

Sustainable Park Enhancements: Selna Ballfield & Mongini Park

A Fall 2021
Collaborative Project with
Arizona State University's
Project Cities & the
Town of Clarkdale



Sustainable
Cities
Network

Arizona State
University

Project Cities



PART 1:

Project and Community Introduction

GET TO KNOW THE PROJECT

ABOUT ASU PROJECT CITIES

ABOUT THE TOWN OF CLARKDALE

EXECUTIVE SUMMARY

KEY STUDENT RECOMMENDATIONS

SUSTAINABLE DEVELOPMENT GOALS

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This report represents original work prepared for the Town of Clarkdale by students participating in courses aligned with Arizona State University's Project Cities program. Findings, information, and recommendations are those of students and are not necessarily of Arizona State University. Student reports are not peer reviewed for statistical or computational accuracy, or comprehensively fact-checked, in the same fashion as academic journal articles. Editor's notes are provided throughout the report to highlight instances where Project Cities staff, ASU faculty, municipal staff, or any other reviewer felt the need to further clarify information or comment on student conclusions. Project partners should use care when using student reports as justification for future actions. Text and images contained in this report may not be used without permission from Project Cities.

Cover images:

**Project Cities and
SOS 498/594 students**

ACKNOWLEDGMENTS

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On behalf of the Julie Ann Wrigley Global Futures Laboratory, the Global Institute of Sustainability and Innovation, and the School of Sustainability, we extend a heartfelt thank you to the Town of Clarkdale for enthusiastically engaging with students and faculty throughout the semester. These projects provide valuable real-world experience for our students and we hope that their perspectives shine light on opportunities to continuously improve Clarkdale's future livelihood and community well-being.

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To access the original student reports, additional materials, and resources, visit:
links.asu.edu/PCClarkdaleSTEMPark21F

ABOUT PROJECT CITIES

The ASU Project Cities program uses an innovative, new approach to traditional university-community partnerships. Through a curated relationship over the course of an academic year, selected Community Partners work with Project Cities faculty and students to co-create strategies for better environmental, economic, and social balance in the places we call home. Students from multiple disciplines research difficult challenges chosen by the city and propose innovative sustainable solutions in consultation with city staff. This is a win-win partnership, which also allows students to reinforce classroom learning and practice professional skills in a real-world client-based project. Project Cities is a member of Educational Partnerships for Innovation in Communities Network (EPIC-N), a growing coalition of more than 35 educational institutions partnering with local government agencies across the United States and around the world.

ABOUT SUSTAINABLE CITIES NETWORK

Project Cities is a program of ASU's Sustainable Cities Network. This network was founded in 2008 to support communities in sharing knowledge and coordinating efforts to understand and solve sustainability problems. It is designed to foster partnerships, identify best practices, provide training and information, and connect ASU's research to front-line challenges facing local communities. Network members come from Arizona cities, towns, counties, and Native American communities, and cover a broad range of professional disciplines. Together, these members work to create a more sustainable region and state. In 2012, the network was awarded the Pacific Southwest Region's 2012 Green Government Award by the U.S. EPA for its efforts. For more information, visit sustainablecities.asu.edu.

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ABOUT CLARKDALE

The Town of Clarkdale, Arizona is located on the banks of the Verde River in the north central part of Arizona. It is a thriving community and is the gateway to the Sycamore Canyon Wilderness Area in the beautiful Verde Valley. Founded in 1912, Clarkdale is renowned as the first master-planned community in the state of Arizona and was developed with a "Live, work, play" ideology intended to provide its residents with a wholesome living experience. Clarkdale has just over 4,300 residents who thrive in the fresh, clean air of the Verde Valley.

CLARKDALE TEAM

Project Cities Community Liaison

Ruth Mayday, Community Development Department Director

Clarkdale Project Leads

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Celebrating historic charm. Creating a prosperous future.

clarkdale.az.gov



Town of Clarkdale

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March 30, 2022

Dear Town of Clarkdale Residents :

On behalf of the Town Council and the Town of Clarkdale, we would like to express our appreciation to all who have been involved with the ASU Sustainable Cities Project. Over the past two years, the Town has been fortunate to work with nearly 100 students across disciplines to develop strategies for improving the lives of Clarkdale residents. Their efforts support the work of Town staff and is vital to the planning and development of a Clarkdale that will meet the needs of all its residents.

Our continued partnership is important to the Town of Clarkdale. Because we are a small town with a small staff, our capacity to research and produce in-depth documents is limited; the ability to work with the students and faculty at ASU provides us with the expertise we need to accomplish our goals for our community, while providing the students with hands-on, documentable experience in the public sector.

The Town of Clarkdale looks forward to our continued collaboration with Sustainable Cities Program and another successful year with the students at ASU.

Sincerely,

Robyn Prudhomme-Bauer, Mayor

Susan Guthrie, Town Manger

Clarkdale, Arizona



Proud partner of

ASU Sustainable Cities
Network
Arizona State University

Project Cities

Verde River at Box Canyon

Demographics

total population: **4,424**

36% of residents are over the age of 65

median age: **56.27**

78% of residents are homeowners

67.1% of the population has some college education, 31.75% are college graduates

median yearly income: **\$45,304**

Schools

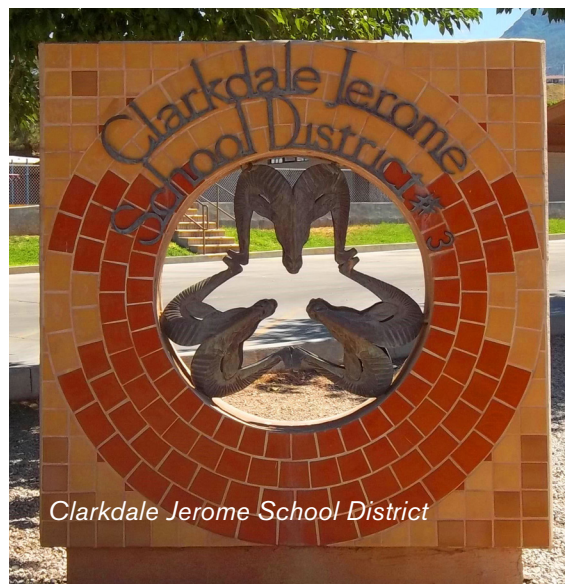
Clarkdale is home to the Yavapai College Verde Campus and the Small Business Development Center. Yavapai College has one of the leading viticulture and enology schools in the Southwest. High school students in Clarkdale attend Mingus Union High School, and the Clarkdale-Jerome Elementary School boasts an excellent reputation for educating students from Kindergarten through 8th grade.

Sustainability

In Clarkdale's 2013 General Plan, the City identified four main sustainability objectives: **water use, ecological design, sustainable construction** and **mixed use development**. In 2019, Clarkdale announced its partnership with ASU's Project Cities to enliven the Central Business District with a sustainability orientation.



