Desert Child: Unearthing Landscape Narratives to Cultivate Creativity and Connections to Nature

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Abstract

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Stories for children are grounded in landscapes. How do stories children listen to and read come alive in the landscape? How can the human connection to story become a tool to improve the child-nature connection? Children are increasingly growing up in urban environments and their access to ‘wild nature’ is limited, hindering a healthy connection to the native environment. Stories represented through children’s literature are archetypal landscapes intended to create a sense of place. Within these stories, children internalize and bring to life the locations, shaping their views towards places set in their own lives . These imaginative landscapes become a creative tool to develop our hopes and desires for the spaces we spend our time in. This project aims to understand the connections between stories and land to increase children’s creativity and relationship with nature. Storytelling and creation become the vehicle for engaging deeply in the wonder and awe of local ecosystems. To employ these methods, a design framework is developed then applied to a proposed landscape interventions in Las Vegas, Nevada. In this future vision, an integrated model of child-centered design and place-based storytelling combine to create an immersive environment in the Mojave Desert.

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1. Intro

Early Connections with the Land

A Childhood Story

I step into the hands of my older cousin, reaching up for the lowest limb of the tree, the only one I could manage to sling an arm over. Elbow crook firmly holding smooth bark, my cousin pushes my foot up and I begin to climb. Reaching for branch after branch, I monkey my way up. I reach a sought-after spot; two strong branches form a Y and gently slope up towards the sky. A perfect chair and headrest for a small seven-year-old. My cousins arrive and we settle in with our backpacks filled with books and snacks for the afternoon in the tree.

The details of this childhood memory are vague, I called my mother to fill in the details. Between the ages of 4 and 10, my family frequently camped at Arrow Rock State Park along the Missouri River in central Missouri. We spent the days biking along the Katy Trail, a gravel bike path that traverses the center of the state. Limestone caves and bluffs along the river were excellent pull over spots for exploration. We imagined Meriwether Lewis and William Clark camping in the caves with their expedition and Native American tribes hunting and fishing. After each ride, we escaped the supervision of the campsite to climb into our favorite hangout spot - a deciduous tree, likely a native oak or maple, planted along the entrance to the campground. As she recalled the story, my mother noted “the tree was only twenty-five feet tall at most, but you kids spent all day up there”. It was our fort, hideout, secret spot to spy on other campsites and cars, reading nook, and it was totally ours.

This story is important to me; it is a childhood experience that I remember vividly. The details may be fuzzy, but the feelings of freedom and excitement in exploring are clear. I remembered this story during a community design seminar in which each participant was asked to recall a childhood story. As others shared, they told a similar story to mine. Their childhood experiences included building forts in the woods and exploring creeks. Their memories of childhood were experiences were along the messy fringes of nature, at a point where childhood supervision wanes and independent exploration begins.

Environmental psychologist Louise Chawla defines this as an ‘ecstatic place’. These ‘ecstatic places’ require space, discovery, freedom, and engagement of the senses. These ecstatic experiences give us “meaningful images; an internalized core of calm; a sense of integration with nature; and for some, a creative disposition.”[1]

Memories of our childhood experiences are important to consider as designers determining the worth and program of spaces for children. Just as important as these memories are the stories we were told that shape our worldviews, values, and inspire us. Stories and memories provide meaning that caries into adulthood.

The story of the human experience and connection to nature is complex. We develop powerful nature relationships that connect the mind and body to place. These relationships can provide meaning and fulfillment. Time in nature can calm, excite, incite wonder, and is an endless source of amazement. These connections build sense of place, a feeling of belonging, and connection to a specific place. The experiences build meaning about our place in the world. At least, this has been my experience. As demonstrated in my own camping memory, deep connections to place start in childhood.

OUTDOOR CLASSROOMS

The story for this project starts at the beginning of my two-year span teaching second-graders in Las Vegas, Nevada. I spent the summer months before teaching learning to write lesson plans, organize a classroom, and navigate the complex relationship of classroom rules and enforcing them to a group of wiggling, giggling, excitable young children. Additionally, I spent the summer reading Richard Louv's influential book *Last Child in the Woods*. (I read this while road tripping and camping in the Rocky Mountain west. The deep connection between his defense for child-nature relationships and my Ponderosa Pine reading setting likely enhanced the experience and my belief in his argument.) Louv carefully describes the ways in which children experience nature-deficit disorder. He defines this as "the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses. The disorder can be detected in individuals, families, and communities."[2]

Teaching is an immensely complex and difficult task. I balanced the demanding requirements required by state and district standards with creating a welcoming, safe learning environment. The children were constantly struggling with family hardships, learning was difficult when outside forces stress young children. Guided by Louv's lessons, I worked to bring students to outdoor environments as much as possible. The school's neighborhood environment left little opportunity to engage in nature, but just outside the city were thousands of acres of public land. We traveled to Red Rock Conservation Area, Lake Mead National Recreation Area, and Mount Charleston. Rangers taught the students about local flora and fauna, and the fragile yet resilient arid ecosystem. Sometimes students, their parents, and I would meet on Saturday mornings to hike and explore trails. Often, the children expressed some initial fear and discomfort with the outdoor setting. At first they were cautious and timid, but they grew visibly more emotionally and physically confident while outside.

The first image (Figure 1.1) demonstrates one of the experiences in nature that changed my own definition for the child-nature connection. In the image, students can be seen sliding and crawling on a large sandstone boulder. Just prior to taking this photo, I was attempting to organize the six second-grade classes into groups for hikes on a network of trails. Pointing leaders in different directions to disperse our large group, I turned around to find a particularly bold student climbing up a boulder twice her height, using the cracks and rock patina as a ladder to the top. Across the smooth top she ran, screaming with joy. She reached this edge and paused just long enough to determine it safe and slid on her feet down the slope. Soon all classes noticed the fun and more than fifty students were running, climbing, running, sliding, and repeating. Over and over they ran, their excitement was clear. However, I was supposed to keep them on trails; the parent volunteers looked on while I attempted to corral the group back in. While I felt like I had completely lost control of the field trip, I could not help watching their fun and taking a quick photo. Could this have been a student's 'ecstatic place'?

Figure 1.1. Second grade students sliding at Red Rock Conservation Area during a field trip in the spring of 2018.

Considering this moment, the ability to access this specific place following the field trip felt impossible for my students. Access to this wilderness place was not possible for most students living in the urban core of Las Vegas. High quality nature experience needs to be accessible in the city. This led to my first question: **what are methods for increasing the child-nature connection in the urban environment?**

Thorough investigation into child related literature led to an answer that I explore as a response to this initial question - story. Humans connect to stories. Stories allow us to relive moments of our past, orient us, teach lessons and values, elicit emotions, engage the senses, and connect with others. Story-time is an essential moment from infanthood until a child reads independently. The landscape setting in stories build identities about place for children. They associate landscapes with the meanings the story expresses in both text and illustrations. That landscape comes to life when the story takes place in the child's environment, and becomes a place setting for exploratory play. The story setting teaches children lessons about the landscape ethics and values. Time spent in landscapes that elicit the stories trigger emotional qualities and reinvigorate the feelings from the story. Stories and landscapes each give a gift of connection to place. **Children can learn and experience stories in the landscape as they build a sense of place. Utilization of a design method that integrates place-based narratives with play and nature creates ideal children's environments.**

End Notes

1. Richard Louv, Last Child in the Woods : Saving our Children from Nature-Deficit Disorder, 1st ed. ed. (Chapel Hill, NC: Chapel Hill, NC : Algonquin Books of Chapel Hill, 2005). 95.

2. Ibid. 34.

2. Story and Sense of Place

Building a Relationship Between Children and Nature

"[S]pace is imbued with values through narrative which, in turn, works to produce and communicate notions of what a location means and what makes it a distinctive 'place'. In other words, space is made place through the process of narrative." Alana Nicole Seaman[1]

Why story?

Narratives define place, as mentioned in the above quote. By defining place as opposed to space, meaning is given to the land. This land meaning through narrative embodies the culture, values, and attitudes by the communities engaged with it. For children, these narratives are a critical place to engage children in learning.

Children's connection to story is powerful. Place-based educator Sarah Fisher describes stories represented through children's literature as archetypal landscapes intended to create a sense of place.[2] Within these stories, children internalize and bring to life the locations, shaping their views towards places set in their own lives. The landscapes in literature become a creative tool to develop the hopes and desires for the spaces they spend their time in. Their "engagement in literary experiences nurtures their development as self-aware place-makers" and "are learning to see the world differently and be in the world differently".[3] Meaning that stories are shaping children's view of the world and their definition of themselves in the world.

As children's experiences with story develops their identity in the world, it is important to connect their development as place-makers with experiences in their own local environment.

Engaging children opens their minds to become creators and inventors, explorers and caretakers, visitors of other planets and stewards of their local land. When children are given autonomy, doors open for them to truly explore the extents of their minds and bodies. Landscapes are an opportunity to provide access to nature and engage in unique ways. Through landscapes children learn physics of the natural world, engineering, land stewardship, and aesthetics.

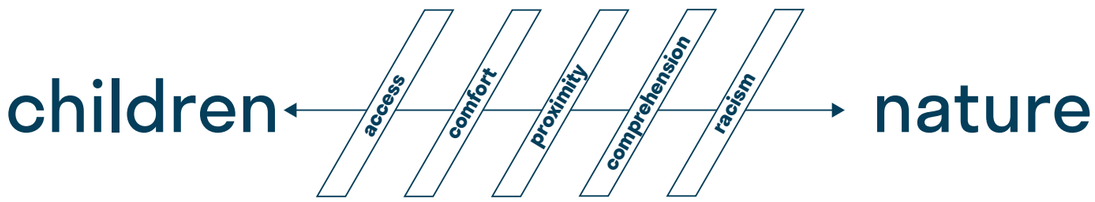


Figure 2.1. Children's pathway to connecting to nature can be plagued by many roadblocks. These roadblocks can be caused by a lack of resources and access. Additionally, a continued presence of racism prevents people of color from accessing natural spaces as often as their white counterparts.

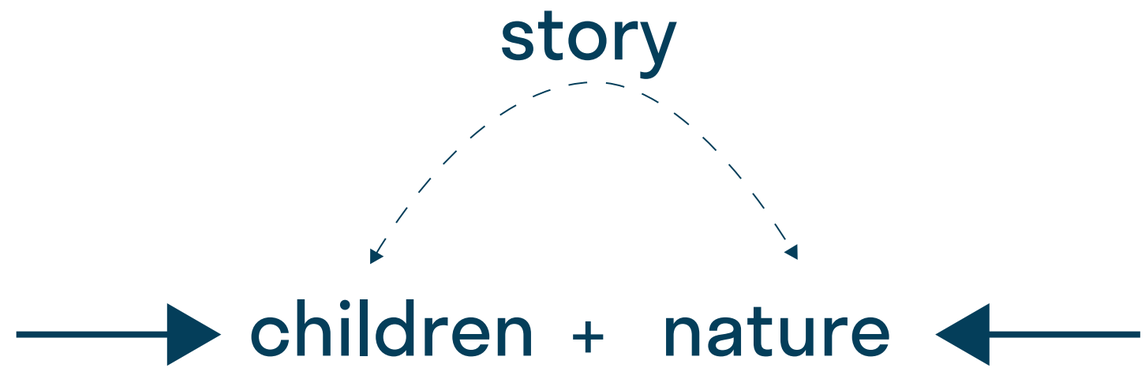
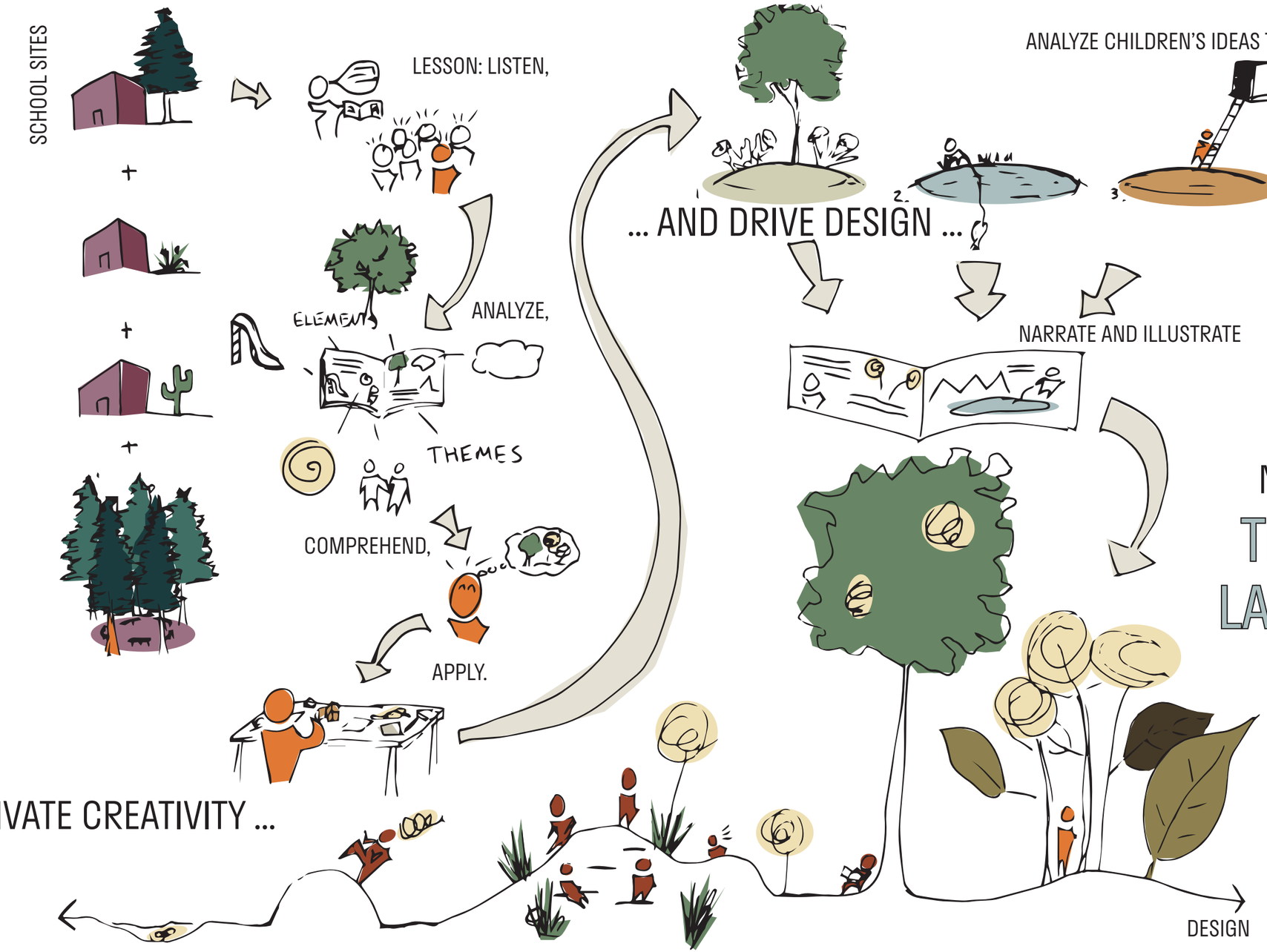


Figure 2.2. Story can act as the bridge over the roadblocks. Story creates emotional connections and can ease fear for children about what is in nature. Both the landscape and story build a sense of place, vital for child development.

USE LANDSCAPE STORIES...



... SO CHILDREN FEEL A SENSE OF PLACE AND CONNECTION TO NATURE.

Figure 2.3. An early road map for the project process.

End Notes

1. Alana Nicole Seaman, “Exploring the Connections between Literary Places, Literary Texts, and Tourist Performance”), . http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2003&xri:pqil:res_ver=0.2&res_id=xri:ilcs-us&rft_id=xri:ilcs:rec:abell:R05517199. 26.

2. Fischer, S. B. (2015). The experience of place in childhood literacy life-worlds: A phenomenological study of readers as place-makers Available from Dissertations & Theses Europe Full Text: Literature & Language. Retrieved from https://search.proquest.com/docview/1770083780

3. Ibid. Page 8, 16.

3 Design Framework

Connecting story and landscapes using a design matrix thinking tool

Methods for Developing Engagement with Place-based Landscapes

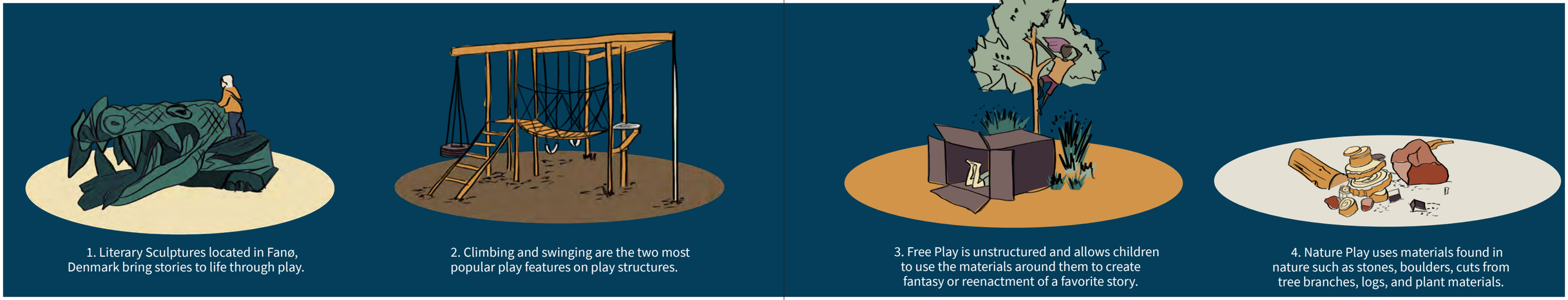
To address the goal of this investigation, two areas of of design are important for creating place-based landscapes for children. The first area considers the relevant literature and best practices. The second area is the need for a deep comprehension of the local narratives the landscape and community. After investigating these areas separately, I realized that the two can support each other in design. Combining these topics into a design matrix creates a tool to use during design development. The tool addresses critical needs of children's landscapes and connects them to place-based narratives resulting in holistic, creative design potentials.

First this chapter will look at methods for achieving best practices in children's design and the qualities that emerge from the literature and research. Second, discussion of five categories of landscape narrative investigations are described. Finally, the resulting matrix is presented.

Landscapes narratives engage children all around the world. This design methodology allows for creation of landscapes that respond to the cultural values and stories of the nearby community and engages the stories in a creative design process addressing children's needs.

Experiential Qualities for Children's Landscapes

Design research provides perspective on how to engage children meaningfully in design. With the goal of fostering child-nature connections through landscape stories, a few best practices for engagement are extracted and tools for design offered. These experiences integrated into the site holistically consider the growing mind and body of the child in the landscape. Six experiences to incorporate are play, learn, wonder, create, imagine, and sense. Tools to incite these experiences come through precedent studies and research.



1. Literary Sculptures located in Fanø, Denmark bring stories to life through play.

2. Climbing and swinging are the two most popular play features on play structures.

3. Free Play is unstructured and allows children to use the materials around them to create fantasy or reenactment of a favorite story.

4. Nature Play uses materials found in nature such as stones, boulders, cuts from tree branches, logs, and plant materials.

Figure 3.1. Types of play.

Design for Play

A landscape experience that incorporates land narratives must account for children's play. Play is so important to a child's well-being that the United Nations Convention on the Rights of the Child includes the right to play as important as the right to be safe from violence and right to freedom of expression.[1] Play is mental and physical exercise, and builds social-emotional skills, resilience, creativity, and cooperation. Play is one way for children to bring to life landscape stories. At the literary sculpture park in Fanø, Denmark, characters sculpted into wood double as play features for crawling and climbing over (Figure 3.1.1). The child's experience playing on the character sculptures provides opportunity to engage the structures in new stories from the child's imagination or reenact familiar stories. To allow the stories to come to life, it is important to consider the ways in which children play and design qualities that dictate the play experience.

