso Trails Preserve will be based on providing a safe and accessible preserve first and then the specialty areas like the Pond and Driving Range Nodes as follows.

Phase I – Safety, Access, Education, Revegetation

Phase I of the implementation of Vistoso Trails Preserve will focus on the development of the main trailhead off of West Vistoso Highlands Drive, addressing the existing concrete path cracks, breaks, heaves, and parking lots in partnership with the project developer. This phase of construction should also include the installation of informational, educational, and wayfinding signage, and beginning the revegetation process in three areas: North, South, and stabilizing the existing pond.

Phase II – Accessibility and Revegetation

This phase of construction should focus on the development and implementation of ADA trails, adding two small trailheads adjacent to the ADA trails and continued implementation of the revegetation plan.

Phase III – Driving Range Node and Revegetation

This phase of implementation of the Vistoso Trails Preserve will focus on the development and implementation of the education and program areas associated with the former driving range along with the continued implementation of the revegetation plan.

Phase IV – Pond and Revegetation

The last Phase of construction will concentrate on the development and implementation of the approved final concept of the former pond along with the continued implementation of the revegetation plan.

COSTS

The cost estimate shown is for the preferred options. Because the cost estimate is so preliminary, it makes a lot of allowances. This is not a true cost estimate in terms of exact area and linear footage calculations; at this point, it is very parametric.

Assumptions

- This cost estimate assumes that the construction would be built as one project (no phases) and built in 2023
- The mobilization cost included in the infrastructure section of the spreadsheet assumes the mobilization cost is for the total project, not just infrastructure
- Because there is no actual design, the contingency is placed at 50%. Sites Southwest believes this is a fair number for this extrapolation
- The SWWP is also assumed to be done as part of one project

Preferred Option

ITEM #	ITEM DESCRIPTION		UNIT	QTY	UNIT COST	Total	Notes
	Infrastructure						
1	Mobilization/Demobilization		LS	1	$40,000.00	$40,000.00	Allowance
2	Construction Staking		LS	1	$54,000.00	$54,000.00	30 Days Including As-Builts
3	Selective Clearing, Prunning & Plant Relocation		AC	8	$7,500.00	$60,000.00	Allowance
4	SWPP Plan Preparation, Installation, and Maintenance		LS	1	$40,000.00	$40,000.00	Allowance
5	Unclassified Excavation, Including Placement and Compaction		CY	9000	$15.00	$135,000.00	Allowance
6	Material Testing & Inspections		LS	1	$15,000.00	$15,000.00	Allowance
7	Trailhead Parking at N Rancho Vistoso Blvd. (15 Spaces)		SY	600	$35.00	$21,000.00	Allowance
8	ADA Trailhead Parking at W Vistoso Highlands Dr. (4 Spaces)		SY	750	$35.00	$26,250.00	Allowance
9	Trailhead Parking at W Vistoso Highlands Dr. (31 Spaces)		SY	0	$30.00	$0.00	Allowance
10	ADA Trail (5'-0" Wide Compacted Fines)		SY	4,190	$18.00	$75,420.00	Allowance
11	Cart Path Loop Extension (5'-0" Wide Compacted Fines)		SY	2,955	$18.00	$53,190.00	Allowance
12	Cart Path Shoulder Improvements (4'-0" Wide Each Side)		SY	26,350	$18.00	$474,300.00	Allowance
13	Cart Path Repairs and Drainage Improvements		LS	1	$100,000.00	$100,000.00	Allowance
14	Directional, Safety & Educational Signage		LS	1	$75,000.00	$75,000.00	Allowance
15	Site Furnishing , (Benches, Bollards, Trash Receptacles)		LS	1	$50,000.00	$50,000.00	Allowance
					Subtotal	**$1,219,160.00**	
					50% Cont.	**$610,000.00**	
					TOTAL	**$1,829,160.00**	**Range: $2,000,000.00 to $3,000,000.00**

ITEM #	ITEM DESCRIPTION		UNIT	QTY	UNIT COST	Total	Notes
Zone	**Revegetation and Reclamation**						
1	Fairways & Putting Green		AC	3	$15,000.00	$45,000.00	Allowance - (Rip, Seed, Straw & Compact)
2A	Fairways		AC	0.7	$15,000.00	$10,500.00	Allowance - (Rip, Seed, Straw & Compact)
2B	Fairways		AC	1.5	$15,000.00	$22,500.00	Allowance - (Rip, Seed, Straw & Compact)
2C	Fairways & Putting Green		AC	2.1	$15,000.00	$31,500.00	Allowance - (Rip, Seed, Straw & Compact)
2D	Fairways & Putting Green		AC	0.8	$15,000.00	$12,000.00	Allowance - (Rip, Seed, Straw & Compact)
3A	Fairways & Putting Green		AC	2.4	$15,000.00	$36,000.00	Allowance - (Rip, Seed, Straw & Compact)
3B	Fairways & Putting Green		AC	3.2	$15,000.00	$48,000.00	Allowance - (Rip, Seed, Straw & Compact)
4A	Fairways		AC	2.4	$15,000.00	$36,000.00	Allowance - (Rip, Seed, Straw & Compact)
4B	Fairways & Putting Green		AC	2.7	$15,000.00	$40,500.00	Allowance - (Rip, Seed, Straw & Compact)
4C	Fairways & Putting Green		AC	1.3	$15,000.00	$19,500.00	Allowance - (Rip, Seed, Straw & Compact)
5	Fairways & Putting Green		AC	2.9	$15,000.00	$43,500.00	Allowance - (Rip, Seed, Straw & Compact)
6A	Fairways & Putting Green		AC	2.9	$15,000.00	$43,500.00	Allowance - (Rip, Seed, Straw & Compact)
6B	Fairways & Putting Green		AC	2.4	$15,000.00	$36,000.00	Allowance - (Rip, Seed, Straw & Compact)
6C	Fairways & Putting Green		AC	1.3	$15,000.00	$19,500.00	Allowance - (Rip, Seed, Straw & Compact)
6D	Fairways & Putting Green		AC	0.7	$15,000.00	$10,500.00	Allowance - (Rip, Seed, Straw & Compact)
7A	Fairways & Putting Green		AC	1	$15,000.00	$15,000.00	Allowance - (Rip, Seed, Straw & Compact)
7B	Fairways & Putting Green		AC	5	$15,000.00	$75,000.00	Allowance - (Rip, Seed, Straw & Compact)
8A	Fairways & Putting Green		AC	1.1	$15,000.00	$16,500.00	Allowance - (Rip, Seed, Straw & Compact)
8B	Fairways & Putting Green		AC	1.8	$15,000.00	$27,000.00	Allowance - (Rip, Seed, Straw & Compact)
8C	Fairways & Putting Green		AC	1	$15,000.00	$15,000.00	Allowance - (Rip, Seed, Straw & Compact)
9A	Fairways & Putting Green		AC	0.8	$15,000.00	$12,000.00	Allowance - (Rip, Seed, Straw & Compact)
9B	Fairways & Putting Green		AC	4	$15,000.00	$60,000.00	Allowance - (Rip, Seed, Straw & Compact)
10A	Fairways & Putting Green		AC	1.5	$15,000.00	$22,500.00	Allowance - (Rip, Seed, Straw & Compact)
10B	Fairways & Putting Green		AC	1.8	$15,000.00	$27,000.00	Allowance - (Rip, Seed, Straw & Compact)
11	Fairways & Putting Green		AC	3	$15,000.00	$45,000.00	Allowance - (Rip, Seed, Straw & Compact)
					Subtotal	**$769,500.00**	
					50% Cont.	**$381,000.00**	
					TOTAL	**$1,150,500.00**	**Range: $1,500,000 to $2,500,000.00**

ITEM #	ITEM DESCRIPTION		UNIT	QTY	UNIT COST	Total	Notes
	Pond Reconstruction & Infrastructure						
1	Mobilization/Demobilization		LS	1	$0.00	$0.00	Allowance
2	Construction Staking		LS	1	$17,500.00	$17,500.00	10 Days Including As-Builts
3	Selective Clearing, Prunning & Plant Relocation		AC	0.25	$7,500.00	$1,875.00	Allowance
4	Demolition		LS	1	$10,000.00	$10,000.00	Allowance
5	SWPP Plan Preparation, Installation, and Maintenance		LS	1	$0.00	$0.00	Allowance
6	Earthwork - Borrow (including haul, placement and compaction)		CY	8700	$25.00	$217,500.00	Allowance
7	Material Testing & Inspections		LS	1	$10,000.00	$10,000.00	Allowance
8	Landscape Plantings		LS	1	$47,500.00	$47,500.00	Allowance
9	Native Seed Mix		AC	2	$15,000.00	$30,000.00	Allowance
10	Waterfall Reconstruction & Infrastructure		LS	1	$150,000.00	$150,000.00	Allowance
11	Pond Reconstruction & Infrastructure		LS	1	$225,000.00	$225,000.00	Allowance
12	Wildlife Drinkers		EA	3	$7,000.00	$21,000.00	Allowance
13	Directional, Safety & Educational Signage		LS	1	$7,500.00	$7,500.00	Allowance
					Subtotal	**$737,875.00**	
					50% Cont.	**$640,000.00**	
					TOTAL	**$1,377,875.00**	**Range: $2,000,000.00 to $3,000,000.00**

DRIVING RANGE IMPROVEMENT RECOMMENDATIONS

ITEM #	ITEM DESCRIPTION		UNIT	QTY	UNIT COST	Total	Notes
1	Mobilization/Demobilization		LS	1	$0.00	$0.00	Allowance
2	Construction Staking		LS	1	$17,500.00	$17,500.00	10 Days Including As-Builts
3	Selective Clearing, Prunning & Plant Relocation		AC	1	$7,500.00	$7,500.00	Allowance
4	SWPP Plan Preparation, Installation, and Maintenance		LS	1	$0.00	$0.00	Allowance
5	Unclassified Excavation, Including Placement and Compaction		CY	575	$15.00	$8,625.00	Allowance
7	Material Testing & Inspections		LS	1	$5,000.00	$5,000.00	Allowance
8	Pollenator Garden		LS	1	$35,000.00	$35,000.00	Allowance
9	Outdoor Classroom		LS	1	$25,000.00	$25,000.00	Allowance
10	Educational Gardens & Trail		LS	1	$175,000.00	$175,000.00	Allowance
11	STEM Trail		LS	1	$15,000.00	$15,000.00	Allowance
12	Directional, Safety & Educational Signage		LS	1	$50,000.00	$50,000.00	Allowance
13	Native Seeding		AC	3	$15,000.00	$45,000.00	Allowance
					Subtotal	**$383,625.00**	
					50% Cont.	**$220,000.00**	
					TOTAL	**$603,625.00**	**Range: $650,000.00 to $1,300,000.00**

Vistoso Trails Nature Preserve - 15 Year Cost Escalation based on 3% increases yearly

	2023	2028	2033	2038
Infrastructure	$2,000,000	$2,318,548	$2,687,833	$3,115,935
Revegetation and Reclamation	$1,500,000	$1,738,911	$2,015,875	$2,336,951
Pond Reconstruction & Infrastructure	$2,000,000	$2,318,548	$2,687,833	$3,115,935
Driving Range Improvements	$350,000	$405,746	$470,371	$545,289

FUNDING RESOURCES

FUNDING RECOMMENDATIONS

Most trail funding grants and sources are located within the Arizona State Parks and Trails organization. They provide multiple resources to the public including webinars, guides, and tips to apply for funding. It is recommended that town staff review webinars and shared resources on the website, especially the non-motorized priorities in Arizona State Parks & Trails (see Appendix D). They also source some existing plans that grant applications are scored against. Funding sources are accurate as of April 2023 and are subject to change. It is recommended town staff review these plans and resources:

- Arizona Trails 2015 Motorized and Non-Motorized Trail Plan
- 2018-2022 SCORP (Arizona's Outdoor Recreation Policy)
- Grants workshops for the Arizona State Parks and Trails group
- Arizona State Parks & Trails Grants Manual

FUNDING SOURCES

Name	Description	Source	Project Size	Time	Eligible Trail Activities
Recreational Trails Program (RTP) Non-Motorized	The Recreational Trails Program (RTP) provides funding to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Funds are administered by their respective states and requirements vary. 30% non-motorized, 30% motorized, and 40% diverse trails.	FHWA through ADOT	$5,000-100,000 per project, $1.4 mil available annually	Annual	Maintenance, construction, and restoration on public lands
Recreational Trails Program: Trail Maintenance Program (Non-Motorized Projects Only)	Trail Maintenance Program is part of the Recreational Trails Program, authorized through the Moving Ahead for progress in the 21st Century Act. Eligible projects include routine maintenance on existing trails which may include tread maintenance, corridor maintenance, drainage improvements, fencing repair, and minor reroutes.	ADOT	$10,000-50,000 per project	Annual	Maintenance, construction, and rehabilitation
Land and Water Conservation Fund	The Land and Water Conservation Fund provides funding to states for the acquisition and development of public outdoor recreation areas and facilities. Eligible projects include outdoor recreation facilities, ADA/accessibility upgrades, acquisition of park lands, and other public sporting facilities.	FHWA through ADOT	Varies	Annual	Maintenance, construction, land acquisition, improvements and upgrades
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	The CMAQ program provides funding for projects, programs, and operational strategies that reduce vehicle congestion and air pollutants regulated by the Environmental Protection Agency (EPA). Eligible projects could include transit vehicle replacement, facility development, multi-use trails, and bicycle sharing programs.	FHWA through ADOT	Varies, $500,000 available annually	Annual	Infrastructure, planning, engineering, and construction
Heritage Fund- Trails Program	The Heritage Fund provides funds for trail projects, outdoor education programs, and historic preservation projects. Eligible projects for the Trails Program includes trail construction and maintenance of trails and trail facilities.	Arizona State Parks Heritage Fund	Up to $50,000 per project	Varies	Construction and maintenance
Heritage Fund- Local, Regional, and State Parks (LRSP)	The Heritage Fund provides funds for trail projects, outdoor education programs, and historic preservation projects. Eligible projects include construction, maintenance, an dd	Arizona State Parks Heritage Fund	$10,000 to $250,000 per project	Varies	Construction and maintenance
Safe Routes to School	Safe Routes to School (SRTS) programs encourages children to walk and/or bicycle to and from school safely on a daily basis. New Mexico has a statewide program that provides funding, technical assistance, training opportunities and other resources. Funding available for infrastructure projects within 2 miles of a school	NMDOT – Federal aid program	Infrastructure projects up to $250 K; Non-infrastructure activities up to $25 K	Varies	Infrastructure, planning, engineering, and construction

5. APPENDICES

The following appendices are referenced in the report and are included in the following pages.