Clarkdale Park



Clarkdale Jerome School District



Tuzigoot National Monument

History

The Town of Clarkdale is located on the banks of the Verde River in the north central part of Arizona. It is a thriving community and is the gateway to the Sycamore Canyon Wilderness Area in the beautiful Verde Valley. Founded in 1912, Clarkdale is renowned as the first master planned community in the State of Arizona. The town was founded to house the employees of the smelter in Clarkdale, as well as the mine workers from Jerome. Ahead of its time, Clarkdale boasted underground utilities, sewers, paved streets, stylish homes and a thriving commercial center.

The main town site was located on a ridge overlooking the industrial smelter complex and was developed with residential homes, including upper and lower-income housing, a commercial

area, an administrative center, schools, recreational and cultural facilities, and parks. They intended to include all the parts typically found in a small town within a comprehensive planned design. Today, the original town site of Clarkdale is recognized as a Historic District on the National Register of Historic Places.

The original rail line that served the smelter is now host to a scenic excursion train, the Verde Canyon Railroad, which allows travelers a four-hour round trip to view the protected ecosystem of the Sycamore Canyon Wilderness Area and Verde River firsthand. In addition to the excursion branch, the Arizona Central Railroad (the parent company of the Verde Canyon Railroad) ships materials by rail to Salt River Materials Group, a local cement manufacturer.



Verde Canyon Railroad

Attractions

Hop aboard the Verde Canyon

Railroad for the longest-running nature show along the Verde River. Spot bald eagles and enjoy an array of special events onboard throughout the year. Experience the Arizona Copper Art Museum housed in the restored Clarkdale High School with its dazzling array of thousands of gorgeous copper artifacts (some of which you can touch). Float the Verde River with experienced

local river outfitters and enjoy unspoiled riparian areas adjacent to the Audubon Important Birding Area in Tavasci Marsh. Dance the night away every weekend to live music. Explore the Tuzigoot National Monument featuring the ruins of an ancient Sinagua Indian pueblo. Savor local terroir at Clarkdale's wineries, the Chateau Tumbleweed tasting room and winery or the Southwest Wine Center in the heart of Yavapai College's Verde Campus in Clarkdale.

Downtown Business District



Downtown Business District

The historic Downtown Business District boasts many treasured historic assets and is the center of Clarkdale's government, cultural and historic core. The Town and downtown-area business owners have invested heavily to keep the town core thriving. As of 2019, there are four vacant properties in the Business District that pose opportunities for redevelopment, including a former grocery store, apartments, and the old

Grand Theatre. \$1.5 million in streetscape improvements in the Downtown Business District were completed in March 2005.

Clarkdale revitalization plan

1. Develop a strategy to **encourage public and private investment**
2. Produce a **report of building conditions** including a revitalization plan for each building, cost estimates on the repairs and possible funding sources
3. Develop a **parking, pedestrian and bicycle connection plan**
4. Identify creative use of existing spaces to **promote foot traffic** in the area

Business Highlights

- Clarkdale has 83 businesses
- Workforce is composed of 45% blue collar; 54% white collar
- 90% of businesses have less than 20 employees
- Annual events, such as Clarktoberfest, the Car Show, wine festivals, and multiple block parties, are anchored in the historic business district



Historic Downtown Mainstreet

Leading industries as of 2019

Public Administration



167 Jobs

Education



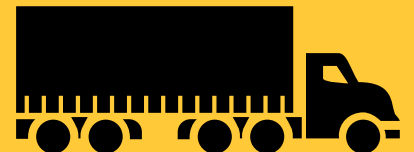
110 Jobs

Information



108 Jobs

Transportation & Warehousing



87 Jobs



Kayaking on the Verde River

Local ecology

The Verde River bisects the north portion of Clarkdale at a low elevation of around 3,300 feet. The west side of the town boundary is located along the foothills of Mingus Mountain in the Black Hills Range at a high elevation of approximately 4,600 feet above sea level. On the northeast border of Clarkdale, the National Park service operates the 42-acre Tuzigoot National Monument, an 800-year-old Sinagua pueblo, which is surrounded by hiking trails and hosts a complete museum. Tavasci Marsh borders Tuzigoot National Monument and has been designated as an Important Birding Area by the North American Audubon Society. Arizona State Parks also manages the Tuzigoot River Access Point along the Verde River in Clarkdale. The town is surrounded by the Prescott National Forest to the west and the Coconino National Forest to the east. In addition, trust lands of the Yavapai-Apache Nation are located within the town boundary.