There are multiple design considerations for children's play. Playground design and play structures can be traced to the late 1800's as industrial cities such as New York, Chicago, and Boston looked for ways to reduce child fatalities in city streets. The designs were intended to allow for physical exercise, sports practice, and socialization with other children. Based on German playground design that took the form of gymnastics equipment, steel beams and sheet metal were molded into bars, slides, swings, jungle gyms, and see saws.[2] These play structures became playground staples. Their legacy continues to this day; manufactured play equipment with almost identical uses are found in many American playgrounds. The benefits of these play structures include providing challenge and risk. For example, a child may challenge their strength on monkey bars or their fear of heights by sliding down a tall slide. Additionally, manufactured play structures account for safety guidelines such as fall zones. The use of play structures by children was of interest to StudioLudo, a play design and research firm in Philadelphia, Pennsylvania. The studio conducted a study of play features in London to understand the most desirable spaces in the playground. Their findings explored material preference and play preference on the playgrounds. They found the most desirable play surface were grass and sand, then hard surfaces such as asphalt or concrete. Climbing and swinging were the most popular play activities by far (Figure 3.1.2).[3] From young children climbing a low feature to teenagers seeking riskier heights, all age groups preferred climbing. The researchers noted the importance of boulders and other non-manufactured equipment in the landscape that can be used for multiple types of play activity.[4] Utilizing this research, the preference of swinging and climbing by all age groups provided by the play structures is a clue for designers when specifying manufactured play equipment.

However popular their use, there are downsides to the play structures. In one study, the use of a playground with only traditional play structures was compared to the use of a contemporary-designed playground and natural-designed playground. The traditional play structures were considered boring and offered less challenging play than the other designed environments.[5] Additionally, the attention to extreme safety standards and standardization of equipment prevents children from exploring various levels of risk. This may lead to lower resiliency and capacity to adapt in unfamiliar environments.[6] Risk in play is a contentious topic as safety is a high priority for parents, educators, designers, and playground officials, but it is necessary for healthy child development. Norwegian researcher Ellen Sandseter's research on Norwegian preschool children offers an alternate model of play. Compared with the lengthy rules and standards for United States playgrounds, her findings show the perception of danger is different for Norwegian parents and educators. More choice and autonomy are given, and less rules on landscape use enforced. For example, children use tools such as saws for cutting wood, climb rocky walls and trees, and play at high speeds.[7] All three of these activities are not tolerated within most children's school playgrounds and likely not allowed at city playgrounds. A seminar held by the Norwegian preschool teachers revealed they did not perceive the children's activities as riskier because the children were in tune to their skills before taking the risk. Additionally, if a child fell or was hurt, it was not perceived as a bad thing.[8] A litigious United States society makes integration of risk in play difficult to implement, and the values of the society are unlikely to quickly shift to Norwegian views. However, the concept and benefits of risk may be carefully afforded through natural materials and 'play' opportunities integrated into the landscape in natural features.

An alternative typology of play is free play. Free play is defined as unstructured play utilizing the materials afforded in the play environment (Figure 3.1.3). In this play, children dramatize and create their own games and stories. This type of play is essential for developing creativity. Unlike the structures that indicate the play action, free play allows a child to imagine and develop their own rules, structures, and communities with each other. Children often imitate and apply structures of society in their own worlds. Working together, complex societies develop with rules, goals, and roles for the different characters. This play aids children's "cognitive development and the world around them" and their sense of place in society.[9] To provide places in which children engage in free play (also called deep play), loose part materials that can be manipulated by children are necessary. Inclusion of these elements leads to constructive play, fantasy play within the constructed spaces, communication, and negotiation skills.[10]

Nature playgrounds offer children free play opportunities with many loose parts as well as interaction with natural materials, fostering child-nature connections (Figure 3.1.4). This model closely ties play with the local environment, fostering place-based play. Common construction materials include boulders, logs, stumps, topography, water, and more. Play in these natural environments increases a child's creativity.[11] Louv explores how the affordances in nature of mud, dust, sticks, plants, and sand in nature is "imperfectly perfect" for fostering exploration and creation.[12] Nature play

can mimic the play experiences with manufactured play structures. As discussed in the London Study of Play, climbing and swinging were the most preferable activities in a playground.[13] Nature play can provide the same experiences integrated into the landscape. A slide may be built into the hillside, a climbing rope hung from an existing tree, and climbing structures built from locally-sourced logs. All three of these examples are demonstrated at the Matairangi Nature Play trail located in Wellington, New Zealand (Figure 3.2). This model of play most closely connects children with the local environment. The stories of the environment are experienced by the children using local materials and incorporated into the play activities.

In both design for free play and nature play, the need for loose parts is emphasized. The loose parts make up potential affordances of the child's environment. Marketa Kyttä's Bullerby Model theorizes that a child-friendly environment contains a high quantity of the perceived affordances. Her research reaffirms the need for loose parts. However, the model emphasizes an additional component: the need of the child for a high degree of age appropriate independent mobility.[14] Independent mobility means a child has choice in where they choose to play and travel. When both independent mobility and quantity of affordances are realized, children receive the best outcomes.

This brief evaluation looks at three typologies of play: traditional play structures, free play, and natural playgrounds. While all play is good for a child, the literature demonstrates that high quality environments offer many affordances for free play, are related to the local environment, and utilize natural materials. Built structures should offer climbing and swinging opportunities, although those activities can be achieved in many ways. Play is essential to child development; nurturing cognitive growth and connectedness to their environment. Connecting their play to landscape stories creates modes for exploring the stories further and understanding them through creative, deep play.

Design Tools for Including Play

- Design play equipment and structures using natural materials such as logs, sand, rocks, plants, and water
- Represent local and fantasy stories
- Allow children to explore risk-taking through heights, speed, and contact with other children
- Include swings and climbing opportunities
- Offer loose parts

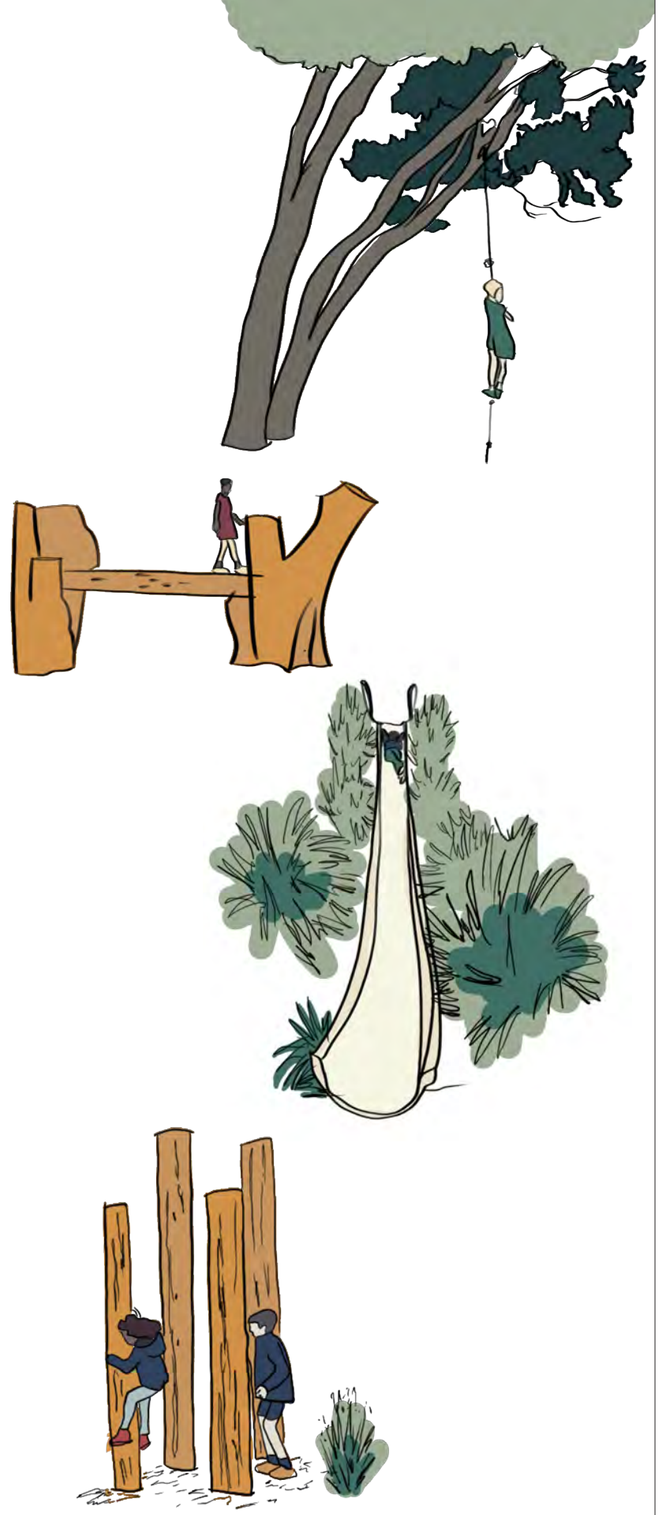


Figure 3.2. Matairangi Nature Playground found in Wellington, New Zealand includes slides, climbing, and strength challenges.

Learn

Childhood is full of learning experiences. John Dewey, twentieth century educational philosopher, wrote about the power of experience in education. His argument towards progressive pedagogy was in reaction to schooling of the early 20th century in which children were supposed to absorb material through lecture and rote memorization. He theorized how hands-on experiences built the connections between concept and the child's brain. He claimed it was the only way to learn and master concepts.[15] This experiential model transformed education, leading to modern progressive education and curriculum such as Waldorf and Montessori schools. Transformation of the theory over time led to place-based learning pedagogy. Place-based learning offers deep learning from and about the local environment. Children's landscapes need to offer opportunities to learn and interact with the landscape stories expressed in design. These learning explorations connect children to their local landscape. The meaningful connections through learning connect children to place and develop landscape literacy and empathy for their environment. The following recommendations describe ways in which learning in the landscape may occur.

Experiential learning progresses through a series of stages which can be afforded in the design of the landscape. Experiential learning expert David Kolb, following Dewey's practice, breaks the experiential learning into steps. He states that the child must first have a concrete experience with a concept. Following their experience, they reflect and observe on the experience, then may attain an abstract conceptualization of the concept.

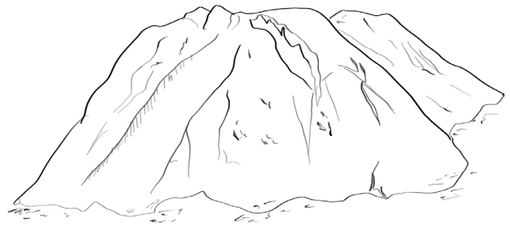


Figure 3.3. Education and play historically have a lot in common: the manipulation of sand teaches and encourages exploration and play.

Finally, the child experiments with the concept, challenges their understanding of it, and connects it to other concepts.[16] To achieve the level of experimentation with the concept, the child needs multiple exposures and time to test their theories over and over. A tangible example of this concept can be understood teaching physics principles in engineering, such as building a bridge that does not fall when weight is applied. Translating experiential learning to the child's environment requires an innovative approach. Educators need to value improving children's decision-making skills, honoring them as designers, and encouraging cooperative learning.[17] The physical to meet these goals relates to needs for play environments discussed in Bullerby's model, which emphasizes high affordances and high independent mobility.

Learning environments for children closely tie with environments for play. In 1885, around the same time as the early manufactured playgrounds, a group of women in Boston's North End saw the need for children to have a safe place to play in the crowded city. Their response was to truck piles of sand into an empty lot. Essentially a blank canvas, children were free to manipulate the sand with water and containers as much as they wished.[18] These sandboxes were also viewed by early progressive educators as essential educational tools (Figure 3.3). Friedrich Froebel, the inventor of modern Kindergarten, and John Dewey both used sandboxes in their educational models. Dewey's laboratory school at the University of Chicago connected the sand to teaching about landforms and topography.[19] A critical component for success of sandboxes as learning tools is the ability of the sand to be manipulated time and time again.

Design Tools for Including Learning

- Provide objects to manipulate and experiment with.
- Design signs for interpretation of elements that children may read and learn from.
- Ensure comfort in the space by offering shelter from wind, sun, rain, heat, and cold.
- Include spaces for group lessons

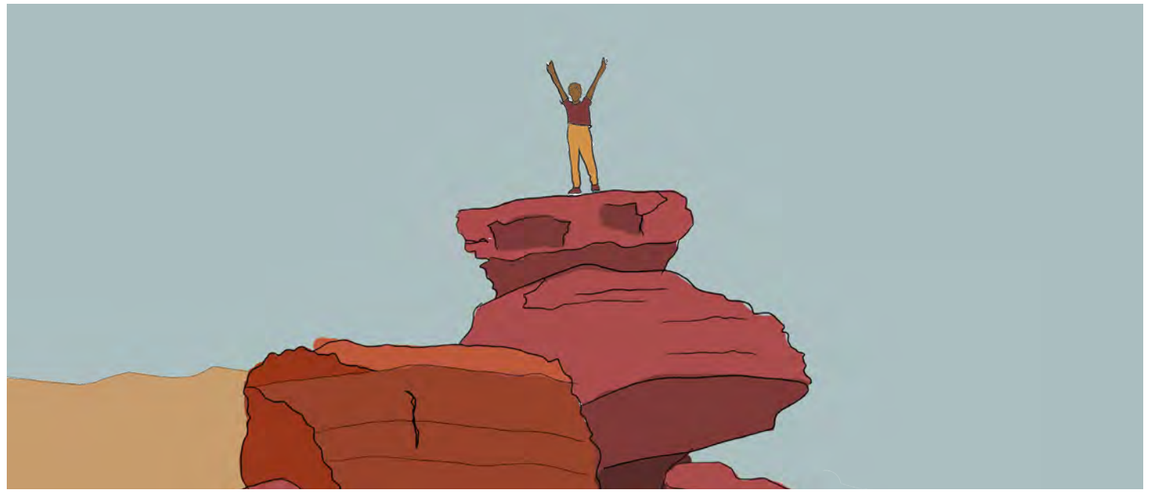


Figure 3.4. A young student celebrates climbing a boulder during a hike to Red Rock Conservation Area.

Wonder

Wonder inspires and excites. Wonder is an ephemeral feeling that brings about excitement and passion for children. Incorporating elements that incite wonder may increase a child's desire to be in a landscape, engage with it, and return repeatedly. Wonder is important to storytelling because it can inspire ideas and imagination. It leads to dreaming of limitless possibilities, something a sterile environment cannot provide.

Natural environments are full of wonder. They are active and stimulating. They change with the weather, seasons, and over the years in processes. In "A Child's Sense of Wildness", author Gary Nahban describes taking his children to the Grand Canyon Wilderness.[20] In the experience, he notices his children enthralled and engaged in all the elements close to the ground. Bones, sandstone, and feathers were the treasures. These small, tangible objects became tools for creating stories about the land and an endless source of fascination. Contrary to the adult visitor's fascination with the sweeping vistas and panoramic views, the wonder a child felt was at their own scale.[21] This provides evidence for design to incorporate wild spaces, whether natural or restored in an urban environment to incite the wonder Nahban's children felt on their desert vacation.

In my own experience, I recall taking children on a trip to Red Rock Conservation Area outside of Las Vegas, Nevada. The specific trail I chose was part of the deep red sandstone formations leading into a narrow canyon. As we traveled, the kids ran up over boulders, finding caves and tunnels tucked into the rock. The layers of rock became perfect ledges for scaling up above the trail and finding alternate routes. The patina became hand and foot holds as they squeezed past scrub brush and avoided spiny cacti. The red rock formation was full of wonder for the children. The excitement of squeezing through tight tunnels and the twisting and turning was endless excitement and discovery (Figure 3.4).

Feelings of wonder can come from many different landscape affordances. As shown in Nahban's example, wonder was the treasures found under bushes and in the desert dirt. On my hiking trip to Red Rock, wonder was the caves and tunnels in the rock. Inclusion of this feeling can be accomplished by providing variety and dynamic elements. With wonder, the story of landscape can feel alive and exciting. Children can engage in the story and add on their own dreams and imaginations.

Design Tools for Including Wonder

- Hide discoverable treasures such as hidden sculptures, small pathways, and many routes for travel. A series of tunnels, boulders, and climbable surfaces provide opportunity to arrive the same location but the child makes a choice and discovers the best pathway for themself.
- Plant gardens that create beautiful or dramatic effects, such as a flowing field.
- Locate play around the site, rather than a singular playground, for more choice and discovery.

Create

An environment that supports creation allows children to move and manipulate the landscape. Children's creations builds upon their connection with the stories around them and their own made up stories. Creation in the landscape connects closely with children's free play, incorporating the building of fantasy worlds and characters. Creation expands the fantasy by allowing children to construct their worlds and ideas with real materials. Similar to other design qualities described, loose parts that can be stacked or built with facilitates this experience. Boxes and pipes are used to build 'houses' and 'forts' as the setting for dramatic play.[22]

Wonderful things happen when children create, but it takes time to develop complex play. Journalist David Cohen and psychologist Stephan MacKeith's research into child imaginations distinguishes a hierarchy of paracosmic (parallel) imaginary play ranging from concrete to abstract. Toy animation (1) is an early form and transforms with time into narratives involving (2) particular places and local communities, (3) imagined islands, countries, and their people, (4) imagined systems, documents, and languages, and (5) unstructured, idyllic words.[23] The creation of worlds is linked to creativity in adulthood.[24] To develop creatively, both time and affordances are necessary. Time necessitates easy access by the child to the same landscape, so they can revisit over and over to build on their previous experience. Since time is critical, these landcapes for children in urban locations need to be in urban areas. Affordances are the tools children use in their fantasy play.

Roxaboxen is a children's imaginary city located at the outskirts of Yuma, Arizona. The children's book written by Alice McLerran is based off her mother's journal entries of this real location and experience. As a young child, McLerran's mother and neighborhood friends found a sandy hill covered in rocks, boxes, and cacti.[25] As they played, they discovered new and exciting treasures like shiny, black pebbles that became currency. In the book, the land becomes a city lined by polished glass, children drive cars, ride horses, and war with one another. There are businesses selling ice cream and bakeries with pies and bread. Police enforced rules and sent violators to the cactus covered jail. Spring blooms from Ocotillo and Beavertail Cactus became decorations and memorials for their lost lizard pets. The place was magical because it was whatever they wanted it to be. In the end, the residents never forget their childhood imaginary world.[26] This story shows the power of childhood experience to carry on for a lifetime of happy memories.

For children to truly create, they must be allowed to change their environment. Adventure playgrounds were a response to the need for children to create. The playground offers materials like wood, tires, and cinder blocks for children to experiment with.[27] However, creativity can occur in any children's landscape, as long as the ethics of the land are taught and upheld to protect fragile systems.

Creation does not stop with imagined landscapes. Children's involvement in the creation of their own landscape alongside designers gives them an opportunity to include their voices and dreams. This involvement builds narrative of the site as one they have ownership of and belong in. The stories developed in design about the land become their stories as well.

Design Tools for Including Creation

- Surprise children with unexpected wonders that spur imagination such as unexpected loose parts, contrast in scale and texture, or imaginary creatures.
- Allow children to build, construct, and design on the landscape. Establish clear guidelines about areas that can be manipulated and areas that cannot.
- Provide material for construction.
- Include children in design charettes
- Encourage free play

A Lesson From the Classroom:

While designing their own gardens, the group of 1st graders were tasked to include different types of play, plants, and spaces for family inside their garden. While many gardens contained items typically found in a garden such as trees, a slide, or bench, there was often an elements of fantasy in their gardens. Since the site was unknown to the children, I suspect they did not feel constrained to keep their landscapes practical. Children included imaginary elements such as giant donuts that became houses, a floating tree house, and dragons. Inclusion of these imaginary elements can further develop children's narratives and connection to place - who would forget a giant donut house?

