HAYDEN BUTTE AND PAPAGO PRESERVES

MANAGEMENT PLAN

August 10, 2024

Tempe

LOGANSIMPSON

ACKNOWLEDGMENTS

We would like to thank the many citizens, staff, and partners who provided extensive input during the development of the Hayden Butte and Papago Preserves Management Plan.

DESERT CONSERVATION COMMISSION

COMMUNITY SERVICES DEPARTMENT

HISTORIC PRESERVATION COMMISSION

NEIGHBORHOOD SERVICES

PARKS AND RECREATION

We wish to acknowledge that Tempe is the homeland of the Native people who have inhabited this landscape since time immemorial. Anthropological studies document large and advanced Ancestral O'Odham settlements located throughout the entirety of present-day Tempe and recognize the ancestral lands of the O'Odham (known as the Pima), Piipaash (known as the Maricopa), and their ancestors as extending far beyond our community. This land continues to be spiritually connected to the O'Odham of the Salt River Pima-Maricopa Indian Community and Gila River Indian Community. The SRPMIC and GRIC, located northeast and south of Tempe, respectively, are confederations of two unique groups with their own languages, customs, cultures, religions, and histories; the O'Odham and the Piipaash. Both the O'Odham and the Piipaash are oral history cultures.

The landscape is sacred to the O'Odham and Piipaash and reflects cultural values that are central to their way of life and their self-definition. Their oral history and song culture are indelibly tied to tangible places that are associated with specific historic, cultural, and religious values. Settlement patterns, advanced irrigation practices, and other lifeways driven by a deep understanding of and respect for the landscape are directly attributable to the ancestors of the O'Odham and Piipaash and served as the template for the establishment of Tempe. We accept the responsibility of stewarding those places and solemnly pledge to consider this commitment in every action.

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MAPS, TABLES, AND FIGURES

Maps, Tables, and Figures List will be updated.

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1. INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

The purpose of the Hayden Butte and Papago Preserves Management Plan (Management Plan or MP) is to document the existing conditions of the natural and cultural resources of the Preserves and make specific recommendations for protection and restoration of on-site resources, allowable activities and uses, educational opportunities, management strategies, and specific near-term or future activities or repairs that could be funded and implemented through grants or other sources.

The objective of this Management Plan is to provide direction and guidance on the management and operation of the Preserves in a manner that is compliant with Tempe City Code Chapter 23, Article V, as amended by Ordinance No. 2002.22 and Resolution Nos. 2002.43 (Hayden Butte Preserve) and 2017.138 (Papago Preserve). Emphasis is focused in this Management Plan on conserving and maintaining the natural conditions and functions of the Preserves as an open space resource while allowing appropriate public access and use.

Purpose of a Preserve

The City's Preserve Ordinance identifies three purposes for a preserve. They are:

- The purpose of a preserve is to establish a preserve of desert land as a habitat for desert vegetation, wildlife and natural resources, and to protect archaeological, paleontological and historical resources and sites, while providing appropriate public access.
- A preserve will be left in as pristine a state as possible to maintain for this and future generations a nearby natural desert refuge from the rigors of urban life.
- A preserve will not contain traditional facilities or improvements associated with a public park but may contain facilities or improvements that the city determines are necessary or appropriate to support its activities.

The ballot language presented to Tempe residents to amend the City's Charter to allow the Papago Preserve states that the use of the Preserve is to ..."Provide cultural, educational, and recreational opportunities designed to heighten appreciation and enjoyment of the natural Arizona desert environment."

The Preserve Ordinance also stipulates that, except as authorized by permit, civil and criminal penalties can be assessed for violation of the Preserve rules, including but not limited to using a motorized vehicle, camping, defacing or damaging Preserve material, inscribing messages or symbols on any natural feature, going off trails, or endangering the safety of other Preserve users.

Unhoused Population

The Hayden Butte and Papago Preserves are used by unhoused persons; the use is more pronounced in the southern portion of the Papago Preserve. Evidence of impromptu encampments, natural resource damage, including vegetation damage, and illicit activities exists at various locations. This population presents concerns about crime, security, and safety of Preserves visitors, public health, trash, and maintenance. The City has recently reinstated their Park Ranger program and has begun having Rangers patrol the Preserves, as well as other park facilities in the City. It is presumed that the Ranger Program coupled with future City policies and procedures will significantly resolve the homelessness- related issues. As a result, no specific recommendations are included in the Management Plan to address the unhoused challenge.

Native American Input

The Hayden Butte and Papago Preserves are known to be areas of great cultural significance to the O'Odham (Pima) and Piipaash (Maricopa). Portions of the lands within each Preserve has have been previously recognized as a Traditional Cultural Property (TCP) by the Four Southern Tribes. The Salt River Pima-Maricopa Indian Community (SRPMIC) is currently representing the Four Southern Tribes (Tribes) in a dialogue process with the City to obtain the Tribes' understanding of the natural and cultural resources within the Preserves and their observations about the Management Plan recommendations. Because those discussions are ongoing, this report does not contain the Tribes' perspective on the significance of the Preserves to the Tribes.

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1.2 REPORT ORGANIZATION

This document contains inventory maps, provides a summary of resources that currently exist, and includes a preferred plan map, descriptions of proposed improvements, management recommendations, implementation activities, and an initial assessment of magnitude of costs for some of the proposed activities.

Within each subsection of this report, there is a discussion of Hayden Butte Preserve followed by a discussion of the Papago Preserve features, elements, and considerations.

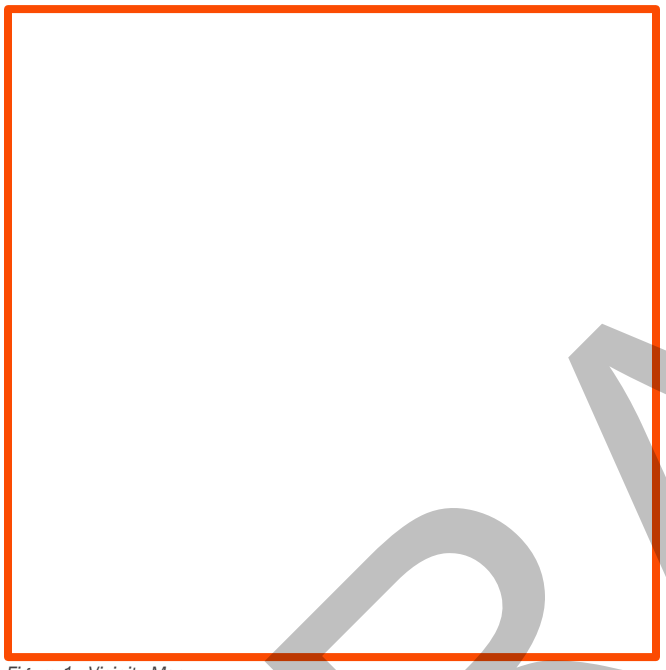

Figure 1. Vicinity Map

Figure 2. Location Map

1.3 REGIONAL CONTEXT

Hayden Butte Preserve

Hayden Butte is located on the south bank of the Salt River in the Phoenix Basin of Central Arizona - which is located in the northern portion of the Sonoran Desert of the southwestern United States and northern Mexico. While the official name of Hayden Butte is "Tempe Butte," this report will refer to it as "Hayden Butte" as adopted by City Council in 1961.

PROJECT AREA OVERVIEW

Hayden Butte rises nearly 350 feet from its base at 1,150 feet above mean sea level (AMSL) to 1,498 feet AMSL, covers approximately 59 acres, and despite being surrounded by urban development, has remained an "island of nature" in the middle of the City.

Hayden Butte Park was established by the City of Tempe in 1983, and in 2002 was designated as Hayden Butte Preserve. It was listed in the Tempe Historic Property Register in August of 2008 and in the National Register of Historic Places in 2011. It is also recognized as a Traditional Cultural Property by the Four Southern Tribes.

LAND USE HISTORY

- Pre-10,000 BC – Tempe Butte is a landform known as a hogback or a long ridge of resistant rock. The crest of the butte is composed of altered andesite that is approximately 18 million years old. The lower slopes are composed of river-lain sedimentary rocks above solidified rhyolitic ash. The Butte is known as Oidbad Do'ag in the Akimel O'Odham language which means Dead Field Mountain. The Akimel O'Odham maintain that they have always lived in the vicinity of the Preserve.
- 10,000 BC–AD 450 – The earliest archaeological evidence for human activity in the vicinity of the Preserve dates to the Late (8500-5000 BC) and Middle Archaic (5000-1500 BC) periods. Excavations conducted in the shadow of the Butte indicate that Archaic period peoples visited the area to gather, process, and consume riparian resources growing along the banks of the Salt River and edible plants growing atop Tempe Butte.
- AD 450-1450 – Beginning around AD 450 and persisting for the next 1,000 years, a large Hohokam settlement occupied the land surrounding Tempe Butte. This village included at least three examples of monumental architecture, dozens of residential habitation areas, and a network of irrigation canals that delivered river water to fields of corn, beans, and squash. Additionally, between approximately AD 1150-1450, another, smaller community existed on the northwest slopes of Tempe Butte that practiced terrace farming, evidence of which remains visible to this day.

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- AD 1450-1700 – The traditional historical narrative is that the area around Tempe Butte represented an unoccupied zone between the Akimel O'Odham residing on the Gila River and the more mobile groups residing in upland areas north of the Salt River. However, archaeological evidence refutes this narrative. Archaeological evidence suggests that the Akimel O'Odham farmed and collected wild resources in the vicinity of the Preserve.
- Circa 1868 – Charles Hayden, founder of modern Tempe, is said to have climbed the butte while waiting for the then-raging Salt River to subside. When atop the butte, Hayden recognized the potential of the lands surrounding the butte and the river to its north, leading him to relocate from Tucson to what is now Tempe just a few short years after this event. Although possibly apocryphal, the story of Hayden's Butte ascent is popularly accepted as Tempe's founding story. Regardless of whether Hayden climbed to the summit, he would have passed by the butte on his trek northward through the Valley as the butte, in conjunction with the landforms in the Papago Preserve, creates a hardbottom river crossing point that has been utilized for millennia.
- 1875 – Hayden acquires 160 acres of land in what is now Tempe. In addition to the properties on which the Charles T. Hayden House (formerly La Casa Vieja) and the Hayden Flour Mill now sit, this acreage includes the north half of the Hayden Butte Preserve and a portion of the Papago Preserve.
- 1888 – Joseph Campbell is granted trusteeship over much of what is now downtown Tempe, to include the south half of the Hayden Butte Preserve. This acreage, in addition to much of the property acquired by Hayden in 1875, was purchased by the Tempe Land and Improvement Company, which aggressively marketed the potential of the growing community.
- Late 1800s/Early 1900s – Quarrying activity removes stone from the butte for use in building foundations, roads, and other components of the built environment. Some of the stone removed from the butte was used in the construction of the 1873 Charles T. Hayden House, located at the southwest corner of Mill Avenue and Rio Salado Parkway, and Old St. Mary's Church, a 1903 building which sits at the northwest corner of University Drive and College Avenue.
- 1902 – Tempe constructs a water reservoir at a point high along the south face of the butte. This reservoir was a key component of the town's advanced and efficient early water system. Unfortunately, the wooden roof of this reservoir, the remains of which are located on ASU-owned land east of the Hayden Butte Preserve, burned in 1949, at which point it was decommissioned.
- 1917 – The United States Geographic Board, now known as the United States Board on Geographic Names, selects Tempe Butte as the formal name for the landform. Tempe Butte remains the official name to this day.
- 1920 – Tempe purchases much of today's Hayden Butte Preserve from the Tempe Land and Improvement Company.
- 1935 – The Tempe Chamber of Commerce proposes butte beautification efforts and calls for it to be named a public park. One beautification concept involved the creation of "a high class recreational area for Tempe and the surrounding district" that would include "a spray waterfall from the top of the butte" accompanied by palm trees, bridle paths, and an observation platform at the summit. The oasis concept failed to materialize, as did the park designation.
- 1950 – Tempe builds a one-million gallon water reservoir midway up the south face of the butte; a two-million gallon tank to the east of the 1950 reservoir followed in 1958.
- 1961 – The Tempe City Council adopts the name Hayden Butte, in honor of Tempe founder Charles Hayden and United States Senator Carl Hayden, in place of Tempe Butte. However, the name does not appear to have been put forward for federal approval. As such, the landform retains Tempe Butte as its official name.
- 1983 – Tempe names Hayden Butte a City park.
- 1990 – Trail improvements make the butte more accessible to users; the main trail is named in honor of Tempe restauranteur Leonard Monti in 1994.
- 2002 – Community concerns relating to development reaching the slopes of the butte following the 1998 Hayden Flour Mill closure and subsequent site redevelopment discussions prompt passage of the Preserve Ordinance (Ordinance 2002.22) and the elevation of Hayden Butte Park to preserve status.
- 2008 – Hayden Butte is added to the Tempe Historic Property Register in recognition of its historic and cultural significance.
- 2011 – Hayden Butte is listed in the National Register of Historic Places.
- 2016 – Tempe undergrounds electrical infrastructure present on the west and southwest slopes of the butte, thereby eliminating visual blight and moving the Hayden Butte Preserve setting closer to that envisioned by the Preserve Ordinance. Telegraph, telephone, and/or electrical poles and associated infrastructure had been present in the now-undergrounded alignments for more than a century.
- 2019 – Tempe removes a fifty-foot broadcast tower and associated equipment from atop the summit. Governor Doug Ducey and the Arizona State Historic Preservation Office recognize the City's 2016 and 2019 efforts with a Governor's Heritage Preservation Award.

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Papago Preserve

The 227-acre Papago Preserve is a large area of undeveloped Sonoran Desertscrub located on the north bank of Tempe Town Lake approximately a third of a mile directly north of the Hayden Butte Preserve. The Preserve gains approximately 185 feet of elevation from its lowest point near the SR 202 (Red Mountain) Freeway at its southern boundary to the top of the bedrock outcrops near the Johnny G. Martinez Water Treatment Plant (1,168 feet AMSL to 1,353 feet AMSL). The Papago Preserve is trisected by East Marigold Lane and East Curry Road, creating distinct areas within the Preserve.

The Papago Preserve is part of the larger Papago Park that encompasses lands within the cities of Phoenix and Tempe. In 2010, the cities approved the Papago Park Regional Master Plan. The purpose of the plan was to develop a shared set of goals, objectives, and guidelines to direct protection efforts, growth, and change that would allow Papago to become a Great American Park. This would strengthen its sense of place and identify, improve visitor experiences, and increase resource stewardship. Papago Preserve is the largest natural desert open space in the City and primarily offers passive recreation opportunities such as hiking, biking, and nature watching.

A special Citywide election was held in March of 2018 to affirm the establishment of the Papago Preserve in response to a 2017 City Council resolution that defined the Preserve's boundaries.

LAND USE HISTORY

- Pre-14,000 BP-AD 450 The geology of Papago Preserve is dominated by red-colored sedimentary rocks (breccia, conglomerate, sandstone, and siltstone) that were tilted about 20 to 25 million years ago so that they now dip to the southwest. Archaeological evidence for Paleoindian or Archaic period land use has not been documented within the Papago Preserve. However, it is possible that evidence of such early deposits is buried within the dry caves and overhangs that are ubiquitous throughout the Preserve.
- AD 450-1450 The Hohokam occupied the Papago Preserve. A recent archaeological survey in the eastern part of the Preserve identified Hohokam habitation features and artifacts that date between AD 750-950. Another settlement (referred to by archaeologists as Loma del Rio) existed atop a small knoll in the western part of the Preserve between AD 1150-1450. This settlement included a residential structure with six contiguous adobe-walled rooms and a suite of agricultural terraces nearby that are similar in form and age to the agricultural terraces located across the Salt River at Tempe Butte.
- AD 1450-1700 Archaeological evidence of early Akimel O'Odham land use within the Papago Preserve is limited. It includes a shrine adjacent to Loma del Rio as well as multiple archaeological surveys conducted within the Preserve have noted O'Odham or Piipaash pottery interspersed among the prehistoric pottery. These studies have also noted that the late pottery's association with the many caves identified within the Preserve. These observations may be partially attributable to the approximately 240 predominantly Akimel O'Odham families who settled on the north side of the Salt River opposite of the historic Tempe townsite during the 1860s-1870s within what would eventually become the Papago Preserve.
- 1860s – Individuals passing through the Salt River Valley on their way to or from Prescott, the first Territorial capital, cross the River at a point near the present Mill Avenue Bridge alignment as the landforms in the Papago Preserve, in conjunction with Hayden Butte to the south, create a hardbottom river crossing point that has been utilized for millennia. This route, now the location of bridges carrying automobile, freight rail, light rail, and pedestrian bridges, still facilitates travel north and south across Tempe Town Lake.
- 1879 – President Rutherford B. Hayes sets aside approximately 680,000 acres of land, to include Papago Preserve and portions of what is now Hayden Butte Preserve, for the O'Odham and Piipaash. Later that year, Hayes rescinds his original order and instead sets aside less than 50,000 acres of land, none of which is included in Papago Preserve or Hayden Butte Preserve. The land set aside in the second executive order, in addition to some other small additions, now comprises the Salt River Pima-Maricopa Indian Community.
- 1887 – Frank Cushing's Hemenway Expedition, an early archaeological study of Tempe and its surrounding areas, establishes Camp Augustus within or in close proximity to what is now the Papago Preserve. This temporary base of operations may have been located near the parking lot for the southern section of Moeur Park. Of note, Cushing noted O'Odham living on lands now included in the Papago Preserve.
- 1903 – The Phoenix and Eastern Railroad lays track in the southern portion of what is now the Papago Preserve; although the tracks were removed in 1930, the rail cut is still visible.