Local wildlife

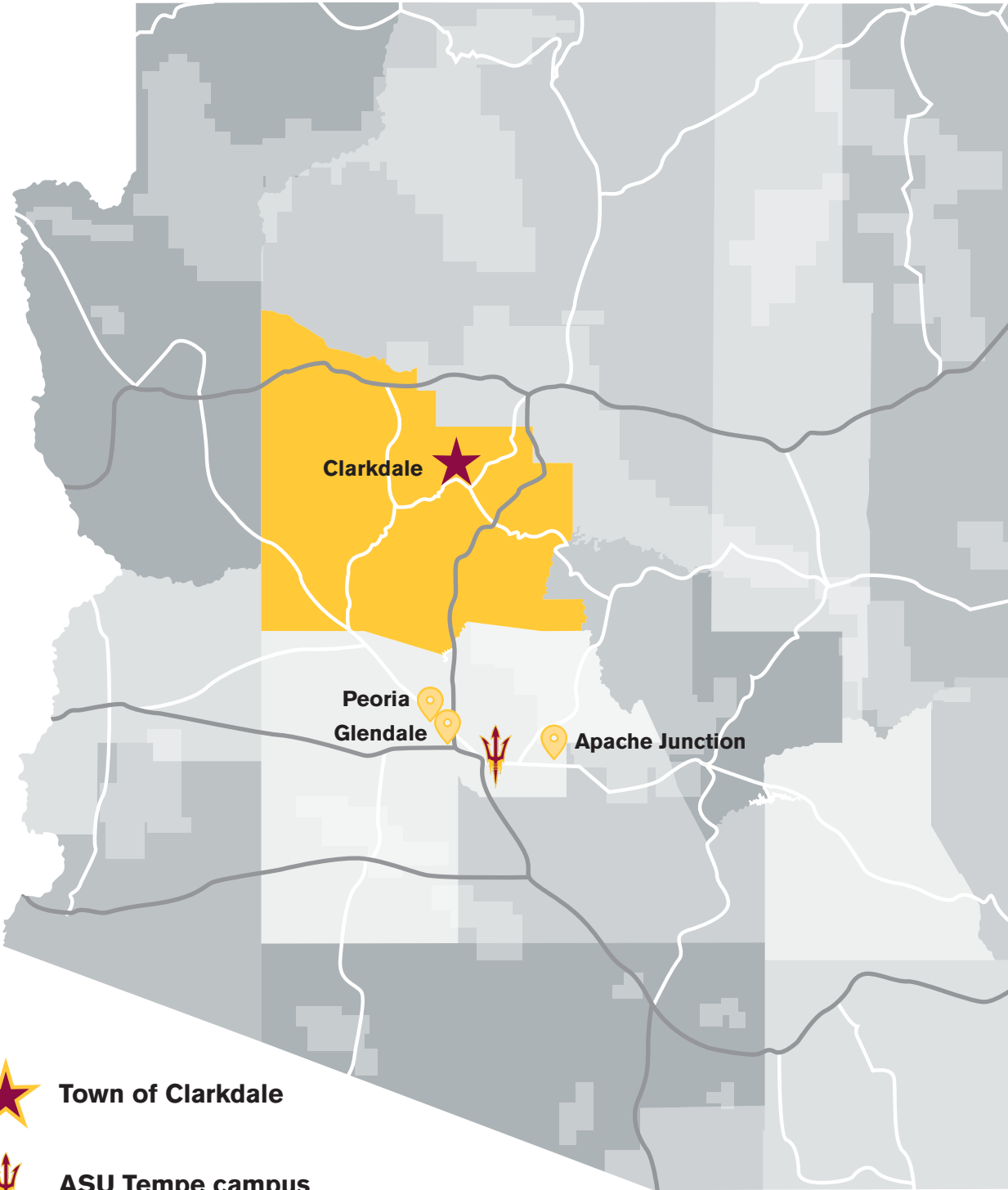


Verde River



Sycamore Canyon

MAP OF PROJECT CITIES PARTNER COMMUNITIES IN ARIZONA



Town of Clarkdale



ASU Tempe campus



Other Project Cities Partner Communities



The following report summarizes and draws highlights from work and research conducted by students in SOS 498/594 Urban Sustainability Best Practices Application for the Fall 2021 partnership between ASU's Project Cities and the Town of Clarkdale.

To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCClarkdaleSTEMPark21F

EXECUTIVE SUMMARY

Located in the historic Verde Valley of central Arizona, the Town of Clarkdale was established as a mining community for the United Verde Copper Company. Known for its copper deposits, the Town has established itself as a desirable community due to its small-town feel and dedication to providing its residents with services on the cutting edge of sustainability. Considered the first master-planned community in Arizona, the Town retains much of its original structures and its projects often pay homage to the Town's rich history.

As a central point of pride for the community, the Selna Ballfield and Mongini Park, also known as Selna-Mongini Park, is a community staple. The park is split into two sections, with the Town-owned Selna Ballfield sitting on 1.66 acres and the Town-leased Mongini Park sitting at the bottom of the ballfield. Due to its advantageous location in the community, the Town of Clarkdale seeks to redevelop and revitalize the space with activity areas, state-of-the-art landscaping, and educational features that emphasize sustainability and STEM education.



Figure 1 Selna-Mongini park

In the fall 2021 semester, the Town of Clarkdale partnered with two graduate students in Nalini Chhetri and Anne Reichman's SOS 498/594 Urban Sustainability Best Practices Application course to research and recommend STEM & sustainability park features that the Town can implement in Selna-Mongini. The two graduate students split their research into three sections: STEM education, sustainability features, and funding opportunities for the park's revitalization. The students recommend a series of improvements to the park and provide recommendations for new features that seek to revitalize the park's existing infrastructure.

Recommended features are based on six topical recommendations: recycling, native plants, reduced paved surfaces, composting, reusing existing infrastructure, and rainwater capture. The topical recommendations capture a variety of potential STEM & sustainability related features and the opportunity to use park signage and tours to educate community members and visitors about the park's features.

As the Town embarks on its design process for the Selna-Monigini Park, the student recommendations seek to equip Town leadership with the knowledge and resources to develop an educational hub and recreation site for the local community and establish itself as a sought-after destination in Clarkdale.

KEY STUDENT RECOMMENDATIONS

Recommendations for sustainability & STEM park features	Read more
Provide numerous trash and recycle containers throughout the park, along with educational materials to inform park visitors what is recyclable.	pp.27-28, 38
Coordinate with Patriot Disposal to develop educational signage and materials, such as flyers with QR codes, that explains which items can be recycled.	pp.27-28, 38
Consult with the Audubon Society database of native plants to determine which native plants are most appropriate for the park.	pp.29-30, 38
Implement neighborhood gardening activities in conjunction with the Selna-Mongini Park in order to promote outdoor activity, exercise, and a feeling of accomplishment for residents.	pp.29-30, 32, 38
Conserve existing open fields of grass or turf in order to preserve local wildlife habitat.	pp.29-30, 39
Consider low-impact development methods, such as reducing paved surfaces, to allow for rainwater ground infiltration.	pp.30-31, 34-36
Maintain walking paths with sustainable, recyclable material, including wood chips or chunks of old rubber tires.	pp.30-31
Utilize compost and mulch as fertilizer for the park's soils and flora.	p.32
Utilize the park's existing topography and infrastructure to reduce additional built structures. Strategies utilizing existing features may include: <ul style="list-style-type: none"> ▪ Taking advantage of the natural slope of Mongini Park for stormwater management, ▪ Employ natural terraces for butterfly gardens, and ▪ Restore the baseball dugouts as restrooms. 	pp.33, 38
Select low impact development methods for rainwater capture, including rain gardens, curb cuts, sidewalk cuts, and sediment traps.	pp.33-36, 39

Recommendations for funding	Read more
Consider applying for the American Academy of Dermatology Association Shade Structure Grant. The funding can ensure appropriate shade structures throughout the park and can be used for sun safety plaques and information for park goers to stay safe in Arizona's harsh climate.	pp.37, 39
Consider applying for the Qaudratec Cares "Energize the Environment" grant program to provide funding for educational awareness targeted towards youth.	pp.37, 39

TOWN OF CLARKDALE PROJECTS: ALIGNMENT WITH THE UNITED NATIONS'

SUSTAINABLE DEVELOPMENT GOALS

As the leading international framework for sustainable decision-making, the 17 Sustainable Development Goals (SDGs) lay out a path for partnerships toward global peace and prosperity. The SDGs provide a set of goals and metrics for project impact to be measured, offering an illustration of the benefits experienced by the cities, towns, and students who participate in a Project Cities partnership. For details on the SDGs, visit sdgs.un.org/goals.