A. Plant List
B. Prior Options for Trails
C. Non-Motorized Priorities for Arizona State Parks and Trails
D. Former Pond Recommendations
E. Recommendations Benefits Matrix
F. VTNP ADA
G. Acorn Reports

APPENDIX A: PLANT LIST

Vegetation Inventory

The following is a list of plant species recorded on site in December 2017 and includes nativity of observed species. This information is from the 2017 Canoa Hills Trails Vegetation Inventory report.

Scientific Name	Common Name	Primary Growth Habit	Nativity	Duration
Abutilon sp.	mallow	Forb/Herb	Native	Perennial
Acacia constricta	whitethorn acacia	Tree	Native	Perennial
Acacia greggii	catclaw acacia	Tree	Native	Perennial
Acourtia nana	dwarf desertpeony	Forb/Herb	Native	Perennial
Allionia incarnata	trailing windmills	Forb/Herb	Native	Annual, Perennial
Aloysia wrightii	Wright's beebrush	Shrub	Native	Perennial
Ambrosia confertiflora	weakleaf burr ragweed	Forb/Herb	Native	Perennial
Aristida adscensionis	sixweeks threeawn	Graminoid	Native	Annual
Aristida purpurea	purple threeawn	Graminoid	Native	Annual, Perennial
Aristida ternipes	spidergrass	Graminoid	Native	Perennial
Atriplex canescens	fourwing saltbush	Shrub	Native	Perennial
Baccharis sarothroides	desertbroom	Shrub	Native	Perennial
Bahia absinthifolia	hairyseed bahia	Forb/Herb	Native	Perennial
Boerhavia scandens	climbing wartclub	Vine	Native	Perennial
Boerhavia sp.	spiderling	Forb/Herb	Native	Annual
Bouteloua aristidoides	needle grama	Graminoid	Native	Annual
Brickellia sp.	brickellbush	Subshrub	Native	Perennial
Calliandra eriophylla	fairyduster	Shrub	Native	Perennial
Carnegiea gigantea	saguaro	Succulent	Native	Perennial
Celtis ehrenbergiana	spiny hackberry	Shrub	Native	Perennial
Chloris virgata	feather fingergrass	Graminoid	Native	Annual
Cocculus diversifolius	snailseed	Vine	Native	Perennial
Cylindropuntia arbuscula	Arizona pencil cholla	Succulent	Native	Perennial
Cylindropuntia fulgida	jumping cholla	Succulent	Native	Perennial
Cylindropuntia spinosior	walkingstick cactus	Succulent	Native	Perennial
Cylindropuntia versicolor	staghorn cholla	Succulent	Native	Perennial
Dasyochloa pulchella	low woollygrass	Graminoid	Native	Perennial
Datura wrightii	sacred thorn-apple	Forb/Herb	Native	Annual, Perennial
Echinocereus engelmannii	Engelmann's hedgehog cactus	Succulent	Native	Perennial
Encelia farinosa	goldenhills	Subshrub	Native	Perennial
Ephedra trifurca	longleaf jointfir	Shrub	Native	Perennial
Ericameria laricifolia	turpentine bush	Subshrub	Native	Perennial
Ferocactus wislizeni	candy barrelcactus	Succulent	Native	Perennial
Fouquieria splendens	ocotillo	Shrub	Native	Perennial
Gutierrezia sp.	snakeweed	Subshrub	Native	Perennial
Ipomoea sp.	morning-glory	Forb/Herb	Native	Annual
Isocoma tenuisecta	burroweed	Subshrub	Native	Perennial
Justicia candicans	Arizona water-willow	Shrub	Native	Perennial
Muhlenbergia porteri	bush muhly	Graminoid	Native	Perennial
Opuntia engelmannii	cactus apple	Succulent	Native	Perennial
Opuntia phaeacantha	tulip pricklypear	Succulent	Native	Perennial
Opuntia santa-rita	Santa Rita pricklypear	Succulent	Native	Perennial
Pappophorum vaginatum	whiplash pappusgrass	Graminoid	Native	Perennial
Parkinsonia florida	blue paloverde	Tree	Native	Perennial
Phoradendron californicum	mesquite mistletoe	Subshrub	Native	Perennial
Physalis sp.	groundcherry	Forb/Herb	Native	Annual, Perennial
Prosopis velutina	velvet mesquite	Tree	Native	Perennial
Salix gooddingii	Goodding's willow	Tree	Native	Perennial
Sapindus saponaria	wingleaf soapberry	Tree	Native	Perennial
Setaria leucopila	streambed bristlegrass	Graminoid	Native	Perennial
Setaria macrostachya	large-spike bristlegrass	Graminoid	Native	Perennial
Simmondsia chinensis	jojoba	Shrub	Native	Perennial
Solanum elaeagnifolium	silverleaf nightshade	Subshrub	Native	Perennial
Stephanomeria pauciflora	brownplume wirelettuce	Subshrub	Native	Perennial
Verbesina encelioides	golden crownbeard	Forb/Herb	Native	Annual
Yucca elata	soaptree yucca	Tree	Native	Perennial
Zinnia acerosa	desert zinnia	Subshrub	Native	Perennial
Nerium oleander	oleander	Tree	Non-Native	Perennial
Opuntia engelmannii var. linguiformis	cactus apple	Succulent	Non-Native	Perennial
Panicum antidotale	blue panicum	Graminoid	Non-Native	Perennial
Parkinsonia aculeata	Jerusalem thorn	Tree	Non-Native	Perennial
Pennisetum ciliare	buffelgrass	Graminoid	Non-Native	Perennial
Pennisetum setaceum	crimson fountaingrass	Graminoid	Non-Native	Perennial
Prosopis sp.	non-native mesquite	Tree	Non-Native	Perennial
Rhus lancea	African sumac	Tree	Non-Native	Perennial
Salsola tragus	prickly Russian thistle	Forb/Herb	Non-Native	Annual
Schinus molle	Peruvian peppertree	Tree	Non-Native	Perennial
Tamarix sp.	tamarisk	Tree	Non-Native	Perennial

Container Species for Restoration

The following is a list of recommended container species appropriate for habitat restoration

	Scientific Name	Common Name
Trees:	*Acacia constricta*	Whitethorn acacia
	Acacia greggii	Catclaw acacia
	Cercidium floridum	Blue Paloverde
	Chilopsis linearis	Desert Willow
	Parkinsonia florida	Blue Paloverde
	Prosopis velutina	Velvet Mesquite
Shrubs:	*Aloysia wrightii*	Wright's beebrush
	Anisacanthus thurberi	Desert honeysuckle
	Calliandra eriophylla	Fairyduster
	Celtis pallida	Desert hackberry
	Condalia warnockii	Kearney's snakewood
	Cylindropuntia arbuscula	Arizona pencil cholla
	Cylindropuntia fulgida	Chain-fruit cholla
	Cylindropuntia leptocaulis	Christmas cactus
	Cylindropuntia spinosior	Cane cholla
	Ferocactus wislizenii	Candy barrel cactus
	Fouquieria splendens	Ocotillo
	Gossypium thurberi	Thurber's cotton
	Lycium andersonii	Anderson Wolfberry
	Lycium exsertum	Thornbush
	Lycium fremontii	Fremont Wolfberry
	Opuntia engelmannii	Prickley pear
	Rhus aromatica var. trilobata	Three-leafed sumac
	Yucca elata	Soaptree yucca
	Zizyphus obtusifolia	Graythorn
Subshrubs:	*Bebbia juncea*	sweetbush
	Brickellia californica	California brickellbush
	Encelia farinosa	Brittlebush
	Isocoma tenuisecta	Burroweed
	Psilostrophe cooperi	Whitestem paperflower
	Senna covesii	Desert senna
	Trixis californica	American threefold
	Zinnia acerosa	Desert Zinnia
	Acacia angustissima	Prairie acacia
	Ambrosia deltoidea	Triangleleaf bursage
Forbs:	*Abutilon sp.*	Mallow
	Asclepias linaria	Pine-leaf milkweed
	Asclepias subulata	Desert milkweed
	Bahia absinthifolia	Dealbata's bahia
	Commicarpus scandens	Climbing wartclub
	Datura wrightii	Sacred datura
	Dicliptera resupinata	Arizona foldwing
	Proboscidea althaeifolia	Devil's claw
	Ruellia nudiflora	Violet wild petunia
	Senna hirsuta	Slimpod senna
	Sphaeralcea ambigua	Desert globemallow
	Sphaeralcea laxa	Caliche globemallow
Grasses:	*Aristida purpurea*	Purple three-awn
	Aristida ternipes	Spidergrass
	Bothriochloa barbinoides	Cane beardgrass
	Bouteloua curtipendula	Sideoats grama
	Digitaria californica	Arizona cottontop
	Heteropogon contortus	Tanglehead
	Leptochloa dubia	Green Sprangletop
	Muhlenbergia porteri	Bush muhly
	Pappophorum vaginatum	Spike Pappusgrass
	Setaria leucopila	Streambed bristlegrass
	Setaria macrostachya	Plains bristlegrass
	Sporobolus contractus	Spike dropseed
	Sporobolus cryptandrus	Sand dropseed
	Sporobolus wrightii	Big Alkali Sacaton
	Trichloris crinita	False Rhodesgrass
Vines:	*Aristolochia watsonii*	Watson's dutchman's pipevine
	Clematis drummondii	Virgin's bower
	Cottsia gracilis	Slender janusia
	Cucurbita digitata	Fingerleaf gourd
	Funastrum cynanchoides	Climbing milkweed
	Marah gilensis	Gila manroot
	Maurandya antirrhiniflora	Roving sailor
	Passiflora mexicana	Mexican passionflower

Seed Mix Plant List

The following is a list of recommended species for inclusion in hydroseed restoration mixes.
report.

	Scientific Name	Common Name	Duration
Shrubs:			
Subshrubs:	*Atriplex elegans*	Wheelscale saltbush	Summer Annual
	Atriplex polycarpa	Allscale saltbush	Summer Annual
	Atriplex wrightii	Wright's saltbush	Summer Annual
	Calliandra eriophylla	Fairyduster	Perennial
	Gutierrezia microcephala	Threadleaf snakeweed	Perennial
	Isocoma tenuisecta	Burroweed	Perennial
	Psilostrophe cooperi	Whitestem paperflower	Perennial
	Senna covesii	Desert senna	Perennial
	Trixis californica	American threefold	Perennial
Forbs:	*Allionia incarnata*	Trailing four-o'clock	Annual/Perennial
	Astragalus arizonicus	Arizona milkvetch	Perennial
	Ayenia filiformis	Trans-Pecos ayenia	Perennial
	Bahia absinthifolia	Dealbata's bahia	Perennial
	Baileya multiradiata	Desert marigold	Annual
	Chamaesyce florida	Chiricahua Mountain sandmat	Winter Annual
	Chamaesyce hyssopifolia	Hyssopleaf sandmat	Annual/Perennial
	Croton pottsii	Leatherweed	Perennial
	Datura wrightii	Sacred datura	Annual/Perennial
	Dicliptera resupinata	Arizona foldwing	Perennial
	Eriastrum diffusum	Miniature woolystar	Winter Annual
	Erigeron divergens	Spreading fleabane	Biennial
	Eschscholzia californica ssp. mexicana	Mexican gold poppy	Winter Annual
	Euphorbia heterophylla	Mexican fireplant	Annual/Perennial
	Evolvulus arizonicus	Wild dwarf morning glory	Perennial
	Glandularia gooddingii	Goodding's verbena	Perennial
	Heliomeris longifolia var. annua	Longleaf false goldeneye	Summer Annual
	Ipomopsis longiflora	flaxflowered ipomopsis	Winter Annual
	Kallstroemia grandiflora	Arizona poppy	Summer Annual
	Lotus humistratus	Foothill deervetch	Winter Annual
	Machaeranthera tanacetifolia	Tansyleaf tansyaster	Summer Annual
	Mentzelia multiflora	Desert blazing star	Perennial
	Oenothera primiveris	Desert evening primrose	Winter Annual
	Pectis papposa	Manybristle cinchweed	Summer Annual