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- 1914 – President Woodrow Wilson creates the Papago Saguaro National Monument, a 2,000-acre area showcasing "giant and many other species of cacti and the yucca palm, with many additional forms of characteristic desert flora," which "grow to great size and perfection and are of great scientific interest, and should, therefore, be preserved." The vast majority of the present-day Papago Preserve was included in the monument.
- 1930 – Papago Saguaro National Monument is delisted; the Federal government turned over lands formerly within the monument to the State of Arizona, the City of Phoenix, the City of Tempe, and the Salt River Valley Water Users' Association (SRP). The Eisendrath House, a two-story Robert Evans-designed adobe home, is built on a parcel immediately west of the former monument property.
- 1934 – The Civil Works Administration, a Depression era Federal jobs program, builds a tuberculosis sanatorium north of Curry Road and immediately east of Moeur Park. The 1934 building was replaced in 1963. The property, owned by ASU, is not included in the Papago Preserve.
- 1967 – Completion of the Papago Water Treatment Plant, now known as the Johnny G. Martinez Water Treatment Plant. This facility supplies the water that feeds the Green Line and, ultimately, the Papago Park pond south of Curry Road.
- 1973 – Canal Park, now known as Evelyn Hallman Park, opens. Designed by Tempe architects Kemper and Michael Goodwin, this park is notable as an early recreational amenity adjacent to an irrigation canal.
- 1974 – Curry Road is realigned to improve safety. The realignment removed dangerous curves that led the Arizona Republic to deem the road "hazardous to even the most cautious drivers" in a 1967 article detailing the numerous accidents that had occurred along the curvy thoroughfare. The former alignment is now a trail within the Papago Preserve.
- 1990s – The LoPiano Mesquite Bosque, a designed habitat for native flora and fauna, opens in 1993. The City of Tempe acquired numerous privately owned parcels to the immediate north and south of the Indian Bend Pump Ditch, most now within the current Papago Preserve, during this decade.
- 2009 – The Sandra Day O'Connor House, a 1958 adobe home built for the late Justice O'Connor, was relocated from Paradise Valley to what is now the Papago Preserve, thereby saving it from demolition.
- 2018 – Tempe voters overwhelmingly approve a charter amendment establishing the 300-acre Papago Preserve.

1.4 STAKEHOLDER AND AGENCY ENGAGEMENT

Four planning workshops were conducted as part of the Management Plan preparation. Each workshop sought to obtain public responses through online surveys and direct responses at in-person meetings. A brief description of the workshops is provided below.

Workshop #1

Virtual and in-person were held for Workshop #1. There were 23 online registrations for the virtual meeting. Fifteen people attended the in-person meeting which was held at the Arizona Heritage Center. At both meetings, Wayne Colebank and John Southard of Logan Simpson gave a short presentation about the Papago and Hayden Butte Preserves Management Plan and its objectives. The presentation provided details about each of the two Preserves and described the purpose of the management plan. The participants were given a chance to ask questions following each presentation.

The virtual meeting focused on two questions related to potential types of funding and the potential for a bike park. Nineteen questions were asked at the in-person meeting. Topics included trails/trail condition, concern about damage resulting from the unhoused population, maintenance practices, enforcement of Preserve rules, which areas of the Preserves will be included in the Management Plan, and the planned budgets for improvements. Additional questions focused on signage within the Preserves, working with Native American communities, and the effect on the Papago Preserve from the future John McCain Library.

In addition, the City utilized several methods to provide information to the public and stakeholders regarding the project, the meeting, and opportunities for input. The City's webpage was updated continuously. Further, information was shared through direct mailers, emails, Tempe Forum, Instagram, Google search engine, Spikes, and press releases and yard signs. The City also conducted an online survey which resulted in a total of 393 visitors and 241 responses.

CITY OF TEMPE ONLINE SURVEY ASSOCIATED WITH WORKSHOP #1

The City offered an online survey that was available from November 13 to November 27, 2023 at tempe.gov/Forum. The survey was divided into three sections. One section addressed the Hayden Butte Preserve, one addressed the Papago Preserve, and one addressed both preserves together. The input obtained from the online survey is noted below.

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Hayden Butte Preserve

Nearly 70 percent of respondents regarding the Hayden Butte Preserve indicated that they currently visit the Preserve. About a third of those who visit the Preserve do so between one and five times per year. About a fifth indicated they visit the Preserve monthly, and more than 10 percent visit weekly. The most popular activity is hiking, followed by walking, biking, and climbing.

When asked what was missing from the Preserve, respondents indicated a desire for more or improved trails. Some cited the lack of biking-specific trails or facilities such as a bike park or berms, and jumps. Multiple respondents cited a need for improved trail maintenance for existing trails. Several people indicated that existing trails were difficult to use or mentioned safety issues related to the condition of the trails. Signage, including a lack of signage for trails or to interpret the natural land cultural history of the Preserve, was also noted. Multiple people mentioned the desire for access to or lack of rock climbing facilities. Some people indicated that they would like to see more vegetation and trees. Shade, whether from trees or shade structures, was another theme.

Other issues that were mentioned included the effect of the unhoused population on the Preserve. Concerns related to this population included safety, drug use, potential crime, and trash.

Papago Preserve

Nearly 94 percent of respondents regarding the Papago Preserve indicated that they currently visit the Preserve. More than half use the areas south and north of Curry Road equally, with about 30 percent of the respondents indicating they typically use the area north of Curry, with about 10 percent indicating they use the area south of Curry. About a third who visit the Preserve do so weekly, followed by one to five times per year; monthly, and six to ten times per year. Just over 10 percent of the respondents visit the Preserve daily. The most popular activity is biking, followed by hiking, walking, and rock climbing.

When asked what was missing from the Preserve, respondents overwhelmingly mentioned trails, ranging from the desire for more, better-defined trails to improved trail signage. Respondents also strongly identified biking trails and facilities as a desire. Climbing areas and facilities were repeatedly noted. Other items identified included interpretative signage, the need for trash cans, and the desire for drinking water. As with the Hayden Butte Preserve, respondents mentioned the effect of the unhoused population, including safety, drug use, potential crime, and trash.

Both Preserves

When asked if an increase in signage should be included for both Preserves, more than half of respondents said yes. Respondents wanted directional signage (including maps), as well as educational/interpretive signage. Respondents also mentioned signage that included rules for Preserve use.

Respondents were also asked what uses or facilities should be added, modified, or eliminated.

Respondents suggested that bathrooms, climbing facilities, exercise stations, trash cans, additional trails, bike facilities (including a bike park), and drinking water be added, among other things. Multiple respondents suggested improving biking and climbing facilities. Items suggested for elimination included spider trails, motorized bicycles, and BMX/mountain biking facilities.

On the question of how the desert environment should be preserved, respondents suggested signage that includes rules for Preserve use, designated trails with clear trail markers/signage, adding trash cans, replanting native vegetation, closing the area to climbers, providing educational programs on the value of the desert environment, removing invasive plants, encouraging wildlife habitat, enhanced security patrols, not allowing camping, and limiting nighttime lights.

On the question of maintenance and operations, respondents suggested more security, reducing homeless activity, adding trash cans, organizing regular community-based clean-ups, enforcing against littering, allowing climbing user groups to maintain climbing routes, establishing a program to encourage volunteers from the community and ASU to educate users about the environment and stewardship and posting signage about appropriate use of the Preserves.

(Discussion of Workshops 3 and 4 to be added.)

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2. EXISTING CONDITIONS

2.1 NATURAL RESOURCES

Geology and Soils

HAYDEN BUTTE PRESERVE

Hayden Butte Preserve occurs within the Basin and Range physiographic province of the North American Cordillera of the southwestern United States. Formed during middle and late Tertiary time (10 to 15 million years ago), the Basin and Range province is dominated by fault-controlled topography. The topography consists of mountain ranges and relatively flat, alluviated valleys. These mountain ranges and valleys have evolved from generally complex movements and associated erosional and depositional processes. Hayden Butte lies within the Hayden Buttes physiographic area of the Basin and Range province.

Hayden Butte is composed of three general rock types, laid down horizontally in a basin-type setting. The lower rock type is rhyolitic rock derived from volcanic ash. The middle rock type consists of sedimentary sandstone and mudstone deposits derived from river deposition and locally referred to as the Tempe Beds. The upper andesitic cap rock type is derived from lava flow. Figure 3 depicts the upper andesitic cap (Tv), the Tempe Beds (Ttb) unit, and slope colluvium deposits (Qsc). Colluvium is a general term applied to loosened and incoherent deposits, usually at the foot of a slope or cliff and brought there chiefly by gravity. At Hayden Butte, recent colluvium consists of up to boulder-sized fragments that have been dislodged by gravity and weathering and have toppled down the surface of the slope. Older colluvium deposits are described as gray, poorly sorted, strongly calichified (cemented by calcium carbonate), angular talus on lower bedrock slopes. After river deposition of the rock, the Hayden Butte area was tilted downward toward the south through additional geologic processes.

Man-Made Fill

Portions of the original landscape at Hayden Butte have been altered by human activity. The most significant alteration is the result of bedrock excavation to construct the water tanks on the south face of Hayden Butte. The excavation burden was placed over the existing slopes to create the building pad for the tanks as shown in Figure 4. Other minor areas of man-made fill placement occur where hiking trails have been constructed (predominantly on the south and west faces of Hayden Butte). Historically, mineral prospecting may have occurred on the north face of Hayden Butte causing minor alterations to the landscape, but these impacts are hardly noticeable.

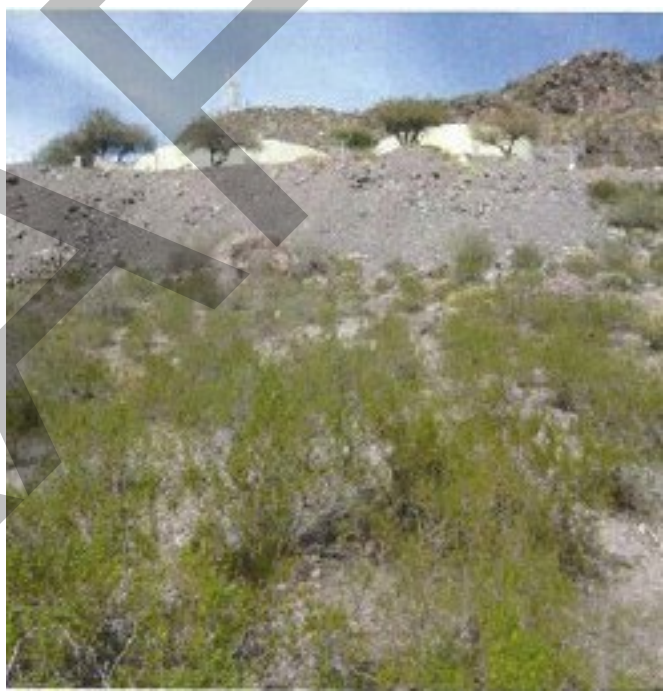

Figure 4. Looking north at excavation spoils south of water tanks

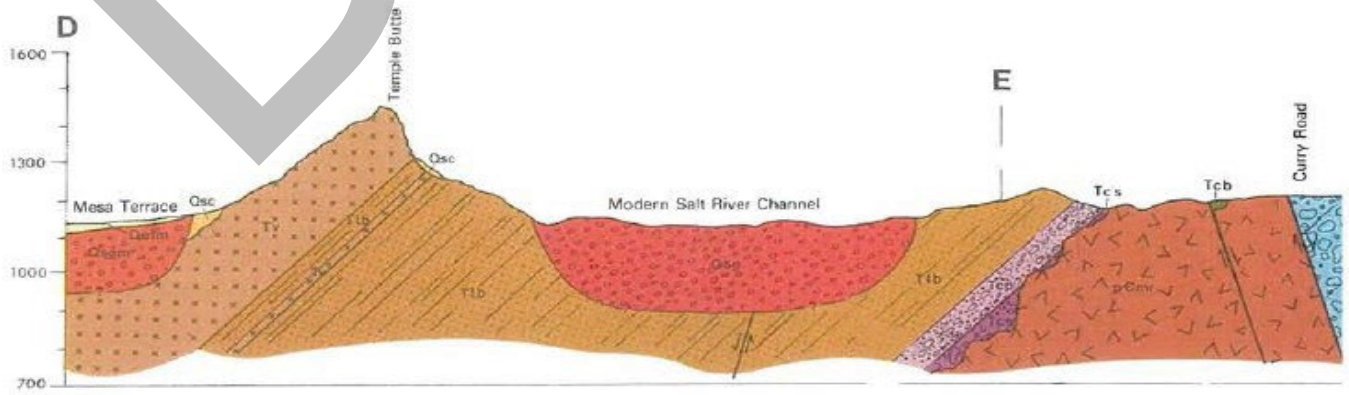

Figure 3. South (left) to North (right) geologic cross-section through Hayden Butte

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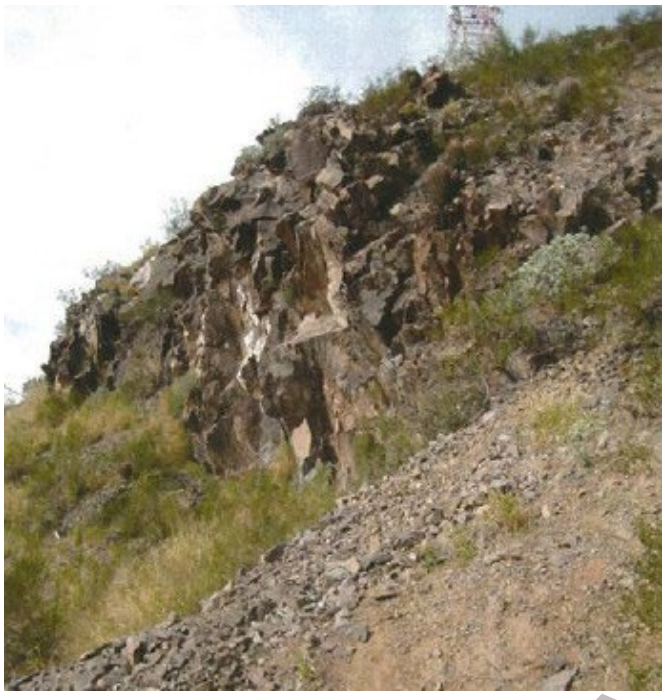

Figure 6. Overhanging bedrock

Geologic Hazards

Geologic hazards are defined as conditions or phenomenon that present a risk or are a potential danger to life and property, either naturally occurring (e.g., earthquakes, volcanic eruptions) or man-made. The most significant geologic hazard on Tempe Butte is the potential rock-fall associated with rocks/boulders that become dislodged and travel uncontrolled down natural and man-made slopes and where bedrock is overhanging potential use areas. Figures 5 and 6 depict these conditions.