Sense

Sensory experiences in the landscape are the perfect opportunity for children to practice and master coordination with unfamiliar environments. This sensory integration takes surrounding stimuli (tastes, smells, sounds, feeling, temperature, balance, and gravity) and the body organizes the response for functional use. Occupational therapists note the decreased overall strength of children since the 1980's as well as decreased experiences with sensory rich environments.[28] This may result in unexpected behaviors such as inattention in school, frustration with tasks such as dressing, eating, walking in a straight line, or being prone to injury because they are unaware of their bodies.[29] Sensory rich landscapes provide opportunities to practice the integration of the senses. They engage the full body in the experience. When connecting the senses to landscape narratives, the story is experienced by the entire body. The story can fully come alive.

Children show a preference for sensory experiences in their play equipment. Researchers in Belgium tasked children to conduct a play landscape using stepping stones.[30] Overall, the children designed the stepping stones at varying distances (Figure 3.5). This provides an experience that challenges balance, strength, and eye-foot coordination. They note this may apply to other play features such as ladders, nets, steps, and monkey bars. Design educator and children's play expert Robin Moore's research indicates the need for variety and contrast in play spaces such as sunny/shady, bright/dark, open/enclosed, or hilly/flat.[31]

Children also desire changes in their environment that engage the senses in different ways. Prospect-refuge theory provides evidence for an attraction to two types of spaces in human environments.[32] The first is prospect, which allows a person to see out. This may be accomplished through elevated views, broad views, or large natural wonders. Refuge is a space that feels safe, it may be an interior space, seat with a wall behind it, cave, or large object to hide behind. Children exemplify this theory through their preference for tall, climbable objects and hiding spots in the form of forts and caves. Sensory experiences offer children choice. It also creates full body engagement in the stories provided in the landscape.

Design Tools for Including Senses

- Engage touch, taste, smell, balance, sounds, and strength
- Provide places with contrasting experiences: light/dark, sunny/shady, open/enclosed, hilly/flat
- Offer varieties of complexity

Figure 3.5. Different size and distribution of stepping stones are preffered by children.

Figure 3.6. Chart depicting the five experiential qualities for children's environments.

Unearthing Stories of Place

To create place-based landscapes which connect children to their local environment, the stories about that landscape need to be uncovered by designers and the community of children the landscape serves. The stories provide the context, history, and narratives that reveal meaning to be incorporated in design. To comprehensively compile place-based narratives, I propose five categories of story to explore. These five categories include ecology, history, culture, phenomenology, and local systems.

The following categories provide ideas of where the explorations may start. Since each place is unique, the story themes are flexible to meet the needs of that site. After explorations, each category can be further refined for the stories the designer and children find most motivating to explore in design.

Engaging Children in Stories of Place

Engaging children in uncovering story narratives of the landscape gives children ownership and identity in a landscape. As part of a comprehensive design engagement strategy, children user groups should be incorporated early in the design process. Their inputs about the landscape can provide insight into stories they seem to already connect with, and which ones can be improved through design. Derr, Chawla, and Mintzer routinely engage children in their innovative program Growing Up Boulder, which brings children into city planning to make Boulder, Colorado a child-friendly city. Their methods for engagement include interviews, surveys, art interventions, photography, map making, and charettes.

Explorations on a site with youth can reveal their existing knowledge about the stories of the site, as well as uncover stories found through landscape clues. One method used by Growing Up Boulder, area sketch maps, involves children drawing maps, diagrams, and pictures of the places they notice. The facilitator can ask children to include favorite places, scary places, dangerous places, and label interesting features such as significant trees, rivers, hills, or buildings. This method could reveal local systems like streams, and preferences for types of spaces by the group.

Figure 3.7. (Opposite) Diagram of site stories to be investigated.

Ecology

- Plant and animal communities
- Regional ecologies or local micro-habitats
- Soil structures or unique landscape formations that support life

Culture

- Customs, current or history, of a population
- Traditional uses of plants and animals from the area for food or craft
- The values and practices of the current community
- Stories told by the local community, current or traditionally, about the landscape
- Place-based artwork

Phenomenology

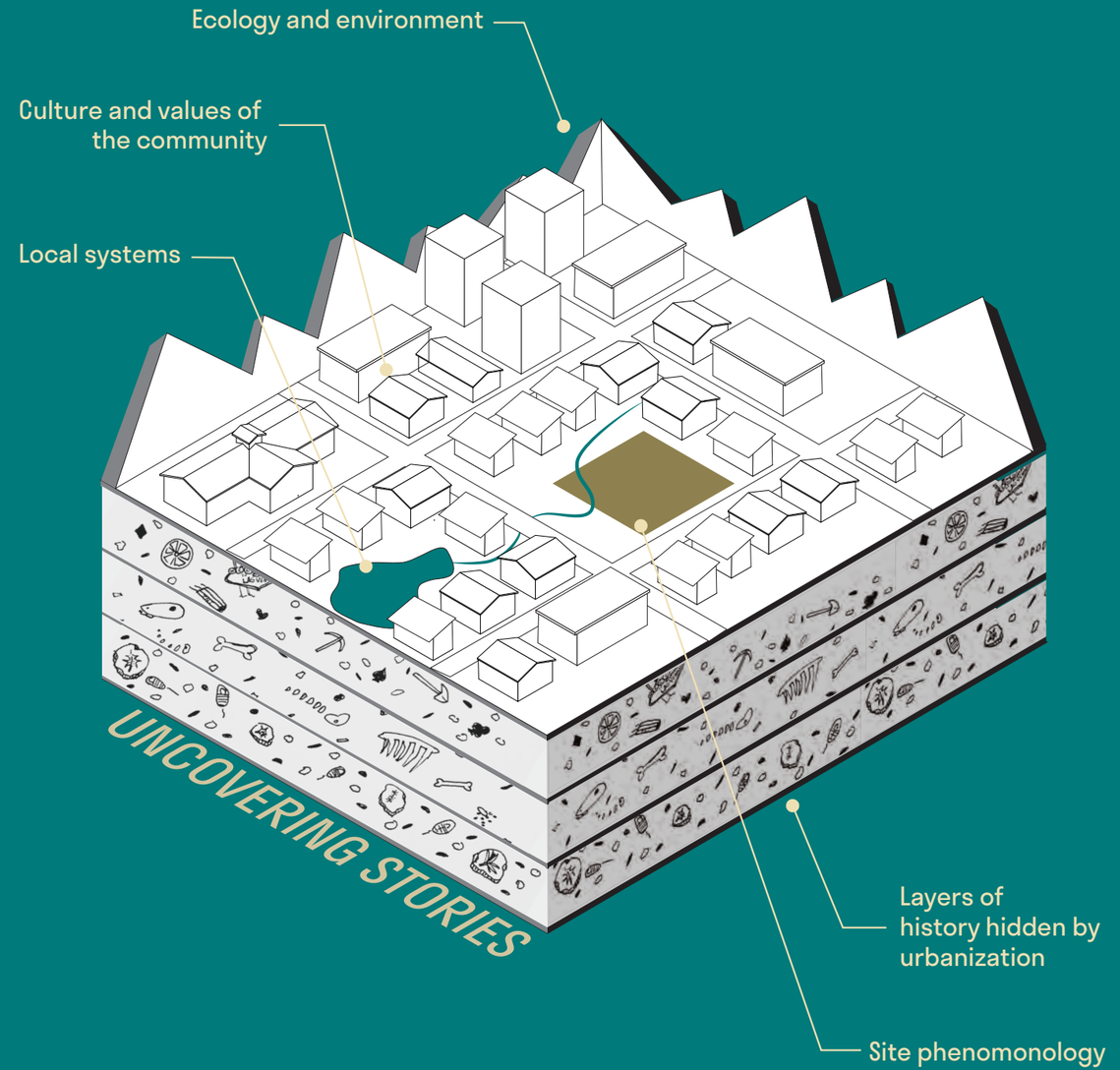
- Feelings and qualities of the land
- Light
- Weather

Local Systems

- Hydrology
- Climate
- Transportation
- Economy

History

- Geology
- Urbanization
- Previous land stewards
- Notable events



Another method for engaging children in the early design stages is described in Design as Democracy is “The Investigative Reporter”. Utilizing children and youth skills with technology, groups investigate different areas of the site or neighborhood. They record their observations as well as conduct short interviews on ideas they have or changes they would like to see. This method is impactful in achieving qualitative data about youth’s experiences and preferences. Additionally, it allows them to think critically about the space around them.

In my site investigations, I started by gauging children’s experiences with and ideas about landscapes. Using one children’s book about gardens, *Grandpa Green* by Lane Smith, and one about the native landscape, *Three Bears of the Pacific Northwest* by Marcia and Richard Lee Vaughn. I engaged two classrooms of children in discussions about story and landscapes. These investigations revealed children were inspired by the garden story to create their own imaginative places. The place-based story was exciting as it related to places the children knew about, but it did not inspire them to write creative stories. In the end, it provided evidence for inclusion of both imaginative features and place-based narratives to be included in design.

The process of site investigations can reveal stories in the landscape’s children are most drawn to or concerned about, such as an interesting landscape feature an adult did not notice. They may acknowledge places they perceive as uncomfortable and places that are the most enjoyable, giving the designer a clue about the phenomenology of the site for children. This method may also reveal insight about the cultural values and markers of a community.

Designing for children’s landscapes should include this user group as a necessary voice in design at all stages of the design process. These methods describe ways to involve children in the investigation of stories, part of the early design process. Later stages may use design workshops and charettes for brainstorming and testing ideas. Planting days for the site can include children of all ages, and older youth can become engaged in construction. This involvement is important to create buy-in from the youth user groups. It facilitates meaningful, personalized design. While the stories are being investigated and incorporated into design, children are creating memories and stories of their own during the process.

Story Theme Matrix

The two categories to create narrative landscapes for children are combined into a matrix. First the qualities of design that meet children’s needs were explored. Each quality adds benefit to the growing child and adds depth to the experience of story. Next, the landscape is discovered through the five site story themes. Unearthing stories is a critical place to engage children in the design process and identifies their landscape values. Separately, the categories add richness to the design experience. However, by combining these categories into a matrix, a useful tool emerges. This tool, the story theme matrix, breaks down the themes and categories into experiences that can be designed in the landscape. The purpose for this matrix is to develop design interventions that address a variety of experiences. Rather than a linear storytelling method, the matrix allows for the story to be told through pieces and uncovered in chapters.

The blank matrix (Figure 3.8) can be manipulated for each site. The story themes discovered and identified as valuable in the process become more specific. The blanks are spots to brainstorm relationships and design interventions that bring the theme to life.

Application of the matrix

The matrix is a tool for design discovery and used in multiple phases of design. From early schematic designs to design details, it ensures high-quality children’s landscapes. Compared with an alternate design process, utilization of the tool allows the design to revisit the ideas and qualities to be included and critically evaluate the site design at different stages. The design can be worked over the process to meet all the design qualities to fully express the landscape narrative.

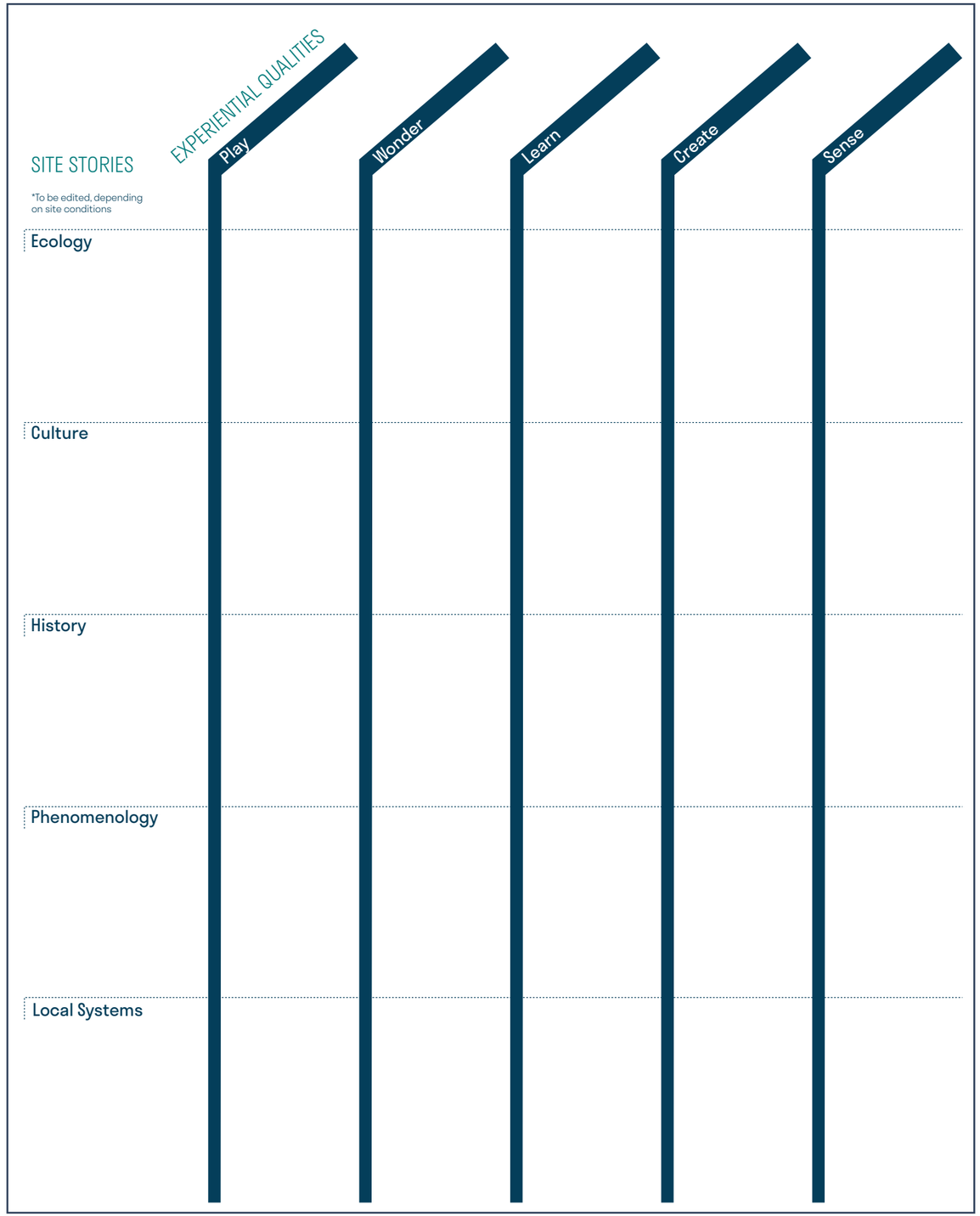


Figure 3.8. Blank story matrix to be used for generating design ideas.

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4 Story Application

Searching for Landscape Narratives in the Mojave Desert and Las Vegas, Nevada

Working with students at Explore Knowledge Academy in Las Vegas, Nevada led to the discovery of an undeveloped site adjacent to the school. Approximately 0.5 square miles, a 5 minute walk from one end to the other, the site is formed by steep topography and contains layers of Mojave brush vegetation. The site provides a good opportunity for a design exploration because it is owned by the Clark County School District and it is located in an urban environment. Uncovering story narratives and improving the children's opportunities to engage in nature on site are the primary goals developed by use of the design matrix. The story investigations occur at three scales: the Mojave Desert, City of Las Vegas, and site.

Desert Landscape Stories

Finding Beauty

For people unfamiliar with the desert, it may seem like an inhospitable, empty space. A place that is too extreme - too hot, too dry, too empty, too bleak, or too boring. I suppose I had similar beliefs about the desert before I visited, but digging deeper reveals many of the desert's inspirational stories.

The showiest season, spring, always arrives slowly, but it stays for months. The sunny sky creeps slowly into longer days. Warm winter weather comes and goes and bitter north winds calm for the season. A trip onto a trail gives quick clues that spring is coming. As early as February, annual blooms may pop up through the sand and gravel. In March, the yucca flowers begin to show. White droopy flowers on a large central spike open their slender petals in a cluster. The most noticeable blooms are the brilliant pinks and yellows of the prickly pear cacti. Even the intimidating cholla shows beautiful, bold gold and red tepals surrounding hundreds of bright stamens. Hummingbirds quickly hum from bloom to bloom, a buffet of nectar sources to fuel the hard-working birds.

Understanding the splendor of the Mojave requires leaving the car and looking closely for life and unique forms on the land. From far away, a hill is muted brown sand. However, closer inspection reveals a fascinating ecosystem of reptiles, small mammals, and flowering cacti. The land is rarely completely flat, often suddenly dropping into washes filled with dense vegetation. Stillness interrupted by a hunting bald eagle diving towards its prey. The night sky becomes a twinkling stage for exploring patterns in the stars.

Despite the desert's arid conditions and long, dry season of heat, it is full of life. There are times when it comes alive and is a magical place. Look a little closer and enjoy vibrant details. These are just examples of stories the desert can share. If given the chance young children can learn these stories and share them on their own.

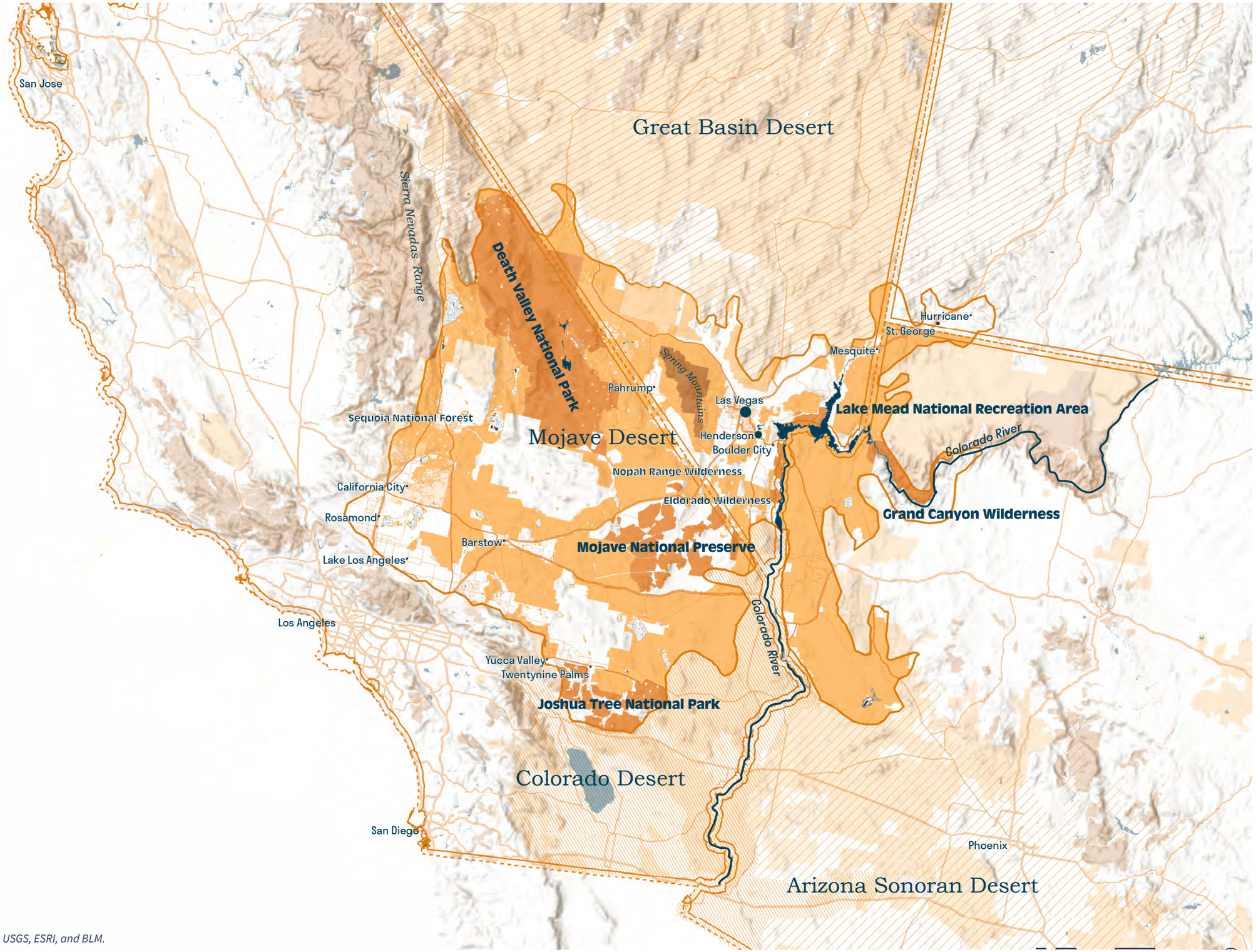


Figure 4.1. Identifying the Mojave Desert. Data from USGS, ESRI, and BLM.