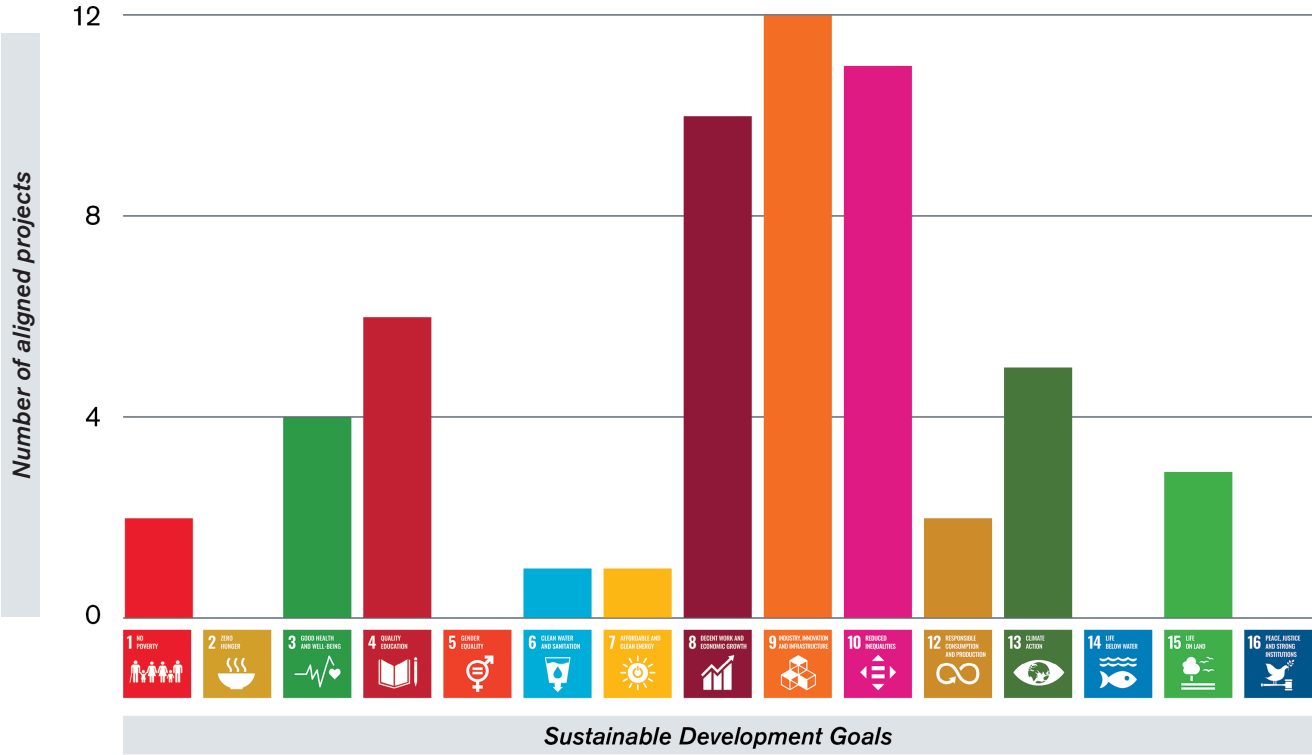
11 SUSTAINABLE CITIES AND COMMUNITIES



17 PARTNERSHIPS FOR THE GOALS

Every project in the PC program aligns with SDGs 11 and 17.

The figure below illustrates SDG project alignment throughout the Town of Clarkdale's partnership with Project Cities, through the Fall 2021 semester.



TOP THREE GOALS ADDRESSED IN THE FOLLOWING REPORT

Community spaces are vital to the health and well-being of residents and visitors. The revitalization of Selma-Mongini Park is another demonstration of Clarkdale's dedication to sustainability efforts in the Town, as well its goal to provide enjoyable recreation and education opportunities for its citizens. This project primarily touches on SDGs 3, 11, and 15.



Goal 3: Good Health and Well-Being

"Ensure healthy lives and promote well-being for all at all ages."

Enhanced recreation spaces can encourage outdoor activity, physical exercise, and social opportunities.



Goal 11: Sustainable Cities and Communities

"Make cities and human settlements inclusive, safe, resilient, and sustainable."

Sustainability features in Selma-Mongini park, such as permeable pavement, can contribute to the Town's overall sustainability goals.



Goal 15: Life on Land

"Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss."

Proposed features such as the pollinator garden can contribute to local habitat conservation.

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PART 2:

Innovative Community Spaces: STEM & Sustainability Park

**ENHANCING PUBLIC SPACES THROUGH SUSTAINABILITY AND
STEM EDUCATION FEATURES**

**SOS 498/594:
URBAN SUSTAINABILITY BEST PRACTICES
APPLICATION**

SCHOOL OF SUSTAINABILITY

**FACULTY
NALINI CHHETRI & ANNE REICHMAN**

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INTRODUCTION

The Verde Valley is geologically a horst and graben region within central Arizona's Transition Zone between the Colorado Plateau and the southern Basin and Range. The area's geologic history is essential in exposing aquifers that provide water to the Verde River and is relied on for agriculture, tourism, and recreation—faulting in the region also revealed copper deposits that eventually brought in the mining industry, leading to the creation of Clarkdale, Arizona.

Founded in 1912 by William A. Clark, Clarkdale was a mining town for the United Verde Copper Company's smelting operations (Clarkdale Historical Society, 2021). Due to the unique geology of the region in Yavapai County, it became a prime location for copper mining thanks to the freshwater availability of the Verde River. Additionally, it was used for housing the mine workers and had amenities including the telegraph, telephone, freshwater, electricity, and sewage.

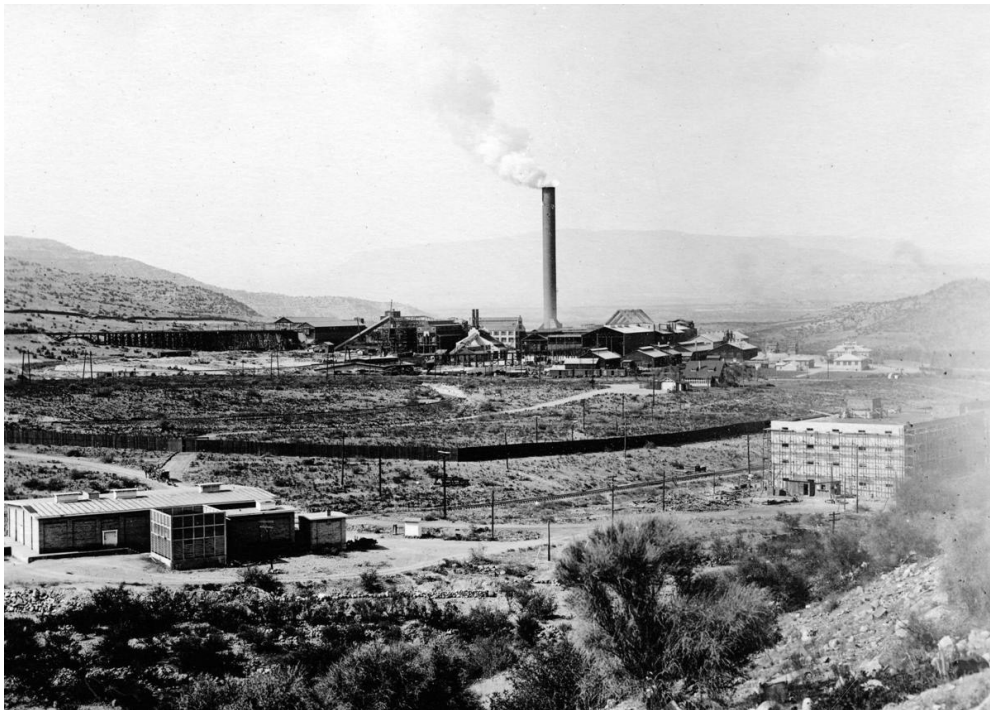


Figure 1 Historical image of the Clarkdale smelter, by Town of Clarkdale

Clarkdale was once considered a “modern mining town,” thanks to its advanced infrastructure; however, the wealth the mine once provided is no longer available. In 1959, the Phoenix Cement Company emerged and would eventually stabilize the local economy. However, this economic transition did little to mitigate the environmental aftermath caused by the past mining operations, such as leftover smelting material in large slag piles and soil pollutants. This long history of environmental degradation and demographic disparities has led the township to its current mindset, incorporating adaptive, sustainable, and inclusive solutions to modern problems. The Town’s estimated 4,271 residents have embraced modern sensibilities to help promote another diminishing resource, the Verde River (Blair, 2021). This effort includes a Town-wide program with oversight from the Arizona Department of Environmental Quality and Freeport Minerals Corporation to identify soil samples suffering from negative impacts from smelter-related metals.