Figure 5. Colluvium boulder at the south flank of Hayden Butte

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Slope Stability of Tank Excavation Embankment

As noted previously, it was assumed in the 2017 study conducted for the Hayden Butte Preserve that the excavated material (the rock and dirt from excavation) was placed over the natural slope south of the tanks during construction. To allay any concerns about the stability of the dumped talus/rock, the safety factor for the built slopes was modeled and analyzed by Terracon as part of the 2017 study. To further evaluate the potential rockfall hazard of the talus slope of the tank pad, in 2022, a field survey and mapping of hundreds of boulders on the slope and rockfall hazard analysis was conducted. The potential for rockfall is more likely to be caused by boulders having an average diameter of 18 inches, therefore they were the primary focus of the analysis. The evaluation attempted to establish whether potentially hazard-prone boulders could reach the pedestrian path on the southern flank of Tempe Butte or the Light Rail improvements.

An historical aerial imagery review did not reveal any discernable movement in the slope material that would be indicative of rockfall events. The analysis identified that a group of boulders near the western limit of the embankment slope and seven individual boulders were a potential rockfall hazard. The analysis stated that given the lack of observed or reported rockfall events, the City may consider a periodic monitoring plan of the analysis area and incorporation of appropriate signage warning Preserve users of the potential rockfall hazard. Rockfall mitigation could also include breaking up the large stones into smaller pieces or relocation of the boulders to a stable portion of the slope at the City's discretion.

PAPAGO PRESERVE

The Papago Preserve lies within the same physiographical area as the Hayden Butte Preserve. For the majority of the Papago Preserve, soils are strongly associated with the underlying geology. Geologic materials are predominately granite. Soils are usually low, eroded bedrock surfaces (known as pediments) with slopes generally less than 10% except where bedrock knobs (called inselbergs) rise up above the pediment surface. Knobs are rugged, steep, and can be tall, sloping upward greater than 15%. The topography is generally undulating with incised channels. Caliche is strongly developed in the overlying colluvium.
Drainage is usually well-developed and flooding is generally contained to the incised channels. Downslope of the SRP reservoir, pebbly sandstone and silt-stone occurs. In the Evelyn Hallman Park area, the pediment is buried by calichified colluvial-alluvial debris, two to 50 feet thick, which allows for surface excavations such as is needed for the existing lake excavation.

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Topography and Erosion

HAYDEN BUTTE PRESERVE

The topography of Hayden Butte is abrupt, in that it steeply projects upward from the surrounding Salt River Valley terrain. Much of the lower portion of the Hayden Butte is relatively accessible with moderate effort. Reaching the top of Hayden Butte requires a considerable climb over steep terrain, although this effort is somewhat mitigated by the grades of the constructed trails on the lower elevations.

The land slope making up Hayden Butte ranges between gentle and severe. A gentle slope for purpose of this report is considered walkable for most people - this is generally up to 15% slope. Natural slopes of 30% to over 60% dominate Hayden Butte, limiting access across the Preserve and contributing to greater land disturbance from man-made features.

Erosion occurs, whether the Hayden Butte topography remains in its natural state or is altered in any way. With or without human modifications, wind and rain erode the ground surface and mechanically weather rock surfaces. Surface erosion by mechanical means, including man-made modifications, tends to increase as slope increases.

When access is improved, whether for recreation trails, vehicular access roads, or utility facilities, it is generally done by creating a gentle pad for those uses. However, where pads are installed, severe cut and fill slopes must be created to produce the flattened area. It is at those cut and fill slopes where erosion is a challenge.

There are several notable locations where man-made modifications are causing erosion and sedimentation in the Hayden Butte Preserve. They are: 1) The summit trail-related erosion is causing the handrail pole foundations to become exposed, rendering the railing unsafe and ineffective; 2) The area in and around the "A" is continuing to erode, creating an unsafe condition for individuals who visit this feature; and 3) The embankment slope created to support the water tanks appears to be continuously eroding due to the finer-grained soil particles being washed downslope by rainfall. As a result, sediment is being deposited between the lower trails and the Light Rail perimeter wall along the south side of the Preserve. The erosion also appears to be the cause of larger cobbles and boulders becoming dislodged on the slope and potentially rolling down the slope, 4) The asphalt access road, in the upper quartile, is eroding along its southern edge and also appears to be concentrating runoff at several locations in that area, which is causing significant erosion on the south face and trails of Tempe Butte, 5) The Leonard Monti Trail and a portion of the lower trail adjacent to the Light Rail tracks are experiencing significant erosion/wash outs along their lengths. The cause of the erosion varies by location, and 6) Spider trails are also creating erosion because of the disturbance to the natural soil crust. Maintenance, upkeep, and repairs at these locations represent a continuous demand for staff and material resources.

(See Exhibit _ – Slope Analysis)

PAPAGO PRESERVE

The terrain is highly dissected by hill, ridge, and drainage landforms that, in addition to the bedrock knobs, create the primary character of the Preserve. As the Papago Preserve elevation generally decreases from north to south, long views and vistas of downtown Tempe are available looking southward, particularly from locations such as the high point of the Crosscut Canal Trail and near the Loma del Rio ruin site.

Because of the generally shallower slopes than the Hayden Butte Preserve and the pediment condition, erosion tends to be limited in the Papago Preserve, associated primarily with concentrated use areas such as dirt trails where washouts occasionally occur and the bike jumping area near the Johnny G. Martinez Water Treatment Plant due to continued ground reshaping by users of this area. There is no visual evidence of recent ground disturbance associated with the overhead power lines maintenance or repair.

(See Exhibit > – Slope Analysis)

Drainage

HAYDEN BUTTE PRESERVE

The drainage of Hayden Butte is primarily via sheet flow, with several small to medium-sized drainage channels interspersed throughout the south flank and several medium to large channels on the north side.

On the north side, runoff empties into a deep gorge, running east to west between the base of Hayden Butte and the southern edge of Rio Salado Parkway, and subsequently into one large box culvert and a smaller storm drainpipe that run under the Parkway and into the City's storm drain system. On the south side, drainage collects north of the Light Rail tracks, where it flows into several catch basins, and into the City's storm drain system. Runoff to the west flows unencumbered by development.

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Generally, the natural drainage channels function well, and erosion is minimal due to the rock conditions, with the exception of areas where the natural flow is forced into small culverts installed under the access road to the water tanks, and on the hiking trails to the summit. At these locations, the flow velocities tend to wash out the downstream portions of the channels where the underlying geology and/or vegetation are not sufficient to hold the soils in place. There is also evidence of sediment build up in the small stone sedimentation basins on the downhill side of the culverts.

(See Exhibit 5 - Drainage)

PAPAGO PRESERVE

The Papago Preserve drainage is primarily sheet flow. Small to medium-sized drainages scattered throughout the Preserve flow in multiple directions in response to the landform orientations. Drainage in Evelyn Hallman Park area flows eastward. From approximately the Crosscut Canal Multi-Use Path high point, stormwater travels overland northward toward East Marigold Lane. Flows downstream of the SRP Papago Buttes Facility, including the outfall channel from the reservoir, travel in a ditch in a southwestern direction toward Mill Avenue. Runoff in the central portion of the Preserve north of East Curry Road is blocked by the road itself and therefore pools on the north side of the Road. Along the eastern boundary of the Preserve, south of the Johnny G. Martinez Water Treatment Plant, flows create what is known as the Green Line Channel, which is characterized by riparian trees and moist soils. Stormwater flows south of East Curry Road travel unabated to the south where they are intercepted by the SRP Canal at the base of the landforms.

(See Exhibit 5 – Drainage)

Flora

BACKGROUND

Field inventories were conducted in late 2023 to document current flora and fauna within the Papago Preserve; field inventories were not conducted on Hayden Butte. Desktop research was also conducted to include a wider scope of species that might not have been present during the inventories. As part of the investigations, science citizen websites including iNaturalist and eBird were reviewed, and the US Fish and Wildlife Service's (USFWS's) Information for Projects and Consulting (IPaC) and Arizona Game and Fish Department's (AGFD) Online Environmental Review tool were accessed.

HAYDEN BUTTE PRESERVE

The vegetation on the Hayden Butte Preserve is typical of that found in the Papago Preserve and the Sonoran Desertscrub vegetative community where the dominant plant types are foothills palo verde (Parkinsonia microphylla), mesquite (Prosopis velutina and P. glandulosa), and saguaro (Carnegiea gigantea), with an underbrush of bursage (Ambrosia deltoidea and A. dumosa), creosotebush (Larrea tridentata), bunchgrasses and a variety of cacti including fishhook barrel (Ferocactus wislizeni), cholla (Cylindropuntia spp.), and prickly pear (Opuntia spp.).No riparian-associated vegetation is found on the Hayden Butte Preserve; urbanization has eliminated all traces of this vegetative community.

Additional trees and other plants found on the Butte include:

Trees:

- Whitethorn acacia (Vachellia constricta)
- Blue palo verde (Parkinsonia floridam)

Shrubs:

- Bursage (Ambrosia dumosa)
- Desert hackberry (Celtis ehrenbergiana)
- Brittlebush (Encelia farinosa)
- Buckwheat Eriogonum spp.)
- Cacti:
- Hedgehog (Echinocereus spp.)
- Pincushion Mammillaria spp.)

Rare:

- Joint Fir (Ephedra spp.)

There are also several non-native, highly-invasive plants that have become established on Hayden Butte. These include:

Buffelgrass (Pennisetum ciliare)

Buffelgrass is a shrubby grass 1.5 feet tall and up to 3 feet wide. It looks like a bunchgrass when it is small (either a seedling or recently burned, grazed or cut). The branches produce new leaves and flower spikes rather quickly after light rains, making buffelgrass an extremely prolific seed producer.

Fountain Grass (Pennisetum setaceum)

Fountain grass is a perennial bunchgrass that was introduced to Arizona from Africa as a landscaping plant. The plant produces long, white seed heads that lead to the spread of the plants outside of landscaped areas. Fountain grass is commonly seen spreading along roadsides, and in washes and canyons.

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Beyond their tendency to spread uncontrollably, both buffelgrass and fountain grass compete with native species for scarce water and nutrients. Their leaves dry when dormant or dead and produce tinder-dry fuels that quickly carry wildfires. Fires kill native plants and create even more space for exotic/invasive grasses and non-native species.

(See Exhibit 6 – Flora)

PAPAGO PRESERVE

Similar to Hayden Butte Preserve, the Papago Preserve is comprised of vegetation typical of Sonoran Desertscrub. Creosotebush is the dominant plant species, scattered among shrubby foothills palo verde trees. Saguaros are scattered throughout the Papago Preserve, with overall more occurrences north of East Curry Road and a noticeably larger quantity at the Eisendrath Center. Additional plant species observed at various locations within the Papago Preserve include but are not limited to triangle leaf bursage, Mormon tea (Ephedra viridis), and various cacti such as buckhorn cholla (Cylindropuntia acanthocarpa), chain-fruit cholla (C. fulgida), Arizona pencil cholla (C. arbuscula), pincushion (Mammillaria sp.), Engelmann's hedgehog cactus (Echinocereus engelmannii), and fishhook barrel cactus. Within this plant community, common Mediterranean grass (Schismus barbatus) is also present in varying densities throughout the Papago Preserve with higher densities in areas with higher disturbance, such as non-designated bike and walking trails and areas frequented by unhoused individuals. Patches of stinknet or globe chamomile (Oncosiphon piluliferum), a Class B State-list noxious weed, was also observed and is mapped in Exhibit 6 - Flora.

Aquatic and riparian vegetation, as well as some exotic plants, are present along the pond in Evelyn Hallman Park, a pipe outlet adjacent to the Grass Clippings Rolling Hills Golf Course, along the SRP Papago Buttes Facility reservoir outfall ditch, the Green Line Channel, and the SRP canal at the southern end of the Papago Preserve. The vegetation in these areas consists of tall, mature trees, including fan palm (Washingtonia sp.), Fremont cottonwood (Populus fremontii), and Goodding's willow (Salix gooddingii) with an understory of shrubs and herbs consisting of arrowweed (Pluchea sericea), cattail (Typha sp.), Madagascar umbrella papyrus (Cyperus alternifolius), desert broom (Baccharis sarothroides), oleander (Nerium oleander), big saltbush (Atriplex lentiformis), cattle saltbush (Atriplex polycarpa), desert tobacco (Nicotiana obtusifolia), sorghum (Sorghum bicolor), fountain grass, and giant reed (Arundo donax). The Green Line Channel also exhibits some additional wetland obligate and native riparian species, such as Arizona black walnut (Juglans major), velvet ash (Fraxinus velutina), catchfly prairie gentian (Eustoma exaltatum), Torrey's rush (Juncus torreyi), miner's lettuce (Claytonia perfoliata), netleaf hackberry (Celtis laevigata), and white mulberry (Morus alba). In some instances within the Papago Preserve, there is a linear stringer of xeroriparian vegetation adjacent to the aquatic/riparian/exotic zones that indicate temporarily pooling water or an arid riparian area that is comprised of very tall foothills and blue palo verde trees, desert ironwood (Olneya tesota), singlewhorl burrobush (Hymenoclea monogyra), catclaw acacia (Senegalia greggii), Coues' senna (Senna covesii), brittlebush, desert broom, and Alkali goldenbush (Isocoma acradenia).

The southern boundary of the Papago Preserve, known as LoPiano Bosque Habitat, is characterized by a man- made mesquite bosque which boasts large honey and velvet mesquite trees with scattered African sumac (Searsia lancea) and Fremont cottonwood trees. The understory is primarily bare ground surface with several patches of stinknet and common Mediterranean grass.

The smallest and last vegetation community observed within the Papago Preserve is landscaped, desertscape plants at the entrance of the Eisendrath Center. Ocotillos (Fouquieria splendens), prickly pear (Opuntia sp.), saguaro, palo verde trees, creosotebush, and aloe (Aloe sp.) make up the landscaped areas. A complete list of the plants observed during the field inventories is summarized in Table 1 below.

The USFWS IPaC system and the AGFD Online Review Tool were accessed. Neither source identified flora (special status or federally protected) within two miles of the Papago Preserve. Exhibit 6 – Flora provides a graphic representation of the vegetation communities as observed during the field inventories.

(See Exhibit 6 – Flora)

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Table 1. Flora Inventoried within the Papago Preserve	
Common Name	**Scientific Name**
Willow Acacia	Acacia salicina
Triangle leaf bursage	Ambrosia deltoidea
Giant reed	Arundo donax
Big saltbush	Atriplex lentiformis
Cattle saltbush	Atriplex polycarpa
Desert broom	Baccharis sarothroides
Bamboo	Bambusa sp.
Saguaro	Carnegiea gigantea
Hackberry	Celtis ehrenbergiana
Netleaf hackberry	Celtis laevigata
Miner's lettuce	Claytonia perfoliata
Buckhorn cholla	Cylindropuntia acanthocarpa
Arizona pencil cholla	Cylindropuntia arbuscula
Chain-fruit cholla	Cylindropuntia fulgida
Madagascar umbrella papyrus	Cyperus alternifolius
Engelmann's hedgehog	Echinocereus engelmannii
Brittlebush	Encelia farinosa
Mormon tea	Ephedra viridis
Catchfly prairie gentian	Eustoma exaltatum
Fishhook barrel cactus	Ferocactus wislizeni
Velvet ash	Fraxinus velutina
Singlewhorl burrobush	Hymenoclea monogyra
Alkali goldenbush	Isocoma acradenia
Arizona black walnut	Juglans major
Torrey's rush	Juncus torreyi
Creosotebush	Larrea tridentata
Graham's fishhook cactus	Mammillaria grahamii

Table 1. Flora Inventoried within the Papago Preserve	
Common Name	**Scientific Name**
White mulberry	Morus alba
Deergrass	Muhlenbergia rigens
Oleander	Nerium oleander
Desert tobacco	Nicotiana obtusifolia
Red waterlily	Nymphaea rubra
Lineleaf whitepuff	Oligomeris linifolia
Desert ironwood	Olneya tesota
Stinknet	Oncosiphon piluliferum
Prickly pear	Opuntia sp.
Mexican palo verde	Parkinsonia aculeata
Blue palo verde	Parkinsonia florida
Foothills palo verde	Parkinsonia microphylla
Fountain grass	Pennisetum setaceum
Marsh fleabane	Pluchea odorata
Arrowweed	Pluchea sericea
Fremont cottonwood	Populus fremontii
Honey mesquite	Prosopis glandulosa
Goodding's willow	Salix gooddingii
Russian thistle	Salsola sp.
Common Mediterranean grass	Schismus barbatus
African sumac	Searsia lancea
Catclaw acacia	Senegalia greggii
Coues's senna	Senna covesii
London rocket	Sisymbrium irio
Sorghum	Sorghum bicolor
Cattail	Typha sp.
Cowpen daisy	Verbesina encelioides
Fan palm	Washingtonia sp.