Macro Scale: Mojave Desert

Local Systems

In the Mojave Desert, the dry climate is a result of the rain shadow effect from the large Eastern Sierra Nevada mountains. The desert is composed of several smaller mountain ranges. The Great Basin Desert makes up the northern border of the desert and the San Bernardino mountains in California form the southern border (Figure 4.1). The southern border intersects with two other distinct desert boundaries. The Colorado Desert in southern California and Sonoran Desert meet and form a transition zone located in Joshua Tree National Park. A major factor differentiating the deserts is the elevation. Generally, the Mojave Desert sits at a higher elevation than the other deserts in Southern California and Arizona. Most of the Mojave sits above 2,000 feet above sea level, where the Joshua Tree plant thrives. However, some lower regions exist including the lowest point in the United States in Death Valley which is as low as 282 feet below sea level. The highest point in the desert is Mount Charleston, located northwest of Las Vegas approximately 40 miles and rises to 11,918 feet above sea level.

The Mojave is experiencing more extreme heat events with climate change. The average temperatures in the summer reach 100 degrees Fahrenheit, with extreme events surpassing 115 degrees. Annual extreme heat events have risen for the Las Vegas Valley from 3.3 per year between 2007-2009 to 4.7 between 2010-2016.[1] These extreme heat events are extremely dangerous for all living beings surviving in the desert during this time. The urban regions are especially dangerous with the combination of the heat island effect from vast amounts of concrete and asphalt absorbing and retaining heat overnight. The urban populations most at-risk from the extreme events are low income and older populations.

The spring, fall, and winter months are more pleasant compared to the intense summer heat. The weather is sunny an average of 300 days per year. Spring and fall averages 60-70 degrees Fahrenheit. Winter months are generally between 50-60 degrees during the day and can reach freezing temperatures overnight. The winter months also become extremely windy as storm systems that passed through the Sierra Nevada mountains, now dry, pass through the valley.

The Mojave is the driest of the North American deserts. The desert receives less than four inches of rainfall on average per year. Most of this rain typically falls during the winter months when temperatures are cooler. Occasional summer storms may pass through, but the intense heat often dries up the water as soon as it reaches the ground. The annual rainfall varies largely depending on the elevation. The Spring Mountains which includes Mount Charleston receives 23 inches per year of rain and 97 inches of snow pack. The lowest region in Death Valley receives only 2 inches per year. The largest city, Las Vegas, averages 4 inches per year with February often being the wettest month (Figure 4.2).

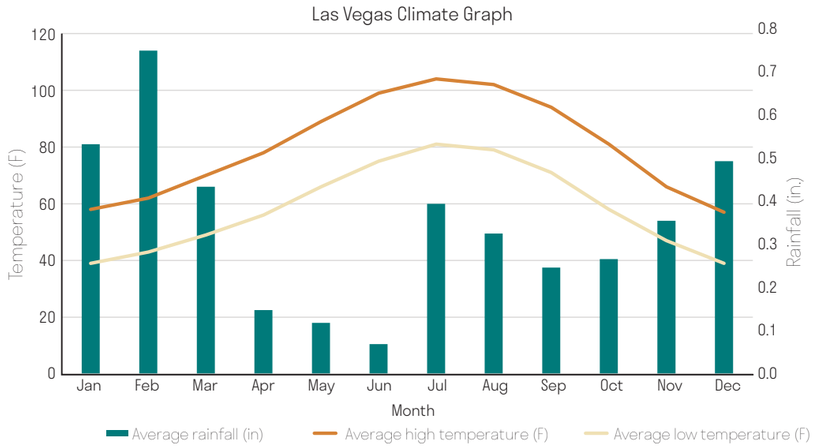
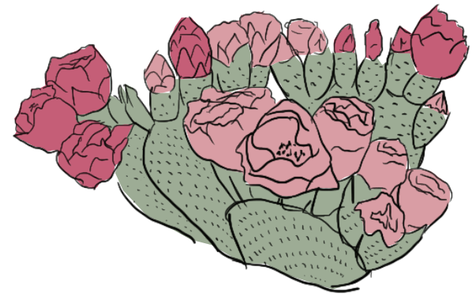
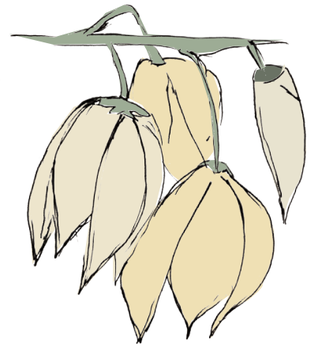


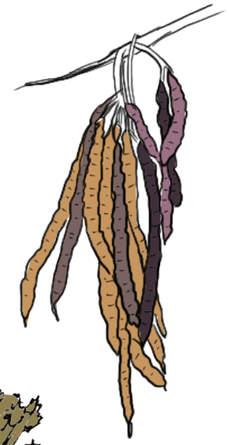
Figure 4.2. Las Vegas Climate Graph. Data from USClimateData.com..



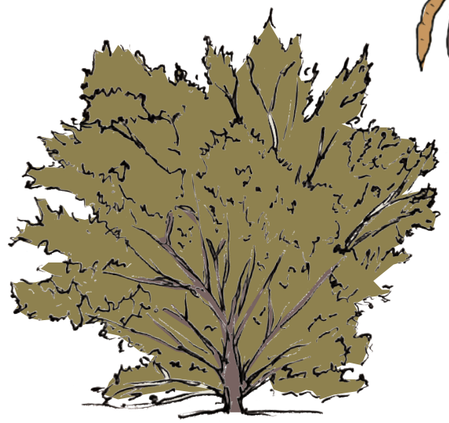


Yucca Flowers
Flowers, seeds, stems and fruits are edible

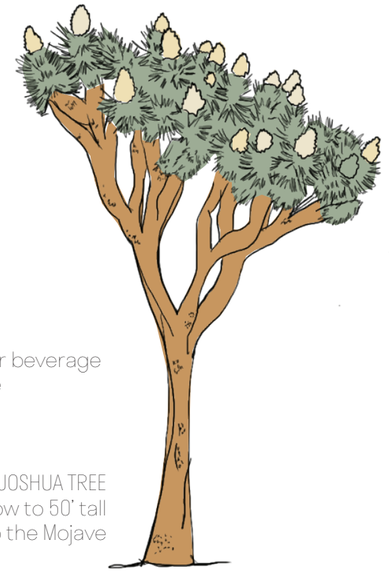
BEAVERTAIL CACTUS
Grows 12" tall
Endemic to Mojave



CREOSOTE BUSH
Multiple medicinal uses
Grows between 4'-12' tall



MESQUITE PODS
Can be made into flour or beverage
Tree sap is used as a dye
Several medicinal uses



JOSHUA TREE
Grow to 50' tall
Endemic to the Mojave

Figure 4.3. Native and endemic vegetation.

Ecology

The Mojave hosts abundant wildlife and several endemic species. Mammals include coyote, fox, kangaroo rats, bighorn sheep, jackrabbit, and mountain lions. Birds include birds of prey such as the bald eagle, great-horned owl, and burrowing owls. The iconic road runner is well suited to the climate using zygodactyl feet to quickly run across the hot sandy landscapes to capture and eat snakes and lizards. Small nesting birds such as the Cactus Wren, Black-throated sparrow, Lawrence's goldfinch, and multiple hummingbirds make their homes in the desert's shrubs and cacti. The desert tortoise is a threatened species native to the Mojave and Sonoran deserts. They can live over 50 years in the wild, surviving off seasonal rain pools and herbaceous wildflowers, grasses, and cacti. Other notable reptiles include rattlesnakes, sidewinders, chuckwallas, many lizards, and the large, venomous Gila monster.

The venomous snakes of the desert can be extremely intimidating. The Mojave rattlesnakes effectively camouflage into the scrub brush and rocks. Their rattle is unmistakable, a clear sign to move away. When intruders come too close and they feel threatened, they sink into a tight coil and rattle, but are ready to strike. When not threatened, they often can be spotted laying out over rocks to soak up the sun's warm rays. While important to always be wary as a human visitor to their habitat, most trips into the desert will go without a spotting. Spring and summertime is the most active for spotting snakes as they come out of hibernation when the temperatures start to reach 80 degrees. For this reason, people should always hike in groups and keep pets leashed.

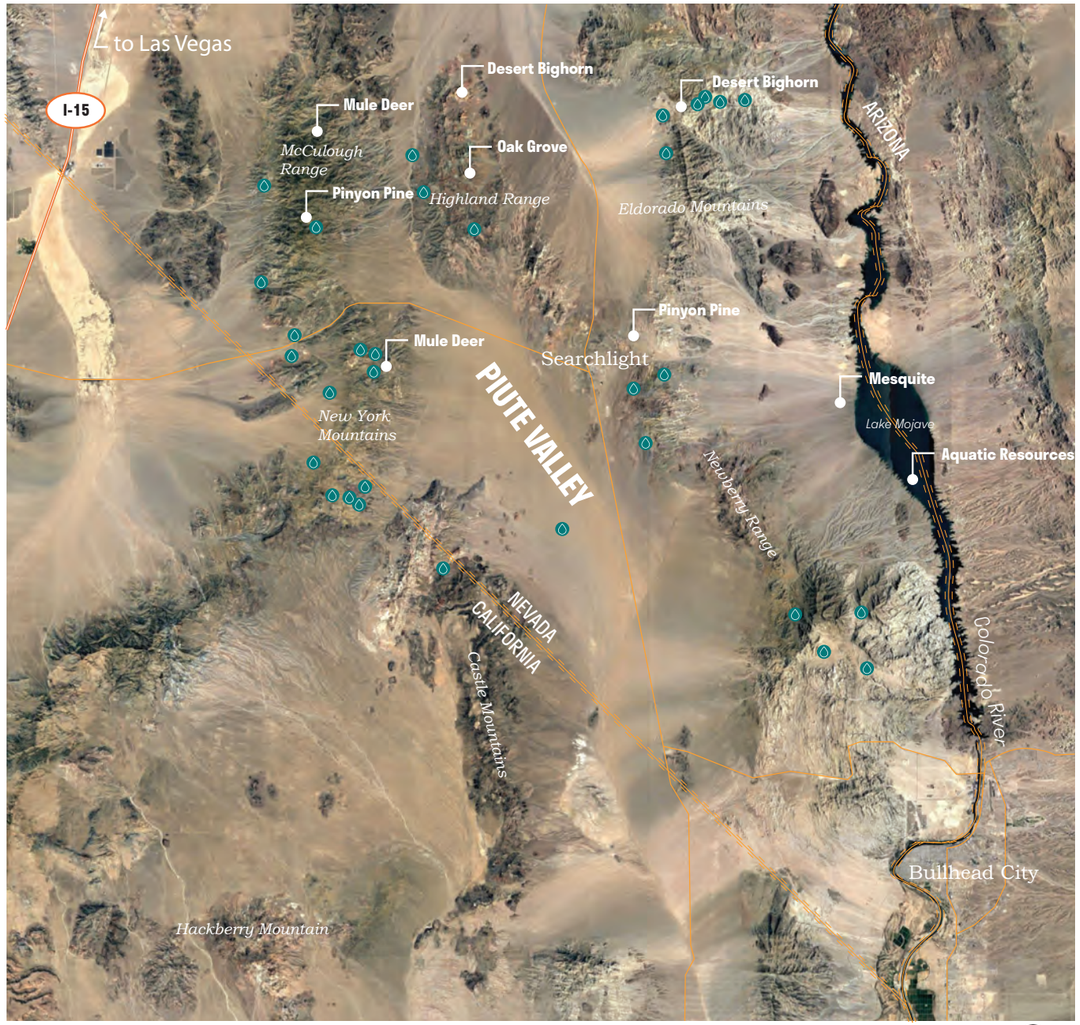


Figure 4.4. A sample of resource availability for tribes prior to contact with European settlers. Data from Bronson 2012.

The native Mojave flora is a combination of the surrounding desert systems, but with a few distinct and endemic species. Biologists estimate there to be at least 250 species living in the region, with 80-90 species endemic to the Mojave Desert (Figure 4.3).[2] One of the most important and widespread plants is the creosote bush (***Larra tridentata***), which grows into dense clusters that stay small but may be well over 50 years old. Other common plants spread out on the vast plains and include white burro bush (***Hymenoclea salsola***), desert holly (***Atriplex hymenelytra***), brittlebush (***Encelia farinosa***), and all-scale (***Atriplex polycarpa***). The Joshua tree (***Yucca brevifolia***) is a yucca that grows up to 50 feet tall and has a deep root system that reaches down 30 feet. This species is endemic to the Mojave and is found at elevations between 1,300 and 5,900 feet. There is large conservation concern for this plant as climate change predictions estimate only 10% of suitable habitats will remain.[3]

Several cacti live throughout the region. Endemic species include silver cholla ***(Opuntia echinocarpa)***, Mojave prickly pear (***O. erinacea)***, beavertail cactus (***O. basilaris***), and many-headed barrel cactus (***Echinocactus polycephalus***).

Trees that live in the region include the spiny Mesquite, which appears bushier in the wild, but cultivated into spineless trees in urban areas. Their pods drop in the fall and have many uses. The desert willow (***Chilopsis linearis***) has a drooping habit and flowers for a long period in the fall, providing a good source of nectar for pollinators. Cottonwoods (***Populus sp.***) grow in riparian areas, providing excellent cooling and shade while absorbing available moisture from creek systems. Single leaf Pinyon pine ***(Pinus monophylla)*** and Ponderosa pine ***(Pinus ponderosa)*** are found at higher elevations with cooler temperatures. The ancient Bristlecone Pine ***(Pinus longaeva)*** is found in regions of the Mojave including within the Spring Mountains and White Mountains. These are the oldest living trees in the world, exceeding 4000 years old. In 2012, a bristlecone that is thought to be the oldest was found to be 5,065 years old. The trees many not show any green needles and bark is twisted and gray. These inspirational trees are a wonder and unique demonstration of resilience. Most of these plants have importance to the Paiute, Shoshone, and other tribes native to the area.[4]

History

People of the Mojave

Earliest known

Evidence of Paleo-Indians can be found in multiple places in the Mojave. These groups are the earliest humans to travel through North America, likely crossing from Asia over Bering Strait land bridge. The migration of the land bridge likely occurred between 45,000-12,000 BCE into interior Alaska, and south into the rest of North America between 16,500-13,500 BCE. During the Early Holocene (8,000 BCE to 5,500 BCE), the Mojave region had a climate that was cooler and wetter and allowed for larger plants and animals. The tribes hunted large game through marshes and small lakes.[5] Evidence for these groups include ancient petroglyphs carved into stone scattered through the desert. Additionally, tools made with obsidian are found in archaeological digs that provide further evidence for their existence in the region.[6] The disappearance of the communities coincides with the shift of the climate to a hotter, drier period during the Middle Holocene.[7]

Native Tribes - Pre and post Colonialism

The Late Holocene marked a shift to slighter moister condition. At this time, Ancient Puebloans (or Anasazi) lived in the current United States southwest from 100 to 1600 AD. These early human communities in the desert developed methods for agriculture and advanced civilization. Settling near water sources, they devised efficient growing systems with the available water. Archaeologist found turquoise beads and pottery scattered throughout the Mojave, supporting theories that the Anasazi traded with other tribes in the region.[8] The Ancient Puebloan communities disappeared around the 14th century. However, a few tribes that live today evolved from the ancient culture, such as the Hopi Tribe in Northern Arizona.

From 1100 AD to 1500 AD the Southern Paiute, Shoshone, and Mohave tribes lived in the Mojave Desert and Great Basin region. They hunted game such as sheep and mule deer with bow and arrows, foraged, and had small amounts of agriculture. The tribes spread across the desert regions living largely nomadic lifestyles.[9] Figure 4.4, adapted from an archaeological investigation to reveal foraging strategies in the Paiute Valley, maps a sample of animal, vegetation, and springs that provided resources for the tribes.[10] Some tribes in the region shared customs with one another, while others had their own unique culture, language, and ways of living.

Around 1500 AD, Spanish settlers were among the first colonizers in the western part of the current United States to interact with desert tribes. Contact with the Europeans changed the way of life for the native tribes. In the Mojave, only pockets of tribal lands are left, scattered throughout the desert region.

Geology

The exposed geography tells another story in the Mojave. Hiking up sandstone peaks or plodding through washes, the effects of sun, wind, and water reveal themselves in the landform. Deep red sandstone outcroppings are unique sedimentary rock layers from the Jurassic era.[11] Sand dunes and wind formed the striking pillars and smattered patina unique to the desert climate.[12] These exposed sandstone features are part of conservation efforts and popular recreation areas like Red Rock Conservation Area and Valley of Fire State Park. The red hue develops from rusted iron ore embedded in the rock. Ancient granite boulders stack together in unique formats in places like Joshua Tree National Park and spread throughout the low mountain ranges. Exposed limestone cliffs, volcanic tuff, and mineral rich threads pocket the region.

Culture

Besides broad adaptations for survival in the desert environment, there is not a single culture to classify the Mojave Desert. From nomadic tribes living in the region pre-colonization to the current development of cities, the existence of people in the desert has always included living and surviving from nearby water sources. The Mojave is comprised of a majority of federally owned land. Much of this land is made available for recreation. Activities like hiking, rock climbing, and canyoneering are popular.

The federal land is also utilized for government testing projects. The Nevada Test Site was a significant nuclear testing location just north of Las Vegas during World War II. An ongoing battle to store nuclear waste in Yucca Mountain continues between the United States Congress, Nevadans, and environmentalists.

Figure 4.5. Exploration of space in a broad, expansive landscape. Photography by Sam Berry, illustration by the author.

Phenomenology

Spending time in the desert environment reveals a unique, almost unearthly experience. The phenomenology of the desert has captivated the work of creative artists for centuries. They attempt to capture the alluring, indescribable feelings in writing, paint, and song. The space, scale, light, textures, and variety all help bring comprehension to the feelings of the place. However, there is no replacement for time spent completely immersed in the broad landscapes. The narrated photo story works to explore some of the elements that contribute to the complexity of desert phenomenology.

Next Page:
(Left and above) Figure 4.6. Experiencing the scale of enormous sandstone cliffs , boulders, and canyons.
(Left and below) Figure 4.7. Textures of the Mojave include spines, brush, waving grasses, and smooth sand.
(Right side) Figure 4.8. The Mojave Desert is not just sand and shrubs, but has immense variety in the texture, form and colors.

towering canyon walls
ledges + caves
climbing!
Scale
Enormous Boulders
climber for scale
smooth sandstone
Texture
brittle, earthy brush
ephemeral flowers
waving grasses
firm, spiny
soft sandy trails
form
color
Variety

Figure 4.9. Light has a unique quality in the desert, and can quickly change the comfort of the visitor.