Figure 2 Phoenix Cement Company's Clarkdale plant, by Town of Clarkdale

The Selna-Mongini Park is one of the Town’s landmark features, which hosts a historic ballpark and is shaped by sloped ridges that mirror the topography of the banks of the Verde River. In an effort to revitalize the park as a community hub, the Town of Clarkdale has developed a park design that raises educational awareness regarding the local geologic history and does so in a manner that is sustainably responsible for future generations.

While there is considerable research and literature on sustainable parks, it is crucial to consider the local community's needs. Clarkdale's population of roughly 4,300 individuals has an average age of approximately 57.3, according to the most recent 2020 census (Blair, 2021). Selna-Mongini Park aims to strike a balance between appealing to youth with educational features and playgrounds while also serving the needs of adult residents seeking restorative recreation. The park's layout provides ample opportunity to improve upon existing features while implementing new ones that can spur wider community involvement in sustainable practices adopted and promoted by the new park. The research will outline and recommend potential STEM & sustainability park features and identify potential funding sources for the Town's consideration.

Context and drivers

Park mission statement:

"To revitalize Selna-Mongini Park so that it is once again a hub of community activity" (Town of Clarkdale, Master Planning, n.d.c).

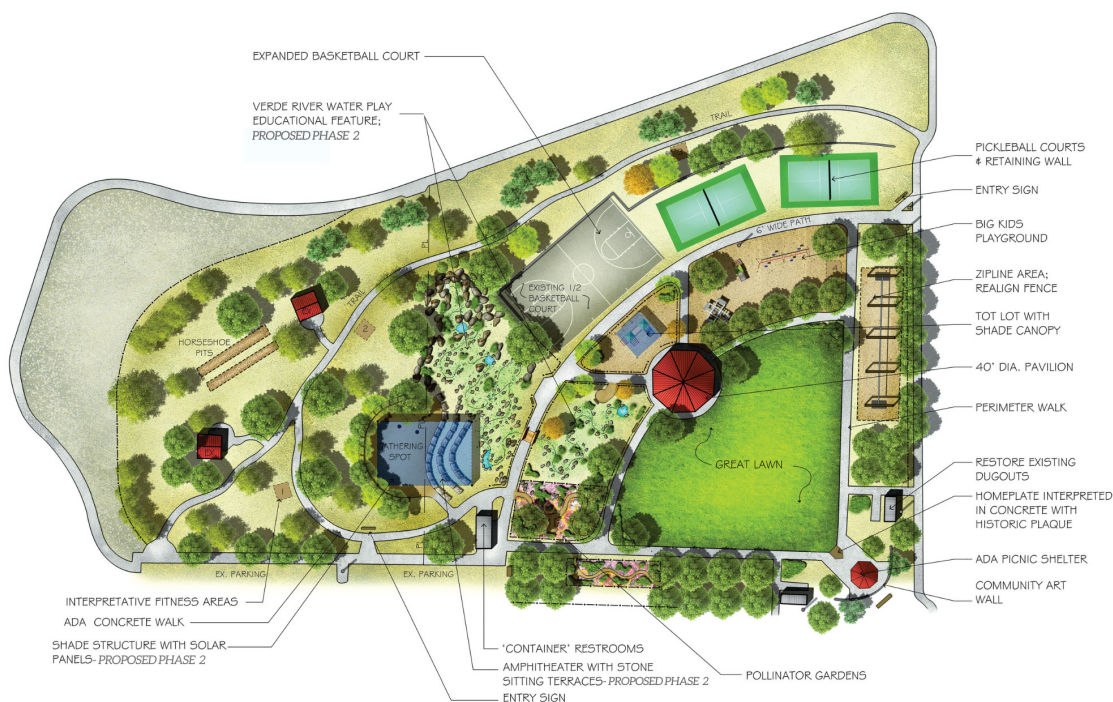


Figure 3 Selna-Mongini master plan proposal, designed with public input and landscape architect T.B. Kane

Selna-Mongini Park is comprised of two sites, the Selna Ballfield and Mongini Park. Due to its optimal location, Town leadership seeks to redesign Selna-Mongini as a recreational education park that will interactively address critical hydrologic concepts like watersheds and aquifers while improving residents' quality of life through environmental remediation. Due to the diminishing outflows of the Verde River, the new park design will include an interactive and educational water feature that educates park visitors about the Verde River's significance to the community. The Town is poised to revitalize the Selna-Mongini park as a community hub and utilize this as an opportunity to highlight the Town's commitment to sustainability and its historical ties to the Verde River.



Figure 4 Aerial view of Selna Ballfield and Mongini Park, from Google Maps

In September 2018, the Town's Parks and Recreation Department and the Parks and Recreation Commission began a community engagement process to gather public input to inform the park's redesign (Town of Clarkdale, n.d.c). Community cooperation between Town officials, landowners, and citizens provides the best opportunity for this project to succeed. In many ways, buy-in by local businesses and entrepreneurs willing to contribute resources or workforce may reduce park development costs. Additional community assistance elevates the educational value of the park by allowing local resources to be utilized in other aspects of the park.

RESEARCH METHODS

This paper aims to provide the Town of Clarkdale with various beneficial features for implementation in the Selna-Mongini Park. There will be three main areas of focus, including research into STEM educational features, sustainable approaches to building and maintenance, and potential funding sources. This research will provide a framework to process past successes and attempts to implement them to fit the community's needs. Based on the research collection and analysis, recommendations will be provided for park features that will help achieve the Town's aspirations while also achieving maximum functionality.

FINDINGS & ANALYSIS

Sustainability park features and STEM education

Over the past two decades, many parks have begun to embrace a sustainable approach by implementing features that suit the community's needs (Caldwell, 2014; Hamilton, 2019). Parks throughout the country will vary depending on local conditions such as soil permeability, climate, rock type, elevation, and many more. To find the best solutions for Clarkdale, students examined existing Town assets and how they can be best utilized for the community moving forward. To do this, the students assembled a number of commonly implemented sustainable tactics for renovating parks and identified suitable approaches that will maximize the benefit for the Town while minimizing potential costs. These concepts will then be analyzed using the Strength-Weakness-Opportunity-Threats (SWOT) analysis to synthesize potential design options and inform recommendations for community leaders.