	Scientific Name	Common Name	Duration
	Penstemon parryi	Desert penstemon	Perennial
	Phacelia arizonica	Arizona phacelia	Winter Annual
	Phacelia bombycina	Mangas Spring phacelia	Winter Annual
	Phacelia crenulata	cleftleaf wildheliotrope	Winter Annual
	Phacelia distans	Distant phacelia	Winter Annual
	Physalis pubescens	Husk tomato	Summer Annual
	Physaria gordonii	Gordon's bladderpod	Winter Annual
	Plantago ovata	Desert Indianwheat	Winter Annual
	Plantago patagonica	Woolly plantain	Winter Annual
	Proboscidea althaeifolia	Devil's claw	Perennial
	Proboscidea parviflora	Doubleclaw	Summer Annual
	Rafinesquia neomexicana	New Mexico plumeseed	Winter Annual
	Salvia columbariae	Desert chia	Winter Annual
	Sphaeralcea angustifolia	Copper globemallow	Perennial
	Sphaeralcea emoryi	Emory's globemallow	Perennial
Grasses:	*Aristida purpurea*	Purple threeawn	Perennial
	Aristida ternipes	Spidergrass	Perennial
	Bouteloua barbata	Sixweeks grama	Annual
	Bouteloua curtipendula	Sideoats grama	Perennial
	Bouteloua rothrockii	Rothrock's grama	Perennial
	Chloris virgata	Feather fingergrass	Annual
	Dasyochloa pulchella	Fluffgrass	Perennial
	Eriochloa acuminata var. minor	tapertip cupgrass	Annual
	Heteropogon contortus	Tanglehead	Perennial
	Hilaria mutica	tobosagrass	Perennial
	Muhlenbergia microsperma	Littleseed muhly	Annual
	Muhlenbergia porteri	Bush muhly	Perennial
	Panicum capillare	Witchgrass	Annual
	Panicum obtusum	Vine mesquite	Perennial
	Setaria leucopila	Streambed bristlegrass	Perennial
	Setaria macrostachya	Plains bristlegrass	Perennial
	Urochloa arizonica	Arizona signalgrass	Annual
	Vulpia octoflora	Sixweeks fescue	Annual
Vines:	*Clematis drummondii*	Virgin's bower	Perennial
	Cottsia gracilis	Slender janusia	Perennial
	Cucurbita digitata	Fingerleaf gourd	Perennial
	Echinopepon wrightii	Wild balsam apple	Summer Annual

APPENDIX B: PRIOR OPTIONS FOR TRAILS

Based upon trail systems analysis and community outreach, three alternatives or options were developed throughout the master plan process. The alternatives were posed to the public, and to both the Parks and Recreation Advisory Board (PRAB) and the Town Council. Below we have provided each alternative with a brief description followed by the final and preferred Master Plan.

Alternative A

Alternative A emphasizes use of the existing cart path with proposed cart path loop extensions constructed to provide looping opportunities throughout the network. Loop extensions are proposed near roadway crossings and in the center of segments.

Loop extensions were conceptualized as an 8-foot wide stabilized crusher fine with similar color to the naturally occurring soils. Loops were located in nine different areas on an average of 380 feet in length, accumulating to 1 mile of loop extensions.

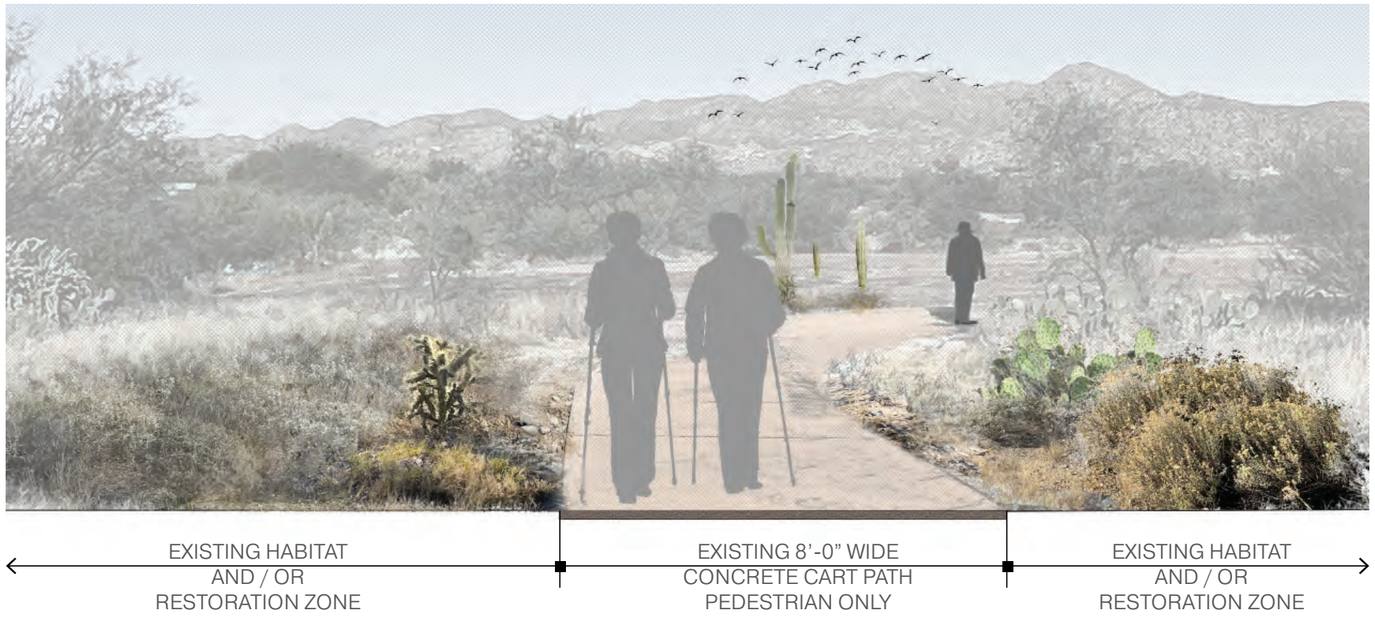
In addition to the trails, it was recommended that a 4-foot wide crusher fine shoulder be constructed on both sides of the existing cart path. This shoulder provides safe passing opportunities and a buffer between the trail and vegetation to make the cart path safer for multi-user groups. Without the shoulder, it is not recommended that the trail be used for multiple user groups.

As with all alternatives, this one includes ADA trail loops located near the former hole 8 and near the former driving range. These loops are proposed as shorter and provide a flat, stable surface for disabled users. Each trail is planned at differing lengths. The Hole 8 trail is shown a little under 1 mile and the driving range loop is approximately half a mile in length. Each area as proposed would have frequent rest areas with benches to provide rest opportunities for trail users. In addition to establishing a new ADA trail, in this alternative it is recommended that a section of existing cart path be closed and removed rather than included in the ADA loop since the current condition of the segment is not conducive to an ADA trail. Additional analysis would be needed to determine if other existing cart path alignments need to be repaired or rerouted to ensure ADA trail standards are maintained. Overall, this alternative includes 1.4 miles of ADA accessible trails in the network.

TRAIL	FT	MI
ADA Trail	7,540	1.4
Existing Cart Path	32,736	6.2
Proposed Cart Path Loop Extensions	5,315	1
Proposed Cart Path Removal	1,045	0.2

Of the alternative plans, Alternative A requires the least amount of new construction. Cart path maintenance, repair, and loop extension construction will be the largest construction needs for this trail. This trail also allows for multiple users on all paths. However, to ensure safety of users, it is recommended that a four-foot crusher fines shoulder be constructed on both side of the cart path to limit conflict between user groups. This will ensure large groups, bicyclists, and people with disabilities have adequate space to navigate the trail safely.

Loop extensions were conceptualized as an 8-foot wide stabilized crusher fine with similar color to the naturally occurring soils.



As with all alternatives, this one includes ADA trail loops located near the former hole 8 and near the former driving range.

Alternative B

Alternative B shares similarities with Alternative A in that the use of the cart path, cart path loop extensions, ADA loops, and cart path closures are the same. However, Alternative B will include all recommendations for the cart path and cart path loop extension from Alternative A including the 4-foot wide crusher fine shoulders. In addition to these pathways, this alternative would also include a wide walking path. This path would be separate from the cart path and loop extensions, providing access to other parts of the preserve.

In this alternative, the 5-foot wide walking path would connect to the cart path but in this option the trail would be pedestrian only. Overall, the wide walking path would include a little over 3.5 miles of paths for a little under 12 miles of trail in total.

Alternative B also provides separated use between pedestrians and bicyclists through creating pedestrian-only trails. The cart path is too narrow for pedestrians and bicyclists to safely share the pathway as is. Therefore, the separated path will create a safer network. In addition, the wide pathway ensures large groups walking opposite directions are able to comfortably share the trail.

TRAIL	FT	MI
ADA Trail	7,540	1.4
Existing Cart Path	32,736	6.2
Proposed Cart Path Loop Extensions	5,315	1
Proposed Cart Path Removal	1,040	0.2
Wide Walking Path	19,270	3.6

A 5-foot wide walking path would connect to the cart path but the trail would be pedestrian only

Alternative C

Alternative C takes alignment recommendations from Alternative A and B with changes to trail composition. Instead of 5-foot wide walking paths, trails will be narrowed to 3-foot wide with no shoulders to provide a more nature-focused experience with nature trails.
With the narrower path, limited shoulders, and pedestrian-only access, trail users will have a more serene experience through the nature preserve. This alternative would be ideal for wildlife viewing and photography as hikers are able to get closer to habitat. Narrower trails will also be easier for volunteers and youth crews to construct compared to wider, concrete and crusher fine paths and so would offer cost savings to Oro Valley.

TRAIL	FT	MI
ADA Trail	7,540	1.4
Existing Cart Path	32,736	6.2
Proposed Cart Path Loop Extensions	5,315	1
Proposed Cart Path Removal	1,040	0.2
Nature Trail	19,270	3.6

With the narrower path, limited shoulders, and pedestrian-only access, trail users will have a more serene experience

APPENDIX C: NON-MOTORIZED PRIORITIES FROM AZ STATE PARKS & TRAILS 2018

Non-Motorized Priorities (PULLED FROM AZ STATE PARKS & TRAILS 2018 GRANTS MANUAL)

First Level Priority Components

Scope Items 1-3 12 Points Each

1) Renovation and Maintenance of Existing Trails and Support Facilities
   a) Under this criterion, a project must take an action to maintain and/or renovate existing trails or its support facility. This can be accomplished by staff labor, contracted labor, or coordinated volunteer efforts.
   b) Project to renovate an inaccessible trail to an accessible trail.
   c) Time needed to coordinate and train volunteers to provide trail maintenance is an eligible project cost.
2) Protect Access to Trails/Acquire Land for Public Access
   a) Under this criterion, a project must acquire title or permanent easement. Access refers to the ability of the user to get to the trailhead or area where the recreational opportunities exist.
3) Mitigate and Restore Damage to Surrounding Trails
   a) Areas around trails become damaged for a host of reasons. To score points under this category, a project must include components specifically designated to rectify or reduce this damage along or on a trail.
      i) Example: a “social” trail is causing erosion down from the trail – a project will place boulders in front of the “social” trail to keep people from using the trail thus reducing erosion.
   b) Installing signage that promotes environmental and cultural protection must be done in addition to on the-ground actions

Second Level Priority Components

Scope Items 4-9 10 Points Each

1) Provide Educational Programs and Trail Etiquette
   a) Projects, which include promoting “share the trail” and emphasize cooperation, tolerance and respect for other trail users, are eligible under this criterion.
   b) Other actions include bilingual educational resources, Leave No Trace, Carry-In/Carry-Out, and Tread Lightly. Interpretive panels along the trail are an eligible scope expense under this category.
2) Enforce Existing Rules and Regulation
   a) Trail rules and regulations are often unknown or ignored by users. People not following existing rules and laws create conflicts with other users and adjacent landowners.
   b) Programs that promote volunteer clubs or individuals to patrol and monitor trail use and educate users about these rules is eligible under this category. Actions such as installing regulatory signs, imposing heavier fines for repeat offenders and installing complaint registers or provide enforcement contacts to report inappropriate are eligible scope items under this category.
3) Provide and Install Trail Signs
   a) Projects which include costs for signs that identify routes or provide trail related information such as distances, directions, obstacles, rules and regulations, are eligible under this criterion.
   b) Time and materials needed to coordinate and train volunteers to monitor, install or replace signs is an eligible project cost. Regulatory signs are limited to safe trail use and environmental protection.
   c) Bilingual signage is encouraged for trail projects maps and signs.
4) Develop Support Facilities
   a) For RTP purposes, support facilities include trailheads and access road, restrooms, kiosks, protective fencing, water for humans and/or stock, hitching rails, and bike racks as eligible costs.
   b) Camping and picnic sites are not eligible.
   c) Lighting for trailhead areas and trails is eligible.
      i) ADA Requirements: Any project that will be developing support facilities (Restrooms, trailheads, and ramadas at trailheads must comply with ADA standards. All support facilities must be accessible.
5) Construct New Trails
   a) The proposed project must include construction of multiuse or specialized trail on a previously unused or unauthorized alignment.
   b) Trail realignment outside of fifteen feet of the existing corridor is

considered a new trail. However, to score points in this category the estimated cost for the new trail construction must be at least 50% of the total cost for the new trail and any trail maintenance / renovations included in the proposed project.