City and Site

Las Vegas Range

Muddy Mountains

Valley of Fire State Park

North Las Vegas

Red Rock Conservation Area

Spring Mountains

Sunrise & Frenchman Mtns.

Las Vegas

Las Vegas Strip

Site Area

Lake Mead Nat. Rec. Area

Lake Mead

River Mountains

Henderson

Colorado River

McCullough Range

1 MILE

Figure 4.10. Locating Las Vegas in its desert context. Image from Google Earth.

Figure 4.11 The Duck Creek Canal passes by the located site. This canal is one of the larger stormwater canal systems working to prevent flooding in the urban Las Vegas Valley. Image from Google Earth.

City and Site Scale

The largest city in the Mojave is Las Vegas. 2.2 million people live within the metropolitan area comprised of Las Vegas, North Las Vegas, and Henderson (Figure 4.10). This symbolic city is known for its culture of excess and is just as extreme as its climate. Most famous, The Las Vegas Strip is a broad, six lane road flanked by an onslaught of advertisements for mind-bending magic shows, comedy, DJ's, dance performances, night clubs, all-you-can eat and all-you-can-drink brunch buffets, and resident music artists. The economy is driven by entertainment. In 2019, 49.5 million people visited the city dotted with casinos and resorts.[13] It is one of the most visited places in the world. Visitor spending and induced spending (by employees of the entertainment industry) totaled $57.6 billion in revenue in 2018. The industry also supports around 25% of Southern Nevada's total employment.[14]

Located to the southeast of downtown, the site has views of the international airport and surrounding mountains (Figure 4.11). It is 36 acres, or .5 square miles of undeveloped land adjacent to a K-12 school and technical school (Figure 4.12). It is a slice of undeveloped land with native vegetation, unusual in the city and a reminder that the site is definitely in the Mojave Desert.

Ecology

City Ecology

The urbanization of the Las Vegas Valley affects native habitats. Development that continuously moves into higher elevations of the valley cuts off transportation networks for resources and migration, and limits habitat areas. Additionally, the urban area creates a heat island effect, making the hot climate even hotter. Traditional washes and low areas are developed over limited water resources in the city. The Las Vegas Wash is most diverse ecological areas in the city (Figure 4.13). Parts of the wash and the other stormwater canals are constructed like native washes and provide vegetation and water resources. The adjacent wetlands are home to over 200 species of birds and mammals such as beavers, bobcats, coyotes, and snakes.[15]

The desert tortoise is especially threatened by urbanization. The Mojave species of tortoise was listed as endangered in 1990. Construction destroys water resources and the network of ephemeral plants it relies on for food and water. Outside the urban growth area, human recreation also endangers the species. Off road vehicles are especially dangerous as they may unknowingly run over a burrowed tortoise.

Site Ecology

The site consists of spotty creosotebush and brittlebush shrub vegetation. The highest concentrations of vegetation are in steep swales from the Whitney Mesa geology. The proximity to the Duck Creek Canal provides a corridor and access from the Las Vegas Wash, making a potentially crucial connection for wildlife. An additional ecological connection is possible close to the Whitney Mesa Recreation Area, which consists of conservation and recreation for foot traffic a few blocks east of the site. Closer inspection of the site's ecology was not possible due to travel restrictions from COVID-19. Another ecological investigation would ideally reveal any locations of desert tortoise and evidence of mammals like the desert fox or coyote and the potential connections as a habitat corridor.

Figure 4.12 The site sits adjacent to a concrete portion of the Duck Creek Canal. Two schools on the north and east side of the site have close access. Image from Google Earth.

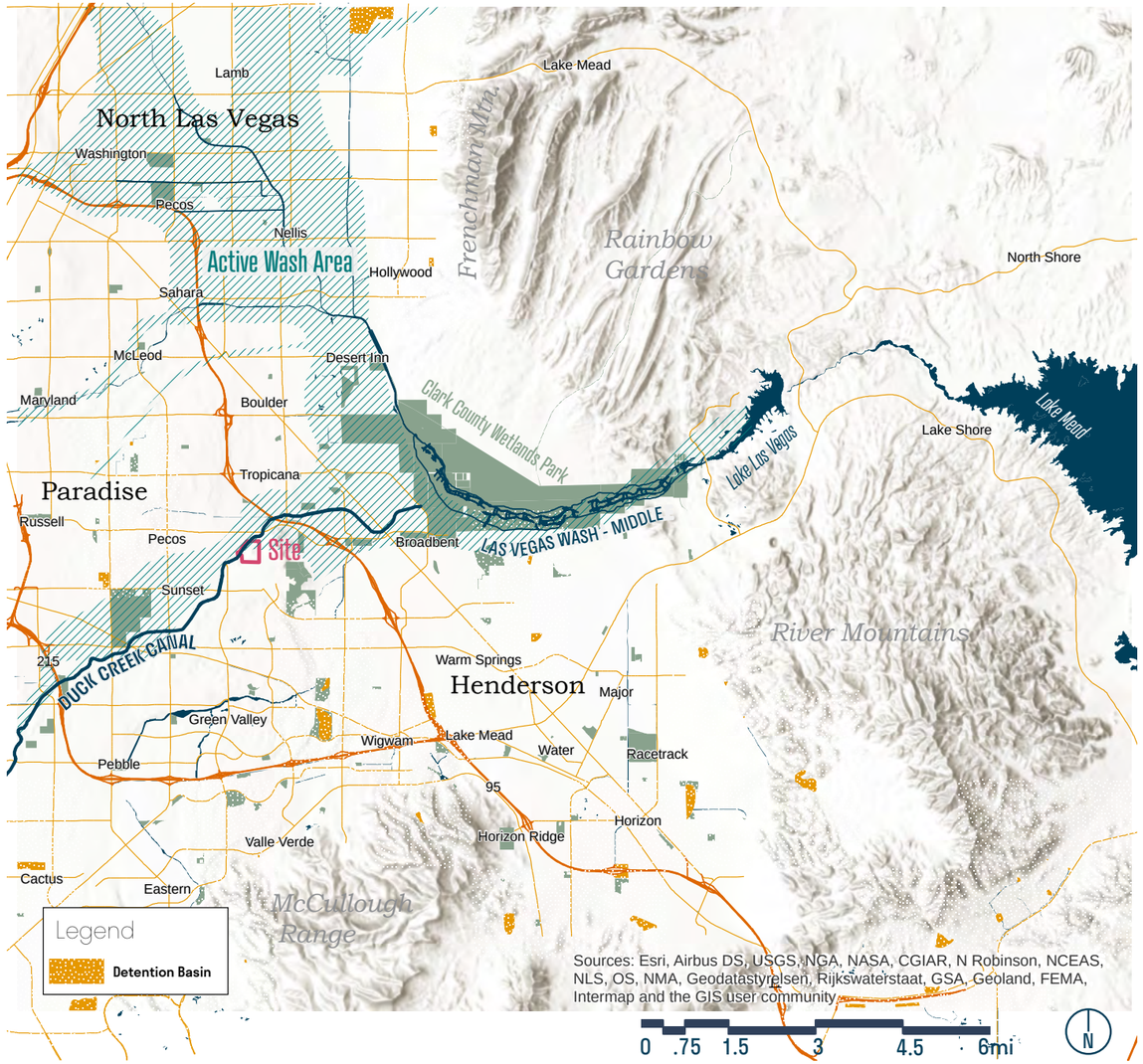


Figure 4.13. The site is situated in a historically active wash area that drains at the wetlands park, indicating potential habitat connections with nearby open spaces.

Local Systems

City Water Systems

A precious desert resource, water in the Las Vegas Valley is managed in the following ways. The Colorado River that feeds Lake Mead supplies 90% of the city's water supplies. The other 10% comes from an underground aquifer fed by rain and snowmelt.[16] Stormwater from the city and metropolitan area travels via storm drainpipes to Lake Mead. Municipal water travels to one of five water treatment plants in the valley then is returned to Lake Mead.

Despite the low average rain flow per year, flooding is an issue in the urban grid. Rainwater hits the concrete, asphalt, and rooftops and quickly overwhelms the city storm drains. The native groundcover is packed and hard, not allowing for quick infiltration. A 100-year flood event in 1999 led to a flood management plan to protect human life and infrastructure. The result from that effort is 650 miles of flood channels (Figure 4.14) and 100 flood control basins (Figure 4.15).[17] The channels are built in leftover spaces of urban development. Often made of concrete, their goal is to collect stormwater and quickly transport it

Figure 4.14. View of the Duck Creek Canal from the northwest corner of the site.

Figure 4.15. View of a typical detention basin used to store water and prevent flooding in the city. Image from the Center for Urban Land Use Interpretation.

out of the city. The detention basins take many forms, some are public parks while others are large earthen basins. The basins hold water that is eventually transported back to Lake Mead.

All the captured stormwater, in addition to treated municipal water and urban runoff, travels through the Las Vegas Wash before reentering Lake Mead. The wash contributes 2% of inflow into Lake Mead.[18] The wash also feeds a wetlands area, which helps to treat stormwater and runoff before entering Lake Mead. Prior to dense urbanization, the wash created 2,000 acres of wetlands. The current wetland area is only approximately 200 acres.[19] The wetlands help to further clean the water and supports abundant wildlife in the city.

Site Water Systems

Water flows to the northwest corner of the site. The steep topography crossing the site has multiple swales carved into it that direct water drainage (Figure 4.16). At the northwest corner of the site is Duck Creek Canal. The canal is one of the major flood control canals in the city and leads directly to the Las Vegas Wash.

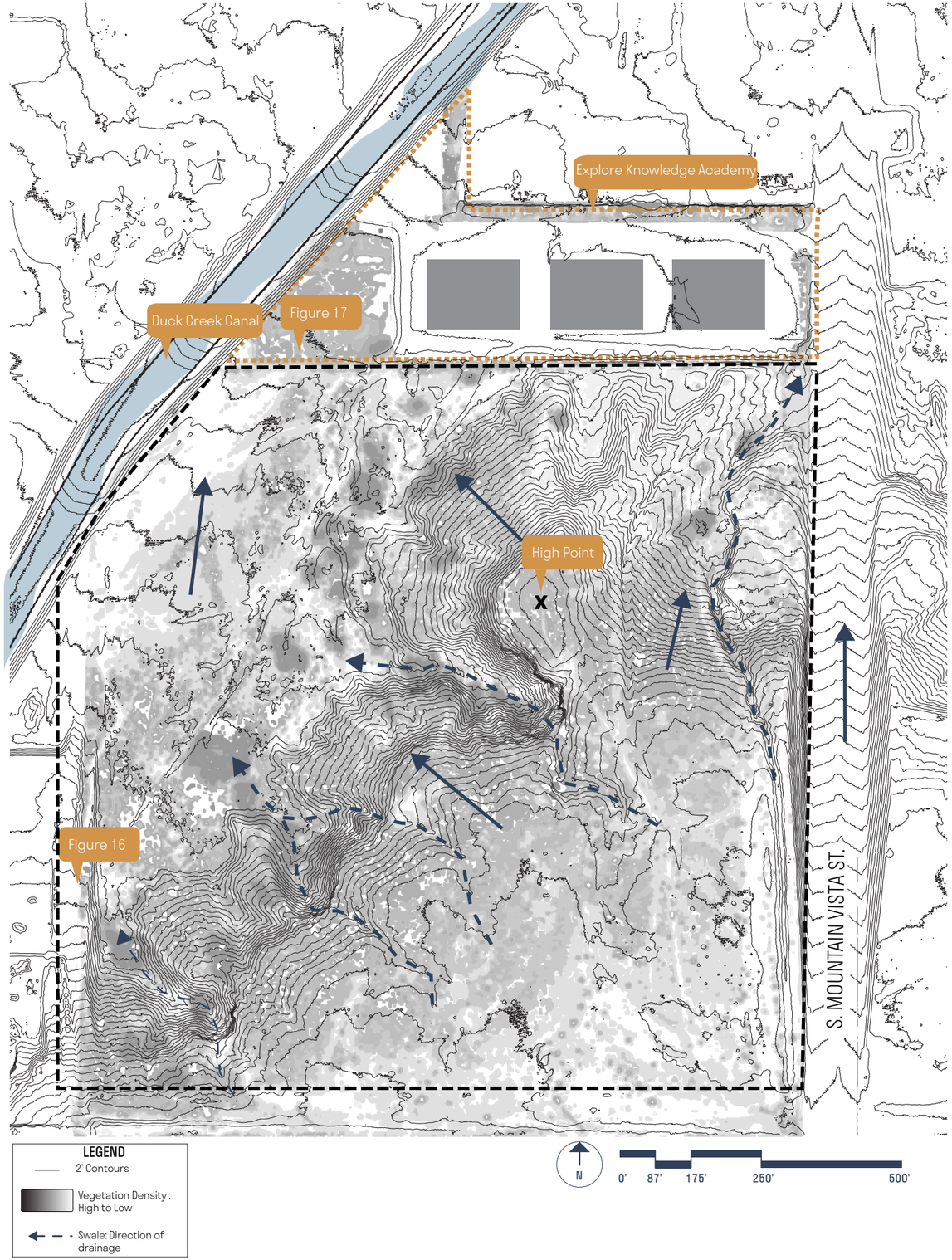


Figure 4.16 Topographic map of site shows steep swales along with flat areas. Data from Clark County GIS.

Figure 4.17. View of the highest elevation point from the Explore Knowledge Academy campus.

Figure 4.18 Vegetation density varies across the site, determined by natural water sources and exposure to sun and shade.

History

People

City History

Establishment of Las Vegas as a city began with traders and the subsequent building of the trans-continental railroad. This growth relocated the Paiute tribes and the land they lived on for hundreds of years. Since establishment, it has grown into a booming entertainment and tourism capital. The following timeline (Figure 4.19) is adapted from the Las Vegas Sun's work about major events that built the entertainment city.[20] In addition to these dates, the history of native people in the area are included and considered equally important for understanding the collective history of Las Vegas.[21]

Site History

The site is owned by the Clark County School Board of Trustees in conjunction with the neighboring Southeast Career Technical Academy. Initial construction of the site that includes the current technical school began in 1968. The approximately 35-acre site has no existing structures and no known history of structures built on the site.

Geology

City Geology

The city of Las Vegas sits in a flat valley surrounded by mountains (Figure 4.9). The northern ranges are the Sheep Range and Las Vegas Range. To the east sits Sunrise, Frenchman, and River Mountains. To the south is the McCullough Range. The west consists of the Spring Mountains which includes Red Rock Conservation Area. This western range is the longest continuous range of mountains near Las Vegas and stretch from north of Mt Charleston, a peak that tops out at 11,916 ft and is the tallest in southern Nevada, to Mt Potosi, more than 40 miles of continuous mountain terrain. This range is part of the Keystone Thrust, an active fault zone that stacked older limestone rock on top the younger sedimentary sandstone.[22]

The city is a flat valley and the lowest elevation is near the Las Vegas Strip. It rises slowly in all directions as the extents reach the various mountain ranges. Sedimentary erosion from the parallel mountain ranges created the smooth valley floor.[23] Within the city borders, there are only a few notable geologic features. Lone Mountain is a small mountain surrounded by the flat valley floor in the northwest portion of the urban area. Another notable feature is the Whitney Mesa. The mesa drops steeply creating fingers of valleys and ridges and was formed by sedimentary erosion.

Site Geology

The site is the western part of the Whitney Mesa. While less dramatic in topographic change than the Whitney Mesa Recreation Area, it includes similar curving valleys and ridges formed from sedimentary erosion (Figure 4.16). The northwest corner of the site, the lower elevation portion not part of the mesa, is comprised of silty clay soils associated with an active wash area. The active wash zone correlates with the current path of the Duck Creek Canal, which drains into the Las Vegas Wash and Clark County Wetlands (Figure 4.13). With this soil structure, the site may be well suited to support plants found in typical desert wetlands such as dense grasses and trees like Mesquite and Cottonwood. The upper portion of the site, part of the Whitney Mesa, contains soils that support the creosotebush community of plants, a typical vegetation ecology for the Mojave at the given elevation.

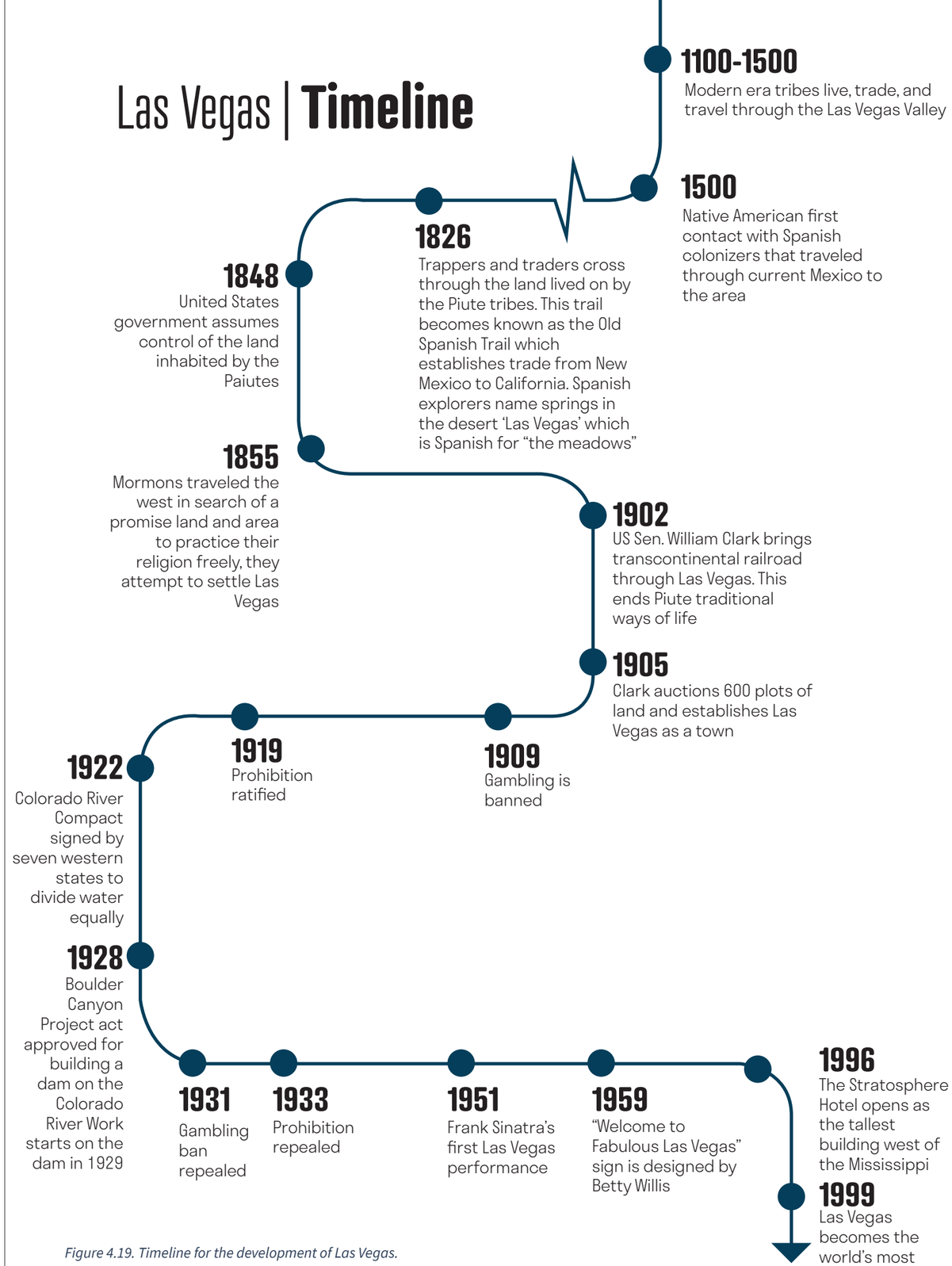


Figure 4.19. Timeline for the development of Las Vegas.

Phenomenology

City Phenomenology

Some may love the energy of the Las Vegas Strip and its culture of gambling, shows, convention, and tourism. Some may be appalled at the excessive consumption in food and drink and extravagant use of water and energy resources in a fragile desert ecosystem. Regardless of one's disposition towards the city's culture, there is an energy and spirit unlike anywhere else. From almost anywhere in town, a view towards downtown reveals the skyline of hotels and casinos that support the city. Most identifiable is the Stratosphere, the tallest building in Las Vegas with a 1,400 ft tall observation tower.

Site Phenomenology

Unfortunately, due to travel restrictions related to COVID-19 my time at the site was limited to viewing it outside the fenced perimeter. More time at this site is needed to understand all the characteristics on site. For future visits, this phenomenology should be explored alongside students to understand their initial observations of the place.

Culture

City Culture

An understanding of the development of the Las Vegas strip and its aesthetic is important to consider for the development of the rest of the city. As an entertainment center, it grew out of accommodation for the entertainment industry. The boom of the city from the 1950's and 60's into its current state affects the way the children of the city now grow up.

In 1973, the population of Las Vegas was 358,000. The Strip was well established and growing even larger, but the population of the city was still modest. Between 1973 to 2006, the population grew to over 2 million people. With the exponential growth, the city rapidly built housing to accommodate the influx of people. Neighborhoods were built by the hundreds. Growth from the original downtown spread in all directions of the valley. Navigating the city is like a giant game board. The flat topography of the valley allowed development to perfectly lay an orthogonal grid for the new developments, quickening the pace and ease of design and building. Massive neighborhoods can be viewed from satellite views, clay roofs clustered in neat groups mile after mile. Notable is a lack of parks or green space for the immense size of the city. The occasional dense green pockets are most often golf courses, which oftentimes require a membership and are historically limited to white men.

The rapid population growth ignored the environmental conditions of the city. Early housing reflected traditional southwest architectural styles of single-story ranch homes. This style takes advantage of outdoor courtyards with large covered roofs to make spending time outdoors more tolerable in the summer heat and protect from winter winds. The surge in development changed the style of housing to make use of available space. Many neighborhoods were built as multi-level homes that require more energy to cool but fit more building footprints per square mile. The additional 1.5 million new residents brought aesthetics of their previous homes with them, California style ranches and East coast colonial homes are not uncommon neighbors. They also brought their vision of the home garden, resulting in preference for green lawns. These landscapes are extremely energy intensive to maintain and require daily irrigation. However, a recent trend towards water conservation and native plants has encouraged more homeowners to exchange energy intensive lawns for desert adapted gardens (xeriscaping).

The fast expansion of the city has not benefitted all residents. The neighborhoods that support the entertainment industry workforce are clustered closer towards downtown while large modern homes in private communities spread into the mountains. Wealth segregation has negative impacts on the residents growing up in the city. Dense neighborhoods tend to have fewer amenities such as green spaces, grocery stores, and health care. Wide multi-lane arterial roads require cars, even though they are not accessible for every person. The Clark County School District unequally achieves state standards. Wealthy neighborhoods at the edge of the city are consistently more high achieving than downtown schools whose students include many transient families and families experiencing homelessness.

Site Culture

The site is in the unincorporated city of Paradise, but on the border of the City of Henderson. Both are considered part of the Las Vegas Metropolitan area, but vary greatly in income, race, and access to neighborhood resources like green space and community centers. Census data reveals an average median household income of $45,000 for Paradise, while Henderson's median household income is $73,000. Henderson is 63% White, 17% Hispanic, 8% Asian, and 5% Black.[24] Paradise is more diverse with 37% White, 35% Hispanic, 12% Black, and 10% Asian.[25]This divide reveals likely worse living conditions and lower income for BIPOC. To better understand the culture of the community living around the site, time spent engaging the communities in the design process is necessary. Due to travel restrictions related to COVID-19 I was unable to return to the site and engage with community groups. This exploration is necessary to understand how income and diverse cultural representation affects the value of land, dreams for the site, and children's needs.

Summary

Across the Mojave Desert, city of Las Vegas, and site location, urbanization plays a large role in understanding the current conditions. The investigation into human history in the desert reveals a rich history of adapting to life in the desert environment. It also reveals that changing climate conditions make it more difficult for low-income people living in dense urban areas to adapt. Exploring the development of the city and culture reveals ways human technology contributed to advanced adaptations. However, further adaptations need to be made to prepare for the increasing heat due to human induced climate change.

Investigating the Mojave ecologies reveals diverse ecological communities. The city's urban sprawl lacks habitat corridors, but the site connections may help improve desert ecology in the city. Connections with the Duck Creek Canal and proximity to Whitney Mesa Recreation Area can create habitat connections within the urban sprawl.

The investigatory stories reveal city and regional culture; however a site-specific evaluation of culture was not possible. More time needs to be spent exploring culture and site phenomena to have a complete evaluation of the stories at each scale. This time would include working with children groups, parents, and teachers to understand culture, phenomena, and other stories that may be revealed while working with the intended users.

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5. Design

Narratives that Come to Life in the Landscape

"If places are texts that instruct children about a way of life, what types of landscapes might enable them to take leave of their assigned ranks and roles in the hierarchies of the dominant culture?"
– Sharon Sutton[1]

Vision statement

The design for this landscape reveals stories of the Mojave Desert, explored through the multi-design quality experiences for children. Each child grounds their experience of local stories in an authentic Mojave experience. At this site and around the city, education and achievement is unequal for children depending on their race and family's income, as alluded to in the site culture story (page 61). Additionally, Las Vegas lacks nature experiences in the city. The urban location of the site provides equitable opportunities for nearby children to learn and be in the natural world. The nature experience provides sense of relief from the stress of the city, and a chance to learn and connect with the stories they are surrounded by but not yet aware of.

Maintaining a unique sense of desert life is important to build an authentic experience of place. Existing vegetation is maintained and native plants incorporated into the gardens to expand habitat and beauty. While grounded in the Mojave, a child's imagination is released by dirt trails and freedom to create, change, and manipulate. The site develops sensory narratives explored through built structure, trails, and habitat. These stories evoke sensory experiences and incite play. The methods for engaging in the site provide discovery and exploration in meaningful ways, evoking wonder. Touching the hard spines and waving grasses of plants are sensory and material for building and creation. A child's imagination engaged – it is a place to play, learn, and be immersed.

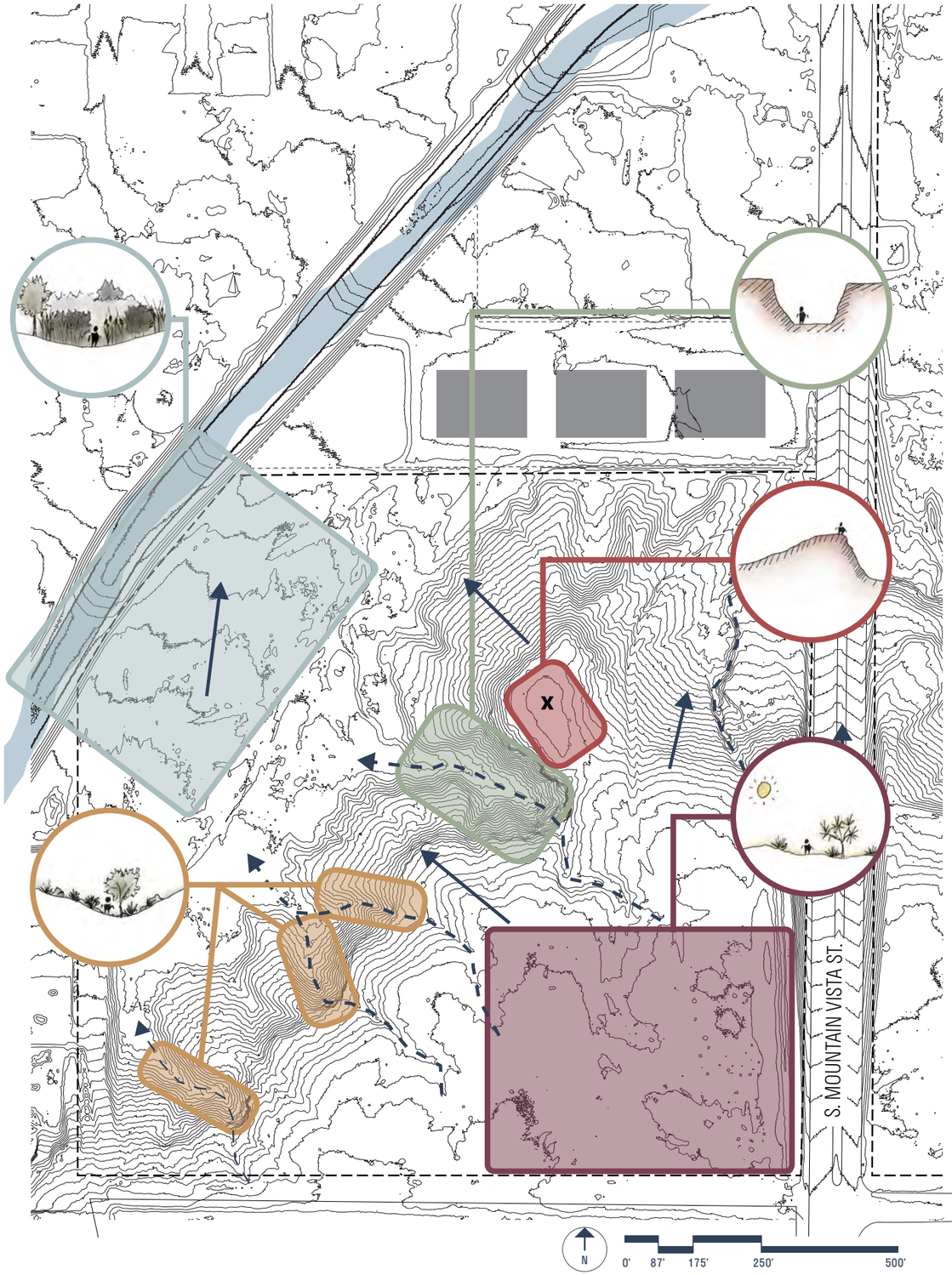


Figure 5.12. Site analysis based upon topography, sun, exposure, and water flow. Topographic data from Clark County GIS.

Site Opportunities

Site assessment revealed many areas that exemplify desert ecology and land formation. These typologies of desert experiences are places to work with existing conditions for design. Coordinating existing, natural conditions with the uncovered desert stories can authentically locate the stories. Existing conditions of the site are the exposed area, watershed, canyon, high point, and wash.

Exposed Area

This area is hot, dry, and exposed to all conditions such as sun and wind. It is the most accessible due to its location by the road and has been altered by cars driving over the area. Vegetation is the most scarce here and only the hardiest plants like creosotebush and cacti survive.

Canyon

Not incredibly dramatic, but the steep walls of the Whitney Mesa allude to interesting desert geologic formation. It carries water from the road area through the canyon, to the Duck Creek Canal. This area is denser in vegetation because of its regular shading and transportation of water through the spot.

Washes

Also called arroyos, the washes move stormwater during a rain event. Vegetation grows more abundantly in these spots and can block some extreme elements such as wind or sun.

Viewpoint

A high point with a steep drop below. It has views of the surrounding mountain ranges and downtown Las Vegas.

Water System

The site investigation revealed the wash soil structures that may provide for wetland or wash vegetation that is different than the soils on the steep slopes and in the exposed area of the Whitney Mesa. The Duck Creek Canal is part of a large citywide watershed that moves water from the southwest part of town through the canal to the Las Vegas Wash. While not always filled, it moves high water volume in a single event and in the winter had a constant stream.

Development: Utilization of the Design Matrix

Localized Story Themes

Identifying the potential story themes was the first step in utilizing the design matrix as a tool. The story categories that were investigated (history, ecology, phenomenology, systems, and culture) were too broad to be applied to design ideas using the matrix. They needed further refinement based upon the results of site investigations.

A first topic of exploration was regarding the specific ecologic communities of the Mojave. Plant and animal relationships emerged as a specific story theme to use for the matrix. A study that was initially very interesting identified traditional tribal uses for desert plants in southern Nevada.[2] This study led to further inquiry about the history of Native Americans and how they adapted to the desert. It also revealed how intertwined the relationship of land and human survival was, a lesson that aims to be revealed in the design. This investigation revealed that exploration of *Mojave ecology* connected to Native American history.

For cultural stories, I relied on *traditional knowledge* as the cultural landscape to explore. The adaptations of indigenous tribes from the pre-historic to modern tribes are considered in design. However, the inclusion of the culture of the children's communities needs to be included. Their diverse backgrounds should be reflected in design. This category cannot be fully explored until there is an opportunity to return to the site and explore with the children groups.

Geology connects currant human uses in outdoor recreation with history. Exploring the story of time through layers of rock is an opportunity to be creative and educational in design. I wanted to explore ways to interact with the layers that are so visible in the mountain topography.

To identify a story theme for phenomenology for the matrix, *light* was chosen as it is a significant quality that can be observed even in the city. Additionally, controlling light can provide human comfort in the intense heat.

For the local systems, the *water systems* seemed to be a logical choice with the proximity of the flood control canal and importance of water in the desert ecosystem. Investigation into the canal system revealed more about the geology of the city and the potential incorporation of the canal on site. There were other systems to consider, such as transportation and education that could be potentially investigated or used for additional design development.

Identifying the Participants

Before using the matrix, it seemed important to consider who the ideal users of the site are. The experiential qualities are related to children of all ages, so the design ideas can apply to a large range of youth users. With the proximity to two schools ranging from kindergarten through high school, the site could consider ways to involve education and learning. Potential spaces for classroom gathering and use by the schools for environmental education are developed as part of the design. The site is also intended for all types of children to visit, not the students at the nearby schools. It is a welcome landscape for all.

Design Development with the Tool

Utilizing the design matrix is useful in a few different ways. First, investigating site stories provides a deep analysis of the site and potential areas to develop. This assessment reveals the Whitney Mesa topography, including a high point and places to view how water moves on site. It reveals the importance of the Duck Creek Canal and its connection to the Las Vegas Wash and the city's flood prevention water infrastructure. Finally, the exploration of existing vegetation on the site provides a deeper understanding of the Mojave ecologic communities. These stories and investigations on-site locate potential opportunity areas. These areas are the canyon, water system, exposed area, wash, and viewpoint Figure 5.12).

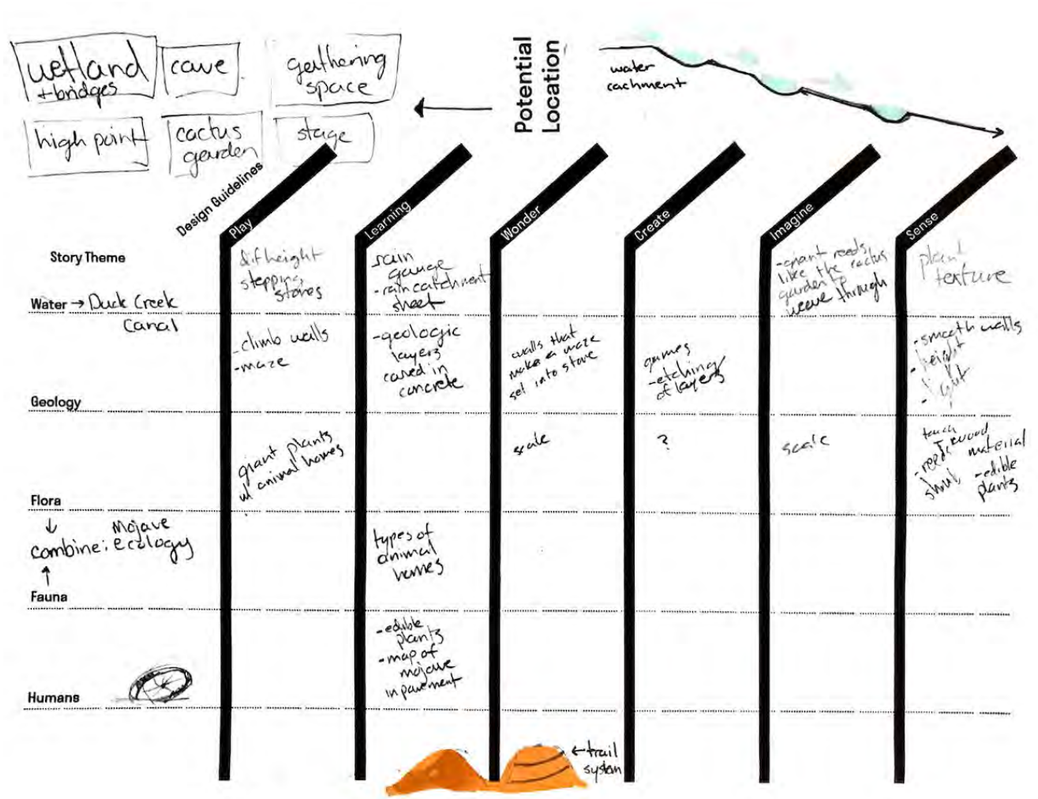


Figure 5.2. Using the design matrix as a development tool led to a different way of thinking about the child's experience on site.

The design matrix provides additional benefit by considering the child experiences in regard to the stories to reveal on site. Thinking about each box as a potential design opportunity allows for more creative ideas by pushing the boundaries of what a space needs to include. For example, sculptural representations of native plants and animals is an idea that incorporates play into the ecological story category. The idea is pushed by considering how that idea includes learning, wonder, creation, and sensing. Scaling the sculptures to make a child the scale of a desert animal is way of increasing wonder. With the experience qualities category, each idea is expanded to further reveal the story and improve the child experience.

Summary

Using the matrix ideas, I balance developing the ideas for each story while working with the existing landscape opportunities. This process is like a push and pull – I push the ideas on the matrix and then consider their application with the given conditions. In the end, the ideas are imaginative but grounded in the site conditions and site stories.

POTENTIAL LOCATION

Water System | Viewpoint | Canyon | Washes | Exposed Area

EXPERIENTIAL QUALITIES

SITE STORIES

*To be edited, depending on site conditions

	Play	Wonder	Learn	Create	Sense
Ecology					
Mojave native plants and animals	*-Play in and on animals and plants -Native plants and gardens can be adopted and manipulated by children*	*-Scale of play structures make child feel small or the size of a desert creature*	*-Represent many types of animal homes -Interpretive garden walks that represent different plant systems of the Mojave*	*-Children's desert garden: designed and maintained by any child that wants to join -Plants used for food, construction material, imaginative games without consequence for removing them*	*-Be able to touch many kinds of plants -Smell of spring blooms, rainfall on leaves -Taste edible plants*
Culture					
Human settlement and urbanization	*-Signage with edible plants -Map of Mojave cast in paving details*	*-Desert adaptive inventions that children can manipulate (ex. straw bales, water pumps, solar power panels)*	*-Signage with edible plants -Map of Mojave cast in paving details*	*-Activities that use traditional plants for basket-weaving or other crafts*	*-Use of natural and traditional materials in construction*
History					
Geology	*-Climbing walls that look like nearby stone - Maze that mimics canyon like walls*	*-Walls that make a maze but have no direction or clear purpose, encourage creativity and curiosity*	*-Geologic layers carved into concrete teach about time and rock formation*	*-Layers could be etched onto children's paper*	*-Textures: smooth concrete, rough sandstone, sand -Scale walls to feel enclosure -Places to look out*
Phenomenology					
Light	*-Screens that move to create different shapes*	*-Cast shadows that can take different forms during dif. sun positions*	*-Sun dial or similar that teaches positions of the sun during the different seasons/ time of the day -Types of light waves*	*-Use of mirrors to reflect and refract light - Building shelters to protect from heat, cold, or wind*	*-Shady and sunny spots that make the space more/less comfortable*
Local Systems					
Water and the Las Vegas city stormwater canals	*-Stepping stones at different water heights -Human powered water pumps that create sprinklers*	*-Rushing water/ waterfall features -Touching cool water on a hot day -Rainbows after a storm or with a sprinkler system*	*-Rain gauge to measure rainfall -Rain catchment system used by Ancient Puebloans*	*-Giant reeds to weave through and be used for building materials -Larger than life wetland features that inspire*	*- Touching cool water -Sound of water rushing over rocks - Smell of wet earth and the change in humidity - View of different plants*

Figure 5.3. Finalized version of the matrix. Potential locations were located using the colored dots the relate to the design areas on the concept plan.

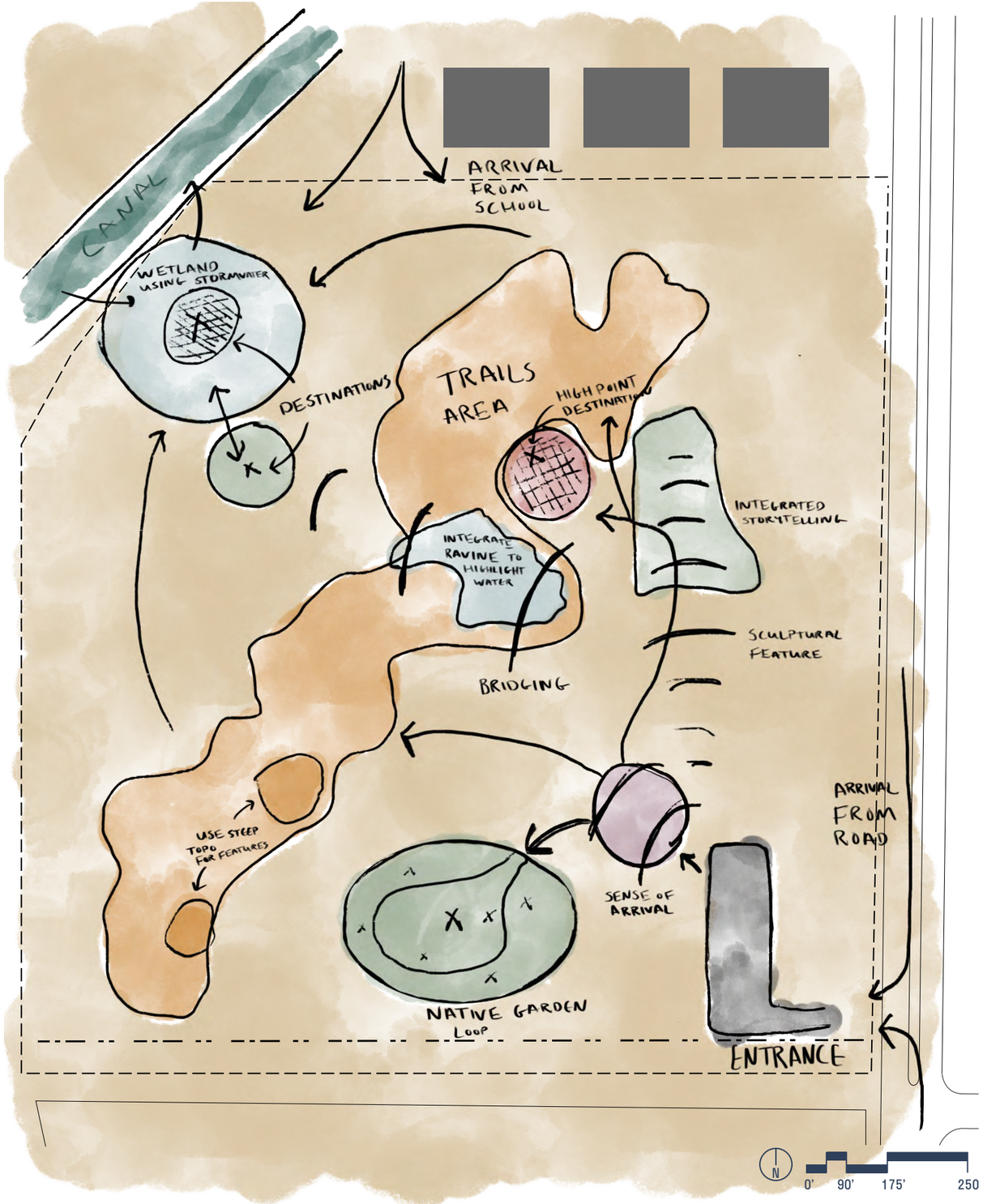
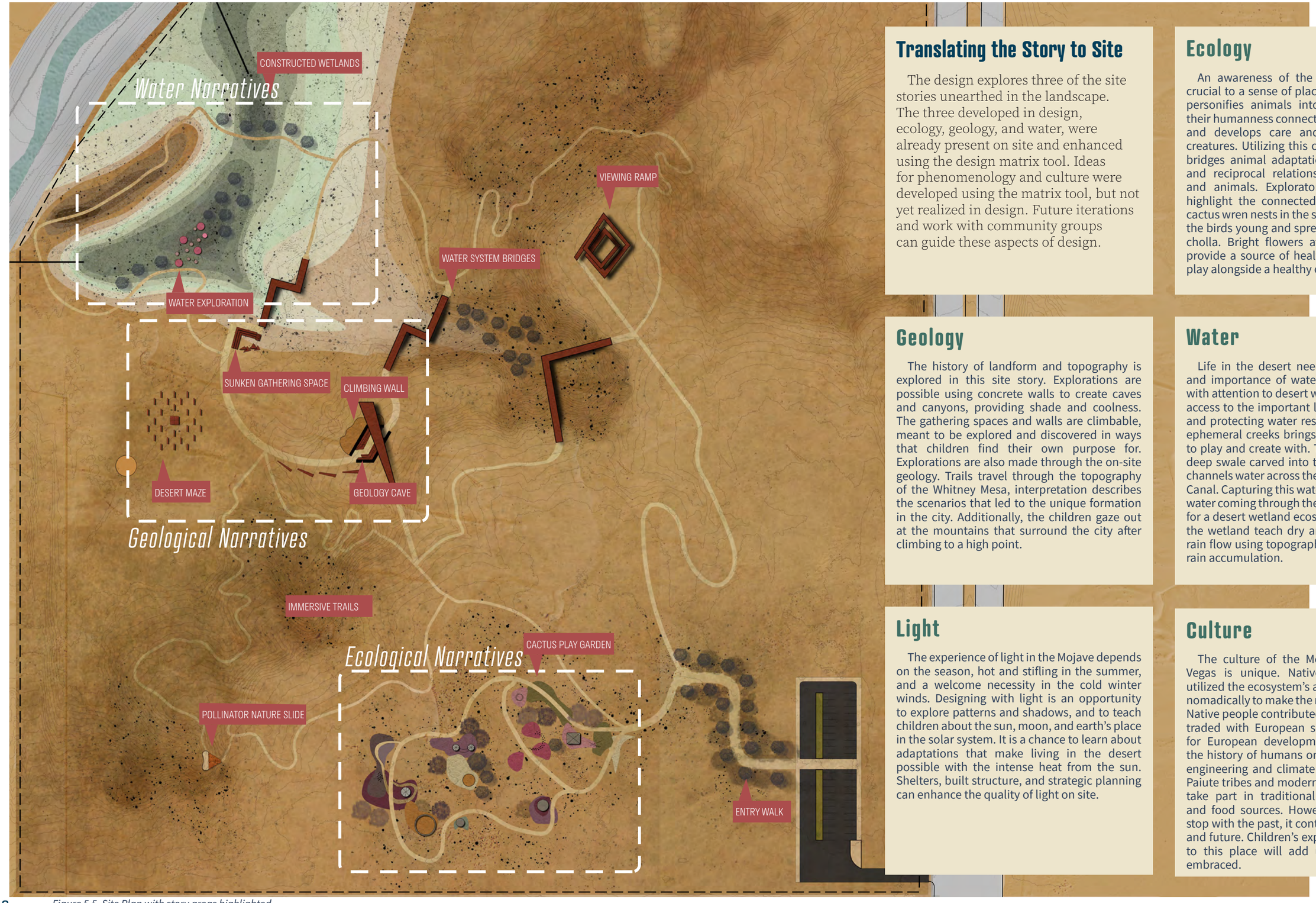


Figure 5.4. The concept plan labels areas developed using the site analysis and story theme matrix.



Translating the Story to Site

The design explores three of the site stories unearthed in the landscape. The three developed in design, ecology, geology, and water, were already present on site and enhanced using the design matrix tool. Ideas for phenomenology and culture were developed using the matrix tool, but not yet realized in design. Future iterations and work with community groups can guide these aspects of design.

Ecology

An awareness of the natural ecosystem is crucial to a sense of place. Children's literature personifies animals into beloved characters, their humanness connects children emotionally and develops care and empathy for living creatures. Utilizing this connection, the design bridges animal adaptations to desert climate and reciprocal relationships between plants and animals. Exploratory gardens and play highlight the connected system. A sculptural cactus wren nests in the spiny cholla, protecting the birds young and spreading the seeds of the cholla. Bright flowers attract pollinators and provide a source of healthy nectar as children play alongside a healthy ecosystem.

Geology

The history of landform and topography is explored in this site story. Explorations are possible using concrete walls to create caves and canyons, providing shade and coolness. The gathering spaces and walls are climbable, meant to be explored and discovered in ways that children find their own purpose for. Explorations are also made through the on-site geology. Trails travel through the topography of the Whitney Mesa, interpretation describes the scenarios that led to the unique formation in the city. Additionally, the children gaze out at the mountains that surround the city after climbing to a high point.

Water

Life in the desert needs to discuss scarcity and importance of water. Developing the site with attention to desert water systems provides access to the important lessons of maintaining and protecting water resources. Exploration of ephemeral creeks brings water to the children to play and create with. The design utilizes the deep swale carved into the Whitney Mesa that channels water across the site to the Duck Creek Canal. Capturing this water, as well as upstream water coming through the canal, builds capacity for a desert wetland ecosystem. Explorations in the wetland teach dry and wet seasons, track rain flow using topography, and monitor yearly rain accumulation.

Light

The experience of light in the Mojave depends on the season, hot and stifling in the summer, and a welcome necessity in the cold winter winds. Designing with light is an opportunity to explore patterns and shadows, and to teach children about the sun, moon, and earth's place in the solar system. It is a chance to learn about adaptations that make living in the desert possible with the intense heat from the sun. Shelters, built structure, and strategic planning can enhance the quality of light on site.

Culture

The culture of the Mojave Desert and Las Vegas is unique. Native American lifestyles utilized the ecosystem's amenities and traveled nomadically to make the most of prime seasons. Native people contributed skills, resources, and traded with European settlers which allowed for European development. Children explore the history of humans onsite by engaging with engineering and climate adaptations from the Paiute tribes and modern technology. They can take part in traditional agriculture methods and food sources. However, culture does not stop with the past, it continues into the present and future. Children's experiences and changes to this place will add unique culture to be embraced.

Figure 5.5. Site Plan with story areas highlighted.

Play

Sculpture
- Play in and on animals and plants
- Native plants and gardens are adopted and designed by children

Stumps
- Logs used for balance, boardwalks, climbers, and seats

Wonder

Scale
- Play structures are enormous, putting the child into the scene of the desert as a desert creature

Learn

Habitats
- Playful representations and real examples of animal homes
- Interpretive garden walks with emphasis on reciprical relation of plants and animals of the Mojave

Desert adaptations
- Interpretation of plants and their human and animal uses

Create

Desert garden
- Children's desert garden: designed and maintained by any child that wants to join
- Plants used for food, construction material, imaginative games without consequence for removing them

Sense

Touch
- Hundreds of native plants

Smell
- Spring blooms, rainfall on leaves

Taste
- Edible plants

Figure 5.6. Plan view of the desert garden and play area that explores ecological stories.

ECOLOGICAL NARRATIVES

This graphic rendering represents the combination ecologic habitats with play through built structures. Intermixed are children's gardens, fully manipulated, adopted, and designed by children. The area is accessible and encourages freedom of play, learning, and creativity.

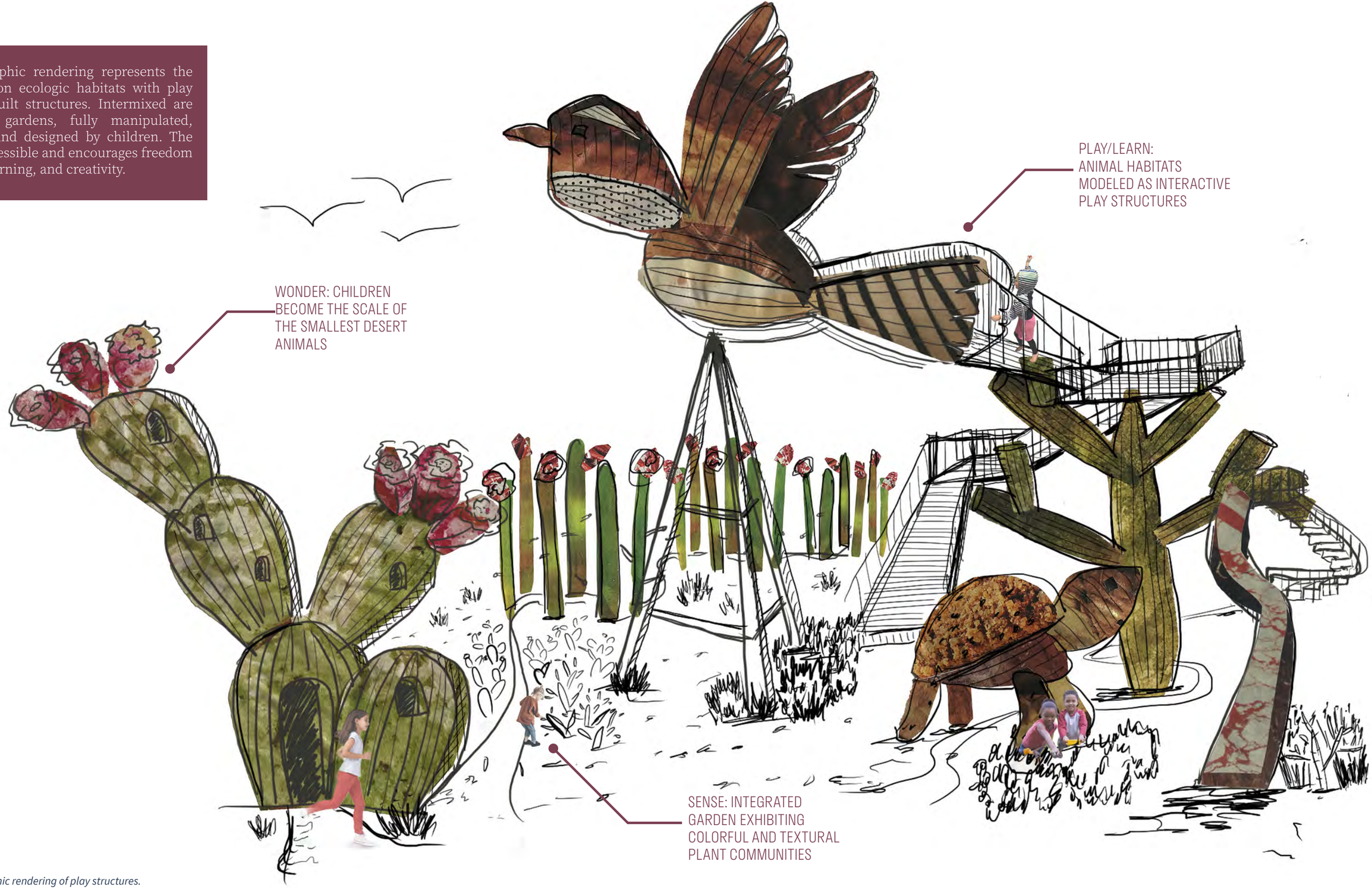


Figure 5.7. Graphic rendering of play structures.

ECOLOGICAL NARRATIVES

Play

Platforms
- Stepping stones at different water heights

Splash
- Human powered water pumps that create sprinklers

Wonder

Scale
- Bridging over water at different heights
- Touching cool water on a hot day
- Rainbows after a storm or sprinkler

Learn

Measure
- Rain gauge to measure yearly, daily, and monthly rainfall

Farm
- Water harvesting systems used by Ancient Puebloans for agriculture

Create

Desert wetland
- Reeds and wetland plants for creating mazes and to be used as building materials
- Larger than life sculptures hidden in wetland trials that inspire and incite curiosity

Sense

Touch
- Cool water

Hear
- Water rushes over rocks

Smell
- Wet earth and the change in humidity

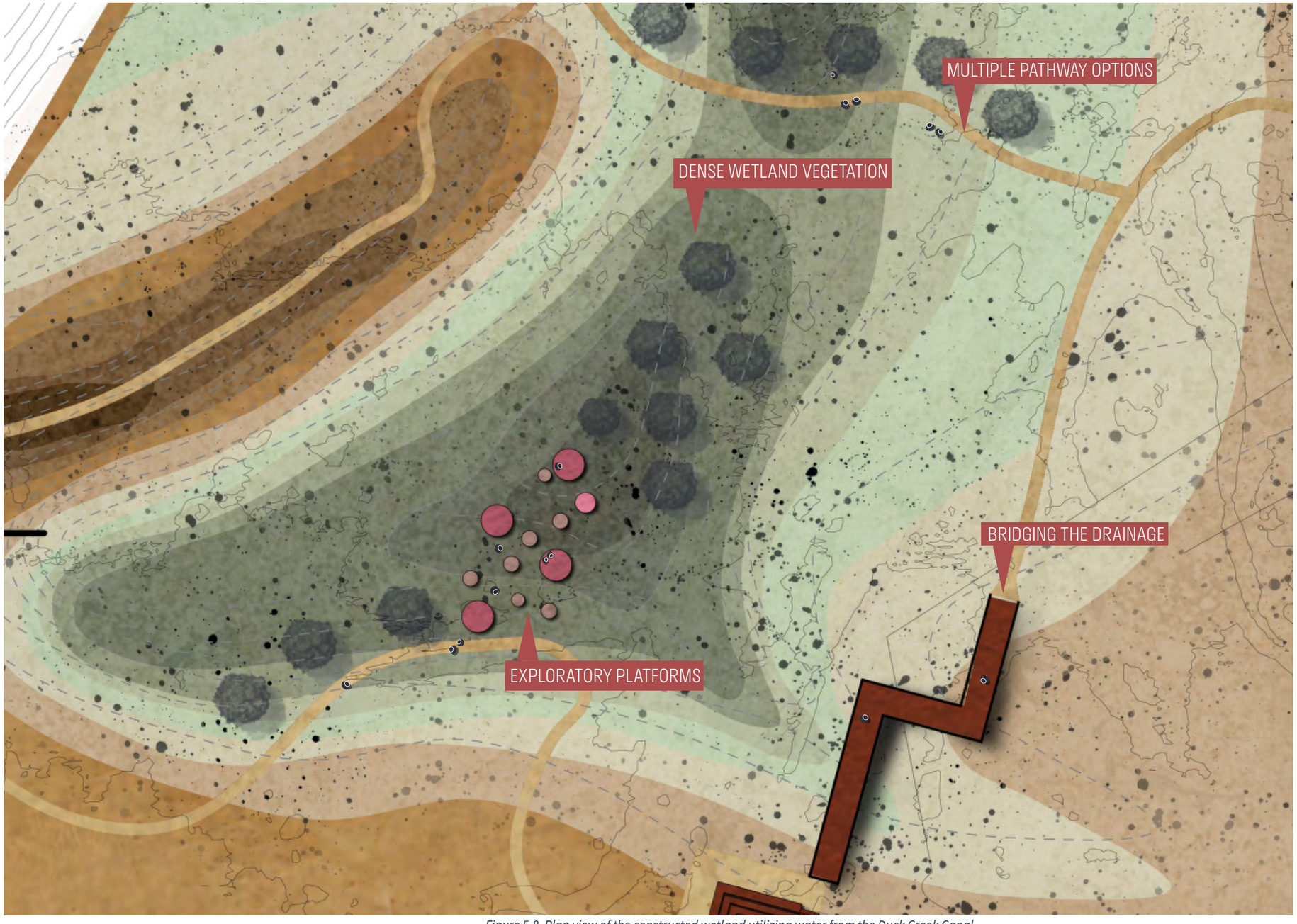


Figure 5.8. Plan view of the constructed wetland utilizing water from the Duck Creek Canal.

WATER NARRATIVES

This rendering represents possibilities for play and exploration in the desert wetland. Providing access to wetland plants and animals is unique. A gradient from mesa, cliffs, and wetland provides n exemplary transect of the desert watershed.

CREATE: IMAGINATIVE PLAY WITH GRASS AND WETLAND MATERIAL FOR CONSTRUCTION

WONDER: VISUALIZE THE WATER SYSTEM AS IT DEMONSTRATES THE IMPORTANCE OF PROTECTING WATER RESOURCES

SENSE: TOUCHING THE WATER NO MATTER THE LEVEL IT IS AT

LEARN: NAMES AND USES FOR WETLAND PLANTS

Figure 5.9. Graphic rendering of the desert wetland habitat.

Play

Climb
- Climbing walls that look like nearby stone
- Maze that mimics canyon walls
- Caves with stacked layers and sizes of squeeze points and ledges

Maze
- Walls that make a maze without a clear ending, encouraging creativity and curiosity

Learn

Formation
- Geologic layers carved into concrete teach about time and rock formation
- Water erosion stations to witness affects of water on different types of stone

Create

Stack
- Use rocks, stones, boulders as building materials in the children's garden and habtitat building

Etchings
- Layers etched onto paper using crayon materials for art

Sense

Touch
- Smooth concrete, rough sandstone, grains of sand

Feel
- Enclosed and exposed

See
- Viewpoints

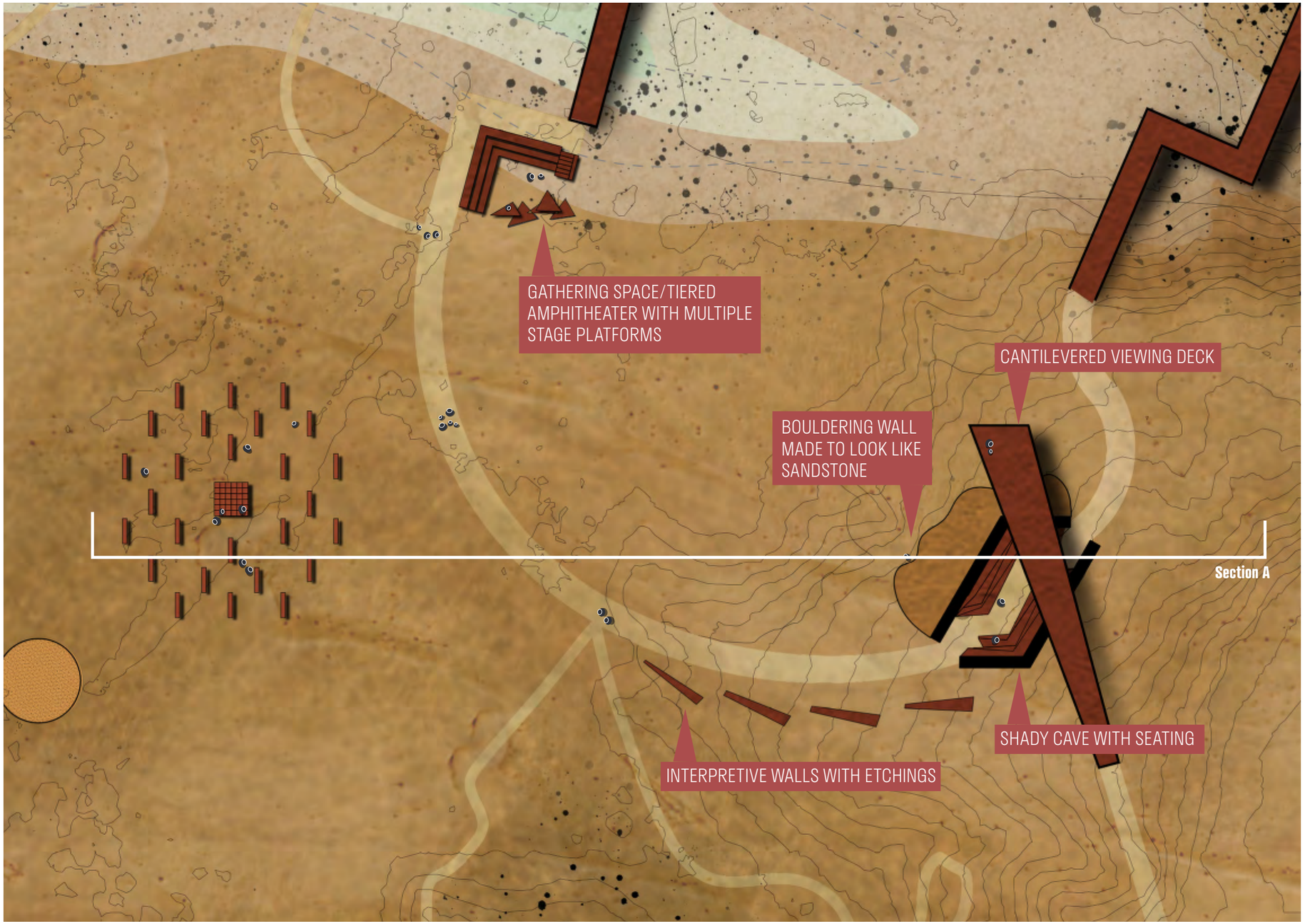


Figure 5.10. Plan view of the gathering and play area that explores geologic stories.

GEOLOGICAL NARRATIVES

This gathering and play area provides multiple opportunities to climb, crawl, be covered, be seen, be sheltered, and be exposed. A shady cave built into the hill creates a cool zone for warm days, and viewing deck offers multiple ways of viewing the site and city. Exploring the geologic layers of the Mojave is done through concrete walls and climbing play features.

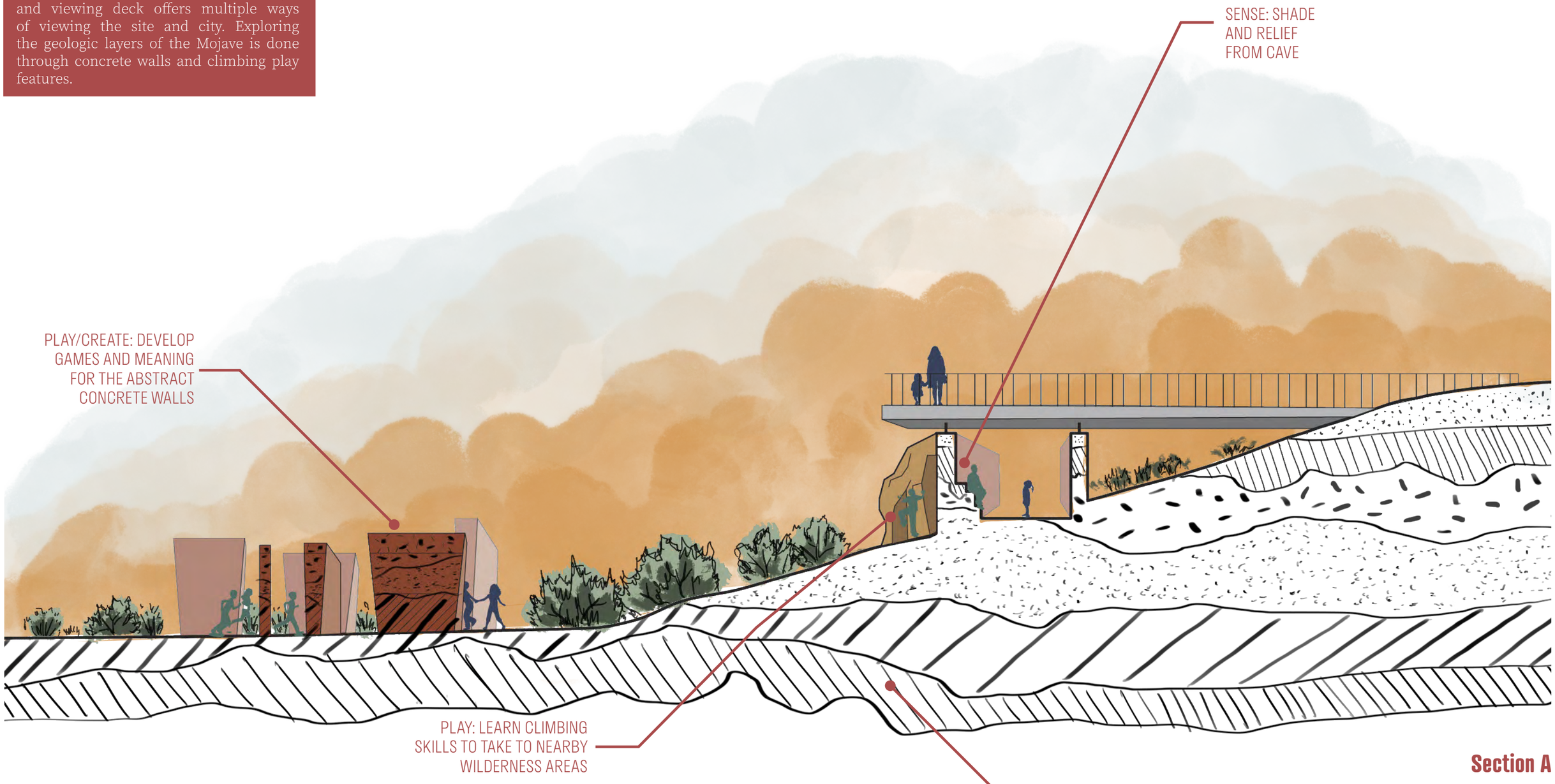


Figure 5.11. Section rendering depicting the relationship between the maze and cave features.

GEOLOGICAL NARRATIVES

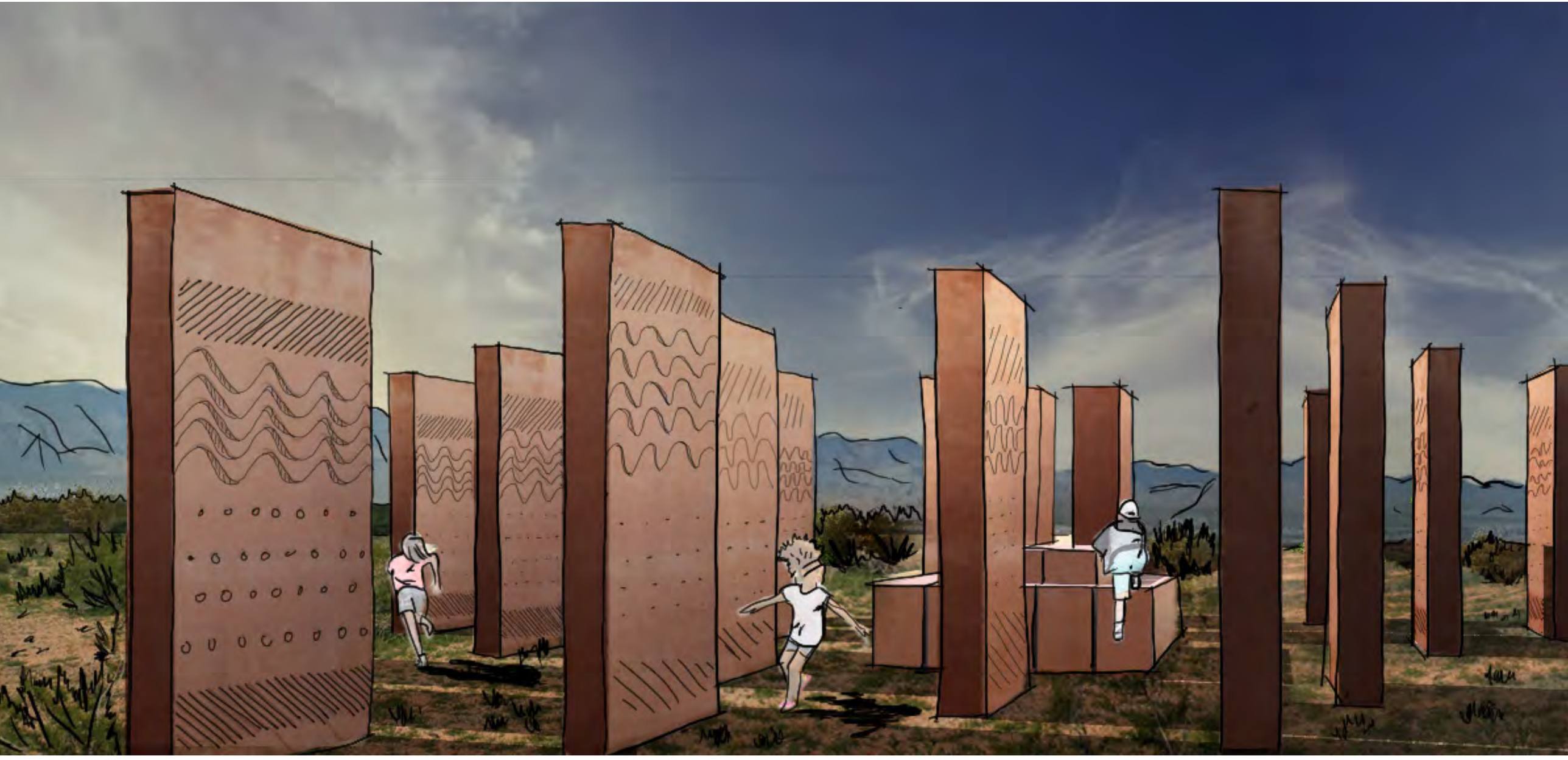


Figure 5.12. Rendering of the maze that includes geologic layers cast into the sandy red concrete. Native vegetation grows up around the features.

Summary

The design represents three unique Mojave Desert stories. While presented as separate, the stories intermingle and flow across the site. The nature of the desert system requires coordination between humans, animals, topography, geology, plants, and animals. These stories teach and engage children about the separate parts, but on site they are united as a larger system. This shift from parts to the united whole builds a sense of place in the desert. As children spend time playing, learning, wondering, creating, and sensing they acquaint themselves with their home habitat. Time spent at this urban site allows for comprehension, growth, and a nature connection through story.

Figure 5.13. Children exploring native Mojave vegetation.

End Notes

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6. Reflection

Meeting Children's Needs for Nature in the Mojave Desert

Developing a Children's Nature Experience in urban Las Vegas

A Purpose for Design

Growing up in Las Vegas, Nevada means learning to live in a dry, desert climate. Growth for the city resulted in adaptive strategies to manage the scare water resources, provide cooling, and build transportation routes through the city. However, its location and attitude toward development largely neglects the long history of survival in the desert by Native Americans and available, fragile resources. Railroads, trade, large infrastructure projects, and entertainment turned a small stopping spot with a spring into the modern city. This city's history as a Euro-centric boom town with manifest destiny attitude towards business and resource exploitation has not catered to the wellbeing of non-white and lower income citizens, affecting these groups children.

The complex relationships associated with growth of the city in this manner affects the attainable quality of life. Living in this climate should not mean acceptance of harsh urban conditions that add undue stress to young children, however this is the reality for many. My experience teaching these children and investigating the city and site culture solidify this unfortunate fact. Children of entertainment industry workers are growing up with less access to nature and messy outdoor spaces, and higher stress from the urban environment and poverty. The ability of a child to travel alone to a nature space is highly unlikely due to the lack of suitable destinations as well as lack of safe routes for transit. The rapid growth and influx of residents not native to the desert led to an aesthetic that has forced non-native ecological values onto the land. The children now growing up in the city are unable to learn from their nearby environment because the city does not represent the hardiness and ingenuity of the plants and animals that make the Mojave their home.

The desert around the city tells another story, one unearthed in design of this project. The Mojave ecologic, geologic, and water stories embrace the mutual relationships that support life in this ecosystem. By tackling a design project focused on an urban location, the messy nature becomes more accessible for children. This project is focused on making the benefits of nature available to any child that spends time on this site. The use of a design matrix is beneficial to meeting these intended goals by developing a framework that incorporates high quality children's landscape experiences and site stories.

Utilization of the Design Matrix

The design matrix is a tool developed with the goal of revealing landscape-based stories through design. It combines critical experiential qualities with site stories to make the narrative engaging to the child's mind, body, and senses. The research investigations reveal connections in ecology, local systems, history, culture, and phenomena to the site. Upon reflection, these connections may not have been realized without this deep site analysis. For example, my first impression of the Duck Creek Canal was an ugly concrete slab with an unknown purpose. The site, city, and desert scale investigation reveals its importance as city infrastructure and potential to develop habitat corridors into the Las Vegas Wash.

The matrix explores a wide breadth of themes. Future use of the tool may find certain stories more or less appealing for design development. For this design exploration, I was unable to engage with students following the site selection. Not engaging with children in a workshop or design charette limited my understanding of what stories the children were most excited about or could add to as a site experience. Therefore, I relied on my own understanding and experience with the desert and the stories I could remotely research. This demonstrates that the tool is useful as a design development tool, but engagement with the community is necessary to fully understand the perception of the site stories.

The matrix was most useful in its ability to incite critical thinking about the child experience of story in design. It encouraged idea development that was creative, innovative, and comprehensive. The deep investigation of the story was necessary to fully push the design ideas, or else risk surface level stories that do not fully encapsulate the narrative. An example is in investigating plant communities and learning how different elevations and soil structures support unique ecotones. The matrix helped push these ideas about ecologic stories to become more tangible and accessible for children. This resulted in gardens that children participate in design and growing and allowing for change in the landscape by children.

Challenges

A major challenge to this project was incorporating meaningful, succinct child engagement strategies. While I was able to work and travel to Las Vegas in February 2020, my time on site and with children was limited. I was able to use the first meeting as a starting point for design, but I planned to travel again to further explore the use of the design matrix as an engagement tool. The travel restrictions related to COVID-19 prevented any further engagement with children or access to the site. This lack of engagement means that children's needs, desires, and dreams are not fully represented in the design. It also means that the potential application of the matrix as a design charette engagement tool is not completely understood and ready to be used with other groups.

Conclusion

Children need access to messy natural spaces that allow them freedom of expression and choice. Children explorations in nature reveal ecstatic places that create life-long connections with the land. This builds their sense of place and belonging. For children in Las Vegas, Nevada, the world outside their city is full of wonder and discovery but is less accessible for many low-income families. The manifestation of excitement and discovery needs to be brought into the city and handed over for children to take control of. Exploring this site design through story investigations affords the materials to connect to an authentic Mojave Desert sense of place. The stories are dynamic as children grow and add new meaning to the place. Bringing the desert story to the site, all urban dwelling children own the narrative of the Mojave Desert.

Figure 6.1.(Opposite) Children's drawings of play and the desert are collaged with desert scenery. What ecstatic places will they find when given a place for messy wild nature? Their own stories of the land will be revealed when given access to high quality experiences.

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