Offer Recycling

As Selna-Mongini is remodeled as a community hub for Clarkdale, it is imperative to provide recycling for park visitors. Recycling programs are a staple for any entity implementing sustainable solutions (Caldwell, 2014). Parks should have numerous trash and recycle containers parked with a visual representation of what is allowed to go in what bin. Adding additional signage explaining proper recycling techniques in conjunction with current contractor Patriot Disposal can reinforce positive habits in public that can translate to in-home behavior. Take-home flyers or Q.R. codes that explain which items can be recycled may also result in a more cost-effective process for Patriot Disposal.



Figure 5 Patriot Disposal currently serves residential Clarkdale customers, and may be an option to partner with for recycling services in Selna-Mongini Park, images by Patriot Disposal

Recycling SWOT table	
<p>Strengths</p> <ul style="list-style-type: none"> Essential for any modern sustainable park. Accessibility of receptacles reduces the volume of litter. Increases overall environmental consciousness. 	<p>Weaknesses</p> <ul style="list-style-type: none"> Must be regularly maintained to ensure overflow, increasing maintenance costs. Cannot recycle everything; transparent, proper educational signage is critical.
<p>Opportunities</p> <ul style="list-style-type: none"> Provides an opportunity for sustainable growth in the community through educational literature (Q.R. code, signage on bins). Potential relationship opportunity with Patriot Disposal. 	<p>Threats</p> <ul style="list-style-type: none"> The area could become a dumping ground for community recycling which could overwhelm the maintenance team. Must keep signage updated through shifts in environmental standards. Soil contamination threatens the recycling program if it's not adequately implemented.

Figure 6 SWOT table regarding the offering of recycling services in Selna-Mongini Park

Use native plants

Community parks not only serve as a recreational area for residents, but can be used to house native wildlife and fauna. The use of native plants sustains the local ecosystems for insects, birds, and native fauna. The **Audubon Society** has a catalog of native flora that will be more suitable for the local biome, thus demanding fewer resources than non-native plants since they often require less water and fertilizer (Audubon Society, 2021). These plants offer natural beauty, producing an assortment of wildflowers with vibrant colors, as well as require less water resources as they've adapted to the area. Upkeep for traditional lawns and grassy areas in parks often requires artificial fertilizers, chemical pesticides, and herbicides that negatively impact humans. Open fields of grass or turf should be reserved for areas designed for open space. Selecting native flora provides a healthier place for the community, and wildlife would provide essential pollination, further promoting native flora while preserving biodiversity. In addition to using native plants for landscaping in the park, implementing neighborhood gardening may promote outdoor activity, exercise, and a feeling of community cohesion.

Editor's Note

The Audubon Society hosts an online database of native plants and local resources, available at www.audubon.org/native-plants. The Arizona Department of Forestry and Fire Management also provides a native tree selection and care guide, available at dffm.az.gov/forestry-community-forestry/urban-community-forestry/tree-care.



Figure 7 Some Arizona native plants that support pollinators include (clockwise from top left) Desert Lavender, Arizona Milkweed, Beavertail Cactus, and Barrel Cactus

Native plants SWOT table	
<p>Strengths</p> <ul style="list-style-type: none"> Using native plants provides more opportunities for park plant growth to thrive with the most suitably adapted vegetation. The ecological benefit is habitat, food, and nutrition for local fauna. Reduced demand on watering and irrigation requirements. 	<p>Weaknesses</p> <ul style="list-style-type: none"> Desert and drought-tolerant landscaping is not typically associated with traditional park environments.
<p>Opportunities</p> <ul style="list-style-type: none"> Displaying a variety of species may encourage locals to place similar flora in their home gardens. Developing a community garden may bring together community members and encourage outdoor activity. 	<p>Threats</p> <ul style="list-style-type: none"> Some native plants can allow non-native species to emerge in the region. Desert vegetation is often more rugged with thorns, and due diligence is required when selecting plants.

Figure 8 SWOT table regarding the use of native plants in Selna-Mongini Park

Reduce paved surfaces

As Selna-Mongini gains new features, park connectivity and accessibility will be important for visitors. Typical paving materials, such as concrete, can lead to stormwater runoff, while permeable materials allow for more groundwater infiltration. By reducing paved surfaces, ground infiltration is significantly increased by removing impermeable materials (Sustainable Cities Network, 2019). Walking paths can be maintained with sustainable, recyclable material, including wood chips or chunks of old rubber tires. Reduced cement increases the amount of permeable surface area while an emphasis on permeable material can reduce shock on joints and bones for walkers and runners. Arizona State University is actively researching other porous surfaces that provide more support for wheelchairs while still allowing for water percolation.

Editor's Note

The Boyce Thompson Arboretum recently installed Porous Pave XL, an eco-friendly porous pavement material. The newly installed pavement can support routine foot traffic and wheelchair use while being slip-resistant and allowing rainwater to percolate the ground. More information is available at www.estormwater.com/permeable-pavement-improves-arizona-arboretum.

Reduction of paved surfaces SWOT table

Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ Increases ground permeability, allowing for higher water retention. ▪ Impact on joints for walkers and runners lowered on non-cement trails. 	<ul style="list-style-type: none"> ▪ Significantly reduces accessibility for individuals who need firm footing. ▪ Residents requiring wheelchair access would have limited access to the park.
Opportunities	Threats
<ul style="list-style-type: none"> ▪ The Town qualifies for many grants regarding trails and the development of walking paths. ▪ Repurposing of deadwood or disposing of tires to replenish paths. 	<ul style="list-style-type: none"> ▪ Due to inaccessibility, the park has become underutilized.

Figure 9 SWOT table regarding the reduction of paved surfaces in Selna-Mongini Park



Figure 10 One example of permeable pavement includes bricks laid with a fine gravel underneath, which allows water to infiltrate the ground through the crevices between bricks

Fertilize with compost and mulch

With the proposed use of native plants and implementation of other natural features, the need for fertilizer to promote plant growth and maturity will be critical to park success. Fertilizing with compost and mulch instead of traditional chemical-based fertilizers will encourage ecological sustainability and protect public health. The Arizona Department of Environmental Quality (ADEQ) deals with organizations that might undertake composting (ADEQ, n.d.). Composting creates higher quality soils that assist in water retention while reducing the need for chemical fertilizers at a lower cost to maintain (United States Composting Council, n.d.). Bacteria break down properly recycled materials into nutrient-rich topsoil called humus. Pulling this material from landfills also assists in lowering carbon emissions. Maintaining healthy topsoil is an essential part of building a sustainable park design, and efforts to reduce disturbances of this soil should promote healthy plant environments while reducing potential erosion by slowing water flow. Composting aids stormwater management as increases in soil infiltration capacity of quality soils reduce surface flow. Finally, composting can regenerate poor soils while remediating currently contaminated soils.

Compost and mulch fertilization SWOT table	
Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ Using mulch in slope environments allows for higher infiltration of waters into soils. ▪ Fertilizing with compost and mulch reduces the need for fertilizers and pesticides. ▪ Prevents soil losses by reducing overland flow, helping mitigate stormwater runoff. 	<ul style="list-style-type: none"> ▪ If no composting plan is in place, it will require the acquisition of mulch.
Opportunities	Threats
<ul style="list-style-type: none"> ▪ If a community garden is started, the volunteers could provide oversight into a composting program. 	<ul style="list-style-type: none"> ▪ Poor upkeep of on site composting can lead to soil contamination. ▪ Fertilizing with composting and mulch requires regular attention.