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Fauna

HAYDEN BUTTE PRESERVE

A variety of animals make their home on Hayden Butte Preserve. Most of them are smaller reptiles and mammals, although it is conceivable that larger animals such as coyote, javelina, etc., once lived on or around the Butte before urban development eliminated connectivity to surrounding natural areas.

Some of the animals found on Hayden Butte Preserve include:

Lizards:

- Western whiptail lizard (Cnemidophorus tigris)
- Chuckwalla (Sauromalus ater)

Snakes:

- Western diamondback rattlesnake (Crotalus atrox)
- Gopher snake (Pituophis catenifer)
- Ground snake (Sonora semiannulata)

Birds:

- Red-tailed hawk (Buteo jamaicensis)
- Gambel's quail (Callipepla gambelii)
- Peregrine falcon (Falco peregrinus)
- Mourning dove (Zenaida macroura)

Mammals:

- Merriam kangaroo rat (Dipodomys merriami)
- Black-tailed jackrabbit (Lepus californicus)
- Western pipistrel bat (Pipistrellus hesperus)
- Ground squirrel (Spermophilus tereticaudus)

(See Exhibit _ – Fauna)

PAPAGO PRESERVE

Avian species were the animals most frequently heard and seen throughout the Papago Preserve. Aquatic areas support aquatic birds including mallard ducks (Anas platyrhynchos), American coots (Fulica americana), pied-billed grebes (Podilymbus Podiceps), ospreys (Pandion haliaetus), double-crested cormorants (Nannopterum auritum), great-blue herons (Ardea herodias), and green herons (Butorides virescens). Non-aquatic areas boast a variety of Arizona resident birds and migratory species, a full list of which is included in Table 2 on the following page.

The Papago Preserve has several rock faces, outcroppings, and crevices that are likely home to a variety of reptiles. The only reptile observed during the field inventory was the zebra-tailed lizard (Callisaurus draconoides), but it is presumed that common chuckwallas, common side-blotched lizards (Uta stansburiana), and desert spiny lizards (Sceloporus magister) also occupy the area. iNaturalist also reported two types of aquatic turtles, the red-eared slider (Trachemys scripta elegans) and Sonoran mud turtle (Kinosternon sonoriense), in the Evelyn Hallman Pond and the SRP canal. Sonoran desert tortoises (Gopherus morafkai) likely occupied Papago Preserve at one time due to the abundant amount of caliche caves and rock formations present, but due to the surrounding urbanization, they have been extirpated from this area.

Evelyn Hallman Pond is a well-known urban fishing location. The pond and the SRP canal are stocked with channel catfish (Ictalurus punctatus), rainbow trout (Oncorhynchus mykiss), largemouth bass (Micropterus salmoides), redear sunfish (Lepomis microlophus), bluegill (Lepomis macrochirus), and white amur (Ctenopharyngodon idella).

Mammals observed or inferred from the presence of small burrows, middens, or scat within the Papago Preserve are typical of the Sonoran Desert and include coyote (Canis latrans), antelope ground squirrel (Ammospermophilus sp.), black-tailed jackrabbit (Lepus californicus), desert cottontail rabbit (Sylvilagus audubonii), and white-throated woodrat (Neotoma albigula). Bats were not observed during the field investigation; however, suitable roosting habitat is likely present in rock faces, rock outcroppings, and riparian areas with woody/leafy vegetation.

Two notable insect species were observed: A honeybee hive (Apis sp.) was noted in a caliche cave and several dragonflies (Anisoptera sp.) were seen around aquatic areas. As with reptiles, the Preserve is likely home to a large number of other insect species.

A summary of species observed or inferred to be present based on visual or aural cues and recorded on iNaturalist are included below.

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Table 2. Fauna Inventoried or Inferred within the Papago Preserve	
Common Name	**Scientific Name**
BIRDS	
Sharp-shinned hawk	Accipiter striatus
Mallard	Anas platyrhynchos
Great blue heron	Ardea herodias
Verdin	Auriparus flaviceps
Red-tailed hawk	Buteo jamaicensis
Green heron	Butorides virescens
Gambel's quail	Callipepla gambelii
Anna's hummingbird	Calypte anna
Cactus wren	Campylorhynchus brunneicapillus
Killdeer	Charadrius vociferus
Northern Harrier	Circus hudsonius
Northern flicker	Colaptes auratus
Gilded flicker	Colaptes chrysoides
Ladder-backed woodpecker	Dryobates scalaris
American kestrel	Falco sparverius
American coot	Fulica americana
House finch	Haemorhous mexicanus
Dark-eyed junco	Junco hyemalis
Gila woodpecker	Melanerpes uropygialis
Abert's towhee	Melozone aberti
Northern mockingbird	Mimus polyglottos
Double-crested cormorant	Nannopterum auritum
Osprey	Pandion haliaetus
Harris' hawk	Parabuteo unicinctus
House sparrow	Passer domesticus
Pied-billed grebe	Podilymbus podiceps
Great-tailed grackle	Quiscalus mexicanus
Black phoebe	Sayornis nigricans
Say's phoebe	Sayornis saya
Yellow-rumped warbler	Setophaga coronata
Lesser goldfinch	Spinus psaltria
INSECTS	
Dragonfly	Anisoptera sp.
Honey bee	Apis sp

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Table 2. Fauna Inventoried or Inferred within the Papago Preserve	
Common Name	**Scientific Name**
MAMMALS	
Antelope ground squirrel	Ammospermophilus sp.
Coyote	Canis latrans
Black-tailed jackrabbit	Lepus californicus
Desert cottontail rabbit	Sylvilagus audubonii
White-throated woodrat	Neotoma albigula
REPTILES	
Zebra-tailed lizard	Callisaurus draconoides
Common chuckwalla	Sauromalus ater
Common side-blotched lizard	Uta stansburiana
Desert spiny lizard	Sceloporus magister
Red-eared slider	Trachemys scripta elegans
Sonoran mud turtle	Kinosternon sonoriense

The species listed on the USFWS IPaC and AGFD Online Review tool were reviewed for their potential to occur within the Preserves. Species that have a moderate potential to occur within the Preserves, meaning the species have not been recently documented in the Papago Preserve, but potentially suitable habitat is present and there is a reasonable likelihood for the species to occur in the Papago Preserve, include:

- Monarch butterfly (Danaus plexippus; Candidate for Listing under the Endangered Species Act [ESA])
- Bald eagle (Haliaeetus leucocephalus; Bald and Golden Eagle Act)

Species with low potential to occur, which means the species has not recently been documented in the review area, existing habitat conditions in the review area preclude the establishment of viable populations, or the species ranges widely and individuals could incidentally occur in the review area, include:

- Southwestern willow flycatcher (Empidonax traillii extimus; listed Endangered under the ESA)
- Yellow-billed cuckoo (Coccyzus americanus; listed Threatened under the ESA)

The remaining species included by the USFWS IPaC and AGFD Online Review tool either have no potential to occur within the Preserves or are not federally protected. No designated or proposed critical habitat for species protected under the ESA is present within the Papago Preserve or Hayden Butte Preserve.

(See Exhibit _ – Fauna)

Historic and Cultural Resources

Numerous historic and cultural resources are present within the Preserves. Many such resources are culturally sensitive; information pertaining to these resources can be found in the restricted access Class III documentation. A listing of resources not limited to inclusion in the Class III report, all of which are located in the Papago Preserve, follows.

Loma del Rio

A former small Hohokam residence on a hilltop south of Curry Road, the adobe walls of Loma del Rio were covered in 1994 to stabilize the site and to minimize further erosion and deterioration. The site has been determined eligible for the National Register of Historic Places (NRHP) under criteria D. A modern shade structure was installed nearby during the same time period as the protection measures were installed to provide visitors the opportunity to understand the ruin's overall size and room layout. The engineered trail to Loma del Rio needs to be repaired at several locations and thirty years after the initial stabilization, damage assessment, protection, and restoration of the structural mound is essential to preventing further loss to this significant cultural resource due to weathering and public visitation.

Sandra Day O'Connor House and the Rose Elsendrath House

The Sandra Day O'Connor House, the former residence of the retired United States Supreme Court Justice, was originally constructed in 1959 in

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Paradise Valley, Arizona. In 2009, it was dismantled and reconstructed near the Arizona Heritage Center prior to Preserve designation. It is currently listed in the NRHP and Tempe Historic Property Register. The Rose Eisendrath House, a stately

adobe home constructed in 1930, is listed on the NRHP as an exemplar of Pueblo Revival architecture; it currently functions as the City's Water Utilities Administration building.

Contemporary Features

HAYDEN BUTTE PRESERVE

Within the Hayden Butte Preserve there are features, elements, and facilities (improvements) that have been in place for many years. These include:

Seasonal Holiday Displays

Lighted Judeo-Christian holiday displays are installed on the upper slopes and peak of Hayden Butte at times coinciding with religious holidays throughout the year. It is believed that such displays have been erected on a temporary basis since the 1930s. The process by which the City reviews and approves these displays is yet to be determined.

Access/Water Tank Maintenance Road

The primary maintenance access to the City's water tanks and recreation user access to the Tempe Butte peak is a single-lane asphalt road that traverses the west face of the Butte. The road was in place by 1955. The roadway concentrates stormwater runoff along the southern edges and is a significant contributor to erosion on the west face of Tempe Butte, including the Leonard Monti trail.

Water Tanks

The water tanks were originally installed in 1949 and 1956. Renovation of both tanks, including the restoration of the water line on the south slope, was completed in 2018.

Arizona State University "A"

The "A" serves as a backdrop to all ASU sporting events and in many ways is integral to the identity of Downtown Tempe itself. The original "A" was installed on Tempe Butte in 1938. The present "A" stands 60 feet tall; there is no documentation of the design of the reinforced steel and concrete reconstruction that was completed in 1955. Severe erosion is occurring under the structure which raises concerns about its long-term viability and the safety of visitors who participate in activities associated with this feature (e.g., paint the "A").

Trails, Trailheads, Overlooks and Rest Stops

To provide access and avail themselves of the view, it was suggested by members of the community that a "good, smooth trail" be developed to the summit. The trail was completed in 1935. In addition, the Leonard Monti Trail provides a recreation-oriented path that begins near the City's Transportation Center on East 5th Street; it connects to the Maintenance Road near mid-slope on

the western slope. In 1994, the Leonard Monti Trail was dedicated by the City to honor the local businessman and owner of Monti's La Casa Vieja Restaurant which was housed in the original Charles T. Hayden house directly across on Mill Avenue. That same year, trailheads, overlooks, and rest stops were added to the Trail. Several user-established (spider) dirt trails are located on the northwest flank of Hayden Butte.

Two formal trailheads are associated with the Leonard Monti trail; they occur along the south side of Hayden Butte near the City's Transportation Center and near the intersection of 5th Street and South College Avenue. Some users access the butte from an informal path leading from the the parking lot belonging to Mission Palms near the intersection of Mill Avenue and 3rd Street. This access point is not formally designated and has not been established via deed, easement, or other use agreement. A service road access point abuts the Flour Mill development parcel at the northwest area of the Preserve.

Interpretive Signage

Signage describing the various natural and cultural resources on Hayden Butte was installed along the Leonard Monti Trail in 1995. Much of the signage is in poor condition and needs to be repaired or replaced.

Unsanctioned Memorials

Currently there are at least two unsanctioned memorials on the lower west slope of Hayden Butte.

While some of the seasonal holiday displays, the "A", and the memorials have been in place for years, no easement, license, or other City authorizations allowing their presence have been identified. Additionally, these features are likely to be incompatible with the Preserve Ordinance language and the objective of this MP to preserve the natural and cultural resources of the Preserve while allowing appropriate public access and use.

(See Exhibit 9 – Contemporary Features)

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PAPAGO PRESERVE

The primary contemporary features within the Papago Preserve are associated with trails and trailheads, Evelyn Hallman Park, a parking lot and shade canopies adjacent to Moeur Park, a through road under Mill Avenue, an SRP canal, the Green Line, APS utility lines, the Sandra Day O'Connor House, and a Tempe Water Utilities Administration building (Eisendrath Center). Each of these is discussed below or in their respective subsections of this report.

Trails and Trailheads

The Papago Preserve is dissected by a variety of named and unnamed (spider) dirt trails and paved trails. Named trails are mostly identified south of Curry Road; they include the Lizard Trail, Loma Trail, Cactus Trail, and Canal Trail. Spider trails are ubiquitous in the southern three quarters of the Preserve. The Loma del Rio ruin has an improved trail, including several benches, that leads from the trailhead near Moeur Park to the ruin site. The improved trail has degraded over time and has several damaged areas that need to be repaired. Starting near the SRP reservoir, primary trails have been paved, particularly the Crosscut Canal Multi-use Path and the network north of East Marigold Lane that provide access to both sides of the Crosscut Canal, to the parking lot at Evelyn Hallman Park, and to North College Avenue. The Crosscut Canal Multi-use Path within the Preserve serves as the Handle Bars BIKEiT route.

There are three developed trailheads located within the Preserve. They are the Loma del Rio Trailhead in the southwest corner near Moeur Park, the East Trailhead abutting Papago Park, and the Crosscut Canal Multi-use Path Trailhead near the Johnny G. Martinez Water Treatment Plant. The Loma del Rio Trailhead starts the trail to the Loma del Rio interpretive site, is in very poor condition, provides no pedestrian comfort features, and exhibits remnant evidence of prior informational signage. The East Trailhead provides direct access to the Curry Road underpass from the parking area in Papago Park. The existing signage, which is the only user feature, is badly deteriorated. The Crosscut Canal Multi-use Path Trailhead is of more modern construction and includes seating, solar lighting, and informational signage.

Evelyn Hallman Park

This 40-acre park, formerly known as Canal Park, was renamed in honor of Ms. Hallman, an active and charitable member of the North Tempe community and tireless advocate for renovations at the park, in 2006. The park, located at the northernmost limits of the Preserve, contains a lake, restrooms, ramadas, picnic tables, site lighting in the parking lot area, paved and dirt trails, public art, and unique circular day use pads. The lake is regularly stocked by the Arizona Game and Fish Department. Currently, lake edge improvements are underway to reduce lake-edge erosion.

Moeur Park Parking Lot and Shade Structures

The Papago Preserve includes the 35-car parking lot and four shade structures adjacent to Moeur Park along Mill Avenue. The shade structures were recently upgraded; multiple picnic tables were installed under the canopies. Unfortunately, there is no direct connection to the Preserve trails east of East Lake View Drive, such as the Canal or Lizard Trail.

SRP Canal

The Indian Bend Pump Ditch is an open water body along the north side of the LoPiano Mesquite Bosque; it has been located in the Preserve for many decades and provides a unique visual feature for Canal Trail users. However, the canal is not managed by the City of Tempe and is excluded from the Preserve.

Green Line

The Green Line is a man-made water conveyance corridor whose primary function is to allow water from the Johnny G. Martinez Treatment Plant to supply the Papago Park lake on the south side of Curry Road. Due to the routine flows, the Green Line contains the greatest diversity of plant and animal life in the Preserve. The Green Line also contains a minor trail that allows visitors to view the plant diversity and to be comforted by the shade and cooler conditions found in this unique biota.

LoPiano Bosque Habitat

This is a unique vegetative community reminiscent of the bosques that formerly lined the Salt River corridor. It was designed and installed in the early 1990s. The extensive mesquite tree canopy cover, adjacent to the SRP Canal provides comforting shade for those traveling on the Canal Trail.

East Lake View Drive

Subsequent to the construction of the SR 202 Red Mountain Freeway, the City constructed East Lake View Drive as a means to provide vehicular and visitor access to parking areas under the Freeway and Mill Avenue. The road also provides a physical connection between the lands west of Mill Avenue along the north bank of Tempe Town Lake to lands east of Mill Avenue. East Lake View Drive and the parking areas provide easy access to the southwest portion of the Preserve.

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(See Exhibit 9 – Contemporary Features)

Visitor Use/Access

HAYDEN BUTTE PRESERVE

The majority of activities taking place in the Hayden Butte Preserve are walking/hiking, landscape and wildlife viewing, and sightseeing. The steep terrain limits the visitors to a narrow spectrum of activities and generally contains the use of the site to the southern and western flanks of Hayden Butte. Access to the Preserve is encouraged through the formal trailheads, although there is no perimeter fencing or physical barrier to control pedestrian access to any part of the Preserve. Maintenance vehicle access is controlled via existing gates.

PAPAGO PRESERVE

While bounded on all sides by urban infrastructure and development, the Papago Preserve itself is relatively undeveloped. Like the Hayden Butte Preserve, the primary activities within the Papago Preserve are walking/ hiking, landscape and wildlife viewing, and sightseeing. Because of the moderated terrain, biking is also a significant activity; the Preserve is traversed with multiple spider trails in nearly all quadrants. However, there are three current uses in the Preserve that conflict with the City's Preserve Ordinance. Immediately west and adjacent to the Johnny G. Martinez Water Treatment Plan, a dirt bike jumping area ("BMX Track") has developed. The jumping area is routinely recontoured by volunteer users to repair the individual jumps and landforms. The jump area appears to be expanding up into the rock outcrops that border it on the south. North of Moeur Park, along West Operations Drive in the southwestern portion of the Preserve, a disc golf course was installed. Portions of the course were installed by both the City (mid-2000s) and the National Frisbee Golf Association. Rock climbers have been using one of the taller outcrops south of Curry Road. At least one face of the outcrop has metal climbing bolts imbedded in the rock face to aid in the climbing activity. No other evidence of this activity, such as ground disturbance, is visible at the climbing area.

There are multiple access points into the Preserve from adjacent developed parking and through trails such as the Crosscut Multi-Use Trail. There is no perimeter fencing or physical barrier to control pedestrian access into the Preserve.

Activities and Special Events

HAYDEN BUTTE PRESERVE

There are several activities and special events associated with Hayden Butte Preserve that are organized and conducted either by ASU or local community groups. It is believed that these activities are coordinated and/or authorized by the City's Recreation staff. The activities include:

- Butte tours; executed by ASU students and staff at multiple times throughout the year
- ASU class fieldwork, conducted by professors for various classes at ASU throughout the year
- Painting of the "A," conducted by ASU or members of ASU's football opponent supporters and "A" Mountain clean up and restoration events, conducted by the ASU Global Institute of Sustainability
- "A" Mountain Lantern Walk and Lighting of the "A," sponsored by the ASU Alumni Association (since 1917), the Friday before Homecoming Week in mid-October
- Guarding the "A", conducted by ASU students and staff during the week prior to the annual ASU/U of A football game in late November
- Erection of holiday displays; installed by the Friends of Tempe Butte, and others, in early Spring and December
- Launching firework displays, with approved permit by the City (DTA, ASU) at different times throughout the year

While many of these activities and events are long-standing community traditions, except for the ASU class tours and fieldwork, clean up, and restoration activities, these uses are incompatible with the Preserve Ordinance language and the objective of this MP to preserve the natural and cultural resources of the Preserve while allowing appropriate public access and use.

PAPAGO PRESERVE

The special events within the Papago Preserve are generally limited to bike races and similar activities.

Surrounding Land Use

HAYDEN BUTTE PRESERVE

The Hayden Butte Preserve is immediately surrounded by several major urban land uses, infrastructure, and facilities. The land uses generally limit public access to the Preserve. The uses and facilities include the following:

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- Rio Salado Parkway. The Parkway and associated sidewalk border the northern boundary of the Preserve. There is no direct access point from Rio Salado Parkway to enter the Preserve and no plan to have an access point along this border area.
- ASU. An existing chain link fence that traverses the Tempe Butte landform demarcates the boundary between ASU and the Preserve. There are no gates in the fence, and no intent to have access to the Preserve along this boundary. The appearance of the fence, particularly its contrast with the natural landscape color, has been identified as an item of concern to the Four Southern Tribes.
- Light Rail. The southern boundary of the Preserve abuts the Light Rail tracks which limits the Preserve access to the two trailheads (near the Transportation Center and at the 5th Street/North College intersection). No additional access points are anticipated.
- Mission Palms Hotel Parking Lot. In the southwest corner of the Preserve there is a very narrow shared boundary with the parking lot owned/managed by the Mission Palms Hotel. At this location is a small, undistinguished access point that City staff would prefer to be closed.
- Hayden Flour Mill Property. The City has recently entered into a Development and Disposition Agreement with a private entity who will construct a mixed-use development with office, commercial, education/ museum, events, and entertainment uses. The Concept Plan maintains the current vehicular access from Rio Salado Parkway and provides a new pedestrian access trail/path from Mill Avenue.

(See Exhibit _ – Surrounding Land Use)

PAPAGO PRESERVE

Land uses adjacent to the Papago Preserve vary but are reflective of the Preserve's urban setting and surrounding infrastructure development. SRP's Papago Buttes Facility and the Crosscut Canal border the majority of the western boundary of the Preserve. The Grass Clippings Rolling Hills Golf Course also borders the western boundary. The Johnny G. Martinez Water Treatment Plant is situated in the northeast portion of the Preserve, reducing the Preserve land area, yet is itself surrounded on four sides by Preserve lands. The intersection of the Crosscut Canal Multi-use Trail, East Marigold Lane, and the flume to the Johnny G. Martinez Water Treatment Plant create a distinct, highly urbanized sense of place within the Preserve. The Arizona Heritage Center/ Green Line borders the southeastern boundary of the Preserve. Evelyn Hallman Park and the Eisendrath Center are adjacent to residential neighborhoods on the north and east. Moeur and Papago parks, urban parks with related features, buttress the southwestern and southeastern corners of the Preserve, respectively. Moeur Park includes Works Progress Administration-built stone structures and is listed on both the NRHP and THPR lists. The ASU Community Services Building and parking lot encroach into the Preserve near the west end of Curry Road.

A regional freeway and urban streets surround the Preserve on four sides. Mill Avenue establishes the western boundary of the Preserve while the Arizona Department of Transportation-owned land north of the Red Mountain Freeway borders the entire length of the south boundary. North College Avenue borders the full length of the eastern boundary of the Preserve until it intersects with East McKellips Road. East McKellips Roaddefines the northern extent of Evelyn Hallman Park.

(See Exhibit _ – Surrounding Land Use)

Utilities

Water Utilities

HAYDEN BUTTE PRESERVE

In 1902, a 250,000-gallon water tank was installed at an approximate elevation of 1,365 feet AMSL along the east flank of Tempe Butte. Due to the need for increased storage by the City, a 1,000,000-gallon welded steel tank was installed in 1949. Subsequently, a 2,000,000-gallon welded steel tank was installed in 1956. The tanks are enclosed by a chain link fence that does not provide any concealment of myriad electrical and equipment-related facilities. In 2018, the tanks were painted PPG Paints, Chinchilla color, Pitthane Gloss (95-8800) Series in an attempt to ameliorate the tanks' visual impact.
A water fountain for site visitors is located within the pedestrian overlook south of the water tanks.

(See Exhibit _ – Water Utilities)

PAPAGO PRESERVE.

There is only one visible water facility within the Papago Preserve boundaries. This exposed segment of pipe is assumed to be owned by SRP and is located south of the Crosscut Canal Multi-Use Trail approximately 500 feet from Mill Avenue. The large water tank and communication tower

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located on the rock outcropping west of the Johnny G. Martinez Water Treatment Plant are situated within an enclave of the Preserve and are therefore not considered as part of this management plan. Refer to Subsection 2.8 for a description of the Eisendrath House that functions as the City's Water Utilities Administration building.

(See Exhibit _ – Water Utilities)

Electrical Utilities

HAYDEN BUTTE PRESERVE

The condition of the power feeds for the seasonal holiday displays was not evaluated as part of this report. The power feeds were recommended in a previous evaluation as candidates for an assessment of their condition and potential need for repairs.

The underground power lines feeding the water tanks and ancillary facilities are routed underground from the base of Hayden Butte near the Police Station; the year of the primary feed line to the summit is unknown. In the summer of 2016, the City of Tempe and APS completed a project that undergrounded power and removed several existing power poles on the southwest side of Hayden Butte, basically from the Hayden Flour Mill to the Police Station. The specific route of these lines is unknown as no as-builts were discovered during this report preparation.

(See Exhibit _ – Electrical Utilities)

PAPAGO PRESERVE

Both APS and SRP have high-tension transmission lines in the Preserve, likely via easements or rights of way agreements. APS has indicated that maintenance access to their facilities should not be limited by changes in the Preserve's management.

(See Exhibit _ – Electrical Utilities)

2.2 OPPORTUNITIES AND CHALLENGES

Based on documentation of past investigations, the data gathered in Workshop #1, research completed for this study, and field observations of the Preserves, the following narrative identifies key opportunities and challenges that should be addressed as part of the Management Plan. They are:

- Graffiti continues to be a problem on man-made and natural surfaces. The petroglyphs on Hayden Butte Preserve are of particular concern.
- The Hayden Butte Preserve summit trail area and the area around the "A" are eroding, creating unsafe conditions for visitors.
- The potential for rockfalls from the exposed bedrock in the upper elevations of the Hayden Butte Preserve is a constant concern.
- The embankment pad slope at the water tanks appears to be continuously eroding. The erosion also appears to be the cause of larger cobbles and boulders becoming dislodged from the slope.
- The asphalt access road to the water tanks is causing erosion by concentrating runoff at several locations in its upper elevations that is causing significant erosion on the south and southwest slopes and trails of Tempe Butte. The Leonard Monti Trail and a portion of the lower trail adjacent to the Light Rail tracks are continually experiencing significant erosion/wash outs due to this condition.
- Erosion within the Papago Preserve occurs in the bike jump area and is exacerbated by the extensive spider trails, some of which may receive little use and could be considered for restoration.
- The need for improved trail maintenance and repair was identified by the public.
- The public also posited that a higher level of desert vegetation management knowledge was needed by City staff.
- The City currently works with a limited number of volunteer groups and organizations who provide periodic assistance with litter, debris, and trash pickup.
- Within the Papago Preserve, a desire for drinking water and trash/refuse containers was identified by the public.
- Neither Preserve contains adequate interpretive or wayfinding signage to encourage greater conservation of resources or to better define the trails within the Preserves. Hayden Butte Preserve visitors encounter interpretive signs from past installations that are damaged or missing. Papago Preserve has a similar issue in the Papago Park area; signage conditions are more acute because of the large land area north of East Curry Road that contains no signage.
- Pockets of noxious and invasive species occur within the Preserves. The species include

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buffelgrass, fountain grass, stinknet and giant reed. These species will require continuous efforts to control or eradicate.

- Both the Hayden Butte Preserve and the Papago Preserve currently have uses and features that are incompatible with the uses prescribed in the City's Preserve Ordinance 2002.22. Within the Hayden Butte Preserve, the summit stairs, "A," and the seasonal holiday displays are not acceptable uses or features. Two unapproved memorials are also present with the Hayden Butte Preserve. Within the Papago Preserve, the bike jump area, the frisbee golf, and the rock climbing area are incompatible with the Ordinance language. Which uses may be compatible and the process for permitting these uses is not clear.
- Evelyn Hallman Park, with its open space on the existing island and ramada, restroom, and parking infrastructure, offers an opportunity to expand the types of uses occurring at that location.
- The Sandra Day O'Connor House and the Rose Eisendrath House provide opportunities for historic interpretation, particularly if associated with programs at the Arizona Heritage Center.
- Current uses in the Preserves could be expanded to include a more diverse array of recreation, education, and conservation purposes. For example, docent-led education tours, Painting in the Preserve classes, and after dark activities such as stargazing would appeal to a broader array of interests.
- Environmental and cultural education about the Preserves can contribute to an understanding and appreciation for natural and cultural resources. Fostering this understanding and appreciation adds to the quality of visitor experience and creates connections between people and the natural and cultural landscape. Education and outreach services can also provide knowledge about visitor impacts and avoidance measures that enable environmentally and socially responsible visitation. Additionally, an understanding of the importance and benefits of natural and cultural resources—and the effort involved in caring for them sustainably—is vital to the community's long-term support for the Preserves.
- Except for limited members of the community, the Preserves, particularly the Papago Preserve, do not have a recognizable identity. The Papago Preserve lacks any identifiable signage or dedicated infrastructure to establish it as a destination; rather, the Papago Preserve is perceived simply as undeveloped land along East Curry Road. While Hayden Butte is a regional landmark and an emblematic feature of the City, its status as a Preserve is much less well known. Both Preserves would benefit from branding of their unique status and opportunities and experiences that can be found within them.
- Collectively, the Preserves have no physical facilities and a limited online presence dedicated to introducing the Preserves to the public or to disseminate substantial information about them and the activities that occur there. Because of its location contiguous to the Papago Preserve and its existing facilities and programs (i.e., parking, demonstration areas, scholarship focus, etc.), the Arizona Historic Society's Arizona Heritage Center (AHC) would be a logical nexus for offering cultural, educational, and experiential programs related to the Preserves. Essentially, the AHC facility could become the home base for the Preserves' conservation, education, and cultural activities.
- Adaptive management is a decision-making approach that is intended to improve management decisions and resource integrity over time through a cycle of planning, implementation, monitoring, evaluation, and adjustment. This approach allows modifications in management practices in response to changes in surrounding land use, recreation demand, resource degradation, or other events, such as climate change. Adaptive management also recognizes that management activities themselves can result in resource changes and they must be modified over time to maintain or improve the desired outcomes. Applying an adaptive management framework to the Preserves would include monitoring management decisions and activities and assessing their outcomes against the Objectives outlined in the Recommendations section of this report.

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3. RECOMMENDATIONS

This section of the Management Plan identifies the Goal and Objectives proposed for the Preserves, elaborates on the specific management and maintenance strategies proposed to address the protection and restoration of the Preserves' natural and cultural resources, and establishes the recreation and educational uses and opportunities desired for these valuable City land areas.

HAYDEN BUTTE AND PAPAGO PRESERVES GOAL AND OBJECTIVES

The following Goal and Objectives have been established to provide direction on the management and operation of the Preserves in a manner that is compliant with the City Code and applicable establishment ordinances, maintains the Preserves' naturalness, improves routine communication with SRPMIC, and ensures that adaptive management principles are incorporated into Preserves' future operational decision-making.

Goal:

To ensure the Preserves are self-sustaining natural open spaces that are compatible with passive recreation and other necessary or appropriate uses while honoring the sites' natural resources and cultural heritage.

Management Plan Objectives:

Objective 1: Identify the significant natural, cultural, and infrastructure resources within the Preserves.
Objective 2: Institute distinct management zones and practices and procedures for maintaining each zone.
Objective 3: Define allowable temporary or permanent uses, activities, or features within the Preserves. Remove or terminate disallowed elements.
Objective 4: Ensure there are sufficient and coordinated resources available to maintain the Preserves in a natural condition.
Objective 5: Enter into an MOU with SRPMIC to address cultural resource management within the Preserves.
Objective 6: Establish a method for gathering continuous input from SRPMIC on management and maintenance of the Preserves.
Objective 7: Establish the basis for a recreation trails assessment and formal trails plan.
Objective 8: Provide user education program on environmental, cultural, recreation, and water use (related to SRP production facilities) topics.
Objective 9: Focus on visitor safety and security via signage that elaborates on the Preserves' challenging terrain, remoteness, and minimal comfort facilities.
Objective 10: Elevate the Preserve's identity/branding.
Objective 11: Establish the Arizona Historical Society's Arizona Heritage Center (AHC) as the locus for conservation, educational, and cultural activities related to the Preserves.
Objective 12: Restore disturbed Preserves landscapes using native plants and seeds, by eradicating invasive species, and by addressing erosion issues.
Objective 13: Reassess Plan goals, objectives, decisions, activities, and related policies so they can be adapted to changes in surrounding land use (i.e., McCain Library/Rio Reimagined), recreation demand, resource degradation, climate change, etc.

MANAGEMENT ACTIONS

Memorandum of Understanding (MOU)/Comprehensive Cultural Resources Management Plan (CRMP)

The City should initiate an MOU with SRPMIC, to the extent allowed by law, to identify the cultural resources and Traditional Cultural Properties (TCPs) known within the Preserves, to spell out communication protocols, commitments for treatment of known and discovered cultural resources, and to establish ongoing coordination and consultation procedures between the entities. A CRMP should be developed as the basis for the preparation of the MOU.

Routine Communication with SRPMIC

While there are two SRPMIC representatives on the DCC to represent Tribal interests, the City should establish contacts and communique protocols with SRPMIC for matters of a more routine nature that occur on a continuous basis. Examples of this could include addressing items such as: 1) graffiti removal from cultural resources, 2) invitations to participate in meetings or field reviews, or 3) scheduling for Sensitivity

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Training, among others. Greater communication between the parties will result in a reduced potential for miscommunication and a higher potential for successful coordination and cooperation for long-term management of the Preserves.

Sensitivity Training

Many City staff have already completed sensitivity training. Given the archaeological and environmental sensitivity of the Preserves, until a Preserve-specific training is available, it is highly recommended that all persons doing investigative, survey, planning, design, construction, maintenance, or management work within the Preserve should receive the following sensitivity training and resources.

1. SRPMIC Virtual Cultural Sensitivity Online Training course.
2. Archaeological Site Etiquette Guide as prepared by the Arizona State Historic Preservation Office (http://azstateparks.com/archaeological-site-etiquette).

Consolidated Oversight

Multiple sections of the Community Services Department are involved in the management and operations of the Preserve. Recreation staff coordinates and authorizes the temporary activities and events with outside parties. The Park Ranger program provides staff who act as ambassadors for the Preserve while also providing education to Preserve visitors as part of their service-oriented approach to building a connection to the Tempe community. Parks staff is responsible for maintaining the Preserve. Occasionally, the Police and Community Health & Human Services (CHHS) departments are involved in cleanup efforts. It is recommended that CHHS be charged with coordinating and managing the involvement and activities of the multiple groups.

Acceptable Uses, Activities, and Events

The City, through the DCC, should establish a process to specifically identify acceptable and unacceptable uses, activities, and events within the Preserve. Further, the City, through the newly formed Oversight Committee, should consider for continuation those uses, activities, and events that are currently occurring or have historically occurred in the Preserve. Formal guidelines and requirements should be developed by Parks and posted on the City's website.

Management Zones

Three land use/management zone options were presented at Workshop #3 (refer to Section ___). Based on the natural and cultural resources found in the Preserves, professional judgement of the consultant team, and public and stakeholder input, the Recommended Management Zones are shown in Figure ___. The Recommended Management Zones represent a practical approach founded on the identification of compatible resources and site uses with common objectives or unique management strategies. The Recommended Management Zones are:

Zone A . This Zone makes up the primary land area of the Preserves ..... It contains the ___ resources ....

Zone B. Zone B is made up of the .... It offers the greatest .....

Zone C. The unique resources of ___ are found in this Zone. It .....

(graphic goes here)

The Recommended Management Zones will provide for optimal conservation and preservation of the Preserves' natural and cultural resources while allowing responsible recreation, educational, and other required uses. As applicable, adoption and codification of these Management Zones into City policies, ordinances, and governing documents is recommended.

Trails Plan

The City should conduct a formal trails assessment for the existing and proposed trails in the Preserve. The information generated from the study would generate valuable data on the length, width, grade, surface type, and obstructions associated with each trail link in the Preserve. This information would inform decisions on which trails to prioritize for maintenance and improvements, where signage is necessary, and where restoration is needed. Further, the gathered data and related research would be used to clarify the applicable ADA considerations within the Preserves. The end result would be a trails plan for the Preserves. Preserve visitors would benefit from increased advance knowledge of the trails' conditions, thereby allowing them to have a more predictable and overall enjoyable experience. This information would also be helpful for planning any special events or activities in the Preserves. The trails plan

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could also identify how to improve accessibility and recreation experiences for a broader spectrum of the Tempe community citizenry, such as disabled community members.

Identity/Branding

Increase public awareness of the Preserves' natural resources, cultural heritage, historic context, and recreational opportunities by implementing marketing, communications, and branding campaigns. These campaigns may be developed in part through partnerships with SRPMIC as a representative of the Four Southern Tribes; the Tempe History Society; Arizona State University, as the developer of the McCain National Library and major partner in the development of Rio Reimagined; the Downtown Tempe Community; or the developers of the Tempe Flour Mill site. The campaigns should emphasize the rarity and value of natural open space in an urban setting; the geology, cultural context, and history of Hayden Butte, which is a regional landmark; the Preserves' cultural history; City of Tempe history; and the recreational amenities the Preserves provide. Important goals of these campaigns should be to help associate the location of the Preserves within the City of Tempe and promote the sustainability of the City's management approach.

AHC

The City should consider approaching the Arizona Historical Society/AHC to inquire about a cooperative agreement that would see the AHC becoming the home base for offering cultural, educational, and experiential programs related to the Preserves. This facility appears to have many of the requisite resources and capabilities needed for such a role. The Preserves component could augment the Foundation's current purpose of promoting leadership, partnership, and scholarship. The history of the Preserves, as well as the Papago area as a whole, combined with the presence of the Rose Eisendrath and the Sandra Day O'Conner Houses and the anticipated John McCain Library present a compelling historical and cultural education opportunity. Marketing and branding the AHC's role as the center of information about the Preserves should increase interest in both the Preserves and AHC's primary mission.

Education

The Preserves provide a rich opportunity to help educate the community on such topics as the principles of environmental stewardship; the Preserves' natural, cultural, and historical context; how to minimize human impacts; visitor safety and etiquette; available recreation opportunities; and upcoming events. The City's website can provide a baseline of information on all these topics and offer tools, like interactive maps, that help visitors learn about the Preserves' geography and resources. Signage and informational kiosks can help educate visitors as they move throughout the Preserves. Topical, spotlight, and event information can be delivered established community outreach tools, such as the monthly newsletters delivered with utility bills. Partnerships with the Arizona Historical Society AHC, local K-12 schools, Arizona State University, nonprofit organizations, and community groups can help integrate education into existing curriculums, deliver educational workshops, or present exhibitions. Volunteers or members of recreational groups can serve as ambassadors to provide information and encourage visitor use. Finally, the City's Parks and Recreation Department can offer education through community events like open houses, tours, recreation fairs, or educational workshops.

After Hours

Safety and security are of some concern, particularly after the Preserves' 10:00 p.m. daily curfew, because neither Preserve has enclosure fencing to control visitors. After the curfew, the Preserves are accessible to the public, ASU students, Mill Avenue revelers, homeless individuals, or others who may decide to illegally visit the sites after hours and could get hurt or find themselves in an unsafe situation. This situation could also be dangerous for first responders, if dispatched. Given the undesirability of enclosure fencing or similar access control measures, improved signage, defining the Preserves' hours of operation, requesting that people remain on designated trails, and reinforcing the prohibition of overnight/urban camping could assist in reducing the liability risks for the City and safety concerns for individuals.

Adaptive Management

Based on the recommendations in the Management Plan Recommendations section, including the Objectives Implementation table (Table 4), the City, with the appropriate stakeholders, should establish an action plan that identifies management decisions and associated actions as well as monitoring activities, plus their frequency and success measures. The monitoring

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findings should be recorded and reviewed at least biannually by XXXXX the City and stakeholders to identify appropriate changes updates to decisions, activities, or policies related to the Preserves. XXXXX The action plan should also be reviewed biannually or as circumstances change to assess the impact of nearby land uses, recreation demand, resource conditions, or climate change and nearby land use activities and make the appropriate management, activity, and policy change recommendations.

MAINTENANCE PRACTICES

Staffing Needs

Based on discussions with City staff during development of this Management Plan and on observations of the conditions within the Preserves, it is apparent that the current number of maintenance staff and applied resources are inadequate for performing the requisite baseline activities to maintain the Preserves in a sustainable, protected, natural condition. Erosion associated with existing and unapproved trails and the Hayden Butte Preserve access road are examples of the inability to maintain the Preserves' existing conditions. An analysis of the current practices and staffing was not included as part of this Management Plan. However, it is recommended that a complete assessment of the operations and maintenance needs of the Preserves be conducted, particularly in light of the known cultural resources, planned or approved uses, current conditions, objectives of the City Code and Preserve-related ordinances, and need for increased public education about the Preserves and protection from of the Preserves' natural and cultural resources from denigration.

Preserve-Specific Training and Maintenance Manual

A Preserve-specific training program should be developed to inform individuals required to receive sensitivity training from SRPMIC on the specific resources and considerations within the Preserves. This training would focus entirely on the requisite commitments in the MOU and the critical resources encompassed within the agreement. With the training as its basis, a manual should be developed to clearly document the routine maintenance locations, procedures, treatments, equipment, and materials to be employed to address erosion, slope stabilization, trail upkeep, revegetation, graffiti removal, signage repairs and replacement, and the monitoring of uses. The maintenance manual could also be referenced as part of the MOU with SRPMIC.

We understand that Parks' typical maintenance responsibilities for the Hayden Butte Preserve include: 1) emptying trash receptacles, typically a couple times per week; 2) maintaining trail edges and surfaces, including replenishing decomposed granite, as needed; 3) reestablishing and repairing the railroad tie steps along the Leonard Monti Trail, as needed; 4) annually maintaining landscaping, including pruning trees in the overlook adjacent to the water tanks; and 5) clearing debris from the homeless encampments in the gorge area on the north side of the Preserve. These activities in the Hayden Butte Preserve, as well as the current maintenance activities in the Papago Preserve, should be re-evaluated, modified as applicable, and documented in the maintenance manual.

Desert Management Training

At a minimum, Park supervisors and maintenance leads for the Preserves should be trained in desert horticulture and the proper identification, selection, planting, care, and pruning of native Sonoran Desert vegetation. This training can be obtained through the Desert Botanical Garden's Desert Landscape School and the University of Arizona Cooperative Extension Service's Smartscape program. Further, the training should include instruction on the Preserves-specific maintenance manual's guidance and requirements.

Petroglyph Monitoring

The activities of the Arizona Site Steward Program Foundation should be assessed to determine if a greater level of petroglyph monitoring is required.

Trail and Trailhead Monitoring

On a monthly basis or more often, the trails from the various trailheads should be walked to observe their condition and photo- document areas where repairs or replacement are needed. Observations should focus on the trailheads, trails, concrete and railroad tie steps, the access road, and wooden steps above the water tanks leading to the summit. Report and repair any damage in a timely manner. Maintain ADA access wherever applicable.

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Signage Monitoring

The condition of the existing and new directional and educational signage should be reviewed quarterly and be cleaned and repaired as necessary; if damage is extensive or irreparable, the sign should be replaced in a timely manner. The cause(s) of the damage should be assessed so that repaired or replaced signage can incorporate advancements, where possible, to address the cause(s).

Erosion Monitoring

Periodically and after every rainfall event larger than 0.25 inches, the City should inspect and determine that all spider trails, drainage channels and cut/fill slopes are stable. Also, inspections should monitor for newly eroded areas. Trails and other eroded areas should be repaired as soon as possible by replacing soil material or rock into the eroded channel or gully, properly compacting it in place and securing with native stone, branches, and twigs from the adjacent landscape. Decomposed granite on trails should be replenished with same or similar materials. The downhill end of all culverts should be cleaned out, as required. Park staff should provide their leadership with information or suggestions about a more permanent solution to acute or continuous erosion challenges so that a formal evaluation can be undertaken and potential improvement activities be developed, funded, and implemented.

Water Tank Embankment Monitoring

Although the embankment slope in the Hayden Butte Preserve has been relatively stable for the past several decades, there is visible evidence that mechanical weathering of the slope by rain and wind have gradually been eroding the slope. Based on a 2022 geotechnical report, the long-term risks associated with boulder movement (>18 inch diameter), beyond the damage or degradation to the natural and cultural resources in the Hayden Butte Preserve, includes potential injury to Preserve visitors and downslope public facilities such as the Leonard Monti Trail, a trailhead, and the Light Rail perimeter fence and walls. The embankment slope should be monitored periodically (frequency to be re-evaluated by the City) and mitigation measures initiated as appropriate.

Water Tanks Painting

On an annual basis, the appearance of the painted surface of the water tanks should be observed. When the tanks appear faded or not consistent with the intent of the specified paint color, the Water Utilities Division should be notified to assess whether or not the tanks need to be repainted. Paint color selection should be approved by Preserves' stakeholders and be consisted with any updated protocols.

In the 2018 upgrade to the water tanks, PPG Paints color "Chinchilla" was used. Multiple paint manufacturers use "Chinchilla" as the name of their paint color; therefore, the correct manufacturer will need to be confirmed prior to the next painting. Since paint manufacturers also routinely add and eliminate paint colors from their palette, by the time the tanks need to be painted again, the PPG color may not be available, and it may be necessary to choose a different color and manufacturer. The chain link fence around the water tanks should be painted to match the tanks or stained with Natina to mitigate its visual appearance.

Vegetation Monitoring and Removal

The condition of the vegetation in natural, undisturbed areas, as well as areas that have been revegetated, should be monitored to determine if the plants are thriving and providing sufficient cover to mimic natural conditions and prevent erosion. If a location exhibits an inability to establish a vegetative cover, the cause should be determined and application of additional native seed or installation of containerized plants of the type, size, density, and pattern to match the surrounding undisturbed areas should be considered.

Temporary Uses/Events Monitoring

In a sensitive environment such as the Preserves, temporary uses and events can sometimes create unanticipated damage. Prior to beginning any temporary use or event, the City should conduct a pre-activity meeting with the event sponsor to clarify the goals and objectives of the event, to review potential natural and cultural resources of concern, and to ensure a full understanding of the event parameters and participants' responsibilities while utilizing the Preserves. At that time, the City may determine that sensitivity training for sponsor

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representatives is warranted. During or immediately after the use or event, the sponsor should report any damage that occurs during the operation to City staff, so that it can be mitigated in a timely manner. Subsequent to the event, an evaluation of the impact or damage caused by that event should be undertaken. Impacts that are demonstrably more than routine should be repaired or replaced by the event sponsor at no cost to the City. The means for requiring the event sponsor to compensate for the repairs could vary, including requiring the posting of an event-specific bond or the purchase of an insurance policy.

Volunteer Projects

Volunteers, including contractors, individuals, various ASU classes, or other civic and community organizations are one way of supplementing existing City resources while fulfilling the volunteers' objectives for contributing to the protection of the Preserve. When volunteer activities have been approved, they should only happen under the direct supervision of a City staff member or a pre-approved activity leader who has completed the cultural sensitivity training described above and has previous experience working with volunteer groups in a sensitive desert environment.

Debris/Litter/Pet Waste/Trash Removal

Unless conditions change, the current schedule of collecting trash a couple of times per week in the Preserves should be continued. This interval could change depending on whether there is an increase or decrease in visitation to the Preserves; monitoring for those potential changes should be ongoing. Trash collection should also be considered in the Preserves soon after ASU football games or other approved activities or events. Any random debris, litter, pet waste, or trash observed along the trails and within the Preserve areas should be collected and removed.

Native Plants

Only seeds and plants native to the Sonoran Desert Lower Colorado Subdivision and observed as being present within the Preserves should be utilized for any improvement or restoration work (refer to the Flora subsection of the Existing Conditions).

IMPROVEMENTS TO THE PRESERVES

One of the primary objectives of this Master Plan is to provide recommendations for discrete projects or activities that are necessary or desired to protect the resources of the Preserves and provide an enhanced experience for visitors. These include general clean-up and repair, improved functionality, improved aesthetics, long-term preservation and protection of the natural and cultural resources, and the long-term management of resources within the Preserves.

ASU Recognition of Hayden Butte Preserve

Through further discussions, encourage ASU to recognize its natural, undeveloped portion of Hayden Butte as part of the Hayden Butte Preserve. Such a recognition could provide greater opportunities for natural resources studies for ASU students and a unification of management activities by the respective agencies. While the expansion may require some access control (fencing) along the ASU base of Hayden Butte to discourage unwanted entry into the Preserve, it might make it possible to remove the boundary line fence of concern noted above.

Seasonal Holiday Displays

To be compliant with the Tempe City Code and applicable ordinances, holiday displays should be removed from Preserve lands. These displays have been of concern to SRPMIC for some time; consultation is ongoing and will provide further recommendations on disposition of these displays.

The "A"

The "A" is the culmination of the disavowed practice in the west of marking topographic features with letters and university colors. Today, removal of such emblems is viewed as the appropriate next step to restore and preserve natural places, and in this case, to also eliminate an historic, but minor, modern construction. To be compliant with the Tempe City Code Chapter 23, Article V, Ordinance No. 2002.22, and Resolution

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No. 2017.138, the "A" should be removed from Preserve lands. After removal, the disturbed area should be restored. Consultation is ongoing with SRPMIC and will provide further recommendations on disposition of this feature.

Dirt Bike Jumping Area

To be compliant with the Tempe City Code Chapter 23, Article V as amended by Ordinance No. 2002.22, and Resolution No. 2017.138, the bike jumping area in the Papago Preserve should be removed and the site should be restored to a natural condition.

Rock Climbing and Climbing Bolts

To be compliant with the Tempe City Code Chapter 23, Article V, as amended by Ordinance No. 2002.22, and Resolution No. 2017.138, rock climbing should be prohibited in the Papago Preserve. The existing climbing bolts in the Papago Preserve should be removed or mitigated, whichever produces the least damage to the natural resources.

Loma del Rio Trailhead and Ruin

This trailhead is in a dilapidated condition and no longer functions as originally envisioned. It should be removed from the Papago Preserve. An assessment should be conducted as to whether the trailhead should be replaced (redesigned), relocated, or incorporated into other Preserve infrastructure.

The engineered trail to Loma del Rio needs to be repaired at several locations thirty years after stabilization was completed. Damage assessment, protection, and restoration of the structural mound is essential to preventing further loss to this significant cultural resource from weathering and public visitation.

Curry Road Pedestrian Underpass

The viability of a pedestrian underpass (with capability for maintenance vehicle passage) under East Curry Road approximately 250 feet east of the East Curry Road/East Lake View Drive (LoPiano Park) intersection should be evaluated by the City. An underpass at this western location would provide north/south access and increased mobility between the portions of Papago Preserve bisected by East Curry Road where none currently exists. Increased mobility would provide new educational opportunities for local residents and future McCain Library visitors. Additionally, an underpass could provide visitors to the McCain Library with a direct connection to Tempe Town Lake and the Salt River, which would be consistent with McCain's vision of Rio Reimagined. An underpass would also provide greater visitor access to the Preserve lands to the north and should facilitate more efficient maintenance operations.

Accessibility

Improvements, repairs, or restoration in the Preserves should comply with the ADA standards as identified in the Trails Plan. Key areas of focus would include, but not be limited to, access from adjacent properties; trailhead facilities (including rest areas and overlooks); signage; trail grades; and surface treatments.

Trail Improvements

During Trails Plan development, the existing trail systems in the Preserves should be redefined by eradicating and revegetating all undesired spider trails. Signage at these locations could explain the restoration process used to repair erosion damage.

To reduce the visual impact of the existing asphalt access road, to improve its integration into the Hayden Butte landscape, and to repair the damaged road surface, the road should be replaced with an integrally colored, coarse-textured, porous concrete slab. The roughened texture would also provide surer pedestrian footing than the existing asphalt, particularly after rain events. In conjunction with the road replacement, the drainage/erosion issues previously described should also be corrected.

If deemed necessary by the City, the eroded stairs between the water tanks and the summit should be replaced. Replacement of the existing wood retaining walls and wooden steps with more durable integrally colored and/or textured concrete or natural stone steps should be considered. In conjunction with the stair replacement, the exposed

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handrails and drainage/erosion issues previously described should also be addressed. If the stairs are deemed unnecessary, they should be removed.

The unauthorized trailhead at the southwest corner of the Hayden Butte Preserve accessed from the Mission Palms parking area should be eliminated. This removal should be independent of the completion of the Flour Mill development (although may be timed to coincide with the development's completion).

Rockfall and Slope Stabilization

Based upon visual observations and the years that has passed since the previously completed engineering analyses, three potential issues within the Hayden Butte Preserve are worthy of further evaluation and possible remediation. They are:

- The potential rock-fall hazards associated with overhanging bedrock near the summit
- The stability of the embankment fill south and southwest of the water tanks
- The rocks and boulders that have and will become loosened on the water tank fill slopes and will roll down the slope

Further geotechnical evaluation should be completed and cultural resources be properly considered by the Oversight Committee prior to identification of any activity-specific recommendations related to the above matters.

Upgrade Existing Signage

A cohesive signage and wayfinding package should be developed for the Preserves. All signs should be designed to be compatible with the character of a desert nature preserve and the Preserves cultural heritage. Signage should be fabricated from low-profile, integrally colored and/or textured concrete, stone, or weathered steel with compatible and highly durable graphics and lettering. Consideration should be given to individuals of varying abilities by incorporating ADA requirements or properly chosen fonts and graphics to accommodate the needs of a wide audience. Specific elements should include:

- *Enhanced Preserve/Monument Signage* at the two trailheads at the base of Tempe Butte, at the overlook near the water tanks, and at the intersection with the Flour Mill private development pedestrian connection to emphasize the intrinsic value of the Preserves and the open space they provide.
- *Improved Directional/Wayfinding Signs* at each of the trailheads and at key points along the trails to advise visitors of trail length, elevation changes, and grades
- *Interpretive Signs* along the trails from the base to the summit to tell the Tempe Butte "story" and educate visitors about its environmental, cultural, and historical resources, including the history and pre-history of this unique landform. English text should also be translated into O'Odham Nicki and Piipaash Chuukwer.
- *Regulatory Signs* should be limited and distinct from other signage, identifying the Preserves' hours, reminding visitors to remain on the trails and not to deface or remove any resources, prohibiting overnight camping, etc. These regulatory signs will give notice to visitors and assist police with enforcement.

Erosion Control

Within the Hayden Butte Preserve, the primary area of erosion concern is associated with the existing access road. It is apparent that the road has been repeatedly paved over throughout the years with no regard for the downslope drainage impacts. Runoff is eroding the road edges at its higher elevations, then breaking over the south edge in at least two locations. The runoff is severely eroding the west face of Tempe Butte downslope of the road. This same concentrated runoff crosses the Leonard Monti Trail, causing significant washout and erosion damage at that location. The Leonard Monti Trail is also being impacted in other locations by sheet flow that results in the need for continuous repairs. An area-specific hydrological study should be conducted to determine a permanent solution to these drainage issues.

In the Papago Preserve, erosion is dispersed and primarily associated with the existing trails. Problematic erosion areas should be identified and evaluated for permanent repair and restoration. Specifically, the Loma del Rio Trail has exhibited continual erosion at several locations, which will require further study and investigation to determine a long-term erosion control solution.

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Graffiti Removal

The extent of existing graffiti was not identified as part of this Management Plan. Known graffiti (on natural and man-made surfaces) should be identified by the City and a plan of action for removal should be prepared. IN general, graffiti should be removed as soon as possible after it is first discovered in accordance with the City's graffiti removal procedures. Any graffiti removal from natural surfaces should be completed under the direct observation of a City-approved archaeologist with experience in this type of work; removal methods should be developed in consultation with SRPMIC. If needed, the City will contract with a qualified remediation specialist.

Rock Staining

Any rocks, stone overlooks, fences, gates, handrails, etc. that have become damaged, scratched, or scarred should be stained using Natina® or equal, in accordance with the manufacturer's printed instructions. Staining should also be completed for newly created cut or fill slopes or where the visual impacts of ground disturbance warrant the application.

Within the Hayden Butte Preserve, it is recommended that the embankment fill south and southwest of the water tanks, including the ground surface and rocks and boulders be stained to reduce the visual contrast of these features with the adjacent undisturbed slopes of the Preserve.

Define Mill Avenue Point of Entry/Improve Access Control

A point of entry from Mill Avenue to the Hayden Butte Preserve should be defined, particularly through coordination with the Hayden Flour Mill property developer.

Mitigate the Visual Impact of the Existing ASU/Boundary Fence

In prior studies of the Hayden Butte Preserve, the visual appearance of the chain link fence that delineates the boundary between the Preserve and ASU (roughly the College Avenue alignment extended) was a noted concern. As needed, discussions should continue with ASU and SRPMIC on options to mitigate the visual impact of the existing fence. Mitigating the visual impact could involve 1) staining the fencing material using products such as Natina; 2) installing native plants along the fence line in densities and patterns found in the adjacent/undisturbed landscape; or 3) removal of the fence.

Material Replacements

To blend with the overall naturalness of the Preserve's, man-made facilities and features, including existing steel fences, gates, handrails, etc. should be: 1) replaced with redesigned, weathered steel elements; 2) stained to a similar color using Natina; or 3) sandblasted and allowed to rust to a desert-compatible patina.

Develop Preserves Etiquette Guidelines

Expectations for acceptable and unacceptable behavior within the Preserves should be established and posted at all trailheads through signage and QR codes, on the City's website, and in all Preserve-related print material and information.

Information should include but not be limited to:

- The sensitivity of native soils to damage and erosion—the need to remain on trails
- Respectful treatment of cultural resources or artifacts
- The importance of avoiding damage to native vegetation
- How to safely enjoy and behave around wildlife
- Expectations for control of pets in the Preserve
- Trash—use provided trash cans or pack it out

Revegetation

The primary means to re-establish or maintain the natural vegetative communities of the Preserves is by restoring areas damaged by erosion, spider trails, or constructed slopes with native plants. Revegetation includes two components:
1) reseeding with native species, and/or 2) installing containerized native plants. Revegetation should reflect the species, density, and patterns of vegetation in the adjacent, undisturbed areas. Plants with thorns, such as barrel cactus, should be installed at a reasonable distance away from trails and other pedestrian areas.

Installed native plants need some form of temporary supplemental water after planting until their root systems become established. Common methods for providing the supplemental water include temporary above-ground irrigation systems connected to bladder tanks or hand watering from trucks or wagons. The method to be used will depend on the scale and location of the revegetation activities.

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Impromptu/Unsanctioned Memorials

The existing memorials on the Hayden Butte Preserve are prohibited under the City's Preserve Ordinance and should be removed as they detract from the natural, undisturbed desert character of the Preserve.

Eradicate Invasive Species

A thorough investigation should be conducted to identify the locations of noxious and invasive species within the Preserves and a work program initiated to eradicate and remove them. It is understood that removal of invasives is a long-term undertaking and will require perennial efforts to control and reduce the presence of these unwanted plants.

FUNDING AND PARTNERING OPPORTUNITIES

Potential funding and partnership opportunities are presented in Table 3.

Table 3. Summary of Funding and Partnership Opportunities

Title	Administrator	Grant/ Partnership	Maximum Funding	Allowable Expenses
Land and Water Conservation Fund (LWCF)	Arizona State Parks and Trails (ASPT)	Grant	Up to $1M	Park development and/or renovation (e.g., playground equipment, lighting, picnic facilities, ballfields, ramadas, sports facilities, restrooms and other facilities deemed appropriate or eligible by federal and state guidelines).
Notes: ***Website:*** azstateparks.com/lwcf-grants				
Recreational Trails Program (RTP)	ASPT	Grant	Up to $150,000	Development and maintenance of recreational trails and trail-related facilities for non-motorized and motorized recreational trails.
Notes: The RTP is Federal Highway Administration Assistance Program. ***Website:*** azstateparks.com/recreational-trails-program-grants				
Community Challenge	Arizona Department of Forestry and Fire Management (ADFFM)	Grant	$15,000 - $50,000	Activities to encourage and promote citizen involvement in supporting long-term and sustainable urban and community forestry programs at the local level.
Notes: Goal is to improve the long-term health and care of the urban forest or initiate new urban forestry projects in Arizona communities. Funding is limited; intended as "seed grants." ***Website:*** dffm.az.gov/grants/community/Community-Challenge-Grants				
Invasive Plant Grants	ADFFM	Grant	$50,000 - $200,000	Activities to prevent, control, and eradicate invasive plants that are capable of transforming native plant communities in forests, woodlands, or rangelands; assist in preventing fire and flooding, conserving water, and restoring habitat to wildlife; increase local capacity to manage and prevent encroachment of invasive plants. Reseeding and planting native vegetation activities are also allowable.
Notes: Requires an integrated weed management approach, including manual, cultural, mechanical, chemical, and biological control methods. ***Website:*** dffm.az.gov/grants/forest-health/invasive-plant-grants				

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Title	Administrator	Grant/ Partnership	Maximum Funding	Allowable Expenses
Tree Resource Enhancement and Engagement (TREE)	ADFFM	Grant	$1,500 - $5,000	Tree planting to reach canopy cover goals, tree inventory, removal or pruning of hazardous trees, tree ordinance review/ development, and training of volunteers and city/county employees to best care for community forests.
Notes: Must be currently recognized Tree City USA community. Tempe is recognized. Reimbursement grant. ***Website:*** dffm.az.gov/grants/community/TREE-Grants				
Southwest Intervention Fund	National Trust for Historic Preservation (NTHP)	Grant	Typically range from $2,500 to $10,000	Activities that further preservation efforts of the traditional cultures of the Southwest region, including Arizona. Provides support for preservation planning and enables prompt responses to emergency threats or opportunities.
Notes: Open only to Organizational Level Preservation Leadership Forum Members, Main Street America Community Members, and Main Street American General Members. Information on the Main Street America designation process is available at mainstreet.org/our-network/community-evaluation-framework/designation-tiers. ***Website:*** https://savingplaces.org/southwest-fund				
Johanna Favrot Fund for Historic Preservation	NTHP	Grant	Typically range from $2,500 to $15,000	Consultant services for architecture, planning, economics, archeology, fundraising, media relations, education or graphic design; for restoration, rehabilitation, stabilization, and preservation of archaeological sites or cultural landscapes; for restoration, rehabilitation, stabilization, and preservation of designated historic sites and structures, including bricks-and-mortar construction; designing and implementing innovative preservation and education programs; designing, producing and marketing print and video communications materials, and obtaining professional advice to strengthen management capabilities.
Notes: The fund aims to save historic environments to foster an appreciation of our nation's diverse cultural heritage and to preserve and revitalize the livability of the nation's communities. Open only to Organizational Level Preservation Leadership Forum Members, Main Street America Community Members, and Main Street American General Members. Information on the Main Street America designation process is available at mainstreet.org/our-network/community-evaluation-framework/designation-tiers. ***Website:*** savingplaces.org/favrot-fund				
Site Preservation Grant	Archaeological Institute of America	Grant	Up to $15,000	Planning for conservation (documentation including photography and digital applications, assessment of significance and condition, and drawing up a conservation plan in coordination with the local authorities); conservation interventions (physical hands-on treatments, materials and labor); preventive measures [reburial, shelters, fences, walkways, water management (drainage, flood prevention)]; monitoring and maintenance of sites; training of personnel in conservation and site management; public outreach and education
Notes: ***Website:*** www.archaeological.org/grant/site-preservation				

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Title	Administrator	Grant/ Partnership	Maximum Funding	Allowable Expenses
Climate Smart Humanities Organization Grants	National Endowment for the Humanities	Grant – requires partnership with a humanities organization	Up to $300,000	Operational assessments and strategic planning efforts to sustain and protect historical, cultural, educational, intellectual, and physical assets from the risks of climate change.
Notes: Open to humanities organizations, such as museums, libraries, archives, historic sites, and colleges and universities. Proposals must address how strategic planning for climate change will increase the organization's resilience and support its work in the humanities over the long term. ***Website:*** Grants.gov				
Tribal Heritage	National Park Service (NPS)	Grant – requires partnership with federally recognized Tribe	None specified	Locating and identifying cultural resources, including survey and inventory of historic or significant places and survey of traditional skills and information; preserving a historic property listed or eligible for listing in the National Register of Historic Places, including project planning (plans and specifications for preserving a structure or site and repair work to preserve a specific historic structure or site; comprehensive preservation planning; oral history and documenting cultural traditions; training and education for building an historic preservation program; and cultural and historic preservation interpretation and education.
Notes: Open to federally recognized Tribes. Administered through NPS's State, Tribal, Local, Plans & Grants Division. Funded by the Historic Preservation Fund. Approximately $500,000 is available for 2024. ***Website:*** www.nps.gov/subjects/historicpreservationfund/tribal-heritage-grants.htm				
Community Possible Play	US Bank	Grant – requires partnership with 501(c)(3) organization		Activities that align with the Artistic and Cultural Enrichment, Learning Through Play & Preserving, Protecting and Enhancing Outdoor Places to Play focus area.
Notes: Open to 501(c)(3) organizations. ***Website:*** www.usbank.com/about-us-bank/community/community-possible-grant-program.html				
Rivers, Trails, and Conservation Assistance	NPS	Partnership – provides assistance, not funding	N/A	Provides technical assistance in developing or restoring parks, conservation areas, rivers, and wildlife habitats, as well as creating outdoor recreation opportunities and programs that engage future generations in the outdoors.
Notes: ***Website:*** www.nps.gov/orgs/rtca/index.htm				

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Title	Administrator	Grant/ Partnership	Maximum Funding	Allowable Expenses
Conservation Planning Assistance	US Fish and Wildlife Service (USFWS)	Partnership – provides assistance, not funding	N/A	This program integrates information from numerous USFWS programs and delivers that expertise to the people and organizations of urban America. It assists communities in making long-term decisions about locating new green infrastructure or relocating existing infrastructure due to sea level rise and other related concerns. USFWS assists project proponents, planners, and agency personnel in developing plans that conserve, restore, or enhance plant and animal species, while accomplishing the objectives of proposed development. They provide biologists to review and provide recommendations on plans and development designs, craft mitigation plans, provide expertise in wildlife and habitat science, and serve as members on planning teams.
Notes: ***Website:*** www.fws.gov/program/conservation-planning-assistance				

4. OBJECTIVES, IMPLEMENTATION, and SUCCESS CRITERIA

Implementation Approach

The approach to implementing the strategies associated with each Objective is shown in Table 4 below. Some actions are anticipated to occur relatively soon and others will take several years to accomplish. The anticipated timelines are based on a current understanding of the available funding and City staff; these can be adjusted as resources and funding become available. The strategies are also characterized as either periodic or continuous in nature.

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Table 4. Objectives Implementation

Management Plan Objectives	Policy Actions	Management Strategies	Staffing	Timeline (Short-, Medium-, Long-Term, Periodic, Continuous)
1. Identify the significant natural, cultural, and infrastructure resources within the Preserves.	No action required.	Conduct biological and wildlife surveys on Hayden Butte to be commensurate with Papago Preserve studies already completed.	Procurement staff to develop a scope of work and hire consultant to conduct required studies. *	S
	No action required.	Update Papago Preserve studies as needed.	Procurement staff to develop a scope of work and hire consultant to conduct required studies. *	L, P
2. Institute distinct management zones and practices and procedures for maintaining each zone.	• City Council to adopt the Preserves Management Plan. • Update the Preserves ordinances to incorporate management zones.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)	*****	S
3. Define allowable temporary or permanent uses, activities, or features within the Preserves. Remove or terminate disallowed elements.	No action required.	Parks Department is to undertake development of the allowable uses in association with the DCC.	Staff involvement needed during allowable uses determination and during any removals/ terminations. ***	S
4. Ensure there are sufficient and coordinated resources available to maintain the Preserves in a natural condition.	No action required.	Community Services to conduct an assessment of maintenance and operations staffing needs based on Preserves Management Plan recommendations.	**	S, P
5. Enter into an MOU with SRPMIC to address cultural resource management within the Preserves.	Enter into an MOU with SRPMIC.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)	*****	S
6. Establish a method for gathering continuous input from SRPMIC on management and maintenance of the Preserves.	No action required.	In addition to obtaining input through DCC tribal representatives, Community Services should develop protocols to encourage continuous input from SRPMIC.	**	S, C

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Management Plan Objectives	Policy Actions	Management Strategies	Staffing	Timeline (Short-, Medium-, Long-Term, Periodic, Continuous)
7. Establish the basis for a recreation trails assessment and formal trails plan.	No action required.	Implement the strategies outlined in the Preserves Management Plan. (See the Trails Plan section of the MP.)	Procurement staff to develop a scope of work and hire consultant to conduct required studies. *	M
8. Provide user education program on environmental, cultural, recreation, and water use (related to SRP production facilities) topics.	No action required.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)	***	M, C
9. Focus on visitor safety and security via signage that elaborates on the Preserves' challenging terrain, remoteness, and minimal comfort facilities.	No action required.	Implement the strategies outlined in the Preserves Management Plan. (See the Upgrade Existing Signage section of the MP.)	***	M
10. Elevate the Preserve's identity/branding.	No action required.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)	****	L, C
11. Establish the Arizona Heritage Foundation as the center for conservation, educational, and cultural activities related to the Preserves.	Enter into an Intergovernmental Agreement with the Arizona Heritage Foundation.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)	*****	L
12. Restore disturbed Preserves landscapes using native plants and seeds, by eradicating invasive species, and by addressing erosion issues.	No action required.	Implement the strategies outlined in the Preserves Management Plan. (See the Native Plants and Revegetation sections of the MP.)	***	S, C

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Management Plan Objectives	Policy Actions	Management Strategies	Staffing	Timeline (Short-, Medium-, Long-Term, Periodic, Continuous)
13. Reassess Plan goals, objectives, decisions, activities, and related policies so they can be adapted to changes in surrounding land use (i.e., McCain Library/Rio Reimagined), recreation demand, resource degradation, climate change, etc.	Action is required only if policy changes are warranted/desired.	Implement the strategies outlined in the Preserves Management Plan. (See the XXXX section of the MP.)		P

Staffing levels have been assigned from * to *****, with ***** representing the highest level of staffing need.

Success Criteria

Metrics reflect a community's needs, inspire action, and help managers and decision-makers to make informed decisions and adapt to evolving management issues. While no single measurement can paint a complete picture of progress, this Management Plan identifies the measurements needed for successfully accomplishing each of the Management Plan Objectives laid out to ensure that the Preserves can be become self-sustaining open spaces capable of supporting passive recreation and other appropriate uses. By systematically measuring the City's progress towards the Objectives and communicating how tax dollars are being used for that purpose improves accountability and documents how these efforts are meeting the City's goal for the Preserves. Table 5 identifies the Objects and the success criteria for the Hayden Butte and Papago Preserves.

Table 5. Objective Implementation Metrics

Management Plan Objectives	Priority[1] L, M, H	Metric	Current Status	Success Criteria[2]
1. Identify the significant natural, cultural, and infrastructure resources within the Preserves.	H	Completion of appropriate biological and cultural surveys and studies for Hayden Butte Preserve.	Assessment data is more than 5 years old.	Completion of studies within 3 years.
1. Identify the significant natural, cultural, and infrastructure resources within the Preserves.	L	Completion of appropriate biological and cultural surveys and studies for Papago Preserve.	Recently completed.	Update data periodically (within 5 years).
2. Institute distinct management zones, practices, and maintenance procedures for each zone.	H	Establishment of the base line for operations and maintenance practices in the Preserves.	Management zones currently being defined.	Adoption of zones, practices, and maintenance identified in the Plan within 1 year.

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Management Plan Objectives	Priority[1] L, M, H	Metric	Current Status	Success Criteria[2]
3. Define allowable temporary or permanent uses, activities, or features within the Preserves. Remove or terminate disallowed elements.	H	Definition of what uses and activities are allowed and not allowed in the Preserves.	No action taken.	Development of allowable uses, activities, and features and removal of disallowed elements within 1 year.
4. Ensure there are sufficient and coordinated resources available to maintain the Preserves in a natural condition.	H	What resources are needed to maintain the Preserves.	Ongoing.	Comprehensive re-evaluation of resource needs within 6 months.
5. Enter into an MOU with SRPMIC to address cultural resource management within the Preserves.	H	Establishment of the MOU.	No action taken.	MOU established within 2 years.
6. Establish a method for gathering continuous input from SRPMIC on management and maintenance of the Preserves.	M	Improve routine communication with SRPMIC.	No action taken.	Develop communication protocols within 1 year.
7. Establish the basis for a recreation trails assessment and formal trails plan.	L	Trails planning based on specific knowledge of the existing trails	No action taken.	Develop a formal trails plan within 2 years.
8. Provide user education program on environmental, cultural, recreation, and water use (related to SRP production facilities) topics.	H	Improve user education	Very limited signage or information on-line or in the field.	Installation of upgraded signage within 1 year.
9. Focus on visitor safety and security via signage that elaborates on the Preserves' challenging terrain, remoteness, and minimal comfort facilities.	H	Improve user safety	On-going.	Installation of upgraded signage within 1 year.
10. Elevate the Preserve's identity/branding.	M	Increase public awareness	No action taken.	Develop a branding campaign within 2 years.
11. Establish the Arizona Historical Society/Arizona Heritage Center as the center for conservation, educational, and cultural activities related to the Preserves.	L	Provide home base for Preserves' programs and activities.	No action taken.	Initiate outreach discussions within 1 year.
12. Restore disturbed Preserves landscapes using native plants and seeds, by eradicating invasive species, and by addressing erosion issues.	H	Maintain naturalness of the Preserves	On-going.	A plan of action for addressing invasive species and eroded areas is prepared within 6 months.

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Management Plan Objectives	Priority[1] L, M, H	Metric	Current Status	Success Criteria[2]
13. Reassess Plan goals, objectives, decisions, activities, and related policies so they can be adapted to changes in surrounding land use (i.e., McCain Library/Rio Reimagined), recreation demand, resource degradation, climate change, etc.	L	Adapt to changed conditions	No action taken.	Reassess the Plan biannually or as conditions change to determine the need for adaptive measures.

High Priority – Significant impact coupled with urgent need for action (delays may lead to severe environmental or social consequences). Impacts may involve major alterations to ecosystems, high pollution levels, significant depletion of natural resources or impacts to cultural resources, high consumption or use of natural resources, or heavy visitor use.
Medium Priority – Moderate impact coupled with moderate level of urgency (attention required to avoid escalation of issues). Impacts are generally manageable and can be mitigated. Resource use requires careful planning to balance environmental sustainability with resource demands.
Low Priority – Minimal impact coupled with low urgency (routine maintenance or monitoring that can be scheduled flexibly). Impacts typically do not significantly alter or deplete natural, cultural, or recreational resources. Activities may promote conservation or sustainable practices.

5. IMPLEMENTATION CONSIDERATIONS

Data Requirements

When ground disturbance or construction (excluding maintenance activities) are being planned within the Preserves, the following information should be provided to the Community Services Department in a Design Concept Report (DCR) or similar document to document and describe the existing conditions of the anticipated work area. This information will be used to make an informed decision that produces the least area of surface disturbance and effects on the Preserves' natural and cultural environment and minimize long-term maintenance commitments.

- Aerial photographs
- Boundary/topographical data
- Cultural resource site boundaries
- Landownership/existing land use
- Previously prepared plans, reports, and studies regarding visual and biological resources
- Utility locations, including rights of way and easements
- Accurate, scaled base map
- Archaeological surveys (Class I or Class III, as appropriate)
- Geology/soils data
- Detailed topological survey (as necessary)
- Drainage study/analysis (level of study to be determined by project needs)
- Native plant inventory (species, densities, patterns)
- Biological surveys, including for threatened and endangered species
- Detailed photographs of the work area
- Views to and from the work area from key viewpoints determined during design

The DCR would include illustrative graphics, drawings, narrative descriptions of the proposed work, and materials/color palette as applicable. The DCR should represent an approximately 30% design completion and should contain graphic exhibits sufficient to illustrate the general concept of the proposed work and demonstrate the general approach, as applicable, to the limits of ground disturbance, site grading, parking areas, pedestrian/vehicular access points, trailheads and trails, directional and informational signage, pedestrian amenities, site lighting, landscape/ revegetation, irrigation techniques, etc. The DCR

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should also contain all information mandated by the City's plan review submittal requirements. Digital, photorealistic simulations of the proposed modifications would be beneficial for understanding the project's intent and objectives.

Site Development Guidelines

The recommended site development guidelines to be incorporated into all activities within the Preserves includes:

- Vegetation clearing limits shall be irregular, leaving plants, rocks, or boulders in place at the disturbance boundary for a natural appearance, thereby blurring distinct visual edges and smoothing the transition between new construction and the adjacent undisturbed landscape.
- Significant rock outcrops, trees, cacti, and/or cultural features near the construction area shall be identified, located, and protected in place. A vegetation protection plan and/or a plant salvage plan should be developed as part of the restoration activities.
- Existing surface soil (desert pavement) (top 2-4 inches), including stones, soil, vegetation, and natural surface debris within the limits of construction shall be salvaged and stockpiled for later reuse.
- Landscape improvements or restoration shall match the species, pattern, and density of adjacent undisturbed areas, and shall utilize the salvaged plants as a component of the restoration. The long-term goal of the restoration is that within one to two years, the installed plantings should be able to survive without the need for supplemental irrigation.
- Proposed grade modifications should be kept to a minimum and should complement the natural shapes of adjacent landforms and topography. Unnatural, "engineered" slopes that exhibit geometric lines or straight edges shall be avoided.
- Newly created, man-made rock surfaces resulting from blasting or excavation should contain significant relief and have a coarse texture. Typically, rougher surfaces blend better into the natural background. Smooth surfaces do not appear in the natural landscapes and easily contrast with the rough slopes and ground surfaces of the Preserves.
- To mitigate the visual contrast of the lighter colored, newly exposed soil and rock slopes with the undisturbed ground surface, damage to rock installed at trailheads, and galvanized metal, a non-toxic stain similar to Natina should be applied in accordance with the manufacturer's instructions. Multiple color samples and mix formulas should be required as part of the plan. The samples should be tested on a less visible section of material for approval prior to commencing the staining work.
- As needed, the use of low retaining walls made of appropriate materials is preferred to having large, exposed cut or fill slopes. Acceptable wall materials include native or complementary natural stone, weathered steel gabion baskets, or integrally colored and textured concrete.
- Drainage areas with existing erosion, or the potential to erode, shall be treated in a manner that produces a natural appearance using natural stone and vegetation. Unnatural "engineered" solutions, such as plain concrete, Gunnite@, or large areas of non-native riprap, shall be avoided.
- Incorporated materials, equipment, and infrastructure such as benches, bike racks, drinking fountains, signage, trash receptacles, etc. shall be chosen based on their compatibility with the natural character of the Preserves.
- Design development should also identify how noxious and invasive plant species will be managed. Eradication of noxious and invasive species should occur wherever they are encountered or as part of an overall removal program. Removing plants before they form seed heads will slow the spread of these plants. Unwanted plants should be removed by pulling them up by hand or spraying with an organic, non-toxic herbicide (e.g., vinegar) that will not impede germination and growth of desired native vegetation—no other plant removal methods are allowed. After the plant removal, the root zone cavity should be backfilled by hand or foot using soil collected from the adjacent ground area. The removed plant material should be placed in a trash bag or an enclosed container to prevent the spread of seeds or plant parts after the plant is uprooted. Where the disturbed area is significant enough to pose a potential erosion concern, installation of native seeding, plantings, or other treatments should be considered. The area should be monitored for evidence of re-emergence of undesired plant species.
- Graffiti removal should employ "state-of-the-

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art" procedures, which are continuously evolving and informed by Tribal consultation efforts. A graffiti removal plan should be prepared and provide a delineation of what technique will be used and why it is the most appropriate for the given the resources to be restored. The plan should also require that "before" and "after" photo documentation is a component of the removal so that the results can be confirmed.

- The plans should identify how access points and trails, or alternative routes to trails, will remain open throughout the duration of the work. Through the City's outreach media, citizens and users should be informed of the upcoming work, especially if any temporary path closures or lack of access will occur.
- Trail accessibility shall comply with the ADA standards as identified in the Trails Plan.

Construction Guidelines

The following protocols shall be followed for all construction within the Preserves.

- Anyone responsible for overseeing, conducting, or participating in construction and maintenance activities shall be required to have completed one of the cultural sensitivity training programs previously identified in this Management Plan. When this training is not feasible, a Parks staff member who has completed the necessary training or representative of SRPMIC should be present to monitor the proposed activities.
- A pre-construction meeting should be conducted with representatives of the City, SRPMIC, stakeholders, the project designer, the contractor, and other interested parties as appropriate, to clarify the purpose, goals, and objectives of the project and to further the understanding of all parties on the parameters for the work.
- Prior to the pre-construction meeting, the Limit of Disturbance should be flagged for all to review.
- A clean and orderly site should be maintained throughout the construction process to protect unexpected visitors to the work area and curious wildlife who may take an interest in paper, trash, and similar construction waste.
- Work progress should be recorded through photographic documentation that may be made available to City officials and boards and commissions.
- The appropriate stakeholders should be involved during the reviews and approvals, including a representative of SRPMIC.

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