6) Provide Maps and Trail Information

   a) Reprinting trail or trail system maps is not eligible for RTP funding.

   b) Maps that are included with new trail construction projects that are part of a trail safety and environmental protection brochure are eligible. You must provide an example of the proposed layout with the application, and the final draft must be reviewed and approved before printing.

Bonus Points

Scope Items 10-16 2 Points Each

1) Project Includes Matching Funds of At Least 10%

   a) A project must have 10% or greater match and must include documentation prior to submittal.

   b) Documentation may include letters from volunteer groups, staff time and equipment and other matching funds.

2) Youth Involvement with Trail Work

   a) Federal legislation encourages the use of youth from all aspects of society – students from local colleges, to high school students interested in forest and/or park service.

      i) Youth groups such as the Boy and Girl Scouts and other youth groups interested in outdoor recreation activities including Youth Conservation Corps or Service Corps for their projects.

   b) To receive points, a portion of the trail work/maintenance must have a documented letter of support from a youth group with an agreement that some or all of the proposed work will be done using a youth group.

3) Includes ADA Access/Standards

   a) To receive points, a project must include more than 50% of the project to reach ADA standards to include not only the trail, but also the signage and support facilities.

4) All Required SHPO/NEPA Documents Are Included

   a) Projects submitted should be shovel ready if approved. To receive bonus points, a project that has all of the required State Historic Preservation documentation and National Environmental Policy Act documentation must be complete.

   b) Submit required environmental and cultural resource documents.

Environmental Requirements:

- All applicants must provide an updated species list from Game and Fish (G&F). See page 36 for details on the G&F species document and how to generate the list.
- Must complete the NEPA Form on the application (if applicable).

Cultural Resources:

- All maps must clearly identify the location of any ground disturbance (Installing a kiosk, restrooms, trailhead, trail work, etc. If you are putting a shovel into the ground it is ground disturbance. See page 36 for additional details on what Park staff and ADOT's EPG Team are looking for in project maps.
- Project sponsor must complete the Cultural Clearance Review Form. If the applicant's agency has an archaeologist on staff, the form must be completed and signed by the archaeologist. Club/volunteer groups must work with the land manager's archaeologist.
- If a survey was done previously that included the project area upload the most recent surveys.

5) First Time Applicant

   a) The entity or organization proposing the project has never received a project grant from State Parks or State Parks grant funds have never been used for on-the-ground development in the proposed project area.

6) Diversity of Trail Use

   a) Trail is open to more than one type of user group. Diverse trail projects are those that accommodate two or more user groups (e.g., hiking and equestrian, or hiking and ATV use, etc.)

APPENDIX D: FORMER POND RECOMMENDATIONS


PROPOSED REVEGETATION ZONE, (TYP.)
PROPOSED 5’ WIDE WALKING TRAIL, (TYP.)
EXISTING CART PATH, (TYP.)
PROPOSED CONSTRUCTED WETLAND
• 3 BAY CONSTRUCTED WETLAND W/ OPEN WATER + GRASS ZONES
• 5’ WIDE NATURAL SURFACE WALKING TRAIL
• RAMADA’S + WILDLIFE VIEWING PLATFORMS
PROPOSED WILDLIFE VIEWING BLIND, (TYP.)
PROPOSED WILDLIFE DRINKER, (TYP.)
EXISTING WASH, (TYP.)
PROPOSED PICNIC AREA, (TYP.)
PROPOSED OPEN SPACE FIELD / LAWN
PROPOSED OPEN WATER
PROPOSED ADA PARKING - 5 SPACES
W VISTOSO HIGHLANDS DR
EXISTING SIDEWALK, (TYP.)
EXISTING PUMP STATION
NODE: POND ZONE - OPTION B
SCALE = 1” = 150’
0
150’
300’

APPENDIX E: RECOMMENDATIONS BENEFIT MATRIX

Benefits Matrix
As part of the analysis of each of the above-described alternative plans and in order t o derive a preferred alternative, we developed a benefits analysis to help determine best traits of the preferred option.

	Land Forming and Grading	Mobility & Access	Parking	Habitat Benefits	Habitat Detractions	Water Use	Human Benefits	Cost
Pond Option A	Grading would include removing pond bulkheads, partially filling former pond zone and sloughing the side slopes inward. Fine grading of the pond bottom to accept small wetlands, create water harvesting opportunities, and revegetation of the area.	Access excellent around the three bay constructed wetland.	New proposed parking locations would make access to pond easily accessible for all ages and abilities.	Very good benefits for a wider range of avian wildlife. Mammalian species would remain similar to old pond configuration.	None noted.	Least water use pond option.	Educational and interpretive value. Photo opportunities and aesthetic value.	TBD
Option B	Grading would include removing pond bulkheads, partially filling former pond zone and sloughing the side slopes inward. Fine grading of the pond bottom to accept small wetlands, create water harvesting opportunities, and revegetation of the area. Creating new bulkheads for the traditional roadside pond at a smaller scale. Fine grading of the pond bottom to accept the new pond, and revegetation of the area.	Access excellent around the two bay constructed wetland and pond.	New proposed parking locations would make access to pond easily accessible for all ages and abilities	Habitat benefits for new pond configuration similar to old pond configuration, albeit lesser due to pond size.	Less native avian species would be attracted to pond due to less diverse pond depth and conditions.	Greatest water use pond option.	Educational and interpretive value. Photo opportunities and aesthetic value.	TBD
Option C	Grading would include removing pond bulkheads and sloughing the side slopes inward . Creating new bulkheads for the smaller roadside pond. Fine grading of the pond bottom to accept wildlife drinkers and revegetation of the area.	Access excellent around and into the reconfigured former pond.	New proposed parking locations would make access to pond easily accessible for all ages and abilities	Habitat benefits for new pond configuration similar to old pond configuration. Maybe even lesser due to even smaller pond size.	Less native avian species would be attracted to pond due to less diverse pond depth and conditions.	Water use will be increased in the short term for the revegetation activities and will remain high for pond operations.	Educational and interpretive value. Photo opportunities and aesthetic value.	TBD
Driving Range and Vicinity	Little grading would be necessary as the low points already exist. Some grading might be necessary around the old putting green near the existing restroom and concessions.	Access will be improved to multiple venues including star gazing, wildlife "walks", outdoor classrooms and exhibits.	New proposed parking locations would make access to pond easily accessible for all ages and abilities	Habitat benefits include three distinct ecotone exhibits, restoration activities, and Bermuda Grass removal.	None noted	Water use will be increased in the short term for the revegetation activities and level off to little in the future.	Educational and interpretive value. Photo opportunities and aesthetic value.	TBD

APPENDIX F: VTNP ADA

WT Group
Engineering • Design • Consulting

June 8, 2022

Kristy Diaz-Trahan, CPRP
Director
Parks and Recreation Department
Town of Oro Valley
10555 North La Canada Drive
Oro Valley, AZ 85737

Dear Kristy:

Thanks for the opportunity to evaluate the old golf car paths for their accessibility if used as pedestrian trails. In this report, we identify and discuss the applicable requirements of the Americans with Disabilities Act (ADA), and the process we used to evaluate the golf car paths. We then review our findings, and close with recommendations for your consideration.

APPLICABLE ADA REQUIREMENTS

The Americans with Disabilities Act (ADA) became effective January 26, 1992 (see 42 U.S.C. § 12101). The statute prohibits discrimination on the basis of disability. It affords similar protections against discrimination as the Civil Rights Act of 1964 does for race, religious belief, gender, and other circumstances.

Americans with Disabilities Act (ADA) General Mandates

The ADA has three principal chapters or titles.

Title II applies to the Town of Oro Valley and the more than 89,000 other units of state and local government across the country. It requires the Town to make parks, facilities, policies, communications, and programs accessible to and usable by people with disabilities.

There are other ADA requirements that are not within the scope of this study. Title I prohibits private employers of 15 or more, or any unit of state or local government regardless of the number of employees, from discrimination on the basis of disability in regard to employer and employee interactions. Additionally, title III prohibits privately owned places of public accommodation of all size, such as restaurants, fitness centers, hotels, and nonprofit agencies that are open to the public, from discrimination on the basis of disability.

Related Title II Requirements Affecting Parks and Park Assets

The title II requirements for existing facilities begin with a requirement that the **programs** within those facilities and parks are what is to be made accessible. DOJ title II at 35.149

clearly states that "…no qualified individual with a disability shall, because a public entity's facilities are inaccessible to or unusable by individuals with disabilities, be excluded from participation in, or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any public entity."

The term "program" is to be broadly interpreted. For the Town of Oro Valley, a program is an opportunity available to the public. Making public comment at a Town meeting is a program. Eating lunch at a park picnic area is a program. Reserving a park pavilion for a birthday party is a program. ***Trails are a program***. Constructed restrooms in parks is a program. Playgrounds are a program. Think broadly here, and know that a program is not just an organized activity for which one registers and participates. In applying 35.149, it is a violation of the ADA if a Town program cannot be accessed by a person with a disability because the facility or park in which the program is located is inaccessible.

Title II at 35.150 discusses the parameters for making existing facilities accessible. It requires the Town to view that program "…in its entirety…" at 35.150(a). This means that all of the locations of a program, e.g., every Town playground, must be viewed before determining which will be made accessible and which will be left as is until next altered or replaced. This latter statement is made clear at 35.150(a)(1), where DOJ tells the Town that these requirements do not "…necessarily require a public entity to make each of its existing facilities accessible to and usable by individuals with disabilities…".

Making a program accessible does not always require making a facility accessible. This is explained by DOJ at title II 35.150(b), where it reviews some of the methods to make a program accessible. The non-structural methods, include, but are not limited to:

- Relocating a program from an inaccessible site to a site that is accessible;
- Providing a program at two or more sites, one of which is not accessible and at least one of which is accessible;
- Redesign or acquisition of equipment to make program participation possible;
- Bringing the program to the person with a disability by making home visits;
- Construction of new accessible facilities to house the program;
- Providing extra staff to facilitate interaction by program beneficiaries; and
- Use of accessible rolling stock or other means of conveyance.

When nonstructural alternatives are not effective in making the program accessible, 35.150(b) requires the Town to make alterations to existing parks, facilities, and assets, and when doing so, to treat the alteration as new work and comply with title II 35.151.

The Town must also give the highest priority "…to those methods that offer services, programs, and activities…in the most integrated setting appropriate". This mandate is integral to the ADA and reflects clear intent by Congress that separate is not equal. The Town must geographically disperse the accessible programs that are to be retrofit.

Unfinished Business

Town of Oro Valley parks do include some park assets for which there are not yet final and enforceable design standards, at either the state or federal level. The assets that lack a final standard include trails, campsites, picnic areas, viewing areas, beaches, outdoor area accessible routes (ORAR), and constructed park assets such as grills, fire pits, and other similar elements.

There is a long history of the development of standards for these assets. The US Access Board is the small federal agency that develops accessibility requirements. The Access Board has the authority to issue final and enforceable standards for federal agencies, but not for title II entities like the Town of Oro Valley, or title III entities like a public facing business or restaurant. The authority to issue standards that are final and enforceable for title II and title III entities is reserved to the US DOJ.

In 1993, the Access Board convened its first-ever federal advisory committee, the Recreation Access Advisory Committee (RAAC). The committee was comprised of 27 representatives of various recreation industries, membership associations, disability advocacy groups, and other interested persons. The RAAC subcommittees addressed developed outdoor recreation areas, pools, golf, playgrounds, sports facilities, skiing, amusement parks, and boating and fishing facilities.

The Committee made its report to the Access Board in 1994, and recommended further work to reach consensus on trails, picnic areas, campsites, beaches, viewing areas, and outdoor recreation access routes. That work did occur, and in 2013, the Access Board issued a supplement for outdoor developed areas to the Architectural Barriers Act (ABA). The ABA applies only to sites owned and operated by federal agencies, such as the National Park Service, US Forest Service, and Army Corps of Engineers. Since 2013, US DOJ has not issued this guidance as a supplement to the 2010 Standards, making it applicable to the Town. When that will happen is unpredictable.

As a result, at least one state (Illinois) has taken the 2013 guidance and incorporated it into state accessibility codes. It appears that other states may do so in the future. Using this guidance now will provide better accessibility to Town of Oro Valley sites, keeping the Town ahead of the changes that may come.

The ADA Requirements for New Design and Construction

Many of the ADA requirements are open to some interpretation regarding compliance. There is, however, one requirement that is clear: all new design and construction must comply with the federal 2010 Standards for Accessible Design and any State of Arizona requirements that are more stringent from an access perspective. The DOJ regulation at section 35.151 establishes this requirement, and permits new design and construction to vary only when it is "structurally impracticable" to fully comply.

Experts estimate that design and construction for ADA compliance adds not more than 1% to the facility cost. Plan review and effective project management by Town staff assure that plans and ongoing construction are compliant. The investment of human resources towards this goal is much less costly than removing barriers after a park asset has been constructed or installed.

New design and construction includes the design and construction of alterations and additions. Therefore, alterations and additions must strictly adhere to the 2010 Standards. The DOJ title II regulation, at 35.151(b)(4), requires that when alterations or additions occur at an existing Town facility, a "path of travel" is required to connect the accessible elements of the existing facility with accessible elements in the altered area or addition. In preparing the regulation, DOJ recognized the inequity of a result whereby the accessibility portion of an alteration or addition, the path of travel, could require more fiscal resources than the alteration or addition. The regulation therefore introduces the concept of disproportionality, which permits the Town to limit path of travel costs to 20% of the cost of a project

Three clarifications are necessary regarding the concept of disproportionality.

First, the Town may elect to apply the concept of disproportionality; it is not required to do so. If the Town wishes to make the cap 30% of the cost of the alteration or addition, it may do so. The ADA sets the floor, not the ceiling.

Second, the path of travel must be applied when the alteration or addition is to a primary function area. A primary function area is "…a major activity for which the facility is intended." Examples in the title II regulation include "…the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public entity using the facility are carried out."

Third, some work at an alteration or addition is simply maintenance and the cost of that work may be deducted from the determination of the cost of the alteration or addition, thereby affecting the amount necessary to meet the 20% disproportionality test. At most sites these non-alteration costs are very small. In a world where every Town of Oro Valley penny counts, it is appropriate to properly apply the concept of disproportionality.

Access requirements for new design and construction are important in the context of the Town Capital Improvement Plan (CIP). CIP projects, designers, and contractors meet or exceed federal and local requirements.

The ADA Requirements for Existing Facilities

We discuss the program access test earlier in this report (see page 5). In a nutshell, the Town of Oro Valley should interpret the word "program" very broadly. If the Town of Oro Valley offers an opportunity, such as using a trail, using a picnic table, using a park restroom, it is a program. The programs within the parks are what must be accessible.

Title II at 35.150 discusses the parameters for making existing facilities accessible. It requires the Town to view that program "…in its entirety…" at 35.150(a). This is interpreted to mean that all of the locations of a program, e.g., every Town fishing area, must be viewed before determining which will be made accessible and which will be left as is until next altered or replaced. This latter statement is made clear at 35.150(a)(1), where the Town is told by DOJ that these requirements do not "…necessarily require a public entity to make each of its existing facilities accessible to and usable by individuals with disabilities…".

Elsewhere in title II, the Town is required to make changes to rules and policies as well. These nonstructural alternatives may be effective in making a program accessible.

However, when nonstructural alternatives are not effective in making the program accessible, 35.150(b) requires the Town to remove architectural barriers at existing parks, facilities, and assets, and when doing so, to treat the alteration as new work and comply with title II 35.151. The Town must also give the highest priority "…to those methods that offer services, programs, and activities…in the most integrated setting appropriate". This mandate is integral to the ADA and reflects clear intent by Congress that separate is not equal. The Town must also disperse the accessible programs that are to be retrofit.

In 2010, the DOJ issued an amended title II regulation. It became effective March 15, 2011, and introduced safe harbor for the Town and other states and local governments at 35.150(b)(2). If the Town designed and constructed an asset, prior to March 15, 2012, in compliance with the 1991 Standards for Accessible Design, it cannot be penalized if the Standards change at a later date.

An example is the reach range requirement. In the 1991 Standards, reach range could be as high as 54" above the finished floor (aff) for a side approach, and 48" aff for a forward approach. In the 2010 Standards, because of confusion about forward reach and side reach, the maximum reach range was reduced to 48" aff. The safe harbor concept applies, and at Town facilities designed and constructed before March 15, 2012, where a proper side reach can be used, an operating mechanism can be as high as 54" aff. However, if that operating mechanism is at 55" aff, it fails the 1991 Standards and must be retrofit to meet the 2010 Standards maximum of 48" aff.

When nonstructural alternatives are not effective in making the program accessible, 35.150(b) requires the Town to make alterations to existing parks, facilities, and assets, and when doing so, to treat the alteration as new work and comply with title II 35.151.

The Town must also give the highest priority "…to those methods that offer services, programs, and activities…in the most integrated setting appropriate". This mandate is integral to the ADA and reflects clear intent by Congress that separate is not equal. The Town must geographically disperse the accessible programs that are to be retrofit.

OUR PROCESS

For this unique site, Tanya Scheibe walked the entire golf car path with a HETAP device, an acronym for High Efficiency Trail Assessment Process. HETAP was developed by Beneficial Designs. Using this HETAP device consisting of a stroller, computer, sensor box, GPS, and web cam, she captured running and cross slopes, gaps, and changes in level at more than 1,200 points on the trail. While the focus for these locations is where deficiencies occur, points or "stations" were captured about every 30' when specific issues were not present to help identify areas that might be easier to correct and make accessible.

The site was segmented based on its former golf course hole locations. Segment 1 covered the path starting at the parking lot and connecting through holes 1, 2 and 3. Segment 2 is the area that was hole 4 through hole 8. Segment 3 is the very short split path at hole 8. Segment 4 starts at hole 9 and heads through hole 9 back to the parking lot. Segment 5 is the short stretch that connects between hole 9 and hole 18 near the former clubhouse. Segment 6 consists of holes 10 and 11. Segment 7 includes holes 12 through 16. And finally segment 8 is hole 17 and hole 18. The larger segments are

separated by road crossings or underpasses and make it easier to determine where the path is more accessible and less accessible.

She also looked briefly at the current parking area and one of three existing restroom facilities. While these items were not in the original project scope, accessible use of the site will involve parking and restroom use if restroom facilities are reopened or replaced.

From the data collected, we've created a GIS compatible document, an organized set of data in an Excel spreadsheet, and the summary of our findings and recommendations that follow this section.

OUR FINDINGS

In each identified segment, we encountered deficits that include cross slopes exceeding 2.08%, running slopes exceeding 12.5%, running slopes exceeding 5% and lacking level resting areas at the appropriate intervals, changes in level or tread obstacles exceeding .5", gaps or openings exceeding .5", and areas where sand or dirt have accumulated on the trail surface. Additionally, we identified locations in the right of way connecting sections of trail that lacked detectable warnings.

Along the approximately 32,000 ft long trail, we found 680 instances of cross slopes exceeding 2.08%. Of these, 274 are a maximum of 3%, 296 are between 3% and 5%, and 110 exceed 5% with the highest being 8.6%. The area least affected by cross slopes is along the first segment. The area most affected is the area along hole 9 and the short stretch of path between hole 9 and 18. Cross slopes exceeding 2.08% is a common problem on accessible routes, trails, and other outdoor surfaces as any small amount of settling can quickly cause an area or concrete panel to shift and increase the slope in one or more directions. The cross slopes identified affect almost half of the overall trail length.

When considering running slopes, we identified 164 instances where the slope exceeded 5% and lacked resting intervals in distances appropriate for the severity of the slope. These instances affect about 10% of the total trail length, with the highest concentrations occurring along hole 9, the short stretch of path between hole 9 and 18, and along holes 17 and 18. The area with the least impact from running slope deficiencies is along hole 1 to 3 and hole 10 through 11. The severity of the slopes is also important to consider. There were a total of 16 locations identified with slopes exceeding 12.5% - the maximum allowed along a trail. These were not concentrated enough in any one location, though the highest recorded is 17.8% near the lake at hole 8.

Running slopes above 10% and up to 12.5% must have resting intervals at 10'. There were few instances of this issue with the highest concentration occurring along hole 9 and the short stretch of path between hole 9 and 18. Slopes above 8.33% and up to 10% must have resting intervals at 30'. These instances are also limited but most affect hole 9 and hole 17 to 18. For slopes above 5% but not exceeding 8.33%, resting intervals must be provided at 200'. This issue is a bit more common, but is most concentrated from hole 17 to 18, with other issues along holes 4 through 8, along hole 9, and along holes 12 through 16.

With regards to changes in elevation (CIL) or tread obstacles, the overall path is in good shape. CILs most often occur at expansion joints but sometimes occur in locations near trees where roots have caused upheaval or where significant settling or washout may have caused damage or shifting. We identified 17 instances with the highest recorded at 3" in the area along holes 12 through 16. There are also other significant CILs worth noting. An instance of the pavement buckling occurs in the area along holes 4 through 8, near hole 5 and some tree root damage occurs along this segment as well. Additionally, a large shift occurs in the segment along hole 17 and 18 where damaged.

Gaps occur at multiple points along the trail and about 60 were recorded. These range in severity and type, and occur for a variety of reasons. Not surprising, the majority of these were recorded on longer segments of trail including the segments of holes 1 to 3, holes 4 to 8, holes 12 to 16, and hole 17 to 18. Most gaps are relatively small and less than 2". Some more notable gaps are a deterioration at an expansion joint 6" at widest point and one up to 9.5" along hole 1 to hole 3 and 8" wide gap where deteriorated along hole 17 to 18.

One more significant issue that is easily corrected is the sand, dirt, and debris that wash onto the trail surface. In some locations, it may be a recurring issue and may need a bigger solution, but the Town can control this problem with regular maintenance of the surface trail. The most notable issue here was a very large amount of sand accumulated in the tunnel between holes 8 and 9.

The tunnels allowing the trails to continue beneath the roadway have overhead clearances below 80" along the sides of the tunnels. In some tunnels, markings are visible showing the intended width for use by the golf cars during use as a golf course and the space within these marked edges meets the required overhead clearance. However, there is no way for a visually impaired user to detect the reduced overhead along the sides.

In locations where the trail crosses the roadway at the road surface, there are no detectable warnings installed. Detectable warnings in the right-of-way are important to aid visually impaired trail users at crossings to indicate the hazard of the roadway.

The existing parking area, while not viewed in its entirety, has compliant slopes in the stalls near the current trail entry and along the existing drop off/turnaround at the trail entry. This area was discussed as likely being used temporarily while other changes are made to portions of this site.

There are three restroom buildings along the trail that are currently closed. These restrooms were discussed as potentially being reopened for use. A quick look was taken at one of the restrooms in the building that included the starter box and grill. This restroom would require some general repair to the structure of the building, but also changes to some of the fixtures and accessories to make the restroom compliant.

It was suggested that this restroom is almost identical to the others and a simple exchange was shared that emphasized costs to repair the noted deficits. This limited assessment and retrofit conversation was done to assist the Town in determining whether renovating the existing restrooms will be more or less cost effective to installation of a prefab restroom facility.

OUR RECOMMENDATIONS

Discussions on site suggested an interest in focusing improvements for accessibility along the segment of the trail between holes 4 to 8. This may include the addition of a new parking area to serve the accessible section.

There is also an existing restroom building in this section. While this section includes a higher instance of excessive slopes than some of the other larger sections of the trail, it may still be a great area to focus improvements for accessibility. It accounts for more than 25% of the trail's length and has access from the sidewalks along the roadway without requiring a user to traverse the steepest slopes at the underpasses.

The first segment, holes 1 through 3, and the sixth segment, holes 10 and 11 are the other areas where the slopes are less problematic. Combined, these areas do connect to one another and also account for more than 25% of the trail's length. The former starter box restroom is located in this area and could be reopened or replaced to provide an accessible restroom here. Additionally, this area is located close to the existing parking lot. From our understanding, use of this area will depend on the specifics of the plans for use of the portions of the land purchased by a developer.

We recommend making one of the two areas described above accessible, meeting the guidance described in the 2013 Outdoor Developed Areas Accessibility Guidelines published by the US Access Board. This requires the Town to:

- Correct cross slopes throughout to max 2.08% and running slopes to meet requirements
- Correct changes in level or tread obstacles to maximum .5"
- Correct gaps to be max .5" and with the long dimension perpendicular to the direction of travel
- Clearing washout or debris from the trail surface
- Performing regular maintenance on plants or trees along the route to keep the trail width and overhead space clear
- Create level rest intervals, 60" by 60" at distances based on the trail slope when running slopes exceed certain values. The running slopes for the trail should be:
  - Maximum 5% not requiring any resting intervals;
  - No greater than 8.33% while providing resting intervals max 200';
  - No greater than 10% while providing resting intervals max 30'; and
  - No greater than 12.5% while providing resting intervals max 10'.

In addition to trail improvements described above, any added or reopened amenities, such as restrooms or parking lots must also fully comply with the 2010 Standards for Accessible Design and any Arizona standards that may be more stringent.

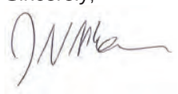
We also recommend adding detectable warnings at each location where the path crosses the road or meets a vehicular way, such as a parking lot.

CONCLUSION

The Town of Oro Valley has a unique opportunity with this site. This report identifies two possibilities to consider. If there are any questions, please reach me or Tanya Scheibe for answers.

Thanks for the opportunity to serve the Town of Oro Valley.

Sincerely,



John N. McGovern, JD
Partner, Principal-in-Charge
The WT Group, LLC Accessibility Practice

JNM/TRS/TOWN OF ORO VALLEY REPORT 202201

APPENDIX G: ACORN REPORTS

DESIGN PRINCIPLES

Throughout the Vistoso Trails Nature Preserve master planning process, we have kept the following design principles in mind:

Principle one:

Visitor experiences follow seven distinct processes in a sequence:

Advance planning: The OVPR website and Town-owned social media channels provide easy-to-access information about the Preserve, including location, parking, amenities, and programs.

Arrival: A clearly defined entry announces the start of the Preserve experience.

Reception: Prominent welcome signage sets the tone for the experience.

Decompression: An open area directly after the arrival zone allows visitors to rest, take care of necessities, and gather before heading out on the trails or joining a program.

Orientation: Visitors plan their journey and gather the information and tools they need to feel competent with wayfinding. Wayfinding signage includes a site map on the orientation panel and directional signs and confidence markers on the trails.

Interpretation: Throughout the Preserve, interpretive signage anchored in the theme and subthemes presents stories about the Preserve that lend new thought and insight.

Transformation: Visitors have opportunities to manifest changes in behavior, perception, values, and attitude.

Principle two:

Interpretive media must make a personal connection with, or be relevant to, the target audiences.

Visitors more readily integrate new learning by relating it to what they already know. Interpretive media can use storytelling, metaphors, and humor to make connections with the audience.

Principle three:

Interpretive media should provide or encourage novel and varied recreation-based experiences.

Interpretation is based first on recreation.

Thought-provoking questions, hands-on experimentation, and multisensory tips (e.g., what to look for, touch, and listen for) help capture and maintain visitor attention.

Preserve visitors are voluntary learners who engage with interpretive media in a leisure setting. Visitors make more profound and extended connections with "fun" material than instructional material.

Principle four:

Interpretive media should be based on a theme.

The interpretive media reflect the overarching theme and subthemes. Focusing interpretation on take-home messaging helps visitors see the big picture and organize new information into an intellectual framework they understand.

Principle five:

Interpretive media should engage visitors in the learning experience and encourage them to take control of their learning.

Exhibit sequencing remains "free choice" among the visiting public. After arrival and decompression, visitors select the order, degree of involvement, and time spent at each panel. The attracting and holding power of the panels is mainly a function of design.

Panel content should demonstrate an understanding of and respect for the audience.

During weekdays more significant numbers of K-12 students and teachers likely will visit the Preserve as a field trip where they see real-world applications of science, technology, and engineering.

During weekends and special events, greater numbers of local residents and visitors likely will visit. Comprised of multi-generational family groups, couples, and small groups of friends, these people will appreciate experiences that encourage conversation and focused attention.

Principle six:

Brevity is critical.

Word counts on interpretive panels should not exceed 110 words for the main body of text. Panel titles and subtitles should also be brief (one – seven words each). Callouts should not exceed 35 words.

INTERPRETIVE WRITING

Interpretive writing differs from expository writing. Its aim is to draw from scientific, historical, and cultural sources to tell a story that reflects the interpretive theme and subthemes and connects the readers emotionally and intellectually to a place, object, artifact, people, or other life form.

It deviates from other writing because it does not cover any topic thoroughly, will likely not be read from beginning to end, and relies on compelling design, images, and voice to create "staying power." That "staying power" extends the reader's attention span from three seconds (the amount of time to read a panel title) to 30 seconds (the amount of time to read a title and some copy plus look at an image or two) or even three minutes (the amount of time to read the panel contents and look at the images).

Best practices in interpretive writing

Interpretive writing has telltale characteristics, purposefully introduced to connect with the visitor. Interpretive writing:

- is based on a particular subtheme and corresponding key concepts.
- introduces sensory language to enhance visceral connections with the reader.
- requires selecting words that "work hard," relying on powerful verbs and nouns over supplementary adverbs and adjectives.
- allows the panels to be read in any order.
- uses questions and statements to engage the visitor, creating a "threshold to learning, not an endpoint[1]."
- shares information in snack-size pieces. Each interpretive panel presents a brief main body of text supported by equally brief callouts and image captions. Sign standards are established early to ensure that all panels present consistently sized blocks of text.
- is concrete, not abstract, and written with an active voice. Visitors can relate to it.
- is written at an eighth-grade reading level or lower. Each sentence is short and introduces a single idea.

[1] Smithsonian Institution

PROPOSED CONTENT FOR THE PRESERVE'S INTERPRETIVE PANELS:

We recommend development of 21 interpretive panels whose content is anchored by and reflective of the message hierarchy (See Vistoso Preserve Interpretive Summary). To some degree, each panel should reflect the overarching theme, one corresponding subtheme, and a select number of corresponding key concepts.

Theme

Once a golf course and now a Preserve, this site demonstrates nature's resiliency. Plants and wildlife of the Sonoran Desert continue to "take back" the land, increasing the richness of both the Preserve and the visitor's experience.

Subtheme one: Thanks to residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley, the Vistoso Golf Course was purchased and repurposed as a nature preserve.

Corresponding panels:

- Modern-day history of the land
- Teamwork: Residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley
- Preserve's significance within the Sonoran Desert
- Preserve assets (recreational, educational and interpretive, physical and psychological, ecological, economic)
- Daily rhythm (daybreak, high noon, sunset, night)

Subtheme two: Vistoso Trails Nature Preserve is a remarkable piece of the Sonoran Desert. Spanning over 200 acres, it is home to cacti, trees, shrubs, and wildflowers, as well as a dazzling array of wildlife.

Corresponding panels:

- A piece of the Sonoran Desert
- Seasons in the desert
- Biological diversity
- Animal tracks and sign
- Wildlife in the Preserve
- Desert scrub community
- Mesquite bosque community

Subtheme three: Nature is resilient, but still, it can benefit from human intervention. Removal of invasive weeds and revegetation with native desert plants are ongoing projects at the Preserve.

Corresponding panels:

Coping with extremes (plant and animal adaptations)

Battling the exotics (presence and threat)

Working together (restoration work)

Reclaiming the desert

Subtheme four: The Hohokam and other Indigenous People have lived on this land for thousands of years. Resilient and resourceful, the Hohokam were sophisticated desert farmers.

Corresponding panels:

Desert farmers (presence of the Hohokam and other Indigenous People)

Ancient gardens (Hohokam crops and irrigation systems)

Village of Sleeping Snake

Stories in stone (modern-day petroglyphs)

The Tohono O'odham Nation today

SIGN GLOSSARY

Institutional panel: a sign that identifies Vistoso Trails Nature Preserve (Preserve) upon approach from a road.

Orientation sign: an entry sign that usually has a map. Its purpose is to welcome visitors and orient them to the Preserve, trails, features, and amenities.

Directional sign: a wayfinding sign that uses a map, arrows, and words to identify specific trails, features, and amenities.

Confidence marker: a wayfinding sign that identifies the reader's current location.

Regulatory sign: a sign that states the Preserve's rules, applicable Town ordinances, and the reasons for them.

Interpretive panel: a sign that moves beyond facts to tell a story that connects the visitor to the Preserve. Interpretive panels reflect the message hierarchy and follow specific writing guidelines.

PANEL MEDIA OPTIONS

High-Pressure Laminate (iZone Imagery)

Layers of printed graphics and proprietary overlays are compressed into a core of phenolic resin-impregnated kraft paper. Melamine resin permeates the digital print resulting in the consolidation of all materials into a single panel of thermoset plastic. This sign carries a ten-year warranty. https://izoneimaging.com

ImageLOC (Gopher Sign Company)

Layers of organic materials are etched directly onto aluminum or stainless steel to create the printing substrate, eliminating the need for paper or film. A protective topcoat locks the image in place. This sign carries a ten-year warranty.
https://gophersign.com

Direct Embed (Direct Embed Coating System, LLC)

Constructed with organic inks, graphics are permanently embedded into a powder-coated surface. The finish is a tough, durable, VOC-free polyurethane powder coat that is formulated to withstand exterior weather conditions.
http://directembedcoating.com

Vistoso Trails Nature Preserve Education Recommendations

The Acorn Group in collaboration with Sites Southwest

Introduction

The Acorn Group is collaborating with Sites Southwest to develop a master plan for Vistoso Trails Nature Preserve. Located in the Town of Oro Valley, Arizona, the Preserve sits on a former golf course. Now repurposed, the Preserve is open to the public. Over six miles of paved cart paths wind through it, taking visitors past desert scrublands and mesquite bosques, viewpoints of the Catalina and Tortolita Mountains, and pullouts where they can savor towering saguaro, woodlands of palo verde and ironwood, and in the spring, pastel-hued cacti flowers.

Our work focuses on both interpretive and educational opportunities at this remarkable site. The former addresses strategies to connect with non-formal visitors who arrive voluntarily. Our recommendations are summarized in the document, *Vistoso Trails Nature Preserve: Interpretive Summary*. The latter addresses strategies to connect with formal education audiences who seek out-of-classroom experiences that augment the curriculum. While the first group will benefit directly from new interpretive media and experiences at the Preserve, the second group will additionally benefit from new programs that lend meaning and authenticity to classroom learning. This requires alignment with grade-specific academic content standards and careful coordination with target schools. The interviews we conducted with school administrators have informed the recommendations summarized in this document.

These recommendations span grades K-6 and focus on both science and history/social science. Differing from classroom-based learning, they are explicitly place-based, focusing on the Preserve and the greater Sonoran Desert to celebrate stories about the land and its people. Cultivating students' sense of place, while expanding knowledge and skills related to science, technology, and engineering are tenets of these programs.

"Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science and other concepts across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school.

(*Place-based Education: Connecting Classrooms & Communities*

Best Practices

Adopting and applying best practices will ensure that programs at Vistoso Trails Nature Preserve are relevant and authentic for each target audience, outcome-based, and reflective of Oro Valley Parks and Recreation Department's mission statement[1]. We offer the following suggestions to help ensure that programs succeed in delivering place-based experiences and cultivating Preserve stewards among an enthusiastic and receptive student audience.

Test the waters

Before an education program is developed, staff will need to more fully assess receptivity among the school audience[2] and Town staff. Integration of recommendations in the Preserve's master plan, determining sources of funding for site improvements and teaching supplies, and assignment of Town and District staff to design and pilot-test the program(s) will be critical. Department staff should also assess capacity. Are there adequate numbers of staff and docents to do this work without straining the resources that support the Preserve? What role will Preserve Vistoso play in the recruitment, training, and management of docents? Will these programs complement, not duplicate, programs already taking place in nearby communities? Will these programs celebrate the uniqueness of Vistoso Trails Nature Preserve and help cultivate a sense of place?

Embrace backward design

We recommend using a program development practice championed by curriculum developers Grant Wiggins and Jay McTighe and business strategists, including Stephen Covey. Rather than begin with preferred topics and instructional activities, we suggest beginning with the end—the desired results—in sight. This backwards approach brings content standards, performance expectations, and goals and objectives to the forefront of curriculum planning.

Typically, backward design encompasses three stages of planning:

> Phase one: identify desired results or curriculum expectations. Identify the big ideas (the "enduring understanding") as well as broad goals and specific, measurable objectives.
>
> Phase two: determine acceptable evidence and identify appropriate assessment tools.

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[1] The mission statement of Oro Valley Parks and Recreation is to inspire connection through recreation.

[2] The school audience consists of traditional K-12 teachers and students, as well as K-12 homeschooling groups.

> Phase three: plan the learning experiences and instruction. Determine what activities, materials, and resources are needed in order to achieve desired results.

For the purposes of our preliminary work at Vistoso Trails Nature Preserve, we studied the Arizona Department of Education and Amphitheater School District educational mandates before we recommended programs. We also interviewed three principals in the District, student members of the Town of Oro Valley Youth Advisory Council, and Kristy Diaz-Trahan, director of Oro Valley Parks and Recreation (OVPR), to better understand interests, needs, and constraints. We have defined a general direction for program development; however, specific backward design work still needs to be conducted.

Mix It Up

We recommend that the Preserve offer education programs that span grade-group levels, ages, content, time commitments, and experiences. At the same time, we encourage staff to start slowly by pilot-testing a program(s) and refining it (them) based on student/faculty feedback.

For formal programs, flexibility is key to accommodating varying needs of teachers which can be dictated by bus schedules. This could mean offering the field programs and field/classroom lab programs in blocks of 1 hour, 1.5 hours, and 2.5 - 3 hours. Regardless of time spent at the Preserve, the District requires that all students return to school by 1 p.m.

Background information related to educational programming

State governance

The State of Arizona has established expectations and learning opportunities in eleven content areas, including early childhood, literacy, computer science, educational technology, English language arts, history and social sciences, math, science, and the world and native languages. Content and grade-specific elements are articulated in each set of standards. They serve as the basis for the curriculum of the district or individual schools, but they are not the curriculum per se. Identifying the content and the sequence of instruction at each grade—what will be taught and for how long—is undertaken at the local level. Curricular tools, including textbooks, are selected by the district/school and adopted through the local governing board.

State science standards

State science standards at grades 3-5 are particularly relevant to current and potential content at Vistoso Trails, especially as they relate to hands-on science and engineering practices on site.

> In third grade, students develop an understanding of systems and system models along with structure and function involving energy and matter.
>
> In fourth grade, students apply systems and system models as they investigate how energy and the availability of resources affect Earth systems (geosphere and biosphere). They also develop an understanding of stability and change with regards to how populations of organisms and Earth have changed over time.
>
> In fifth grade, students apply their understanding of scale at micro levels as they investigate changes in matter and at macro levels as they investigate patterns of genetic information and movement between Earth and Moon.

State history and social science standards

State history and social science standards are based on content, skills, and processes applied to the study of peoples, events, and elements that shape local and world history. Grades 3 and 4 are particularly noteworthy for the Preserve.

> At grade 3, Arizona Studies, students will study Arizona with an integrated approach considering the following factors:

The contributions of various cultural and ethnic groups including the 22 Indian Nations that reside in Arizona.
● Economic, political, and geographic elements
● Structure of the state and local governments
● Roles and responsibilities as citizens of Arizona
● Examination of primary and secondary sources including written and oral histories, images, current events, and artifacts
● Disciplinary skills and processes including change and continuity over time, multiple perspectives, using and understanding sources, and cause and effect.

At grade 4, Regions and Cultures of the Americas, students will study the Americas (North, Central, and South America along with the Caribbean Islands) using an integrated approach considering the following factors:
● Theories about the first peopling of the Americas
● The development of Mesoamerican and South American civilizations including the Olmec, Inca, Maya, and Aztec
● American Indian life in the Americas prior to European exploration including the peoples in the Southwest, Pacific Northwest, nomadic nations of the Great Plains, and the woodland peoples east of the Mississippi River (Eastern Woodland)
● The causes and consequences of European exploration and colonization
● The environmental, political, and cultural consequences of the interactions among European, African, and American Indian peoples in the late 15th through 17th centuries
● Regional settlement patterns, significant developments, and life in the Southern, Middle, and New England colonies
● Roles and responsibilities as members of a society
● The contributions of various cultural and ethnic groups to the development of the Americas
● Examination of primary and secondary sources including written and oral histories, images, and artifacts
● Inclusion of historical fiction and picture books in addition to informational text.
● Disciplinary skills and processes including change and continuity over time, multiple perspectives, using and understanding sources, and cause and effect

District governance

Amphitheater School District, the district closest to Vistoso Trails Nature Preserve, has a science and STEM department. The district cites science concurrently with STEM instruction that spans science, technology, engineering, and mathematics across all grade levels. Reference on the District's website is made to Arizona State Standards.

Elementary school level: Students explore the environment, the universe, and energy sources, and they apply mathematics to real-world situations. Students also participate in regional and state science fairs.

Middle school level: Aspiring scientists and engineers take elective classes through a curriculum called Project Lead the Way (PLTW). Through hands-on, project-based learning, students make connections between what they learn in school to the outside world.

High school level: Classes challenge students to step up to a high level of problem-solving and critical thinking. They include biotechnology, computer programming, engineering, and advanced placement (AP) calculus.

District history and social science standards

The website of Amphitheater School District does not have a link to an academic history-social science department or standards. However, because the district refers to the Arizona State Standards in other curricular areas, we are assuming it defers to Arizona State Standards for History and Social Science as well.

While Vistoso Trails Nature Preserve exists on its own notable terms, its capacity to show alignment and relevance to the science and history/social science curriculum of Amphitheater School District, as well as local charter schools will help classroom teachers justify out-of-class field trips to the preserve.

Oro Valley Parks and Recreation

There are several Native American archaeological sites and historic resources within the Town of Oro Valley. Some fall within the jurisdiction of Arizona State Parks and Pima County. The sites include three Hohokam village sites (Sleeping Snake Village, Romero Ruin, and Honey Bee Village): Sleeping Snake Village is located on the grounds of Vistoso Trails Nature Preserve.

The sites also include Steam Pump Ranch, designated a Heritage Park by the Town of Oro Valley. Oro Valley Parks and Recreation will continue to work with the Oro Valley Historical Society and offer the following topic-specific field trips to Steam Pump Ranch: prehistoric hands-on archaeology, Pusch family history, and Proctor-Leiber history.

Proposed school programs at Vistoso Trails Nature Preserve

The Acorn Group recommends that three on-site programs spanning K-6 are developed. Two focus on science; one focuses on history-social science. Each can be academically robust, providing structured opportunities that extend and build upon classroom learning. At the same time, each can be well poised to facilitate student understanding of a "sense of place." This is particularly possible if field trips to the Preserve are spiraled throughout the K-6 curriculum, taught either in traditional classrooms or in homeschools. By focusing on place-based instruction and celebrating the Preserve as a community-based asset, OVPR can promote excitement and appreciation for the Preserve, the broader region, and students' place within it.

Given the class schedules adopted by middle and high schools, field trips are not easily scheduled at these levels. Instead, the Preserve can be considered a site for community service projects taking place on weekdays after school and on weekends. Such work could include habitat care and restoration, as well as interpretation (e.g., leading weekend tours).

Science

Discovering the Desert, grades K-2

We see a K-2 program, called Discovering the Desert, as a primary program dedicated to cultivating student's sense of place. It celebrates the essence of place and answers seemingly basic questions, such as Where am I and What is the nature of this place? As members of the community of Oro Valley, students take stock of the nearby desert, their neighbors (the resident and migratory species with whom they share the desert), and the uniqueness of the setting.

Such a program requires that students fine-tune their observation skills and sensory perception. They take part in a guided walk at the Preserve, learn to record observations in a nature journal, and hon the skills of a naturalist. Led by trained docents, they begin to expand their senses, interpret the language of birds, track wildlife, and negotiate a special "sit spot," likely near the pond, where they each sit quietly and take stock of the desert's activity. After a few minutes, they reconvene and share their experiences.

Discovering the Desert is student-focused. Trained docents serve as facilitators of experiences rather than dispensers of information. The program requires very little equipment—just nature journals and possibly student-grade binoculars and hand lenses.

Exploring the Desert, grades 3-6[3]

This program builds upon the Discovering the Desert program and further reinforces the skill sets of a naturalist. It also introduces the role of technology in science. Students explore the Preserve where they use smartphones to access apps and record their observations. They assume the role of community scientists, taking photographs of the plants, animals, and phenomena they notice during their visit, and recording the time, location, and conditions. Possible apps include iNaturalist, Project Noah, Journey North, Nature's Notebook, Bumble Bee Watch, eBird, eButterfly, and SpiderSpotter.

Journey North, for example, tracks seasons and migrations of such animals as hummingbirds and orioles, both of which are present at the Preserve. Students can submit their observations and teachers can access numerous resources, including suggestions for activities that build vocabulary, enhance comprehension skills related to reading and map-making, strengthen inquiry skills, and explore environmental concepts.

This could be an exciting, authentic way to record observations; however, it comes with caveats. 1. Parents would need to be informed that their children are accessing science-based apps that do not collect or compromise personal information nor lead the user to any other sites. Their written permission would need to be secured for this activity. 2. To ensure equity and inclusion, the Preserve would need to have some spare smartphones available for use by students who do not have smartphones.

Caveats aside, this presents a remarkable opportunity for students to become researchers and contribute to a project that connects their class to a larger community. It also supports STEM and STEAM initiatives.

History and Social Science

Discovering the Past, grades 3-5

The Preserve is home to a former Hohokan native village called Sleeping Snake. Covering nearly 100 acres, it consists of a ball court site that has yielded numerous artifacts that reveal information about community structure, social organization, and trade dating back to 950-1150 A.D. during its most intensive occupation.

While the village site is off limits, we recommend that OVPR consider developing a fabricated archaeological dig site elsewhere at the Preserve for use to teach history. The pit could contain concrete-cast artifact replicas that are

[3] One principal indicated that, irrespective of state content standards, their students study biology in grades 2 and 6.

secured at various depths. Students on a field trip would learn how to establish a grid, uncover the site, record the location of artifacts, learn about stratigraphy and cross-dating, and generate hypotheses about the artifacts. At the same time, they would also learn about the importance of not disturbing real sites and not removing artifacts when found in the field. We recommend that OVPR discuss the idea of a fabricated archaeological dig site with tribal representatives to ensure that concerns are addressed.

This station could take advantage of an existing sand trap site and therefore avoid disturbing habitat. A shade sail would offer protection from the Sun. Because the materials would be exterior-grade and anchored to the pit's floor and sides, they would hold up against the elements and not "walk away."

While one group would be at the pit, another group would be at the petroglyphs. While created by a modern-day artist, the petroglyphs nevertheless attempt to replicate art created thousands of years ago. Here, students would learn the difference between a petroglyph and a pictograph and the meaning of various symbols. The last activity at this station could be an art project—creating their own rock art on kraft paper using a bleach-dipped cotton swab.

Implications for the master plan

Both the interviews and the recommendations yield a few physical improvements to the site. These include a shaded, solar panel-powered outdoor classroom where students can gather upon arrival, eat lunch, and convene at a program's conclusion. A charging station would be helpful, given smartphones would be used during the Discovering the Desert program. Pullouts along the existing pathways would allow small groups of students, as well as general visitors, to step aside and pause as they view the scenery or wildlife known to frequent a particular location. One additional element is the shaded fabricated archaeo pit (in an existing sand trap).

Both the outdoor classroom and the archaeo pit should be located near Innovation Academy.

Appendices

School interviews for Vistosos Trails Nature Preserve
Summary Report

In October 2022 Jennifer Rigby interviewed three principals of schools located near to Vistoso Trails Nature Preserve (Preserve): Painted Sky Elementary School, Lehman Academy, and Innovation Academy, A fourth principal, from Basis Oro Valley, did not respond to inquiries. The interviews were about 20 minutes long and followed a standard script consisting of 13 questions. Questions that were not applicable were skipped.

Only one school, Innovation Academy, currently uses the Preserve to augment classroom instruction. While this figure is surprisingly low, it can be explained in part by the interruption caused by the pandemic. Innovation Academy's current use of the site is to participate in docent-led guided tours. Past use has focused on bio blitzes—a community science effort to record as many species within a designated location and time period as possible.

The three principals consistently identified the following amenities are desirable at the Preserve: a shaded sheltered area to eat lunch and convene for presentations, electricity (to power this space and charge devices), restrooms and water stations, trash receptacles, and turnaround areas for buses. (Attention to ADA regulations regarding bus loading and trail mobility is also critical). They also suggested a small "botanical garden-inspired" area with plant identification signage. This would serve as an introductory experience for students before they head off on the trails.

They were supportive of having docents available for field trips, acknowledging that classroom teachers are not experts and that docent capacity to interpret things for students will be key.

Bus schedules have a significant bearing on school field trip participation. In Amphitheater School District, students on field trips must be back on campus by 1 p.m. Buses have strict schedules in the morning and afternoon, and their availability for field trip transport is controlled by this schedule. For all three of these schools, proximity to the Preserve means classes can maximize their time off-campus and not feel rushed.

While alignment to academic content standards established by the Arizona Department of Education is important, it is not the only criterion. Relevance to the school's curriculum is equally important. Two principals identified grades three and four being the best fit for field trips to the Preserve; the third principal identified grades two and six because those are the grades that study biology.

A key takeaway from the interviews is that program participation at the Preserve will be boosted by flexible content coverage that accommodates a spectrum of primary through upper elementary classes.

Another point to remember is that the Preserve has the potential of serving as a living laboratory that reveals human history, particularly history related to Indigenous People. Third and fourth grade history/social science content standards are very relevant for this content. The site can complement experiences offered at Steam Pump Ranch and broaden the suite of history programs available to the community.

The principals agreed that the Preserve also has the potential of offering STEM and STEAM-based programs. They reacted very favorably to ideas regarding use student use of devices to take and upload photos to community science-based apps such as iNaturalist, exploration of replicated artifacts in a simulated archaeo pit, engagement with nature journaling, and exploration of ways desert plants and animals yield possibilities for biomimicry and technological applications.

At the same time, use of devices can become an equity issue. Not all students have smartphones, so there would need to be a way to place devices in the hands of all students should device-dependent activities be pursued.

Questions for the VTNP youth meeting, November 21, 2022

Icebreaker for Jenny's purposes (5 minutes):

How many of you are familiar with Vistoso Trails Nature Preserve [show of hands]: three replies

How many of you have visited the Preserve [show of hands]: one reply

Guided discussion (25 minutes) :

On other trails you've hiked (anywhere) did you encounter any park features (like notable signs, displays, exhibits, programs) that really impressed you?

Starbucks at the top of a hill at Red Rock.

I like Vistoso's trails. The concrete is accessible plus it's great for cycling.

The landscape needs revegetation work. Invasive weeds are growing on the fairways. They need to be revegetated.

I like signs that teach you about the wildlife, birds, etc. They explain things about the environment.

My family walked along nature trails in Tucson. I enjoyed using clues on signs to look for wildlife.

How do you prefer receiving information about a place you are visiting (e.g., smartphone app, on-site interpretive panel, staff member or volunteer, etc.)?

I use All Trails. It helps with navigation and for defining trail lengths.

We don't need an app to navigate at the Preserve.

Are there any things you would like to see developed at the Preserve to enhance the visitor's trail experience?

Water fountains, benches, trash cans, dog waste bags. Outdoor ramada—a good idea. Add art (e.g., mural like the one on Tangerine that shows the desert sky from day to night. See TABY [Transportation-funded Art by Youth]. This program is supported by the Regional Transportation Agency).

Consider a nature-inspired sculpture.

Are there any things you would like to see developed at the Preserve to enhance your high school coursework?

At my school, we have an environmental science class. We also have hiking clubs and nature/ sustainability clubs, plus Boy Scout and Girl Scout groups. We have a lot of community groups. They work with State Parks (Catalina State Park) doing weeding and revegetation work plus hiking).

My school is always looking for volunteer opportunities. Trail restoration work could be one activity. We also like the idea of serving as trail guides.

The main thing out of all of this is the restoration and maintenance work. Can sod be added back in? Could we turn portions of the Preserve into a park where you could throw down a blanket and have a picnic? (Jenny said that she would submit all of these suggestions to the master plan team and that the team is working to advance a preserve. Sod replenishment might run contrary.)

The Arizona-Sonora Desert Museum has a lot of nooks and crannies along their trails. This is appealing.

Vistoso Trails Nature Preserve

Interpretive Summary

The Acorn Group in
collaboration with
Sites Southwest

Introduction

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Our work focuses on both interpretive and educational opportunities at this remarkable site. The former addresses strategies to connect with non-formal visitors who arrive voluntarily. The latter addresses strategies to connect with formal education audiences who seek out-of-classroom experiences that augment the curriculum. While the first group will benefit directly from new interpretive media and experiences at the Preserve, the second group will additionally benefit from new programs that lend meaning and authenticity to classroom learning. This requires alignment with grade-specific academic content standards and careful coordination with target schools. The interviews we conducted with school administrators have informed our programming recommendations, summarized in a second document, *Vistoso Trails Nature Preserve: Education Recommendations.*

This interpretive summary is a foundational tool for interpretation. It summarizes the content underlying new interpretive media. It establishes a framework that helps focus the Preserve's features as a means to convey conservation messages. And by establishing goals, it reveals outcomes of the visitor's experience and holds interpretation accountable.

Best Practices in the Field

The following recommendations are considered “best practices” in the field of interpretation. Future development of the Preserve’s interpretive media should reflect these qualities.

- Interpretive panels, other signage, interactives, digital media, and experiences at the Preserve have purpose. These elements support the Town of Oro Valley’s mission statement, as well as the interpretive goals identified in this summary.

- Trailheads, interpretive media, experiences, staff, and volunteers create a welcoming environment where all visitors are valued and receive equal access to opportunities and services.

- The Preserve offers high recreational and educational value. Interpretive panels, other signage, interactives, digital media, and experiences are enjoyable and accessible. Visitors appreciate the experience and gain knowledge and inspiration in the process.

- The interpretive panels, other signage, interactives, digital media, and experiences are meaningful. Visitors will readily embrace them because they find them personally relevant.

- All of these elements are strategically organized: well-planned, well-designed, and guided by storylines that resonate with visitors. At the same time, their placement invites free choice. The audience can decide the sequence and time commitment for visiting each element.

- Last, these elements reflect an overarching theme that connects various facts and concepts together. The theme organizes all the content and makes it easier for the audience to grasp the message behind the subject matter. Understanding the “big ideas” behind the Preserve’s natural and cultural resources and stories is an essential step in this work.

Without a thematic approach, people are less likely to find meaning that is relevant to them and easily organized within their own minds. Linking the Preserve’s tangible elements—its landscapes, viewsheds, life forms, and artifacts—to intangible meanings is one way to achieve this. While important in their own right, these elements can also serve as portals to deeper meaning.

Our goal is to enhance the narrative so that visitors are inspired, open to understanding how the Preserve and larger Sonoran Desert matter to them, and willing to adjust behaviors that better reflect desert stewardship values.

Goals and Objectives

Interpretive planning is mission-driven and purposeful. It is based on goals and objectives that establish guidelines and benchmarks. Together, these goals and objectives guide the formation of interpretive media during the planning process and later serve as the basis for evaluation as the media are designed, created, and installed.

Goals are general statements about desired outcomes. They are the ultimate result of interpretation. They should reflect Oro Valley Parks and Recreation's mission statement[1] while also addressing the general ways the Preserve's media and experiences affect the visitor emotionally, intellectually, and behaviorally. They should also serve as the basis for future evaluation that measures the effectiveness of new interpretive media.

While goals are general statements about desired outcomes, objectives are more specific and measurable. Their purpose is to support the goals and provide a means for evaluation.

Emotional goals (how people feel)

1a. People will have an enjoyable and satisfying time visiting Vistoso Trails Nature Preserve (Preserve).

1.a.1 90% of surveyed people will express a high degree of satisfaction with their visit to the Preserve.

1b. People will feel welcome at the Preserve.

1.b.1 90% of surveyed people will indicate feeling welcomed at the Preserve by personnel, signage, and other media.

1c. People will appreciate the work of Preserve Vistoso, The Conservation Fund, and Town of Oro Valley in establishing the Preserve.

[1] The mission statement of Oro Valley Parks and Recreation is to inspire connection through recreation.

1.c.1 90% of surveyed people will express a high degree of appreciation for the ongoing work of volunteers and staff associated with the Preserve.

1.c.2 90% of surveyed people will indicate appreciation specifically toward Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley for their work establishing the Preserve.

1d. People will be awe-struck by the beauty of the Sonoran desert as experienced at the Preserve.

1.d.1 90% of surveyed people will indicate that the Preserve, the vistas, and the Sonoran Desert generate feelings of awe and amazement.

1e. People will be excited by the recreational, interpretive, and educational opportunities available to them at the Preserve.

1.e.1 80% of surveyed people will report being excited about the opportunities available to them and their families.

1.e.2 80% of surveyed people will indicate they intend to explore the Preserve's recreational, interpretive, and educational opportunities.

2. Cognitive goals (what visitors know)

2a. People will learn about the Sonoran Desert.

2.a.1 70% of surveyed people will be able to describe one notable feature about the Sonoran Desert they learned during their visit to the Preserve.

2b. People will learn about the Preserve's rich biological diversity.

2.b.1 70% of surveyed people will be able to describe in general terms what the term biological diversity means.

2.b.2 70% of surveyed people will be able to describe what is special about the Preserve's biological diversity.

2c. People will learn about the Preserve's plant communities and how they have sustained people and wildlife.

2.c.1. 70% of surveyed people will be able to describe how one plant community in the Preserve has sustained wildlife and people over time.

2d. People will learn about the region's long-standing human history.

2.d.1 70% of surveyed people will be able to identify the Hohokam as an Indigenous People who lived on this land.

2.d.2 70% of surveyed people will be able to identify the citizens of the present-day Tahono O'odham Nation as descendants of the Hohokam.

3. Behavioral Goals (what visitors do)

3a. People will visit the Preserve and experience the Sonoran Desert.

3.a.1 100% of surveyed people will indicate they visited the Preserve's trails.

3b. People will read and interact with the interpretive media.

3.b.1 70% of surveyed people will indicate they read the interpretive panels and learned something during their visit.

3.b.2 70% of surveyed people will indicate they read other media, such as orientation signs, directionals, and confidence markers during their visit.

3c. Teachers and students will use the Preserve as an outdoor classroom.

3.c.1 Once the master plan is implemented, school field trips to the Preserve will increase by at least 25% the first year.

3.c.2 Following the first year after plan implementation, school field trips to the Preserve will continue to increase each year until reaching capacity.

3d. People will abide by rules and engage in appropriate behavior at the Preserve.

3.d.1 90% of surveyed visitors will abide by the Preserve's rules.

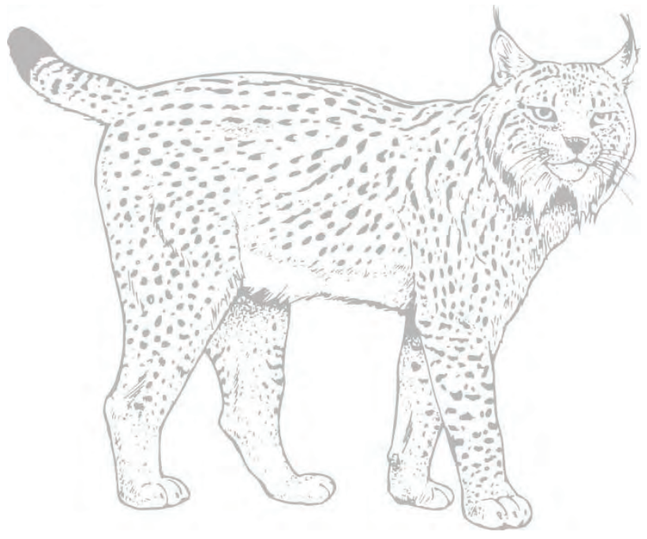
3.d.2 90% of surveyed visitors will demonstrate appropriate behaviors that reflect desert stewardship values.

3.d.3 Town staff and volunteers at the Preserve will report a 30% decline in the incidence of inappropriate behavior and rules violations following implementation of the master plan.

3e. When opportunities arise, people will engage in stewardship activities at the Preserve.

3.e.1 Town staff and volunteers at the Preserve will report a 30% increase in community participation in restoration activities following master plan implementation.

3.e.2 Town staff and volunteers at the Preserve will report a 30% increase in student participation in restoration activities—as part of their community service or service-learning credits—following master plan implementation.



Message Hierarchy

The message hierarchy presents information in a logical and relevant manner. It consists of an overarching theme, subthemes, and subtheme-specific key concepts. It should serve as an "advance organizer," giving visitors a sense of where the exhibit media are going and making it easier to connect their content to other information.

The theme is the "take-home message" we want visitors to grasp and remember. It is not the subject of the Preserve's narrative. Rather, it is the unifying idea that pulls everything together and causes pause and reflection in the audience. Like a subtheme, it is rarely stated verbatim.

The subthemes further develop the central theme, allowing for a logical progression into storylines. A well-planned experience typically conveys three to five subthemes, all of which are subordinate, but related, to the central theme.

Key concepts in turn support the subthemes and form the foundation of the hierarchy. They keep the information "in check," ensuring that we cover important material accurately, keep the interpretive goals in mind, and avoid straying from the messages.

Theme

Once a golf course and now a Preserve, this site demonstrates nature's resiliency. Plants and wildlife of the Sonoran Desert continue to "take back" the land, increasing the richness of both the Preserve and the visitor's experience.

Subthemes

Thanks to residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley, the Vistoso Golf Course was purchased and repurposed as a nature preserve.

Vistoso Trails Nature Preserve is a remarkable piece of the Sonoran Desert. Spanning over 200 acres, it is home to cacti, trees, shrubs, and wildflowers, as well as a dazzling array of wildlife.

Nature is resilient, but still, it can benefit from human intervention. Removal of invasive weeds and revegetation with native desert plants are ongoing projects at the Preserve.

The Hohokam and other Indigenous People have lived on this land for thousands of years. Resilient and resourceful, the Hohokam were sophisticated desert farmers.

Subthemes and key concepts

Subtheme one

Thanks to residents, donors, Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley, the Vistoso Golf Course was purchased and repurposed as a nature preserve.

Key concepts

Key concept: The Preserve is situated on the former Vistoso Golf Course which was established in 1995-1996 and shuttered in 2018.

Key concept: The Preserve lies adjacent to the Rancho Vistoso development within the Town of Oro Valley. The combined efforts of Preserve Vistoso, The Conservation Fund, and the Town of Oro Valley ensured that the Golf Course property was purchased as a nature preserve.

Key concept: The Preserve is a significant asset to the Town of Oro Valley. Not only does it offer prominent recreational and educational value, but also ecological value.

Key concept: The Preserve is framed by the Tortolita Mountains to the north and Coronado National Forest to the east. The Preserve's vistas are expansive; its landscape beckons both people and wildlife.

Key concept: Dark skies are particularly noteworthy from the Preserve's high points.

Key concept: The Preserve is part of the Sonoran Desert which contains globally remarkable biological diversity. Plant communities that are present on the Preserve are in the process of being restored.

Subtheme two

Vistoso Trails Nature Preserve is a remarkable piece of the Sonoran Desert. Spanning over 200 acres, it is home to cacti, trees, shrubs, and wildflowers, as well as a dazzling array of wildlife.

Key concepts

Key concept: The Sonoran Desert covers roughly 120,000 square miles across five states and two countries. On a global scale, both its pollinator diversity and reptile diversity are renowned. The Vistoso Trails Nature Preserve "returns" 200 acres to this remarkable desert.

Key concept: A snapshot of the Sonoran Desert, the Preserve is home to numerous mammals, birds, reptiles, amphibians, and invertebrates, as well as plants. As sections of the Preserve become restored, more wildlife will likely be attracted to it.

Key concept: The Preserve's wildlife is generally subdued and shy, with the exception of the javelinas, cottontails, and some of the birds. Calls and songs often announce the presence of birds before they are seen.

Key concept: The Preserve features plants native to the desert scrub and mesquite bosque communities. Shrubs (jojoba, creosote, chuparosa, acacia), cacti, and succulents form medium-height clusters of scrub, while taller trees, including palo verde, mesquite, and ironwood form taller woodlands, or bosques, especially near intermittent streambeds.

Subtheme three

Nature is resilient, but still, it can benefit from human intervention. Removal of invasive weeds and revegetation with native desert plants are ongoing projects at the Preserve.

Key concepts

Key concept: Plants that are native to this region are adapted to the desert's growing conditions. Native wildlife recognizes them as sources of food. Exotic species, such as the remnant Bermuda grass are not necessarily adapted to the desert's growing conditions or controlled by or recognized by native wildlife.

Key concept: Volunteers and students engaged in service-learning and community service work, raise native plants in the Preserve's nursery, and weed and revegetate sections of the Preserve.

Key concept: Nature is reclaiming the Preserve. Native desert plants continue to take hold and wildlife continues to frequent the Preserve as residents and as migratory species.

Subtheme four

The Hohokam and other Indigenous People have lived on this land for thousands of years. Resilient and resourceful, the Hohokam were sophisticated desert farmers.

Key concepts

Key concept: The Hohokam were present on this land and left clues of their presence. Both they and their ancestors are known for their sophisticated irrigation systems that watered crops, including maize (corn), beans, and squash.

Key concept: The Hohokam native village of Sleeping Snake covers 99 acres within the Preserve boundaries. Archaeological evidence indicates that a ball court anchored the village, pit houses and terraced gardens surrounded it, and art was produced with imported pottery, obsidian, and shell. Intensive occupation of Sleeping Snake Village occurred between 950 and 1150 AD.

Key concept: Artist-created petroglyphs are found at the Preserve. While not authentic, the petroglyphs nevertheless represent a replication of art created thousands of years ago.

Key concept: A petroglyph is an image that is carved, incised, or scratched into stone. It differs from a pictograph that is painted on stone, using natural pigments.

Key concept: Today, descendants of the Hohokam—citizens of the Tohono O'odham Nation—remain connected to the Sonoran Desert.

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