Figure 11 SWOT table regarding the use of compost and mulch as fertilizer in Selna-Mongini Park

Reuse existing infrastructure

Implementing a design that incorporates current infrastructure allows for the repurposing of past investment, and provides a foundation for new ideas. Using slopes to control stormwater, revitalizing natural terraces for a butterfly garden, and restoring baseball dugouts as restrooms reduce the capital needed as it incorporates what already exists.

Reuse of existing infrastructure SWOT table	
Strengths	Weaknesses
<ul style="list-style-type: none">▪ Reduces the investment requirement by utilizing established foundations.▪ Shortens turnaround until park completion.▪ Park is positioned to use slope features for better rainwater collection.	<ul style="list-style-type: none">▪ The remaining structures could require more regular maintenance depending on use and current condition.
Opportunities	Threats
<ul style="list-style-type: none">▪ Allows the park to keep some of the heritage of previous iterations; plaques preserving historical features of the park could be used.	<ul style="list-style-type: none">▪ Could reduce the overall longevity of older structures.▪ Any issues with current features will need repair; first, cost-analysis should be considered in this case.

Figure 12 SWOT table regarding the use of existing infrastructure in Selna-Mongini Park



Figure 13 Existing slope at Selna-Mongini Park that could be used to help control stormwater

Harvest rainwater

Predictable rainfall is a rarity in the Sonoran Desert, but when it does happen there are boundless opportunities for rainwater harvesting. Rainwater harvesting is a **low-impact development** (LID) tool, which allows for the collection of stormwater runoff, and is also used to redirect water from a sloped structure into a basin or reservoir (Shipek, et al., 2017). This process allows more water to percolate into the ground, restoring groundwater and keeping moisture in soils longer due to higher saturation. Implementing sustainable practices can be done in many ways and should be taken seriously for any water-stressed or drought-prone communities. Given the current park layout, there are many opportunities for renovation implementation for the park.

Editor's Note

Low impact development is a series of practices used to redirect and manage stormwater runoff. Stormwater runoff is rainfall that cannot permeate ground surfaces and has been linked to environmental degradation. Common examples of low impact development include rain gardens, permeable pavement, green roofs, and rain harvesting.



Figure 14 Bioswales are one LID tool that helps direct and collect stormwater runoff, allowing it to saturate the soil and replenish groundwater or sustain landscaping

Editor's Note

The ASU Sustainable Cities Network released the Greater Phoenix Metro Green Infrastructure & LID Handbook includes guidance and resources for LID methods, such as curb openings, sediment traps, bioretention planters, permeable pavements, stormwater harvesting bins, and more. The handbook is available at sustainability-innovation.asu.edu/sustainable-cities/resources/lid-handbook/.

Rain gardens

Rain gardens are depressional areas that can collect and harvest runoff from less permeable areas. They are often used to collect water from roofing or streets (Shipek et al., 2017). Rain gardens can be placed anywhere with soils with reasonable percolation rates and where water should be removed, such as foundations, utilities, and septic systems. These gardens reduce pollutants and downstream flood environments like the local Verde River.

Curb cuts

Curb cuts are an opening along the pavement that allows stormwater evacuation from a waterproof material to a depressed zone where soils and vegetation can better utilize the runoff. Observation of local flow mechanics will provide better insight into the most effective placement of road cuts. These cuts may inhibit pedestrian usage in basin areas and require proper sizing to allow for drainage.

Editor's Note

The City of Tucson expanded its rainwater rebate program in 2014. It now includes incentives for the installation of residential curb cuts and the use of rainwater capture for residential landscaping. For more information on Tucson's rainwater rebate program visit www.tucsonaz.gov/water/rainwater-harvesting-rebate.

Sidewalk cuts

Similar to a curb cut, sidewalk cuts are implemented in high pedestrian areas, where water must be transported through a fixture or sidewalk. Sidewalk cuts require less upkeep than a similar curb core structure and can be placed in areas other than the park.

Sediment traps

Due to the lack of topsoil in the arid Southwest, there is an accelerated stripping of sediments due to low infiltration creating significant runoff. Sediment traps should be placed in areas where eroded sediment loads deposit in low lying areas and require occasional sediment removal.

Editor's Note

Sediment traps are temporary ponds that prevent stormwater runoff by capturing rainwater before it can flow to non-permeable areas. Sediment traps are most commonly used at construction sites in order to capture rainwater sediment before it can reach drainage systems, lakes, and other water sources.

Rainwater harvesting SWOT table	
<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none">▪ Rainwater capture allows for natural irrigation, maximizing positive rainfall impact.▪ Reduces water demands during monsoons, and allows for higher storage of winter runoff.▪ Can restore areas to resemble their natural condition more closely.▪ Reduces downslope flooding during heavy rainstorms.▪ Municipal rainwater harvesting efforts, such as rainwater harvesting tanks and water collection rebate programs, have provided community savings and additional contributions to groundwater recharge.	<ul style="list-style-type: none">▪ Limited by soil permeability, less porous surfaces support smaller basin volumes.▪ Some runoff retention methods sometimes require interaction with street infrastructure.▪ Requires regular cleaning of drainages to allow the most effective flow of water.
<i>Opportunities</i>	<i>Threats</i>
<ul style="list-style-type: none">▪ Encourage community participation by offering educational material to visitors.	<ul style="list-style-type: none">▪ Stormwater runoff contains heavy metals, which can lead to soil contamination.▪ Consideration of plant species that can mitigate these metals is recommended.

Figure 15 SWOT table for rainwater harvesting in Selna-Mongini Park

Research for grants

Land and Water Conservation Fund (LWCF)

The National Park Service established the LWCF grants in 1965 to provide funding for state and local recreation area development. Over 2,760 grants have been approved to redevelop older recreation facilities. Grants are variable in their allocations with maximum allotments of \$10,000 and can be used on outdoor recreation areas and facilities.

Link to Grant: www.nps.gov/subjects/lwcf/stateside.htm

Quadrtec Cares “Energize the Environment” Grant Program

This program offers communities an opportunity for \$3,500, offered twice per year. Conditions to qualify for the grant focus on environmental benefits in programs or features designed for positive impacts. Examples of former projects include trail building, restoration projects, educational projects, and community environmental education. Fall grant applications are due June 30th, and spring grants are due October 30th.

Link to Grant: www.quadrtec.com/page/quadrtec-cares-grant-program

Shade Structure Grant

The American Academy of Dermatology Association offers up to \$8,000 to install permanent shade structures for outdoor locations that include signage about sun protection’s importance. Since 1999 the program has provided over 450 structures through the grant program. City and town parks qualify for this grant and require a plan that has been established for one-year to demonstrate the importance of sun safety and skin cancer awareness. The application process is online only and accepts applications from October 1st through December 31st.

Link to Grant: www.aad.org/public/public-health/shade-structure-grants

Safety and Environmental Education (RTP)

The Recreation Trails Program offers the Safety and Education grant used to promote the safety and environmental protection of recreational trails. This grant is open till June 1st, 2022, and is open year-round as a rolling grant. Projects can include trail development, maintenance, and pedestrian usage, including ADA accessibility. Maximum requests for assistance can be awarded up to \$10,000.

Link to Grant: gn.ecivis.com/GO/gn_redir/T/1rk56mchxi8I9

CONCLUSION

This report aims to create a science-focused sustainable park that provides the community with recreational and educational values that align with the sustainability goals of the Town of Clarkdale. This project aims to provide recommendations to the community to build an educational park. Over the semester, the Town has expanded its aspirations to become even more inclusive by initiating the potential implementation of sustainable features and public health improvement focused on local demographics. Students recommend pursuing the following actions moving forward to best serve Selna-Mongini Park and the community:

Though all sustainable suggestions provided are worthy of implementation, there are limited resources to be spread across all features. The following sustainable methods are specifically recommended to meet grant requirements while achieving maximum benefit.

Offer recycling

Ensure sufficient recycling bins are included in the park to encourage cleanliness, signage and/or Q.R. codes can provide educational awareness of recycling etiquette associated with Patriot Disposal. An effective recycling education program is vital in creating community engagement.

Use native flora

Reduce maintenance costs by utilizing the Audubon guide for plants in local areas to choose vegetation more suited for the environment. A well-kept desert landscape with educational plaques for the species would drive community interest in planting similar species in their gardens.

Reuse existing infrastructure

Many new features in the mock-map contain structures that can be repurposed to reduce costs and waste of suitable infrastructure. Natural terracing on the road facing the western portion of the park has high slopes for potential rainwater harvesting.

Harvest rainwater

Given the natural slopes of the area, multiple efforts could be taken to implement capture of rainwater. The large grass area in the northeastern area located on the current baseball field seems like a natural depression that could potentially support a significant reservoir fed by the western slopes. Sidewalk cuts could flow water from these high elevation points into a garden feature. Sediment traps could be necessary due to the shallow soil profiles of the surrounding area. These features would allow lower water demands during seasonal storms, better storm runoff management, and increase groundwater contributions.

To help create the best possible version of the park, pursuing the following grants is recommended:

Quadratic Cares "Energize The Environment" Grant Program

This grant provides educational funding for youth features and environmental awareness, a stated goal of the new Selna-Mongini park. Working with Project Cities in future semesters could allow for a winning grant proposal draft.

Shade Structure Grant

The shade structure grant should be approached by all outdoor recreational projects in the Southwest due to the high potential for sun exposure. By working with Arizona State University Project Cities on a sun safety awareness campaign, the Town would have a program implemented by the end of Spring to pursue this grant in 2023. Given that the parks focus on educational awareness for public health, this grant includes sun safety plaques that should be sought immediately.

The Selna-Mongini design aspirations should continue to make strides through Clarkdale's connection with Arizona State University. Collaboration with ASU allows for further investment into building community infrastructure that aims at improving local health and well-being now and into the future. Clarkdale's openness to suggestions for new ideas shows its commitment to finding and implementing features that will improve residents' and visitors' overall quality of life.

REFERENCES

- Arizona Department of Environmental Quality (ADEQ). (n.d.). *Composting*. <https://azdeq.gov/composting>
- Arizona Department of Environmental Quality. (2020, July 15). *Clarkdale Remediation Study Area | VRP Site*. <https://azdeq.gov/clarkdale-remediation>
- Audubon Society. (2021, October 26). *Why Native Plants Matter*. <https://www.audubon.org/content/why-native-plants-matter>
- Blair, M. (2021, August 17). *2020 census results show most of the Verde Valley is growing*. Journal AZ. <https://journalaz.com/news/yavapai-county/62992-2020-census-results-show-most-of-the-verde-valley-is-growing.html>
- Caldwell, J. (2014, March 17). *Sustainable Parks and Why They Work. Meeting of the Minds*. <https://meetingoftheminds.org/sustainable-parks-work-10514>
- Clarkdale Historical Society. (2021, October 3). *Welcome to the Clarkdale Historical Society and Museum*. <https://www.clarkdalemuseum.org/>
- Hamilton, L. (2019, February 22). *10 Best Ways to Build a Sustainable Park*. BiofriendlyPlanet. <https://biofriendlyplanet.com/green-alternatives/sustainable/10-best-ways-to-build-a-sustainable-park/>
- McCaffrey, Stidham, M., Toman, E., & Shindler, B. (2011). Outreach Programs, Peer Pressure, and Common Sense: What Motivates Homeowners to Mitigate Wildfire Risk? *Environmental Management* (New York), 48(3), 475–488. <https://doi.org/10.1007/s00267-011-9704-6>
- National Park Service. (n.d.). *Gardening for Wildlife with Native Plants*. <https://www.nps.gov/articles/000/gardening-for-wildlife-with-native-plants.htm>
- Platt, B. (2016, April 26). *The Benefits of Composting & Compost Use*. Institute for Local Self Reliance. <https://ilsr.org/benefits-composting-compost/>
- Shipek, L., Shipek, C., Sikdar, K., Roach, K., MacAdam, J., Styacuse, T., & Deroussel, J. (2017, January). *Green Infrastructure for Desert Communities*. Watershed Management Group. <https://watershedmg.org/document/green-infrastructure-manual-for-desert-communities>

- Sprajcar, J. (2010, March). *Creating Sustainable Community Parks and Landscapes: A Guide to Improving Quality of Life by Protecting Natural Resources*. Pennsylvania Department of Conservation and Natural Resources. <https://conservationtools.org/guides/93-creating-sustainable-community-parks>
- Sustainable Cities Network. (2019). *Greater Phoenix Metro Green Infrastructure & LID Handbook*. Arizona State University Global Institute of Sustainability. <https://static.sustainability.asu.edu/giosMS-uploads/sites/22/2019/04/LID2018-Book-04-11-19.pdf>
- Town of Clarkdale. (n.d.a). *Clarkdale's History*. https://www.clarkdale.az.gov/your_government/about_clarkdale/your_government/clarkdale_s_history.php
- Town of Clarkdale. (n.d.b). *United Verde Soil Program*. https://www.clarkdale.az.gov/major_projects/united_verde_soil_program.php
- Town of Clarkdale. (n.d.c). *Selna Ballfield and Mongini Park—Master Planning*. https://www.clarkdale.az.gov/your_government/community_services/selna-mongini_park_planning.php
- United States Composting Council. (n.d.). *Benefits of Compost*. <https://www.compostingcouncil.org/general/custom.asp?page=CompostBenefits>
- United States Environmental Protection Agency. (n.d.). *Composting at Home*. <https://www.epa.gov/recycle/composting-home>
- United Verde Soil Program. (2019, September 9). *Fact Sheet: United Verde Soil Program*. https://www.clarkdale.az.gov/UVSP/FINAL_2019_Fall_Update_Fact%20Sheet.pdf
- Visit Arizona. (2021, October 3). *Clarkdale*. <https://www.visitarizona.com/places/cities/clarkdale/>

To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCClarkdaleSTEMPark21F