Balance of Design: Exploring the harmony of conservation and development in landscape architecture

by

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Abstract

Loss of natural land in the tallgrass prairie ecoregion due to urbanization and agriculture has been a significant issue in the last two hundred years. While the ecology and benefits of tallgrass prairie have been studied, it is vital to understand that development will not stop, and landscape architecture must help communities and regions address the balance of growth, housing, and preservation. This study explores this issue by examining conservation development and co-housing as two residential development models that can help preserve land. This study first examines three conservation developments and three co-housing communities to analyze themes in these communities and assesses their ecological and social benefits. The second method used is a projective design that applies the themes of conservation development co-housing to create a master plan of a site in the Flint Hills. This study finds that combining co-housing and conservation development can preserve the most land while creating socially beneficial communities. These findings can be used to influence future residential developments while still protecting natural landscapes and ecosystems.

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Suzanne Sharp | 2023



Major Professor: Lee Skabelund

Committee Members: Susmita Rishi and Blake Belanger

Abstract

Loss of natural land in the tallgrass prairie ecoregion due to urbanization and agriculture has been a significant issue in the last two hundred years. While the ecology and benefits of tallgrass prairie have been studied, it is vital to understand that development will not stop, and landscape architecture must help communities and regions address the balance of growth, housing, and preservation. This study explores this issue by examining conservation development and co-housing as two residential development models that can help preserve land. This study first examines three conservation developments and three co-housing communities to analyze themes in these communities and assesses their ecological and social benefits. The second method used is a projective design that applies the themes of conservation development co-housing to create a master plan of a site in the Flint Hills. This study finds that combining co-housing and conservation development can preserve the most land while creating socially beneficial communities. These findings can be used to influence future residential developments while still protecting natural landscapes and ecosystems.

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Introduction

INTRODUCTION

Between plowing ground for agricultural use, westward movement, and the industrial revolution, when cities became booming centers for industry, the remaining natural land was put at risk, and still is.

Finding ways to integrate natural landscapes into residential neighborhoods is a way to protect endangered and shrinking ecosystems. Designers may alternatively consider how to integrate neighborhoods into natural landscapes, prioritizing the landscape over the development. Looking at the U.S. Midwest, specifically the region originally supporting Tallgrass Prairie, landscape architects, designers, and planners can find creative and effective ways to preserve this endangered ecosystem. Natural forestland, prairie, and other ecosystems can provide people with aesthetic or scenic views, opportunity for recreation, and educational opportunities.

When designing residential neighborhoods and communities that integrate nature, it is important to design carefully to preserve the most amount of land possible and preserve quality ecosystems. Another aspect of creating these communities is equitable access, ensuring that these neighborhoods are designed to accommodate low and middle-income families, not just the wealthy.

Project Dilemma and Research

Dilemma and Importance of the Research

Aerial photographs (figures 1.1 & 1.2) illustrate the progression of development, spreading from cities and towns into rural and natural areas. Landscape architects and planners responsible for development have a duty to recommend changes with caution, working to preserve natural areas. It is unrealistic to expect complete conservation, but it is possible to work with the land, and to preserve quality ecosystems while developing.

If those responsible for continuous development do not progress thoughtfully and with care, we will lose habitats, plant species, and wildlife. Preserved land can be worked into development in environmentally friendly ways that also benefit communities, as shown by many conservation development efforts and co-housing communities.



Figure 1.1: Manhattan Kansas Aerial 1984 (Google Earth 2023)

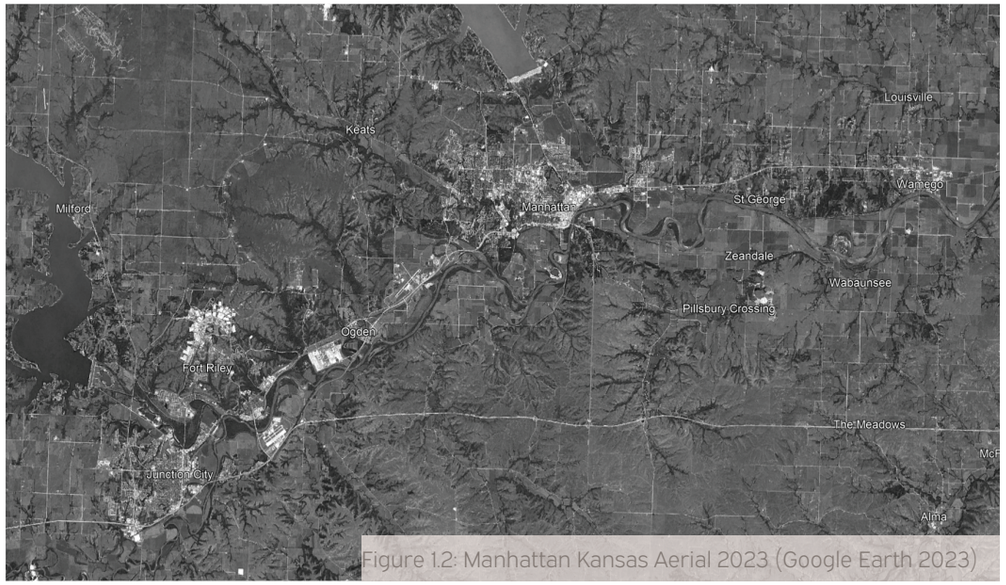


Figure 1.2: Manhattan Kansas Aerial 2023 (Google Earth 2023)

N

1" = 7 Miles

Research Question

How can conservation development and co-housing be used to preserve Tallgrass Prairie in the Flint Hills ecoregion?

Related Questions

What techniques have been previously successful in preserving large quantities of land in residential areas?

How should a site be evaluated for a balance of preservation and development?

How can designers create affordable community-based neighborhoods, with socialization and shared spaces?



Figure 1.3: Konza Prairie in Manhattan, KS (Sharp 2022)



Figure 1.4: Flint Hills in Riley County, KS (Sharp 2022)

Project Goals

The goals of the report and project are to combine the developmental methods of conservation development and co-housing to create a development type that balances the environment with community. The background chapter will review literature on the topics of tallgrass prairie, conservation development, and co-housing.

Understanding the importance of the natural resources is a crucial first step to protecting the. Having a deeper appreciation for the complexity of the tallgrass prairie, hopefully, landscape architects will push to protect the beauty and resources of the natural world. If developments or design are to be pushed into natural areas, then a clear understanding of the site is the first step to any project. Studying precedents and past projects, such as rural design, conservation development, and co-housing, can help designers to learn about what has worked well in other landscapes and developments.

Importance of the Research

Protecting the landscape and the character of the site should be a priority of any design and doing so will help any development to be unique and fit with its context, rather than blending into the sea of suburbs. According to the National Parks Service, there is less than 4% of the Tallgrass Prairie remaining today, when the prairie once covered much of the Midwest (NPS, n.d.). Protecting this biome is important, not only to preserve this endangered landscape type, but to bring attention to the diversity of the prairie. The Tallgrass Prairie National Preserve in Kansas, protected by the National Park Service, has documented over 500 plants, almost 150 birds, 39 reptiles and amphibians, and 31 mammals (NPS, n.d.), showing that the biome contains much more than the tallgrasses that it is named after.



Figure 1.5: Konza Prairie in Manhattan, KS. (Sharp 2022)



Figure 1.6: Shaw Nature Reserve in Gray Summit, MO (Sharp 2022)

The University of Washington reports on the importance of encouraging relationships between people and land, saying “The attachment and meaning of a green place can encourage individuals to actively protest and engage in pro-environmental behavior” (Wolf, Krueger, Flora, 2014), and that shared outdoor spaces in neighborhoods can improve community connections. Research shows that people can form emotional attachments to natural landscapes and experience privacy and separation from stress-filled city life, and enjoy physical activity and a sense of peace in green spaces (Wolf, Krueger, Flora, 2014).

The CDC reports that less than half of the population in the U.S. lives within half of a mile to a park, limiting accessibility to green spaces (CDC, 2022). Increasing access and desire for green spaces, especially natural land in communities can encourage both physical activity for residents while protecting natural resources.

Balancing the protection of natural land and increasing access to green spaces is important for designers and requires a thorough understanding of the natural land in the region and of the development style or styles being used. If done properly, residents of developments can enjoy both the environmental and social benefits of these communities, with minimal damage to the land.

Background

GLOSSARY

Tallgrass Prairie:

An ecoregion in the Midwest that consists of grasses such as Big Bluestem, Little Bluestem, Indiangrass, and Switchgrass that grow to three feet tall or more. The region also consists of various forbs and is a common habitat to wildlife, including many different pollinators (Ladd & Oberle 2005).

Conservation Development:

Using developments, commonly residential neighborhoods, and subdivisions, to develop land while preserving between 40% and 99% of the site for protection, used to preserve views, native plants, and environmental systems (Milder & Clark 2011).

Co-housing:

Communities that live in private housing but share resources such as a common house, land, and resources, (CohoUS n.d.; Sargisson 2012). Co-housing communities are not founded based on religious or spiritual connections (McCamant & Durrett 2011).

Definitions by author, based on cited sources.



Figure 2.1: Literature Map (Sharp 2023)

LITERATURE REVIEW

Tallgrass Prairie background

History of the land

Thousands of years ago, Tallgrass Prairie ecosystems were found well beyond the boundaries that define the Flint Hills Ecoregion today (Ladd & Oberle 2005, 3). Several factors resulted in the shrinking of this landscape type throughout history. Climate change, air pollution, invasive species, and urbanization contributed to the changing landscape (Smith et al. 2010, xix). Understanding what defines the Tallgrass Prairie is crucial to its preservation. Ladd and Oberle define tallgrass prairie as “an abundance of grasses that typically grow three or more feet tall” (2005, 1). Common species of this ecosystem type include Big Bluestem, Little Bluestem, Indiangrass, and Switchgrass, commonly known as the Big Four grasses. It is important to remember that the landscapes within this region very diverse. The ecosystems surrounding or intermingling with the tallgrass prairie, such as wetlands, savannas, woodlands, and more, are influenced by each other and reflect the characteristics of landform, soil, climate, and other attributes (Ladd & Oberle 2005, 2,3).

Endangerment

The endangerment of the tallgrass prairie is a significant issue with many causes. Not only has the amount of prairie significantly decreased, but the quality of the land has also been affected by pollutants, invasive and nonnative plants, and herbicides (Smith et al. 2010, xix). One major cause of the endangerment of the tallgrass prairie is the steel moldboard plow, which John Deere invented in 1837 (Runkel & Roosa 2009, 3; Shirley 1994, 1). Since it was possible to plow with greater ease and efficiency, agriculture and development shrunk the tallgrass prairie from over 170 million acres to a small percentage of remaining land (NPS n.d.; Runkel & Roosa 2009, 3). Sources vary in calculating how much land is left of this once prominent ecoregion. Shirley reports that following the invention of the steel moldboard plow, Iowa's tallgrass prairie shrunk to less than 1% of what existed previously (1994). Other sources state that looking at North America, only 2-3% of original tallgrass prairie remains, making it the most endangered ecosystem on the continent, as of 2010 (Smith et al. 2010, xviii).



Figure 2.2: Reconstructed Prairie at Prairiewood (Sharp 2023)

When studying the endangerment and protection of the tallgrass prairie, the vocabulary is essential to understand. Carol Davit, executive director of the Missouri Prairie Foundation defines some important vocabulary. A prairie remnant is defined as "an original, unplowed habitat, often much reduced from a larger, intact original landscape" (Davit, 2020, paragraph 3). Restoration is defined as "enhancing a site that as been degraded by disturbances, but has never been plowed" (Davit, 2020, paragraph 4). Reconstruction is defined as "establishing a coarse replica of a natural community, like a prairie, from scratch on a previously row-cropped and plowed site, with a seeded planting" (Davit, 2020, paragraph 5).

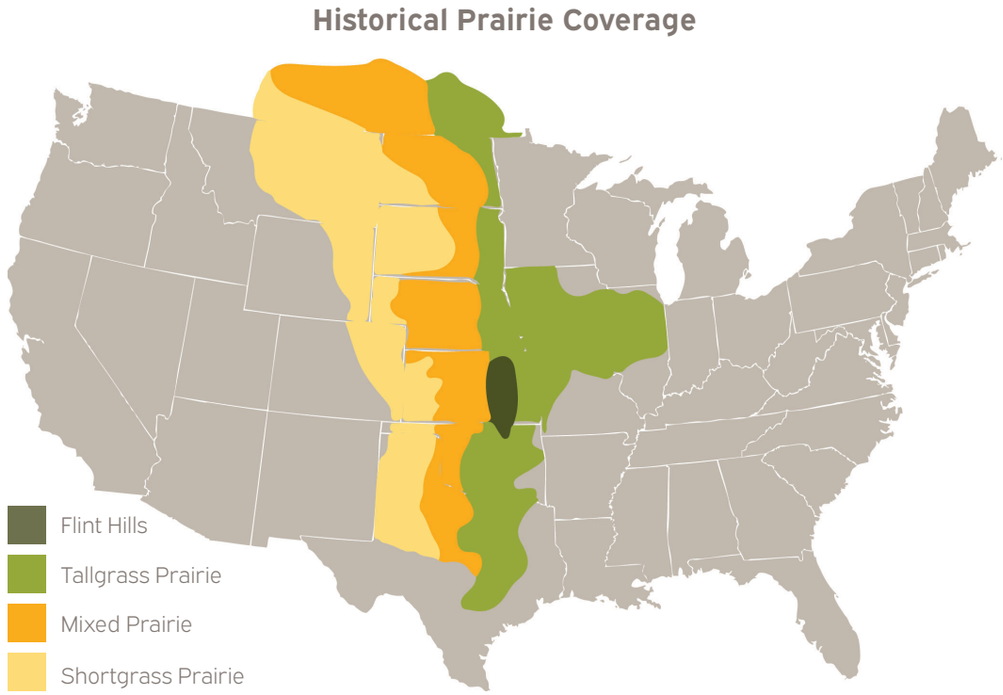


Figure 2.3: Historical Prairie Coverage. Information sourced from Flint Hills Discovery Center (Sharp 2023)

Benefits of Tallgrass Prairie

Though land does not need to benefit humans for it to be protected, considering the diverse benefits of the tallgrass prairie can help emphasize this landscape's importance. Tallgrass prairie is beneficial to the environment, working to sequester carbon from the root systems and above-ground biomass (NPS n.d.; Smith et al. 2010, xx). Environmental benefits of tallgrass prairie include stormwater management, erosion control, and cleaning of the soils and air (Smith et al. 2010, xx). Stormwater management is a significant benefit to the ecosystem, as the roots of some prairie plants are more than 10 feet deep, helping keep soils in place and preventing them from washing away during storm events or near streams and ponds (Smith et al. 2010, xx). Prairies can help people and the environment by bringing greater biodiversity through plants, pollinators, and wildlife (Ladd & Oberle 2005, 9).

Prairies can also be beneficial for maintenance. Once established, there is a reduced need for watering, mowing, fertilizing, and prairies become resilient to flood and drought several years after planting (Ladd & Oberle 2005, 9; Shirley 1994, 10). The social and visual benefits of prairies should also be noted, as prairies help bring unique identity and aesthetics to a site (Ladd & Oberle 2005, 9).

Preservation

Working to preserve the tallgrass prairie is an important task requiring many different parties. Private nonprivate organizations such as "The Nature Conservancy, the Missouri Prairie Foundation, the Iowa Natural Heritage Foundation, the Illinois Natural Land Institute, and the Grassland Heritage Foundation have been instrumental in saving prairies" (Runkel & Roosa 2009, 4). Groups that study prairies are essential for documenting plant and pollinator diversity (Runkel & Roosa 2009, 4). Aside from private groups, universities are a crucial part of the preservation process, as they help educate others on the tallgrass prairie, research the ecosystem and connecting topics, and lead or support management work, providing hands-on experience to future land managers and decisions-makers (Shirley 1994, 2).

Preserving the prairie requires a sound understanding of the ecosystem and the specific site. Some factors to analyze before working to protect or restore a site to tallgrass prairie include the slope of the land, moisture and floodplains, sun exposure, soil type, and existing and surrounding plant species (Shirley 1994, 8). All these factors are crucial to understanding how to best grow and maintain a healthy and diverse tallgrass prairie. One of the most critical factors is sun exposure, which is influenced by plant types and slope-aspect. The more sun that prairie plants can get, the better, as many plants native to this ecosystem are not shade tolerant (Ladd & Oberle 2005, 10).



Figure 2.4: Preserved Prairie at Konza (Sharp 2021)

When looking to preserve land, understanding the site, regardless of if the site is several acres or several hundred or thousands of acres is vital. Designers and developers need to recognize the most important land to preserve, then work development, utilities, roads, etc. around these protected lands (McMahon 2010, 8, 138).

Conservation Development

What is it?

Conservation development is one method that can be used to protect natural land while still developing part of the land. Typically, conservation developments preserve 40% to 99% of the land on a given site (Milder & Clark 2011, 697, 698). One-quarter of the private conservation in America, roughly 4 million hectares (nearly 10 million acres), is from conservation development (Milder & Clark 2011, 697). This practice of "planning, designing, building, and managing communities that preserve landscape or other community resources that are considered valuable for their aesthetic, environmental, cultural, and/or historic values" (McMahon 2010, 7) has been in use for over 50 years (Milder & Clark 2011, 699). As previously stated, it is essential to study each site and find the most suitable places for development while ensuring that the quality of the land remains intact (McMahon 2010, 8).

Subdivisions are a common way that land is developed in conservation development. One way of doing this is to cluster the small housing lots on one part of the site, leaving the rest of the site available for agriculture or preserved as open space or natural land (McMahon 2010, 18).

When designing for a conservation development, identifying the land that should be preserved can be divided into two groups: Primary Conservation Areas and Secondary Conservation Areas. Primary Conservation Areas are lands that cannot be developed, such as wetlands, water, floodplains, and steep slopes. Secondary Conservation are ecologically beneficial and should be preserved to maintain the character of the site, and to protect the biodiversity of the land, including wildlife habitats. This can include woodlands, meadows, farmland, and buffers around the Primary Conservation Areas. Secondary Conservation Areas can also be site-dependent, preserving areas that might be historically or culturally important (Arendt 1996, 7).

Why is it beneficial?

Conservation development is a beneficial way of preserving landscapes and ecosystems, combining development (typically real estate) with permanent land preservation (Milder & Clark 2011, 698). Typical subdivisions leave little to no room for green space, except for land that cannot be developed due to slopes or floodplains (Arendt 1996, 2). Conservation development is used to protect landscapes and ecosystems for a variety of reasons: preserving endangered plants and animals that use the site or landscape as a habitat, protecting farms, ranches, and other agricultural lands, preserving land for aesthetic purposes, protecting native landscapes, and preserving land for education or recreation reasons (Milder & Clark 2011, 700).

Conservation development can help encourage community building. Designing places for children to play, people to walk, parks, and general shared outdoor spaces allows neighbors to have casual and impromptu conversations that develop friendships and create a strong sense of community. When these common outdoor spaces are not included in the development, residents rely on their own private backyards, which limits the ability for social interactions in the community (Arendt 1996, 5-6, 15). When yard size is reduced, there is less need for constant maintenance and upkeep, giving homeowners more time to spend with family and friends, or enjoying the outdoors, rather than doing yard work (Arendt 1996, 16).

Walks are one of the most popular forms of recreation, so when a development includes plenty of pathways and opportunities to go for walks, people take advantage of this (Arendt 1996, 16). Once again, this is another chance for impromptu and casual interaction among neighbors. Shared land can also provide the space to host community events such as picnics, sports, or other gatherings (Arendt 1996, 16).

And, of course, conservation developments provide environmental and ecological benefits through the preservation of land. Land that in a typical suburban development would be paved for driveways, covered with houses, or mowed for lawns, is able to stay as wetlands, prairie, or woodlands, providing wildlife and pollinator habitat and hosting a wide variety of plant species (Arendt 1996, 13). The natural areas provide stormwater management with vegetative buffers that trap pollutants and filter stormwater runoff (Arendt 1996, 13). Open land in conservation developments can be a place to put natural sewage and water treatment systems. These systems may be known as "land treatment", "spray irrigation", or "wastewater reclamation and reuse" (Arendt 1996, 14).

Developments that preserve natural landscapes can be financially and environmentally beneficial, with lots selling quickly and appreciating in value faster than a typical subdivision development (Arendt 1996, 2, 12). "One measure of the demand for open space among homebuyers is the fact that nearly 40% of people living in golf course developments do not even play the game" (Arendt 1996, 2). This shows the desire for homebuyers to live near open land, rather than in a development filled with rows and rows of suburban homes. The preserved land can be very helpful when marketing lots for sale in these developments. In Wisconsin, a sales agent told customers that their purchase would be getting them 80 acres, not just their one acre lots, as they would have access to the woods, meadows, trails, and parks that were a part of the site (Arendt 1996, 11).

The cost of developing land can be cut by avoiding development in wetlands, clustering utilities, and reducing lot sizes. By leaving a majority of the site naturalized, construction costs will be lessened and the hazards of building on sleep slopes avoided (Arendt 1996, 10). Water use will be reduced with less need for irrigation on preserved land. Smaller lot sizes and reduced development costs also help to make sites more affordable (Arendt 1996, 10).

Finances and Management

Beginning a conservation development typically starts with a landowner wanting to sell their land while remaining in control over the future development (McMahon 2010, 15). When landowners donate land to a conservation group, non-profit organization, or a land trust, they can ensure permanent protection of the site (McMahon 2010, 15). Donating land can also be a way for landowners to get income tax savings if donated within a year of purchase (McMahon 2010, 6). "Cost of community services (COCS) studies undertaken by the American Farmland Trust show that, on average, for each dollar generated in revenue through taxes, it costs $1.15 to support residential subdivisions, compared to $0.28 for commercial and industrial uses and $0.36 for working and open land" (McMahon 2010, 4). This data shows that clustering residential development and leaving more land open for preservation can reduce implementation costs.

Criticism of Conservation Development

Conservation development is criticized for contributing to urban sprawl, with some developments spreading homes and other amenities across the entire site, with large patches of preserved land between (McMahon 2010, 9). Fragmentation of land, wildlife, and water corridors can occur in developments that spread homes across the site (McMahon 2010, 4). It is important to understand the various zoning regulations for a site when designing a conservation development. Some zoning codes may require large lot sizes, which leads to greater sprawl and landscape fragmentation (McMahon 2010, 6). Sprawling developments also mean more roads, more materials, increased pollution from driving, and a loss of community in the site (McMahon 2010, 4). Another criticism of conservation development is that the "ideal" consumer for these developments are often high-income or upper-class people, raising the value of the land, which can present challenges for local businesses, farmers, and families (McMahon 2010, 9).

Precedent Studies

Precedent studies and case studies are beneficial for learning about conservation development. Precedents can be used to find inspiration for future developments, especially when learning about the size of developments, organization, and the beginnings of a conservation development. The Methods section this report discusses the precedents in greater detail; however, it is important to provide an overview of the three conservation development precedents and their role in the research.

The first precedent site is **Prairie Crossing** in Grayslake, Illinois. This development is 677 acres, with 365 lots, on 20% of the land. There are ten miles of trails throughout the development, a lake to enjoy fishing or swimming, and various parks to encourage play and outdoor activities (Prairie Crossing, n.d.).

The second precedent is **Jackson Meadow** at Marine of St. Croix, Minnesota, a 145-acre site with 40 acres of residential lots. This site also borrows land from surrounding lots to create 320 acres of preserved land. Clustered housing is a major component of this site, which has helped prioritize the protection of much of the site, manage stormwater, and create a sense of community. The at Jackson Meadow connect to William O'Brian State Park. Many of the lot sizes are less than half an acre, and prices are much lower than other developments, making living close to natural areas affordable (McMahon 2010, 174-182; Jackson Meadow n.d.).

The third conservation development precedent is **Tryon Farms** in Michigan City, Indiana. This is another example of clustered housing scattered across 170 acres, with 75% of the site preserved as pasture, woodlands, and ponds. Homes at Tryon Farm range in size from 700 to 2,000 square feet (Temple 2013) and are priced between $150,000 and $460,000 (McMahon 2010, 237). Amenities at Tryon Farm include nature trails, farm animals, environmental education programs, community gardens, a natural swimming pool, an old barn that serves as a landmark and community gathering space, and proximity to Lake Michigan and the greater Chicago region (McMahon 2010, 232-240; Temple 2013, Tryon Farm n.d.).

Co-housing

What is it?

Co-housing is the name for communities designed to foster connections with neighbors and share resources and common spaces (CohoUS, n.d.). Co-housing has six main ideas: participatory process, designs that facilitate community, shared facilities, complete resident management, a non-hierarchical structure, and separate incomes (McCamant & Durrett 2011, 30). This style of community and living balances privacy and public gatherings with private individual homes but shared community resources such as a common house, occasional group meals, gardens, and land, sometimes conserved ecosystems that can be accessed and enjoyed by residents (Sargisson 2012).

Co-housing has been growing in popularity and can cater to more modern-day communities (Sargisson 2012). Formerly, the typical American family was composed of a working father, a caretaking mother, and several children, but this is not the standard family anymore. Whether it is two working parents and children, single-parent families, single people, or couples with no children, there is more diversity in communities in the modern world. Today's housing does not reflect this, with 69% of American housing being single-family detached homes (McCamant & Durrett 2011, 4). Designers can play a role in helping to diversify new neighborhoods and developments.

One way that co-housing creates a strong sense of community is by working with an architect during the planning process to create designs for specific homes and the overall site that will work with the needs of a particular group (Sargisson 2012). The balance of communal resources and space while still living in a private home seems ideal to some (Sargisson 2012).

Formation/Beginnings

Co-housing began in Denmark in the 1970s (Shadowlake Village n.d.), and there are designs in Sweden and the Netherlands reflecting the same ideas and principles (Sargisson 2012). As cities developed, residential neighborhoods often lost a sense of community as people became more private and isolated (Sargisson 2012), leading to the development of community-focused designs that aim to bring people together in a shared space while maintaining separate homes.

The first co-housing groups in Scandinavia had the idea of multigenerational living, creating elder-friendly communities for safe aging-in-place. These communities were typically seen as being environmentally friendly, with smaller sites (or lots) and less car use (McCamant & Durrett 2011, 5). Small gathering spaces with benches, picnic tables, and spaces for children to play, are incorporated at a co-housing site as a way to bring communities together through casual interactions (McCamant & Durrett, 27).

"Most of the early communities in Denmark, and the large majority of communities in the United States, have used a condominium financing model with a homeowner's association" (McCamant & Durrett 2011, 35). Community members investing in co-housing communities "have typically handled the costs of pre-construction development" (McCamant & Durrett 2011, 35). This financial contribution is another way that brings communities together and drives interest in and design of the project.

Benefits of Co-housing

Co-housing has gained popularity because of its many benefits— social, financial, and environmental. The social aspect of co-housing is a draw for many people, as it connects people to their neighbors, which many modern urban communities lack. According to Sargisson, some factors that affect community engagement in a development include the amount of streets and public spaces (2012).

People who have a greater sense of community and know their neighbors may feel safer in shared outdoor spaces and take advantage of community amenities. Neighbors in co-housing communities may also carpool into town, go hiking, or seek a friend for various other activities, further emphasizing the value of co-housing's socialization and community aspect (Abrahms 2011). McCamant & Durrett point out that when neighbors have a stronger connection, they are better able to borrow a cup of sugar, share camping gear, or pass outgrown clothes down to a younger neighbor (McCamant & Durrett 2011, 15).

A powerful sense of community and increased social interactions requires work to manage membership and formal meetings (Sargisson 2012). If successful, a positive social environment can positively affect community members, such as engendering more confidence and encouraging better relationships, and important aspects that cannot be easily measured, such as financial savings or environmental benefits (McCamant & Durrett 2011, 11).

Shared meals are one aspect of community living that facilitates social interaction among members of the co-housing group. “Common meals lead to other activities after dinner, such as playing pool or enjoying a glass of wine and a game of Scrabble with one of your neighbors” (McCamant & Durrett 2011, 13). Members of the co-housing community are responsible for cooking a meal for the rest of the community in exchange for participating in shared meals at other times, a tradeoff that many people find very reasonable and that can ease the pressure and time commitment of preparing dinner each night at home (McCamant & Durrett 2011, 13). The frequency of needing to help cook will vary, depending on the number of residents.

Shared meals typically take place in the common house, a shared resource that may also have guest rooms, play spaces, laundry facilities, and other spaces that all residents can use. Putting amenities like guest rooms and laundry in the common house means that each residence does not have to have these features, saving space and energy (McCamant & Durrett 2011, 15). Residents can also share tools, lawnmowers, and other items rather than each home needing to purchase its own (McCamant & Durrett 2011, 27).

In a co-housing community in Nevada City, residents stated that their utility bills have been cheaper since moving to the co-housing community (McCamant & Durrett 2011, 20). Smaller utility bills could be credited to the smaller home size and could also be affected by the high quality materials used in construction, leading to a more energy-efficient living space (McCamant & Durrett 2011, 34-35).

“According to the U.S. Census Bureau, at the start of the twenty-first century, the average size of a new home was 2,324 sq. ft. By comparison, the average private home in a co-housing community is 1,250 sq. ft. It is worth noting that the average common house for a typical 30-unit co-housing community averages 4,000 square feet, including workshops and other buildings” (McCamant & Durrett 2011, 29). Even when factoring in the common house, the average square footage is about 1,000 square feet less per home than the average American house, meaning less room to heat, less materials used in building, and less wasted space.

Many co-housing communities also have shared land, such as gardens, woods, or pastures, which benefit the community as a place for growing food and flowers, hiking, giving children social places to play, and enhancing aesthetics (Sargisson 2012). Some common space also require residents to learn how to negotiate and appreciate different ways of interacting with the land and their neighbors.

What is NOT co-housing

Co-housing communities are different from intentional communities or communal living. People live in and own their homes in co-housing, unlike in communal living. Intentional communities are groups based on a shared ideology such as religion, spirituality, or education. “Co-housing developments espouse no ideology other than the desire for a more practical and social home environment” (McCamant & Durrett 2011, 9). Co-housing communities are not elite, high-income only, or gated communities.

Precedent Studies

The methods section of this report provides details and images of the six selected precedents. The following overview of each selected co-housing community shows their benefits in practice and highlights additional features and experiences.

Oakcreek Community is a co-housing group in Stillwater, Oklahoma, formed in 2009. This community is a senior co-housing group with people who wanted to retire in Stillwater but did not like any of the housing options they found. Instead, they purchased land in 2010, began construction in 2011, and moved into their new co-housing community in October of 2012. Oakcreek Community is 7.5 acres of land for 24 houses with residents between 60 and 90 years old. Co-housing has allowed the members of Oakcreek Community to enjoy their retirement and ‘age-in-place’ by getting assistance from their neighbors and living near community amenities such as grocery stores, shopping, and trails (Oakcreek Community n.d.; Abrahms 2011). This precedent spotlights a community designed as a senior co-housing community on a small-scale site with clustered housing near a creek and meadow that residents can enjoy.

The second co-housing precedent is **Zephyr Valley Community Cooperative** (ZVCC) near Rushford, Minnesota. This co-housing community consists of 15 adults and six kids on 500 acres, purchased in 1994. Managing and enjoying the large site is a major feature of this community, with community members renting some of the land for grazing or taking advantage of the swimming pond, trails, or bluffs. "We currently have a grant to help us manage the invasive buckthorn shrubs in our oak savannas, by grazing with goats, followed by hand cutting and burning" (ZVCC 2021). ZVCC is a useful co-housing precedent, as it connects to many conservation development ideals, using abundant land as a major resource and amenity.

The third precedent for co-housing is Shadowlake Village in Blacksburg, Virginia. The 33-acre property includes a mature oak-hickory and beech-maple woodland and is adjacent to Blacksburg's Heritage Park, which is 169 acres, thus offering more than 180 acres of open space that residents can readily access. Clustered housing brings neighbors together and conserves natural land. Shadowlake Village is a good precedent study for its integration of environmental care throughout the site, from electric car charging, to solar panels, to community open space and personal gardens that provide habitat to wildlife. Another reason for studying Shadowlake Village is that even though the site is small, it takes advantage of the surrounding park space and trails, showing the importance of context when selecting a location (Shadowlake Village n.d.).

Methodology

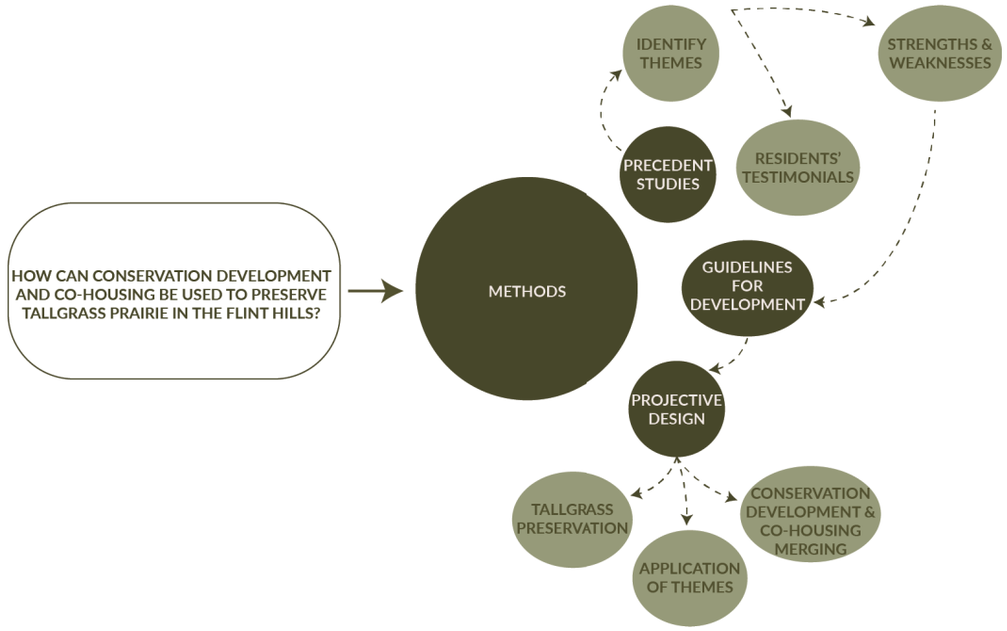


Figure 3.1: Methodology (Sharp 2023)

METHODS

For this study, three methods were used. First, precedent studies were conducted for three conservation developments and three co-housing communities. From these precedents, themes were identified related to strengths and weaknesses as well as resident impressions taken from commentary on each development's website and news articles. The next method was the development of guidelines and considerations for creating a development style that combines the themes and practices of conservation development and co-housing. Finally, a projected design was done for three distinct sites and then assessed using the guidelines.

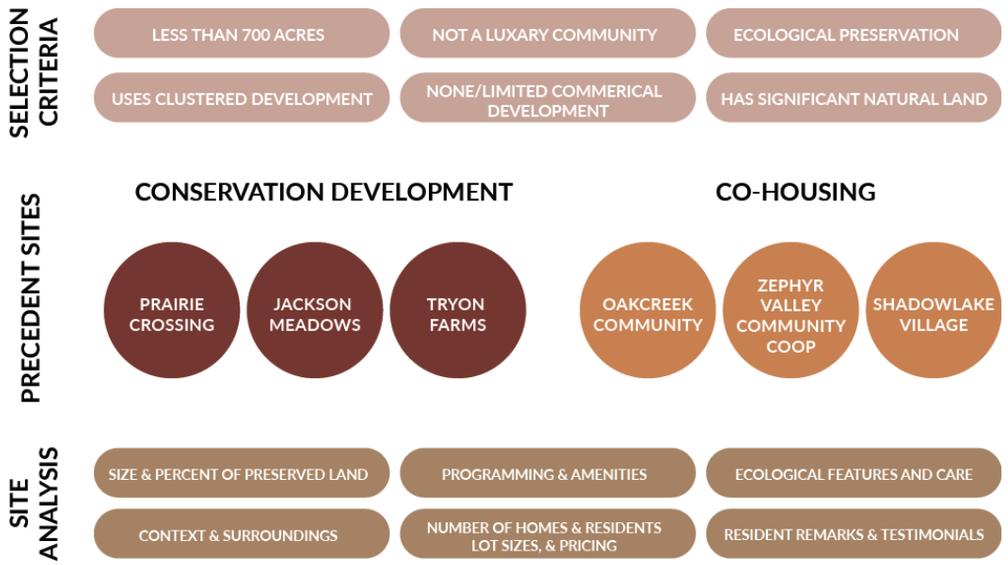


Figure 3.2: Precedent Study Criteria and Analysis Framework (Sharp 2023)

It is worth noting that all six precedents were carefully selected based on specific criteria, see Figure 3.2. Not all conservation developments use clustered development. Some conservation developments have very large lot sizes to preserve scenic views throughout the landscape, however, these sites were not selected for studies as they are not as affective at engaging community as clustered development and large lots are typically much more expensive.

Not all co-housing communities include substantial open land, but because of the environmental and ecological focus of this study, only co-housing communities that had open, shared land were considered.

Additional criteria for selecting precedents and analysis work completed for the precedents can be seen in Figure 3.2.

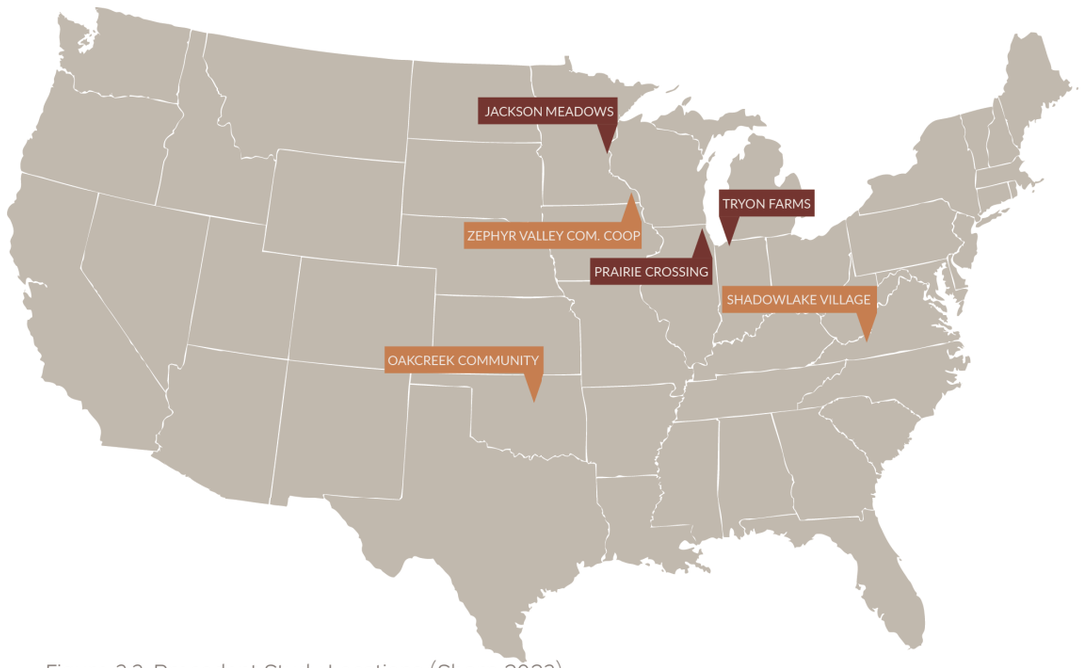


Figure 3.3: Precedent Study Locations (Sharp 2023)

For this study, a luxury community was considered a development with homes and lots that would not be affordable for the middle class and often featured amenities such as fitness centers and golf courses.

Significant natural land was another challenging criterion for this study, as conservation developments and co-housing communities usually have different amounts of land preservation. This criterion applies to selecting co-housing precedents, as conservation developments have preserved land by definition. Many co-housing communities have shared gardening spaces, but to find sites with better connection to the projected design, sites with designated natural land, hiking trails, and/or adjacent to undeveloped land were preferred.

Conservation Developments

	Prairie Crossing	Jackson Meadow	Tryon Farm
Size	675 Acres 70% preserved	145 Acres 70% preserved	170 Acres 75% preserved
Context	Residential	"Borrowed" preserved land	Orchards & Farms, Lake Michigan
Programs	Trails, Bryan Colby Barn, Farm, Charter School, Square	7 miles of Trails	Trails, swimming, fishing, educational programs
Homes	36 condos, 360 single-family homes ~$400-500k	55 lots ~$650-900k	~85 homes & homesites ~$150-460k
Ecology	Native planting, prairie burns, stormwater management	Wetland treatment system	Tryon Farm Institute, educational programs
Resident Impressions	Outdoor time, sense of diverse community	Outdoor time, sense of diverse community	Children's outdoor spaces, sense of community

Co-Housing Communities

	Oakcreek Community	ZVCC	Shadowlake Village
Size	5.4 Acres No natural land on-site	500 Acres <90% preserved	33 Acres 80% preserved
Context	Adjacent to 2.06 acres of undeveloped land	Rural land, Mississippi River, Winona & universities	Toms Creek Blacksburg Heritage Park (169 acres)
Programs	Common House, clubs, gardens	Sports fields, swimming, garden, trails	Community activities, trails, gardens
Homes	24 homes & Common House ~$192-290k	8 homes & Common House No cost estimates available	33 houses ~$265-560k
Ecology	Geothermal heating & recycling programs	Goat prairies, regenerative grazing, federal programs	Clustered development, EV charging, two garden spots
Resident Impressions	Aging in place, strong community	Plenty of natural land & outdoor features	Strong & engaged community atmosphere

Figure 3.4: Table of Precedent Information (Sharp 2023)

Conservation Developments

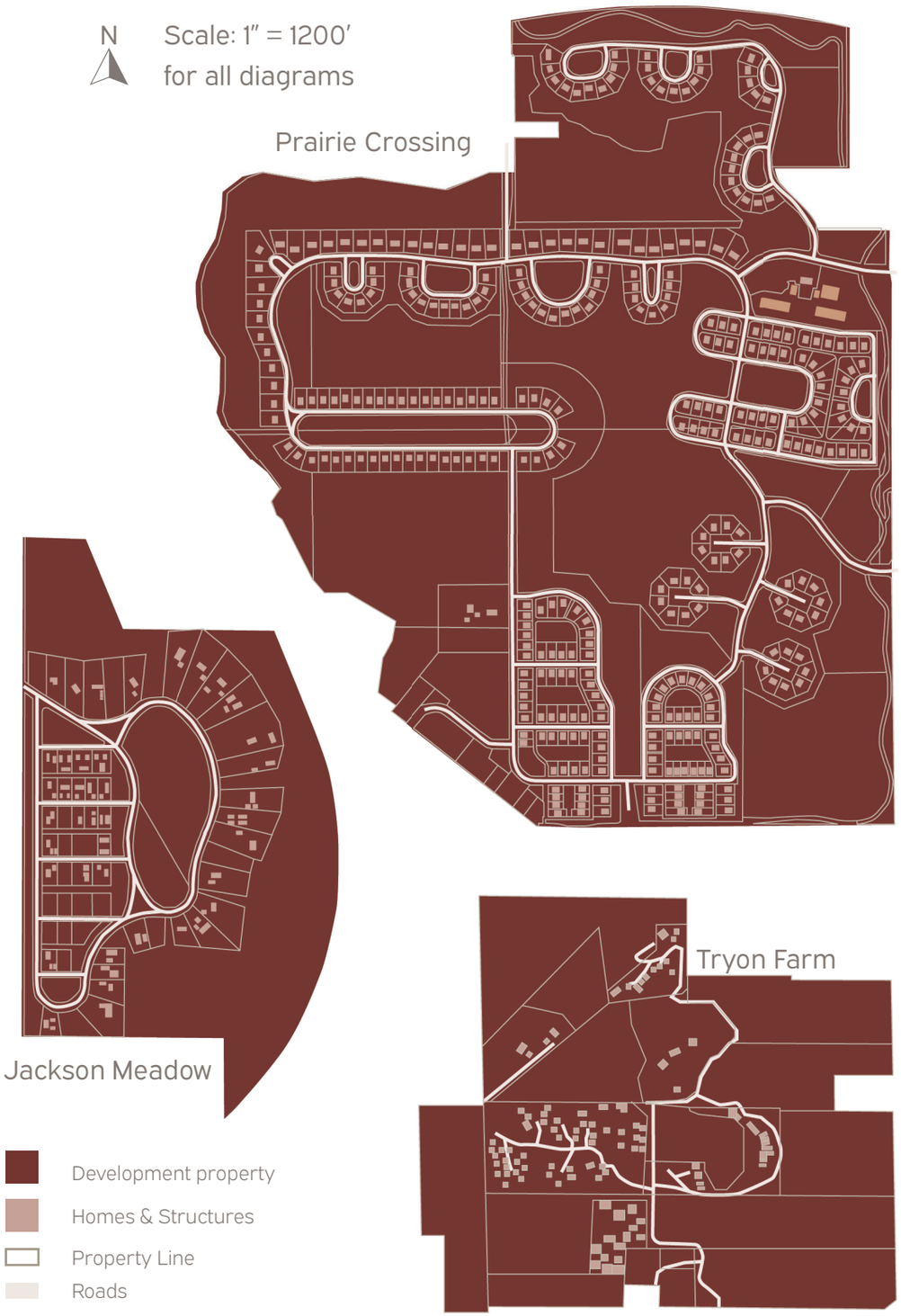


Figure 3.5: Conservation Development Layouts. Information Sourced from county GIS (Sharp 2023)

Co-Housing Communities

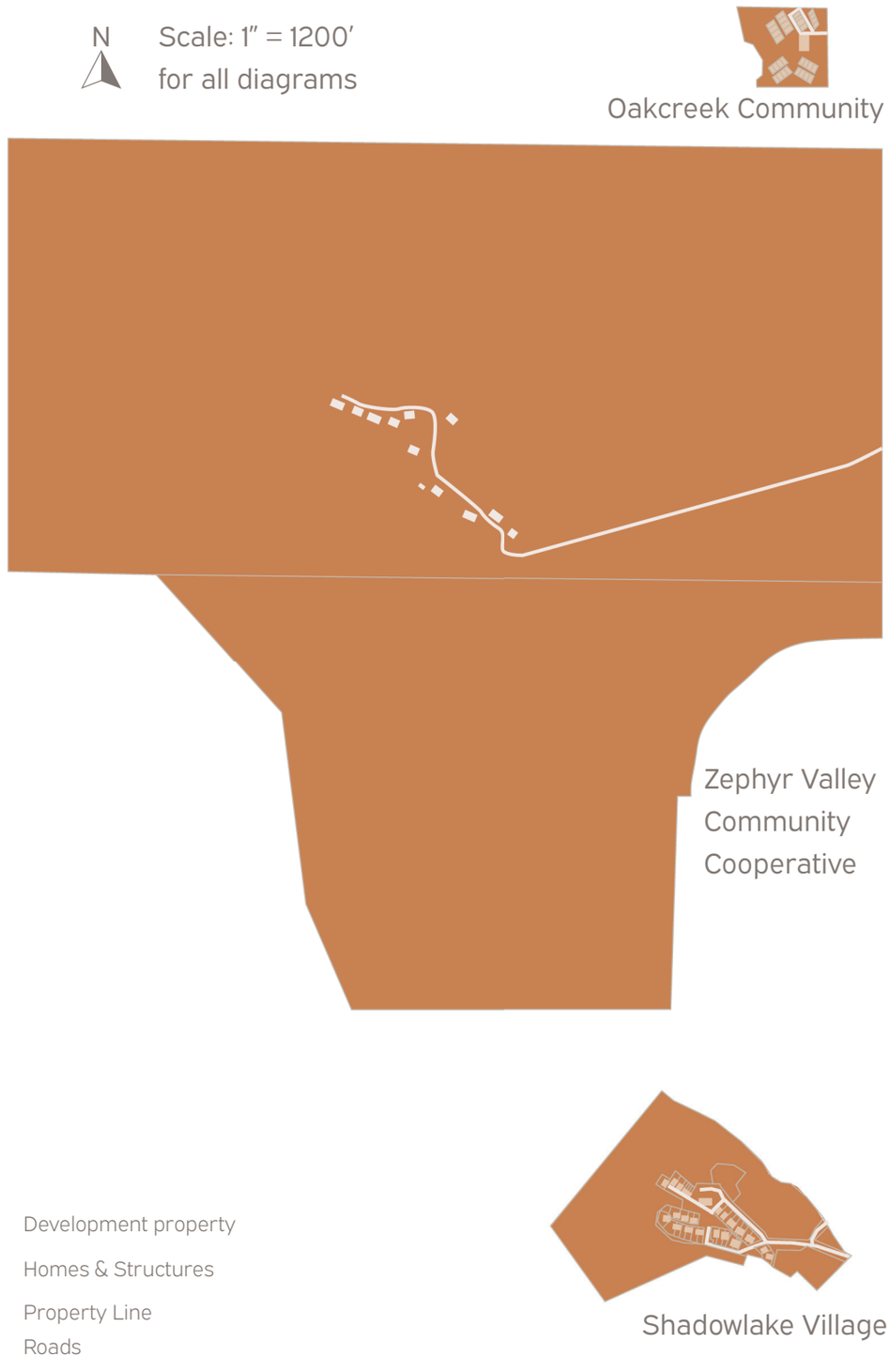


Figure 3.6: Co-Housing Community Layouts. Information Sourced from county GIS (Sharp 2023)

Precedent Studies: Conservation Developments

Prairie Crossing: Grayslake, Illinois

Size and Percent of Preserved Land:

675 acres. 70% open space (farm, restored prairie, wetlands, ponds).

Context & Surroundings:

Other residential neighborhoods

Programming & Amenities:

10 miles of trails

Bryan Colby Barn (community center, location for special events)

Farm

Charter School

Station Square- businesses and café

Number of Homes & Residents, Lot Sizes & Pricing:

360 single family homes

36 condominiums

$400,000-$500,000 cost of homes (Zillow, Prairie Crossing 2022).

Ecological Features & Care:

Native prairie landscaping and wetlands

Prescribed prairie burns

Stormwater management using long-rooted native plants

Resident Impressions:

Increased time outdoors

Sense of community and involvement

Housing options accommodate a diverse community



Figure 3.7: Prairie Crossing (Prairie Crossing n.d.)



Figure 3.8: Prairie Crossing (Prairie Crossing n.d.)



Figure 3.9: Prairie Crossing (Prairie Crossing n.d.)



Figure 3.10: Prairie Crossing (Prairie Crossing n.d.)

Prairie Crossing is a 677-acre conservation development in Grayslake, Illinois. Highlighting the difference between typical suburban development and conservation development, Prairie Crossing has 365 lots, rather than 2,400 that likely would have been present in traditional suburban development (Prairie Crossing n.d.). The residential land occupies 20% of the site, open space is most of it (70%), and commercial and industrial land covers the remaining land (Prairie Crossing (b) 2004).

Although there are no longer new homes available for sale at Prairie Crossing, keeping home prices low was a key component of design. Using Zillow to estimate prices, Prairie Crossing homes averages somewhere between $400,000 and $500,000, making it similar in price to surrounding suburban neighborhoods (Zillow, Prairie Crossing 2022).

The land was purchased in 1987, planning for development began in 1992, and the first residents began to move to Prairie Crossing in late 1994 (Prairie Crossing n.d.).

The Prairie Crossing conservation community was founded on 10 guiding principles:

Environmental protection and enhancement
A healthy lifestyle
A sense of place
A sense of community
Economic and racial diversity
Convenient and efficient transportation
Energy conservation
Lifelong learning and education
Aesthetic design and high-quality construction
Economic viability
(Prairie Crossing n.d.)

The ecological and environmental success of Prairie Crossing can be understood through frequent wildlife sightings, such as bald eagles, blue herons, coyotes, deer, owls, and more. One principal factor for creating an ecologically successful site was avoiding fragmentation of the natural land.

Throughout preserved natural landscapes are 10 miles of trails that can be used to hike, bike, ski, or ride horses. The barns at Prairie Crossing allow residents to keep horses if they wish. Lake Aldo Leopold allows residents to enjoy fishing, swimming, or playing at the beach. There are 14 parks around the site, providing many different play spaces for children in the community (Prairie Crossing n.d.).

The variety of environmental and community features contribute to Prairie Crossing being a nationally-recognized conservation development.



Figure 3.11: Prairie Crossing (Prairie Crossing n.d.)



Figure 3.12: Prairie Crossing (Prairie Crossing n.d.)

Jackson Meadow:
Marine on St. Croix, Minnesota

Size and Percent of Preserved Land:

145 acres of land. About 80% of the site is preserved.

Context & Surroundings:

"Borrowed" land from neighbors, totals to 320 acres of preserved natural land.

Programming & Amenities:

Over 7 miles of trails used all year round. Maintained for Nordic skiing in the winter.

Number of Homes & Residents, Lot Sizes & Pricing:

55 lots. Homes generally range from $650-900K

Ecological Features & Care:

Wetland Treatment System
Prairie, meadow and woodlands

Resident Impressions:

Increased time outdoors
Sense of community and involvement
Housing options accommodate a diverse community



Figure 3.13: Jackson Meadows (Lai 2023)



Figure 3.14: Jackson Meadows (Lai 2023)

Jackson Meadow is a 145-acre site, with 60 lots located on 40 acres of the site. This site “borrows” land from adjacent landowners, creating a total of 320 acres of preserved natural land. The design of the residential lots is very cohesive, following a Scandinavian style (McMahon 2010, 174).

Sustainability is deeply rooted in the site and can be seen through many aspects besides land preservation. The architect and designers took note of the sun and shade patterns, which influenced the location and orientation of the homes. An organic septic system is used to manage stormwater, treat wastewater, and reduce runoff (McMahon 2010, 174).

This is a particularly interesting precedent study because of the involvement of other landowners, and the combination of multiple properties to increase the acreage of preserved and native landscape. Existing zoning laws and ordinances created complications, especially when looking at a clustered housing design, but new ordinances were passed by the town, requiring open space preservation to be at least half of a site when clustering three or more houses (McMahon 2010, 175). When selecting the location for development of the residences, developers wanted to ensure woodland, wetlands, and prairie were protected, maintaining views across the land (McMahon 2010, 177).

Jackson Meadows designers examined the context of the site to maximize the amount of preserved land, making connections to existing trail networks, such as William O’Brian State Park and allowing for greater community usage and walkability to downtown Marine on St. Croix (McMahon 2010, 179). This provides an example of using both site and contextual amenities to make a development that is beneficial for residents and the greater community.

Maintaining fair price points is another example of why Jackson Meadow is a beneficial precedent. Keeping lot and home prices low shows that conservation and connection to nature should be possible for all people regardless of class/status or income. In 2009, prices for a lot were $79,000 - $110,000 in the compact neighborhood section, with one-third to one and one-and-a-half acre lots. Outside of the village center, lots increased in price to $150,000 - $160,000 (McMahon 2010, 180). As of October of 2022, remaining lots range in price from $90,000 to $125,000 for land (Jackson Meadow n.d.).

Recognizing that this style of housing and having smaller lots is not the norm, especially in a region where the average lot is at least five acres, selling the community aspect and the resources becomes very important. Using marketing tactics that highlight open space and aesthetics that come with preserved land is another sales tactic used at Jackson Meadows (McMahon 2010 182).



Figure 3.15: Tryon Farm (Skabelund 2022)



Figure 3.16: Tryon Farm (Skabelund 2022)



Figure 3.17: Tryon Farms (Skabelund 2022)

Tryon Farms: Michigan City, Indiana

Size and Percent of Preserved Land:

170 acres. 75% of land preserved.

Context & Surroundings:

Nearby access to Lake Michigan
Nearby orchards and farms
60 minutes away from Chicago

Programming & Amenities:

Over 5 miles of trails
Creeks and ponds for swimming and fishing
Tryon Farms Institute provides educational opportunities

Number of Homes & Residents, Lot Sizes & Pricing:

About 85 built homes and reserved lots
$150,000 to $460,000 as of 2010 (McMahon 2010, 239).

Ecological Features & Care:

Tryon Farm Institute: educational workshops, beekeeping, habitat restoration, and fish stocking

Resident Impressions:

Connection to nature and outdoors
Sense of community and involvement
Safe and fun for children to spend time outdoors

Tryon Farms in Michigan City is a 170-acre development with 75% of the land preserved. Tryon Farms has seven different neighborhood clusters, and each has a different aesthetic and design to fit with the surrounding landscape context (McMahon 2010, 232).

Like Jackson Meadows, typical zoning laws required one acre per lot, but using a planned-unit-development designers clustered 150 houses together, preserving 120 of 170 acres of the site (McMahon 2010, 234, 239). Analysis of the site was critical in determining the best locations for development, disturbing as little land as possible, and reducing the cost of grading and infrastructure (McMahon 2010, 234,239). Preserved land allows for activities like fishing, hiking, gardening, allowing the residents at Tryon Farms to have a strong connection to nature (McMahon 2010, 232).

Tryon Farms Institute was founded to own and financially manage the property. The Institute prevents residents from being responsible for taxes on the preserved land and guarantees the permanent protection of the 120 acres of wetlands, lakes, and prairie (McMahon 2010, 237).

As of 2010, homes at Tryon Farms ranged from $150,000 to $460,000, with one-third of residents living at Tryon Farms full time. The other two-thirds of the residents use their properties as weekend retreats (McMahon 2010, 239). Some of the homes at Tryon Farms are available to rent on Airbnb as well. The range in prices at Tryon Farms allows for a variety of occupants, “bankers, doctors, and lawyers, as well as teachers, therapists and writers” (McMahon 2010, 240).



Figure 3.18: Tryon Farm (Skabelund 2022)



Figure 3.19: Tryon Farm (Skabelund 2022)

Precedent Studies: Co-Housing Communities

Oakcreek Community: Stillwater, Oklahoma

Size and Percent of Preserved Land:

5.44 acres

Context & Surroundings:

Adjacent to the site is 2.06 acres of undeveloped land

Programming & Amenities:

Common house
Music and Game clubs
Community Gardens and land

Number of Homes & Residents, Lot Sizes & Pricing:

24 homes and a common house
$192K-269K (Zillow estimate)

Ecological Features & Care:

Geothermal heating and cooling in homes.
Recycling program.

Resident Impressions:

Community atmosphere with shared meals, activities, and spaces
Outdoor spaces incorporated into lives without hassle of maintenance
Able to easily age in place



Figure 3.20: Oakcreek Community (Alexander 2023)



Figure 3.21: Oakcreek Community (Alexander 2023)



Figure 3.22: Oakcreek Community (Alexander 2023)

Oakcreek Community is a co-housing community in Stillwater, Oklahoma, initiated by a senior group. This community has 24 homes, all of which were sold by 2014, impressive considering that the idea began in 2009, land was purchased in February 2010, construction began in October 2011, and was finished in October 2012 (Oakcreek Community, n.d.). This site is 7.5 acres and sits next to a creek and wooded area (Oakcreek community, n.d.).

The co-housing community was planned for people in Stillwater to age comfortably in place, without moving into a retirement home. The proximity to stores, banks, trails, and more makes this community an ideal location for people enjoy retirement. The community resources such as shared land, a common house, group dinners, and neighbors help the residents to feel comfortable growing older, knowing that they have familiar faces and helping hands around them as they age (Oakcreek Community n.d.).

Funding for the co-housing community was made possible using an LLC, which was dissolved in 2014, after all homes on site had been sold. Today, buying a home at Oakcreek Community is possible by purchasing from current owners, and includes 1/24th ownership in the shared land and the common house (Oakcreek Community n.d.).

This precedent was selected because of Oakcreek's goal to fulfill the needs of a specific community. It is also an example of how a small site can still be impactful.



Figure 3.23: Oakcreek Community (Alexander 2023)



Figure 3.24: Oakcreek Community (Alexander 2023)

Zephyr Valley Community Cooperative: Rushford, MN

Size and Percent of Preserved Land:

500 acres of land, <90% is preserved.

Context & Surroundings:

Rural land

25 minutes away from the Mississippi River, town of Winona, Winona State University, and St. Mary's University.

Programming & Amenities:

Soccer Field & Playground
Swimming Pond
Community Garden
Hiking Trails

Number of Homes & Residents, Lot Sizes & Pricing:

8 homes, 1 common house.
Up to one acre per home.
No home pricing information available

Ecological Features & Care:

Goat managed prairies
Regenerative grazing
Participant in federal and state conservation programs

Resident Impressions:

Plenty of natural land and outdoor features



Figure 3.25: ZVCC (ZVCC n.d.)



Figure 3.26: ZVCC (ZVCC n.d.)



Figure 3.27: ZVCC (ZVCC n.d.)



Figure 3.28: ZVCC (ZVCC n.d.)

Zephyr Valley Community Cooperative is a co-housing community with 21 people living on 500 acres of land in Rushmore, Minnesota. Of the 500 acres of land, 80 acres are used for farming. The natural land on the site is diverse, with creeks, ponds, pasture, prairie bluffs, and forest (ZVCC 2021).

While the community is not based on a shared spiritual or political interest, the group does have a shared appreciation for nature. Clustered housing for the eight homes helps the residents have a close relationship with one another while still maintaining separate living spaces and privacy (ZVCC 2021).

The large amount of natural land available at Zephyr is used for hiking, cross-country skiing, gardening, farming, swimming, and more. “One of our members is renting our lowland and hillside pastures for a regenerative grazing project” (ZVCC 2021). Zephyr also secured a grant to use goat grazing to manage the oak savannas on site, especially to limit the overgrowth of invasive buckthorn shrubs (ZVCC 2021).

This is an interesting precedent because of the large amount of mostly naturalized open space that is available and the way that the residents can enjoy the natural land that they have available to them.

Shadowlake Village: Blacksburg, Virginia

Size and Percent of Preserved Land:

33 acres of land with 80% open space.

Context & Surroundings:

Borders 169 acres of natural areas and former farmland with managed hayfields, known as the Blacksburg Heritage Park

Short bus ride from supermarket, hotel, restaurants, coffee, etc.

Programming & Amenities:

Weekly happy hours, Weekly potlucks, Weekly common meals

Monthly Poker Nights, Annual Camping Trip, Annual Olympics, Annual Talent Show

Winter Ball, Halloween Parties, Board-game parties, Triathlon

Nature - 17 acres of woods and trails. Nearby Blacksburg Heritage Park, and Brush Mountain (national forest) trails

Cycling & exploring in the Tom's Creek Watershed

Gardening, orchards

Number of Homes & Residents, Lot Sizes & Pricing:

33 households

$265-560k (Zillow estimate)

Ecological Features & Care:

Clustered parking to reduce driving throughout the neighborhood

Electric vehicle charging stations

Community Gardening

Resident Impressions:

Strong community atmosphere (Harris, 2015)



Figure 3.29: Shadowlake Village (Skabelund 2018)



Figure 3.30: Shadowlake Village (Skabelund 2018)

Shadowlake Village in Blacksburg, Virginia is a 33-acre site, with 17 acres preserved as natural land. Adjacent to Shadowlake Village is Blacksburg Heritage Park, a 169-acre public park and natural area, giving residents of the co-housing community access to over 200 acres of open, preserved land (Shadowlake Village n.d.).

This co-housing community has the expected shared resources, such as a common house where community dinners and activities are hosted. The development is also a mile away from a supermarket, restaurants, bookstores, and more shops, giving residents lots of opportunities to venture outside of Shadowlake Village, as well as spending time hiking and enjoying the company of their neighbors (Shadowlake Village n.d.).

This is an excellent precedent of showing how the context of a site can affect the experience of residents, both in terms of urban and natural amenities. It is also a great example of how residents of a community can live a simple life to be more sustainable and preserve resources (Shadowlake Village n.d.).



Figure 3.31: Shadowlake Village (Skabelund 2018)



Figure 3.32: Shadowlake Village (Skabelund 2022)



Figure 3.33: Shadowlake Village (Skabelund 2022)

Analysis of Precedents

As seen from studying the various precedents, there are many ways to have developments surrounded by or connected to preserved land. The precedents all vary in size, amount of preserved land, context, programming, and ecological features, but they all show a combination of natural land and clustered residential communities.

Clustered Development

Some of the examples in this report show that within the development property bounds, there is little to no preserved land, by the surroundings have preserved or undeveloped land, showing that examining context is important for designers.

All the precedents use clustered development, but in a variety of ways. Prairie Crossing shows several ways to cluster housing within this one site. Some clusters show a grouping of homes in a circular pattern, with green space surrounding each of these cul-de-sacs. Other groupings of homes are arranged in rows, resembling a typical suburban layout. Another layout method used is to cluster homes in a loop, around a central green space. Choosing which layout is best depends on the specific site and how to best preserve important patches of land.

Property Lines and Ownership

An interesting observation for the precedent studies is how property lines affect the site. For Prairie Crossing and Jackson Meadow, the property lines include the lot for each house, with a front and backyard. Tryon Farm's property lines hug the homes, so all land is communally owned. Similar observations can be made for the co-housing communities. At Oakcreek Community, the homes are complexes, so each resident owns their own space within a quad, and the outdoor spaces and common house are communally owned by all residents. At Zephyr, there is no property distinction around the homes, so it appears that all land and structures are communally owned. Property lines at Shadowlake Village include some green space around each home, similar to at Prairie Crossing and Jackson Meadow. Property lines and the amount of land that each resident owns is decided as each development is established, based on desired ownership style, utilities and land costs, and ordinances in each city or county.

Programming and Environmental Features

There are a variety of programming types and environmental features for the precedents, but there are some common themes. Nearly all of the sites have trails throughout the development or are connected to trail networks. Trails throughout and around the site allow residents and visitors to see the natural landscape. Trails can also promote physical activity and encourage community building, as walking can be a social activity.

Many of the sites include native plantings, stormwater management, and educational opportunities for residents to learn about and participate in caring for the natural environment. Encouraging residents to become actively involved in care for the land that they occupy is important. Other precedents approach environmental care through recycling programs and electric vehicle charging. All ways to reduce environmental impact are important.

Many of the programs in the precedent studies encourage community building. Educational classes, preparing shared meals, hosting special events, and supporting community gardens and residential clubs are some of the programs mentioned for these six residential communities. There are a variety of ways to get community members involved in each other's lives and build relationships among neighbors.

As different as these six precedents are from location to size, they all seek to balance environmental and community purposes. Different layouts, programs, and context of developments impact the experiences and lives of residents, while working to preserve and protect natural landscapes is important to each of these communities.

GUIDELINES FOR DEVELOPMENT

Environmental Guidelines and Considerations

Preservation and restored prairie

The site should be a minimum of 50 acres. This sets a 20-acre minimum for preserved land, following the definition of conservation development, which states that conservation developments preserve 40-99% of the land on a site (Milder & Clark 2011, 697-698). These 20 acres of preserved land should be unfragmented, to keep as much natural land intact as possible.

A range of 150-800 acres is preferred, as this could allow for multiple clusters of development, while keeping with the minimum preserved acreage. By having at least 20 acres of the site preserved, the land can begin to be restored to prairie conditions or conserved if it is existing prairie.

Trail Design

If there are no existing trails on the site, developers and planners must determine if it is in the best interest of the community and the land to add trails. If trails are to be added to the site, it is important to have a thorough analysis and understanding of the site, so as to have minimum disturbance.

Trails should show the character of the land, highlighting key features, such as outlooks, streams, ponds, valleys, and more. However, trails should not unduly disturb these features, causing harmful erosion or fragmentation of important habitats. Before planning trails, analyze the site for sensitive ecosystems, rare species, wetlands, and high-value wildlife habitats, taking careful consideration to give habitats and wildlife as wide of a buffer as possible.

If a site has existing trails, consider how the trails are currently used. Are the trails open to the public, or kept private? What features on site are accessible by the trails, and is there anything missing? If new trails are created, consider how they can connect to existing networks, including roadways that would be wide enough for biking or pedestrian use along or nearby these corridors. Any trails and pathways should also be analyzed for accessibility, and universal access should be considered for any non-hiking trails.



Figure 3.34: Trail at Konza Prairie in Manhattan, KS (Sharp 2021)

Clustered Development

Clustered Development allows as little disturbance as possible to the land. Fewer roads need to be constructed throughout and around the site when development is clustered in one location. Clustering homes and community buildings brings all utilities to one area.

Not all conservation developments use clustered developments. Some developments dedicate 20 or more acres to each lot, designating a small section, about an acre, to the house. Developers often use this tactic to maintain views across the site. From the author's perspective this is not as environmentally beneficial as clustered development, as it requires more land disturbance from construction vehicles and roads and structures to be spread across the site. Land may also be disturbed throughout the site to connect utilities and roads from lot to lot. Using large lots for conservation developments can also cause ecosystem fragmentation. Breaking apart prairie and woodlands into smaller chunks of native land can be damaging, creating more edges of the landscape which are more susceptible to damage and loss of biodiversity, (Haddad et al, 2015). Large lots in conservation development break apart native ecosystems, and this fragmented land is often filled in with individual floral gardens and non-native plantings.

By using clustered design for this style of development, disturbances to site are kept to as small of an area as possible. Utility lines and roads are kept smaller, which will use less materials. It is important to consider where the clusters of development will go to limit the edges created in the process of implementing roads, utilities, homes and other structures.

Driveways and Roads

As well as using clustered development to reduce roads throughout the site, designing the roads around the development to be small, one-way roads, close to the houses, where this is feasible and desired, will cut down on materials and land covered by roads and driveways.

When selecting a location for the development, consider if there is existing road access to eliminate the need for excess construction. Keeping any development close to existing roads also minimizes creating new development-related edges, which are more susceptible to invasive species, pollution, and damage.

Modest Home and Optional Amenities

For this style of development, keeping homes at a modest size helps to leave as small of a footprint on site as possible. Smaller room sizes and reducing the overall size of the home will require less materials for construction and reduce heating, cooling and other operation costs.

In-home amenities such as dishwashers, washing machines and driers are not necessary, and should be optional, added to the home for an extra cost. Using high-efficiency community laundry spaces and equipment helps to reduce water and electricity waste. Guest bedrooms and shared storage space can be found in a shared community space, such as the common house. By placing guests in the common house, excess rooms will be less likely to remain consistently vacant, and instead will be used more often. Shared rooms and equipment require commitment and communication from the community to coordinate use and maintenance.

Community Guidelines and Considerations

Clustered Development

Not only is clustered development more environmentally friendly, but it helps to foster community in the development. When neighbors are physically closer together, they can spend more time together and get to know each other. Clustered development also provides opportunities for spontaneous encounters with neighbors.



Figure 3.35: Prairie Crossing (Prairie Crossing n.d.)

Common House

The common house, a staple of co-housing communities, is a place for the residents of a development to gather for shared meals and to spend time together. The common house is a shared space for all residents, and should thus incorporate features that bring the community together.

Guest bedrooms, laundry facilities, children's play spaces, a large kitchen, and a large dining space are some of the programs to be included in this space. Shared community amenities in the common house, such as laundry, will encourage impromptu gathering among community members, as well as being more environmentally efficient. Shared meals and activities in the common house are a way that co-housing builds community. Whether shared meals take place each night, or once a week, cooking and dining together is an opportunity for neighbors to spend time together.

Home Design

The design within the private home can affect the community atmosphere of the entire neighborhood. By paying close attention to the layout of each home and private yard, the community can remain engaged in the entire site design.

The front porch of the space can act as out outdoor living room. Keeping the kitchen and living room at the front of the house encourages outward views towards the rest of the community, providing more opportunities to interact with neighbors, and join in community activities. Designing the home with the bedrooms at the back of the house emphasizes the idea of the front of the house being more connected to the rest of the community.

Designers should carefully consider the placement of roads, and garages and driveways, if applicable in the community, to create pedestrian-friendly communities. This will encourage more play among kids from various households and keep the front yards safer. Considering places for children to play, or for outdoor community activities is important for community centered design. Keeping play spaces and green spaces close to clusters of houses will encourage more outdoor time.

Making some features optional within the home but present in the common house is another way to make a development more community centered. Each home should have connections for a washer and dryer, but the common house will have several, so the amenity is option. Reducing the size of kitchens within the private homes, including the essentials, but not excess, encourages residentials to attend group and shared meals with neighbors, using the large kitchen space in the common house.

Shared Open Space and Trails

Shared space does not only include the common house but extends to outdoor spaces. Careful consideration should be given to the location and design of open space for the community to enjoy. There are a variety of options to consider when planning for outdoor gathering and play spaces. Playground equipment, sports fields, or open flex space are all options that planners and developers should consider based on the site and intended community.

Location of the open space and play areas are key aspects to consider. The space should be close enough to encourage frequent visits from neighbors. If it can be visible from the cluster of homes, then people are able to join in play easier as well.

Trails throughout the site can be another opportunity for fostering community relationships. From running into friends on trails or taking the time to explore the site with a neighbor and getting to know each other, walking can be extremely helpful for community relationships. Along the trails and pathways, places to stop and sit should be considered as well.



Figure 3.36: Trail at Konza Prairie in Manhattan, KS (Sharp 2021)

Economic Guidelines and Considerations

Small Scale Economy

From modest and affordable homes, to shared community amenities, there are ways to make conservation co-housing an affordable option. Reducing the size of private homes, by only including what is necessary will allow the cost of building the home and its upkeep to be lowered. By placing guest rooms in the common house, residents will not have to pay to heat or cool rooms that will rarely be occupied. Encouraging a strong community atmosphere allows for neighbors to share equipment like lawn mowers, specialty tools and other items, rather than each home needing to purchase things that won't be used often.

Location is another important consideration. Separation from the nearest town or city not only gives residents a better connection to nature and more open space, but it also reduces the price of land. However, a development should not be so far away that it eliminates the convenience of going to the grocery store, restaurants, shopping, or other activities in town.

Some developments incorporate ways to bring in revenue, including restaurants and shops to rental homes, or using some of the land on site to grow produce to sell.

Large Scale Economy

These two methods of development show that there are ways to design residential communities, besides rows of identical houses. Open spaces, which may include natural or restored ecosystems, farmland, play fields, and play areas, can be practically integrated into neighborhoods, even made to be the main feature, and majority of landcover. Understanding how to design with nature can change development trends and encourage implementation of green space into more neighborhoods and cities.

When looking at the process of setting up conservation developments and cohousing developments the financial aspects can be overwhelming. As mentioned in the background chapter/literature review, there are opportunities for government grants to support land preservation, and tax exemptions for donating land to land trusts and other land protection groups.

Projective Design

Preface to the projective design:

This design is not a push for new residential developments at the selected Prairiewood sites in Riley County, Kansas. Rather it is an exploration of an academic idea. The author has used three selected sites to explore residential development ideas within existing landscape conditions to better understand needs, limitations, and opportunities associated with landscape and development. The priority for this author has been the protection of natural land.

SITE ANALYSIS: PRAIRIEWOOD

Site Selection

Site selection was an important and lengthy process for this projective design. Originally, a site east of Manhattan but west of Wamego was the goal, especially because of development pressures in this region. Several potential sites were identified, but it became a challenge to contact landowners to acquire permission to visit the site to conduct site analysis for the design process. Site parameters were reevaluated to find new site options. Prairiewood, a prairie and retreat space was suggested as it has been used as a site for other projective designs for past student projects (Franks 2022; Wulfkuhle 2022). After getting in touch with landowners, and conducting initial site visits, Prairiewood was selected as the site for this exploratory projective design.

Surrounding Context

Prairiewood is located on the west side of Manhattan. Nearby is Frank Anneberg Park, a 104-acre park with softball fields, baseball fields, shelters, a playground, a fishing lake, and a walking trail (Manhattan Parks & Rec, n.d.). Located off Anderson Avenue, to the north is a gas station. Continuing east, to the south of Anderson Avenue is Blueville Nursery and St. Luke's Lutheran Church.

Northwest of Prairiewood is Liquid Art Winery and Estate, which was established in 2014 (Liquid Art, n.d.) Further west of the site is the Fort Riley army base.



Figure 4.1: Community Context (Google Earth 2023)



Figure 4.2: Site Context (Google Earth 2023)

Prairiewood

Prairiewood is a prairie and retreat located to the west of Manhattan, Kansas in Riley County. It is a fifteen-minute drive from Kansas State University. Prairiewood was founded by Kail and Becky Katzenmeier, who came to Manhattan to study at Kansas State University. The Prairiewood preserve and retreat opened in January 2010. Prairiewood encompasses over 350 acres of prairie, farmland, creek, and woods. The southern part of the site has approximately 3.5 miles of hiking trails throughout the prairie, woodlands, and around a pond. An underground passage connects this trail network to just over a mile of trail and additional prairie on the north side of Wildcat Creek Road (Prairiewood, 2023).

There are three places that can be rented as guest houses on the property. The first is the Retreat House, located near the Blue Sage Barn and Gallery. This lodging option hosts 8-10 guests and includes a full kitchen, living spaces, and a pool and looks down on the Blue Sage Barn facility. On the north side of Anderson Avenue, the StoneHouse also hosts 8-10 guests, and features a stone courtyard outside of the house. The HomePlace is located north of Wildcat Creek Road and features two suites. The Blue Sage Barn is located south of Wildcat Creek Road and can host events for over 125 guests, for meetings, weddings, and more (Prairiewood, 2023).

Existing Conditions at Prairiewood

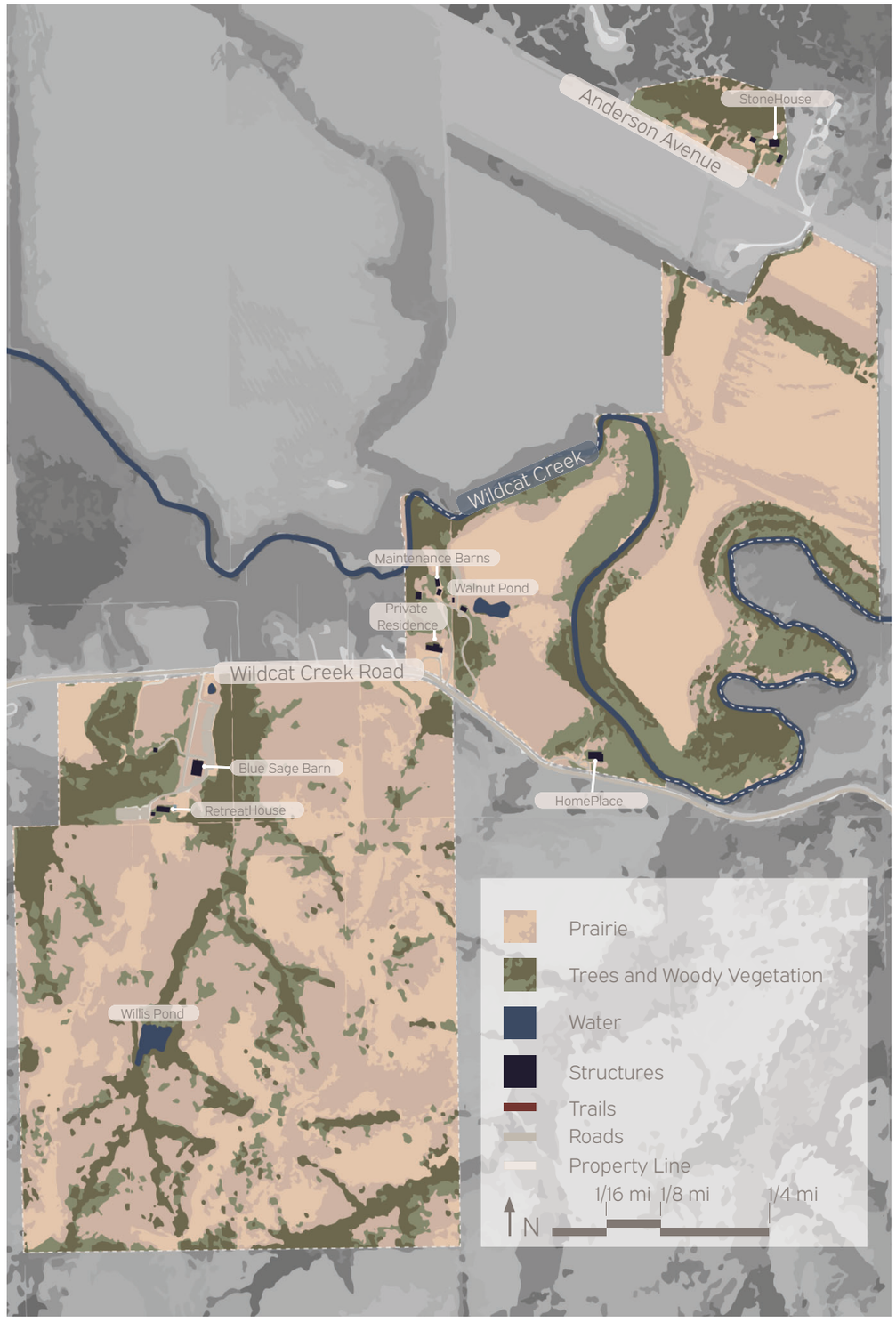


Figure 4.3: Existing Conditions at Prairiewood (Sharp 2023)

Land Types at Prairiewood

Most of the land at Prairiewood is protected tallgrass prairie that guests and visitors can enjoy by walking or hiking on the miles of trails throughout the site. Just south of Anderson Avenue there is about 100 acres of farmland that is owned by Prairiewood by leased out to a farmer (Prairiewood, 2023).

Southeast of the farmland is the Bird, Bee, and Butterfly Sanctuary. One mile of trails circles this prairie land, giving visitors views of tallgrass prairie, woods, and Wildcat Creek that meanders through the site. Walnut Pond is located here, giving guests a picturesque spot for picnics, sand beach, and open lawn to play (Prairiewood, 2023).

South of Wildcat Creek Road is Willis Prairie. This part of the site is over 200 acres of prairie and riparian forests. The 3.5 miles of trails roam throughout the site, going up to outlooks, where visitors can see the surrounding rolling hills of the Flint Hills. Willis Pond, a small pond that guests can walk to and enjoy sits within the prairie. The Willis Prairie is connected to the Bird, Bee, and Butterfly Sanctuary by a small underground passage and gateway located beneath Wildcat Creek Road (Prairiewood, 2023).

Existing Landscape at Prairiewood

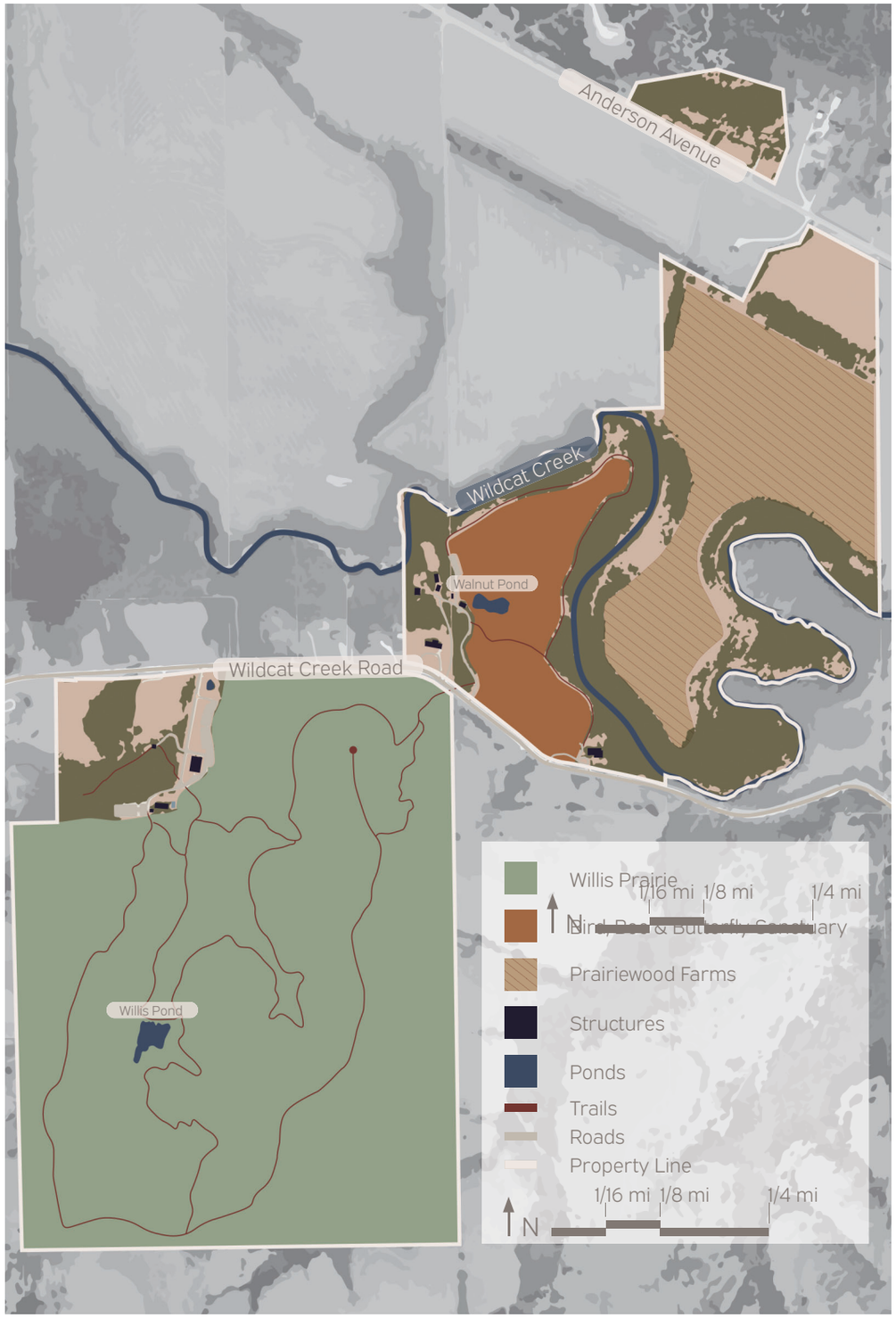


Figure 4.4: Existing Landscape at Prairiewood (Sharp 2023)

Prairiewood Soil Map



Figure 4.5: Prairiewood Soil Map . Adapted from USDA Web Soil Survey (Sharp 2023)

	4050	Ivan and Kennebec silt loams, occasionally flooded
	4051	Ivan silt loam, channeled
	4530	Benfield-Florence complex, 5 to 30 percent slopes
	4590	Clime-Sogn complex, 3 to 20 percent slopes
	4625	Dwight-Irwin complex, 1 to 3 percent slopes
	4783	Tully silty clay loam, 3 to 7 percent slopes
	4784	Tully silty clay loam, 3 to 7 percent slopes, eroded
	7170	Reading silt loam, rarely flooded
	7174	Reading silt loam, 1 to 3 percent slopes
	7690	Wymore-Kennebec complex, 0 to 17 percent slopes
	9999	Water

Table 4.1: Soil Map legend. Adapted from USDA Web Soil Survey (Sharp 2023)

Soils at Prairiewood

There are a variety of soils at Prairiewood. Floodplains, slope, and planting relate to soil types, so knowing what kinds of slopes are on site is important before making major changes to a site.

Further information on each of the soil types at Prairiewood can be found through the USDA's Web Soil Survey.

Prairiewood Slope Map

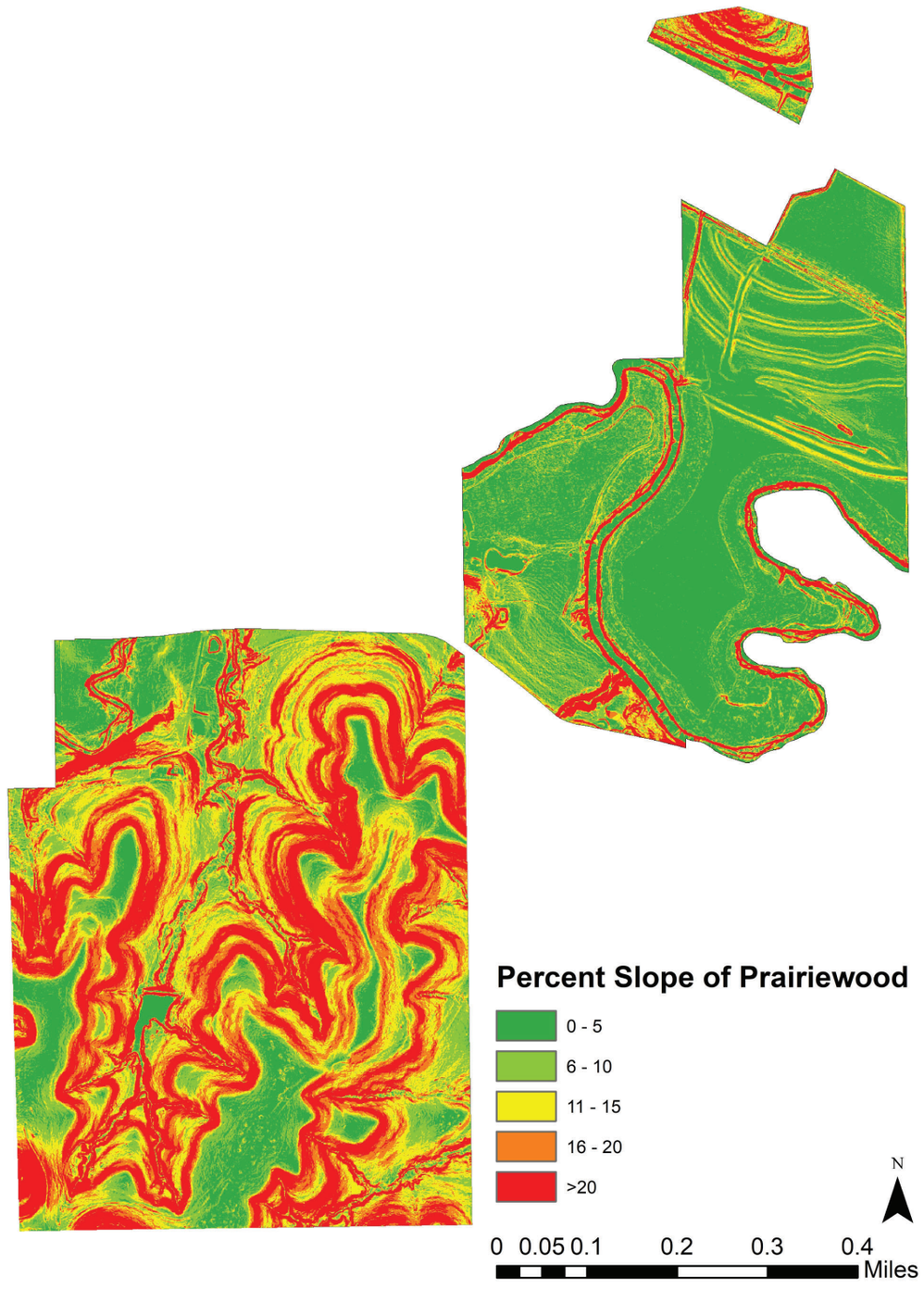


Figure 4.6: Prairiewood Slope Map. Adapted from Riley County GIS (Sharp 2023)

Slope of the Land

The land, over 350 acres, at Prairiewood, has a variety of landforms, from lookout points on hilltops to creeks and ponds settled into the prairie. Understanding the slope of the land is essential to planning any design. Factors to pay attention to are high points, low points, steep slopes, and flat areas. Ensuring that areas of high slope percentage are avoided in development, or planned extremely carefully, is important to prevent damage and erosion to the land during construction. Generally speaking, flat areas are best for development, but it is crucial to examine the surrounding context. If the areas of low slope are in a floodplain, or sensitive land type, then development is unwise and strongly discouraged. For Prairiewood, protecting the riparian forests surrounding Wildcat Creek on the north parts of the site, and the riparian forests throughout the Willis Prairie on the south of the site is a priority of the design. Protecting these land types is important not only for the character of the site, but also to protect the natural features, and provide of buffer from any potential flooding.

Water Utilities



Figure 4.7: Water Utilities at Prairiewood. Adapted from Riley County GIS Information (Sharp 2023)

Water and Wastewater Utilities

Prairiewood's location just outside of Manhattan's city limits means that the site's water utilities are provided and serviced by both the City of Manhattan, and Riley County. The utilities located on the northwest corner of the site near St. Luke's Lutheran Church and associated school are serviced by the City of Manhattan, and all other utilities on site are serviced by Riley County. Knowing where existing water utilities are located is useful to plan future developments, and connecting to these existing lines is wise and generally more cost-effective, rather than installing new systems that would require drilling wells to find potable water and ripping up land for installation of decentralized wastewater treatment systems.

Floodway Map

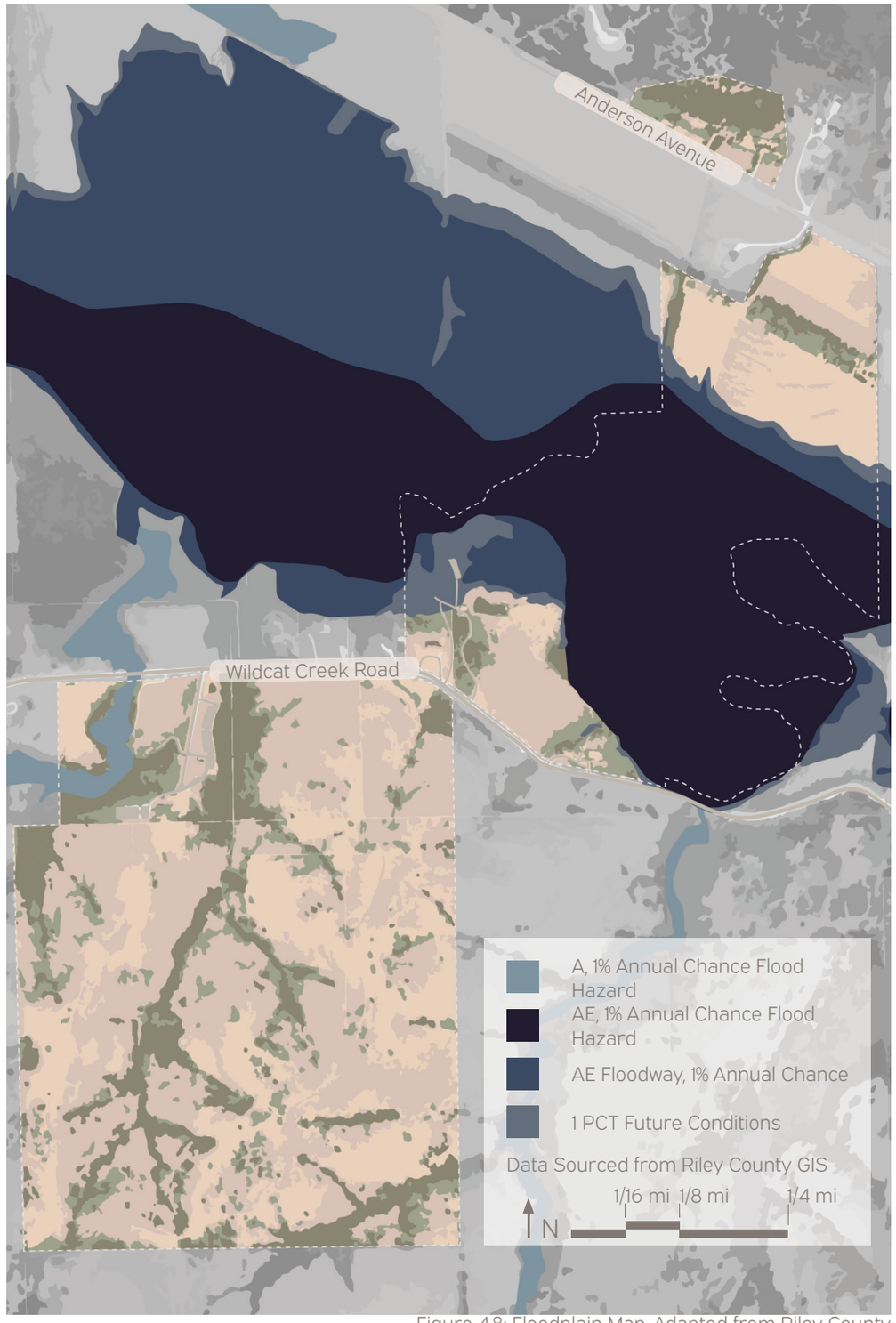


Figure 4.8: Floodplain Map. Adapted from Riley County GIS Information (Sharp 2023)

Floodway

Some of the land of Prairiewood sits within a 100-year floodplain due to Wildcat Creek and is tributaries. According to the Kansas Department of Agriculture's Floodplain Quick Guide (2018), Zone A is "The special flood hazard area without BFEs" (Kansas DOA, 2018). A BFE, or Base Flood Elevation, is "The water surface elevation of the base flood rounded to the nearest whole foot" (Kansas DOA, 2018). Zone AE is the 1%, or 100-year floodplain with BFE's (Kansas DOA, 2018). The map in Figure 4.8 also notes the flood hazard areas, which extend beyond the 100-year floodplain in some areas.

In areas prone to flooding, avoiding development in the floodplain is a good idea to prevent increasing the floodplain or flood depths and to avoid possible damage from flooding to buildings and infrastructure.

Circulation



Figure 4.9: Circulation Map (Sharp 2023)

Circulation

The Prairiewood property is fragmented into three different areas. Anderson Avenue divides the site in the north. This road has a 45 MPH speed limit, so visitors to the site should be cautious of cars on the road when making turns into northernmost properties, including the StoneHouse. Currently there are no roads into Prairiewood Farms.

To the south, Wildcat Creek Road divides the middle and southern properties. This is a gravel road, with a speed limit of 30 MPH. A driveway off this road leads to the HomePlace and has parking for visitors staying at the suites here. To the east, branching off Wildcat Creek on the northern side, there is a narrow gravel road that leads to Walnut Pond and mowed walking trails through and along the restored/planted prairie. There are several parking spaces for visitors to use. Further east down Wildcat Creek Road is the entry that leads towards the Blue Sage Barn, and up a steep gravel drive to the Retreat House. Parking lots are located near each of these structures for visitors.

All the Prairiewood roads are gravel roads, which is less environmentally harmful than pouring concrete roads, but can be challenging to navigate in snow and rain and require slow speeds for safety. The trails through the prairie on the Willis Prairie and the Bird, Bee, and Butterfly Sanctuary are mowed paths, then worn down to soil or rock by foot traffic.

Character of the Land

Prairiewood is an excellent site for a projected design when looking at the balance of preservation and development because of the vast acreage and character throughout this beautiful Flint Hills and Wildcat Creek landscape. In the Willis Prairie, there are miles of trails, allowing visitors to explore prairie and riparian forest. A small pond in the middle of the prairie sits in a low point of the prairie. From a majority of the trails, the roads around the site can only be heard as a soft hum. Wildlife, like deer and turkeys, can be seen wandering throughout the prairie and hiding in the trees. The trails move up and down along the sides of the hills, reaching up to two different high points, where visitors can look out throughout the surrounding land, such as Liquid Art Winery, nearby developments, and Manhattan to the east. Occasionally a helicopter will fly overhead, or visitors will be able to hear noise from Fort Riley to the west.

On the parts of the site north of Wildcat Creek Road, the hum of traffic is a little bit louder, but still easily covered by the sound of leaves and grass crunching under feet along the pathways, or window blowing through the trees and the tallgrass. The loop around the Bird, Bee, and Butterfly Sanctuary is much shorter than the trails in the Willis Prairie, but still highlights the character and beauty of Prairiewood. The trail hugs the tree-line that buffers Wildcat Creek, and these trees provide some shade for visitors along the trail. Looking inward to the site, the Bird, Bee, and Butterfly Sanctuary is filled with various prairie plants and grasses. During some part of the year, the prairie is hayed or mowed. Looking out to the neighboring land, visitors can see and hear some farm equipment and catch glimpses of the long rows of plowed land. Even through the trees, the wind can blow through the site, moving the grasses. Visitors can imagine the sea of yellow and green tallgrass that once filled the entire region, but is now condensed into small patches of preserved land.



Figure 4.10: Willis Prairie Trails (Sharp 2022)



Figure 4.11: Bird, Bee & Butterfly Sanctuary (Sharp 2023)



Figure 4.12: Wildcat Creek (Sharp 2023)



Figure 4.13: Prairiewood Farms (Sharp 2023)



Figure 4.14: Retreat House (Sharp 2022)

Considerations for Development

When thinking about the balance of design and preservation, looking at the landscape and knowing what areas to NOT develop is a critical part of the design process. First, areas that would be impossible to develop are eliminated, such as any spots with water or places where the slope would prevent development. Areas within the 100-year floodplain should also be eliminated from the site considerations to protect the existing landscapes and any proposed developments from flooding. If a buffer around the floodplain can be put in place, this should be considered to protect land that might be impacted by larger floods outside of 100-year storm events.



Figure 4.15: Willis Prairie, looking northwest towards the Blue Sage Barn (Sharp 2022)

Once primary environmental considerations have been taken into account when looking at potential development locations, land that represents the character of the site should also be preserved. For Prairiewood, this means protecting as much of the tallgrass prairie and riparian forest as possible. In places like the Bird, Bee, and Butterfly Sanctuary, which are filled with restored tallgrass prairie plantings, protecting the land helps encourage long-term soil health and native plant and animal conservation. Next, developers and designers should think about the impact of construction and development on the land. The materials and machines that will be needed for construction can wipe out or disrupt plants and compact the land on and surrounding the development, so keeping any development clustered to existing structures or close to existing roads helps reduce impact of the land.

When taking these factors into account for Prairiewood, several options for development are revealed, varying in location and size. All development sites have pros and cons to them and must be designed according to the land they sit on to best respond to both existing and future conditions.

Selecting Development Locations

When selecting the locations for any developments in the projected design, who priorities were keeping any development outside of the 100-year floodplain, and away from areas that have over 15% slope across the space. Developing within these areas could be extremely damaging to the land, making any development susceptible to flooding and erosion.

Once these areas had been removed from consideration, the next priority was to locate development near any existing roads and existing development to cluster development. Putting development in the center of the site, away from existing development would fragment the site, putting ecosystems and habitats at risk.

Once these considerations had been taken into account, three areas were revealed as possible locations for development and design opportunities. Two of the sites are located off Wildcat Creek Road, and one is located off Anderson Avenue. These three locations would provide various opportunities based on their location and context for the development of residential communities.

Analysis for Development Locations

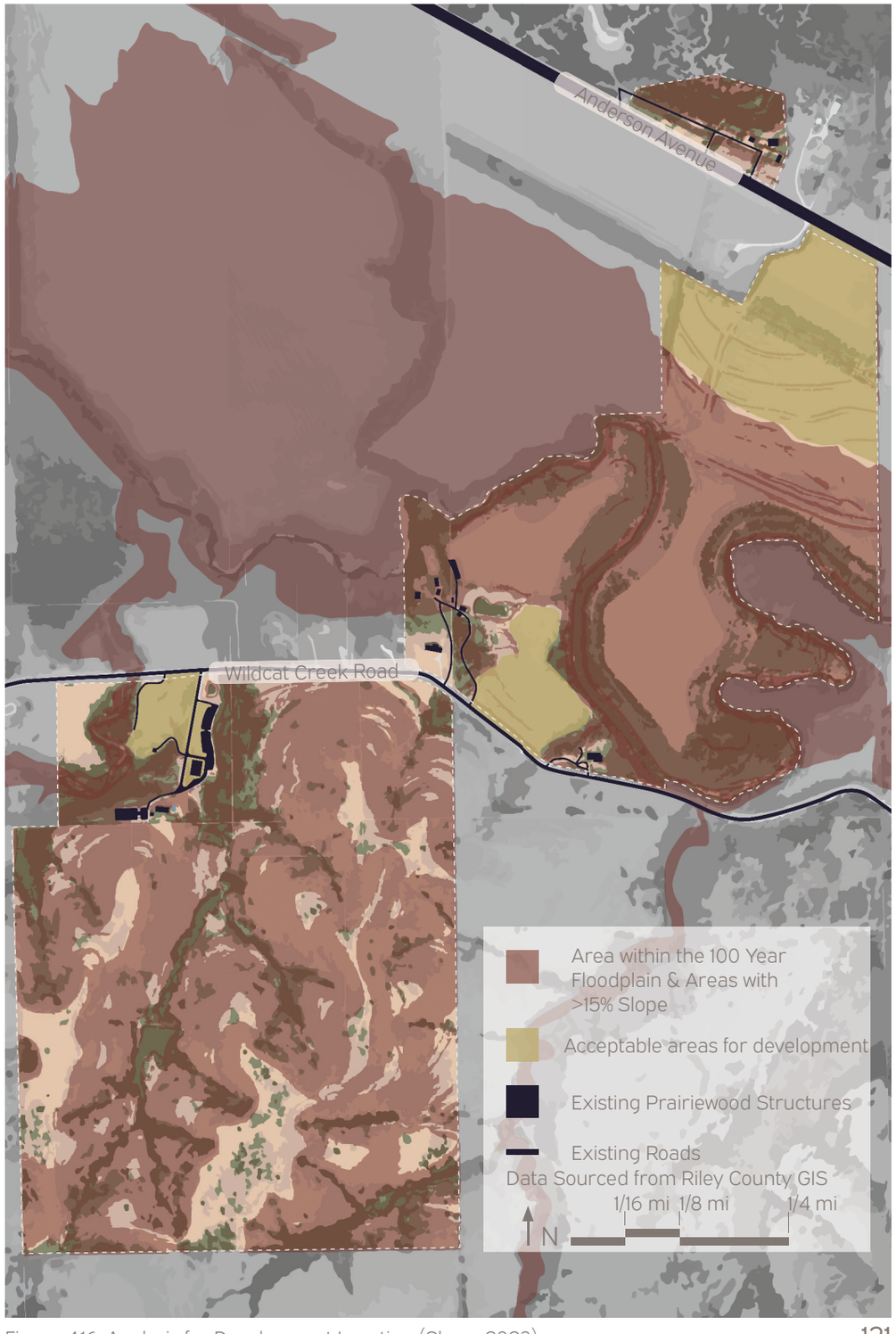


Figure 4.16: Analysis for Development Location (Sharp 2023)

PROJECTIVE DESIGN

Three Clusters of Development

Moving to the application of the projected design, it is important to repeat that this is not a design intended for the future of the property. Any reference to design or application is a theoretical application and exploration of an idea and study of development styles, relating to the landscape architecture concepts of environment and community.

For this report, three clusters of development will be explored, based on the author's analysis of the site.

Willis Development

The first cluster will be referred to as the hypothetical Willis Development, located near the Willis Prairie, Blue Sage Barn, and the Retreat House. The Willis Development will include a cluster of townhomes and single-family homes to the west of the drive that leads to the Blue Sage Barn and Retreat House. The Blue Sage Barn can act as a community gathering space for this cluster of residences. The nearby creek and riparian forest provide shade provide shade along the western side of along the western side of this development and also provide a buffer from the neighboring land. Lawn and open flex land located to the south of a community garden provide an area for children to play, and to host community gatherings. The Willis Development will have close access to the 3.5 miles of trail networks within the Willis Prairie.



Figure 4.17: Walnut Lake at Prairiewood's Bird, Bee & Butterfly Sanctuary (Sharp 2023)

Wildcat Development

The second conceptual development will be referred to as the Wildcat Development, which will be located north of Wildcat Creek Road, southeast of Walnut Pond, and west of the Home Place residence and suites. This development contains 12 single-family homes and a centrally located common house. The residences are grouped around three cul-de-sacs. The development has a close connection to all trails on site, with the nearby Bird, Bee, and Butterfly Sanctuary, the underpass connection to the Willis Prairie, and proposed trails northeast of this development, giving residents access to 6 miles of trails. There is also a community garden with raised beds and in-ground planting, and fruit producing trees along the northern part of the development.

Anderson Development

The third cluster for the projective design will be called the Anderson Design, located south of Anderson Avenue. This hypothetical development will be like a standard co-housing community, with 18 single-family homes around a shared common house. A road circles the development, creating a pedestrian friendly central green space. This green space has a large lawn, a community garden, and a nature playground. To the south of the development is 1.5 miles of proposed trails surrounding the restored prairie, formerly known as Prairiewood Farms.



Figure 4.18: Entry Sign at Prairiewood's StoneHouse (Sharp 2023)

Three Development Clusters at Prairiewood



Figure 4.19: Development Locations (Sharp 2023)

Trails on Site

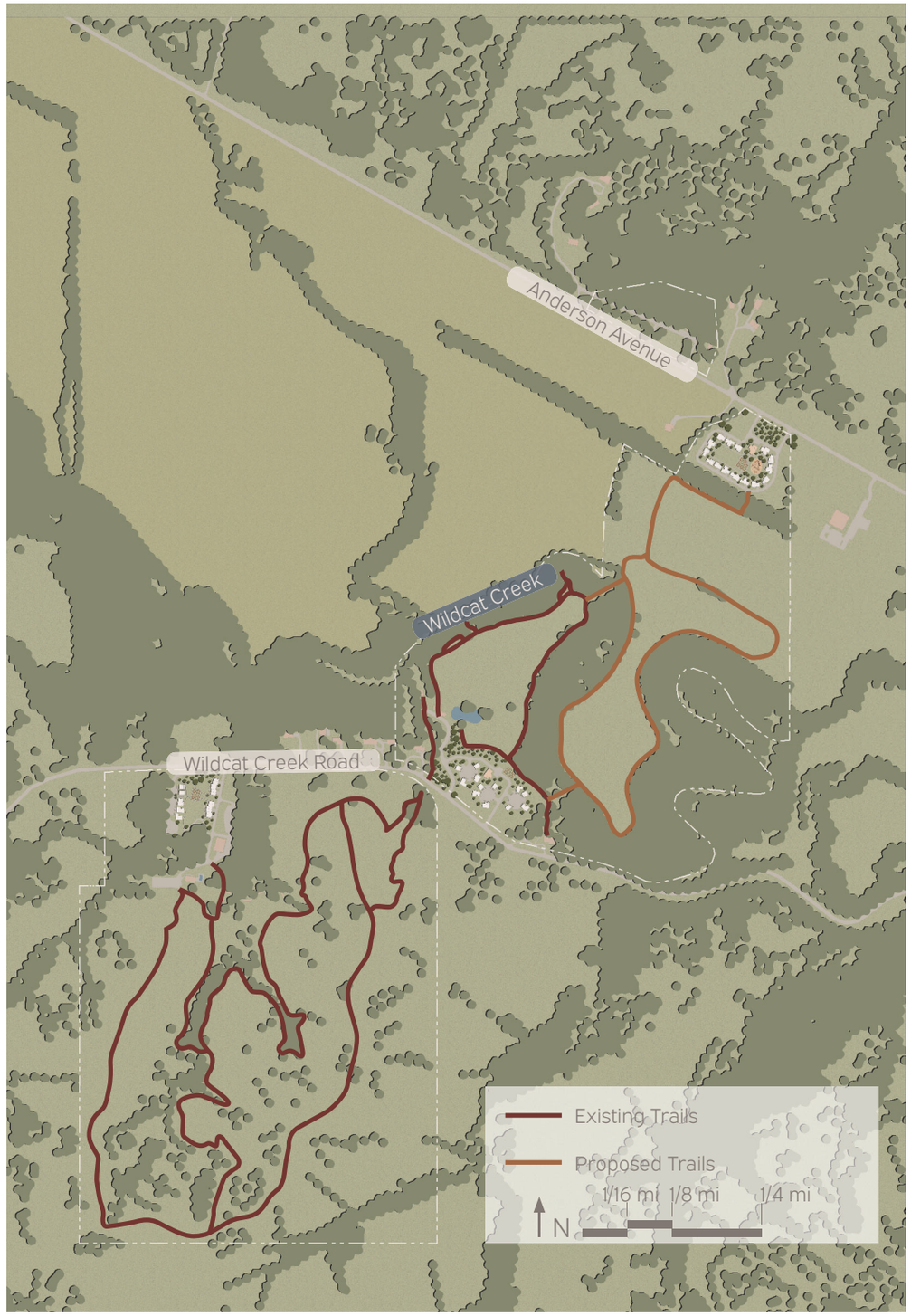


Figure 4.20: Site Trails (Sharp 2023)

Programming the Site

The first step of programming the site for the projected design was to look at the existing programming at Prairiewood. As previously mentioned, the southern part of the site has 3.5 miles of trails, and the northern part of the site has an additional mile of trails. Walnut Pond, near the Bird, Bee & Butterfly Sanctuary, has a small beach for visitors to enjoy. Prairiewood has a canoe that can be rented, and visitors can spend the afternoon paddling down Wildcat Creek.

For the proposed developments, the amenities and programming are connected to the existing network of trails. Each of the developments has a community garden. Including a garden with each development increases accessibility to fresh food, like vegetables and herbs for residents. Fruit and nut trees and shrubs with edible berries could also be planted for people to care for and enjoy harvesting and eating. These plantings may attract deer and other wildlife, so fencing or other protection would be essential to protect the plantings.

Programming of the Site



Figure 4.21: Green Amenities (Sharp 2023)

Each development also includes an open lawn space. The lawn allows each group of residents to use the space as they see fit. Children in the development can use the lawn to play games, organize sporting events, or run around and burn off energy. Residents can host gatherings outside when the weather is nice, have snowball fights in the winter, or use the space however they need to.

Additional trails and connections have been designed around what is currently Prairiewood Farms. Converting the farmland to restored prairie adds an additional 80 acres of restored prairie to the site. A trail surrounding the prairie will allow residents to witness and be involved in the process of converting the land back to tallgrass prairie, seeing the various stages of land restoration and the various types of prairies throughout the property of Prairiewood.

The third development, the Anderson Development, is designed with a nature playground. Giving children a dedicated space is important to help them feel connected to their community and neighborhood. Designing the playground to be made with rope, wood, and stone, rather than plastic, helps to give children a better connection to natural materials and is much more sustainable.

Home Design and Layout

The design of the overall developments is not the only thing that affects the community atmosphere. The layout of individual homes can affect people's daily lives and their interactions with neighbors.

By putting the bedrooms at the back of the house, and putting the kitchen, living room, and dining area at the front of the house, views are directed outward towards the community spaces, rather than inward.

Each of the single-family homes in the design has a front porch. This is a transition zone between the home and the community spaces, such as the lawn, community garden, or the common house.

For this project, there are five different single-family home designs, to accommodate a variety of people. There is one home with four bedrooms, two homes with three bedrooms, and two homes with two bedrooms. In the Wildcat Development, each of the homes has an attached two car garage for parking and storage, refer to figures 4.22 - 4.27.

House 4a: Four bedrooms, two bathrooms

Square Footage: 1457 sq. ft.

Garage: 576 sq. ft.

Porch: 263.2 sq. ft.

Room Dimensions:

Bedroom 1: 10′ x 10′

Bedroom 2: 10′ x 10′

Bedroom 3: 9′ x 13′ 11″

Bedroom 4: 12′ x 13′ 8″

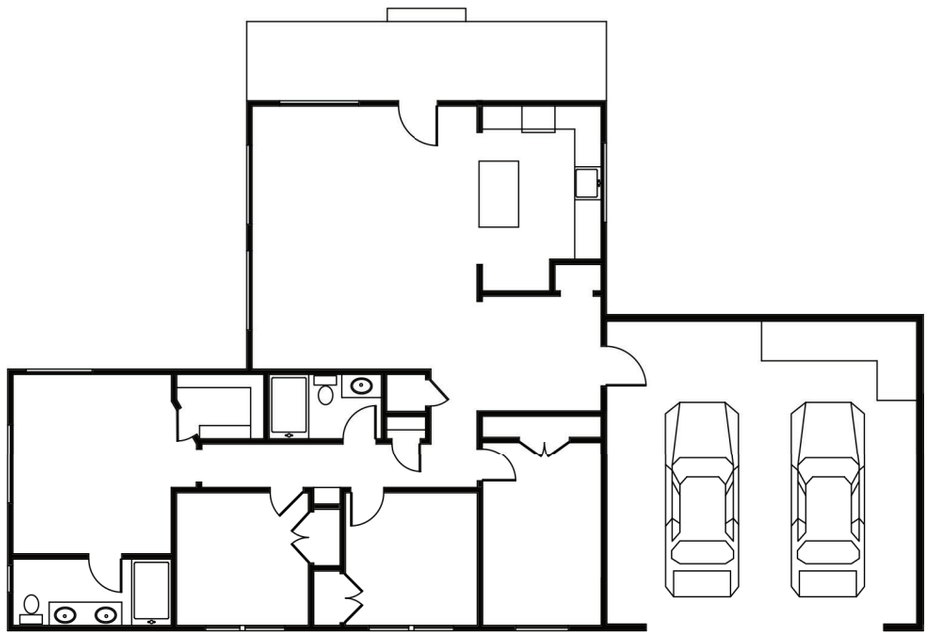


Figure 4.22: House 4a Floor Plan (Sharp 2023)

House 3a: Three bedrooms, two bathrooms

Square Footage: 1469 sq. ft.

Garage: 720 sq. ft.

Porch: 337 sq. ft.

Room Dimensions:

Bedroom 1: 12′ 6″ x 13′

Bedroom 2: 12′ 6″ x 17′ 8″

Bedroom 3: 14′ 7″ x 12′ 7.5″

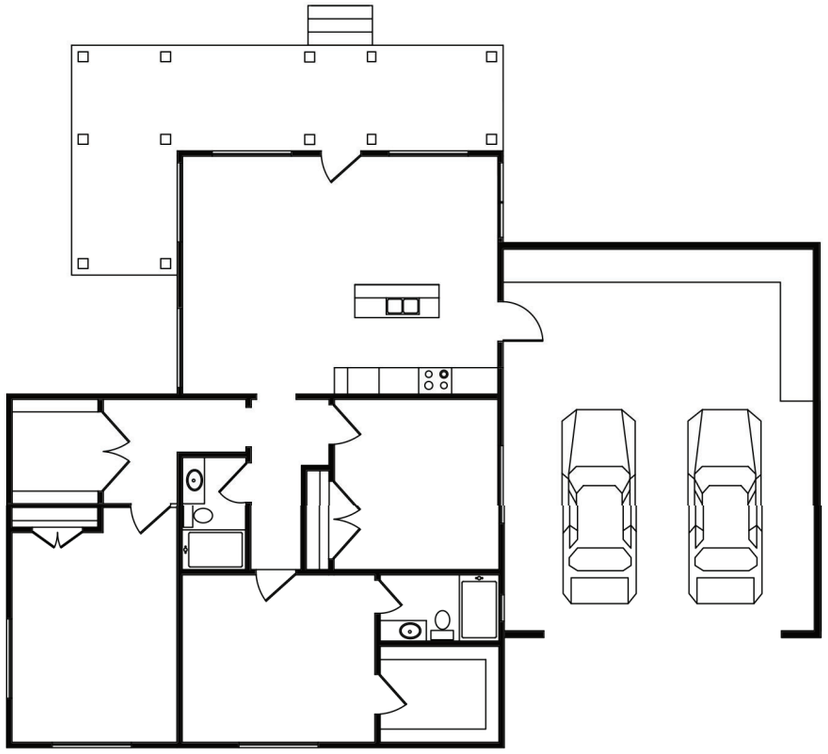


Figure 4.23: House 3a Floor Plan (Sharp 2023)

House 3b: three bedrooms, two bathrooms

Square Footage: 1588 sq. ft.

Garage: 576 sq. ft.

Porch: 263.2 sq. ft.

Room Dimensions:

Bedroom 1: 13′ 2″ x 11′ 2″

Bedroom 2: 13′ 2″ x 11′ 2″

Bedroom 3: 16′ x 14′ 9″

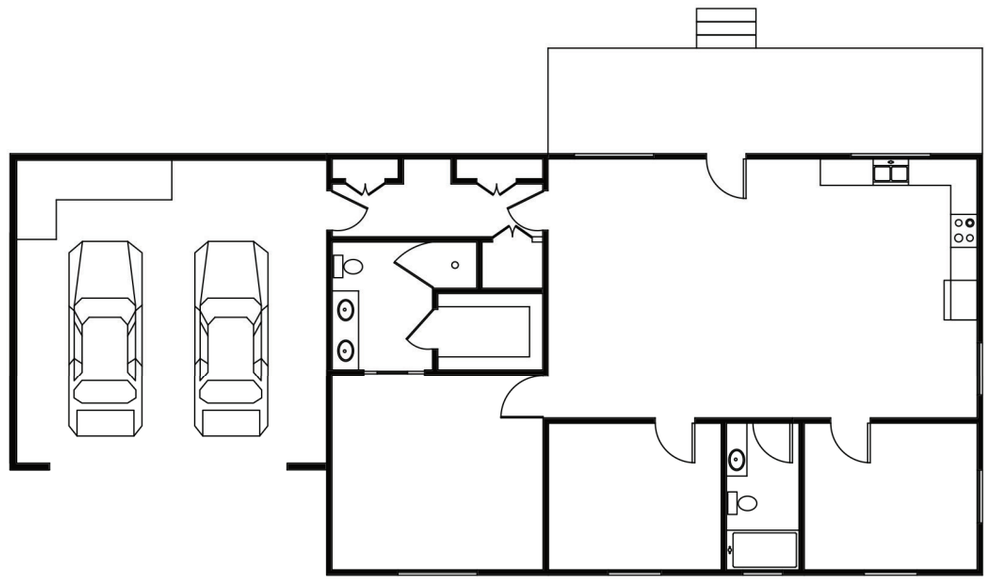


Figure 4.24: House 3b Floor Plan (Sharp 2023)

House 2a: two bedrooms, one bathroom

Square Footage: 1050 sq. ft.

Garage: 720 sq. ft.

Porch: 280 sq. ft.

Room Dimensions:

Bedroom 1: 11′ x 9′ 8″

Bedroom 2: 13′ 11″ x 12′

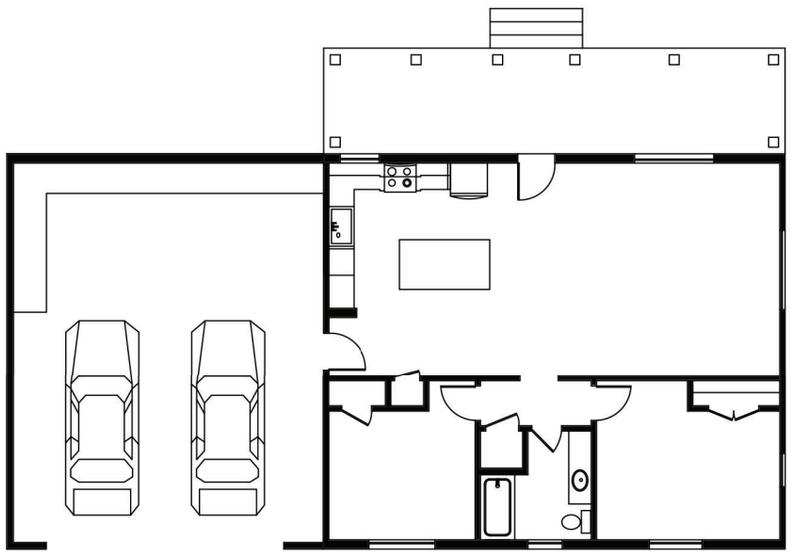


Figure 4.25: House 2a Floor Plan (Sharp 2023)

House 2b: two bedrooms, one bathroom

Square Footage: 925 sq. ft.

Garage: 648 sq. ft.

Porch: 241 sq. ft.

Room Dimensions:

Bedroom 1: 13′ x 9′ 8″

Bedroom 2: 16′ x 12′

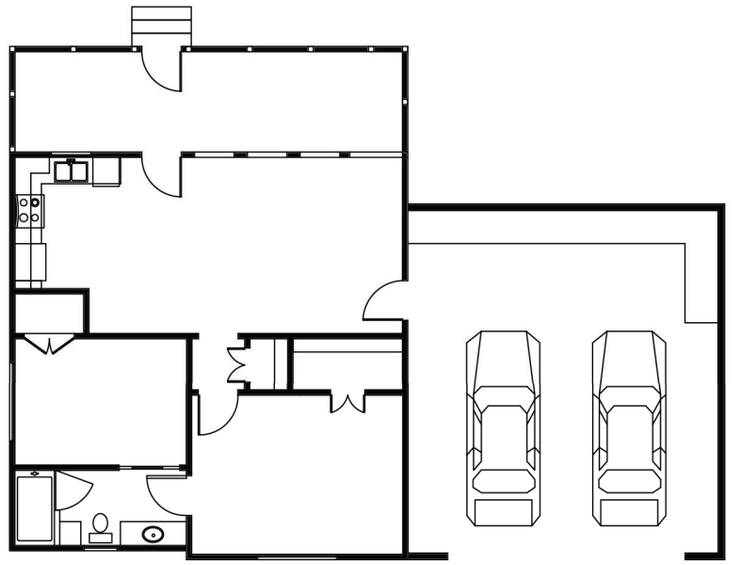


Figure 4.26: House 2b Floor Plan (Sharp 2023)

Townhome two bedrooms, one bathroom

Square Footage: 1264 sq. ft.

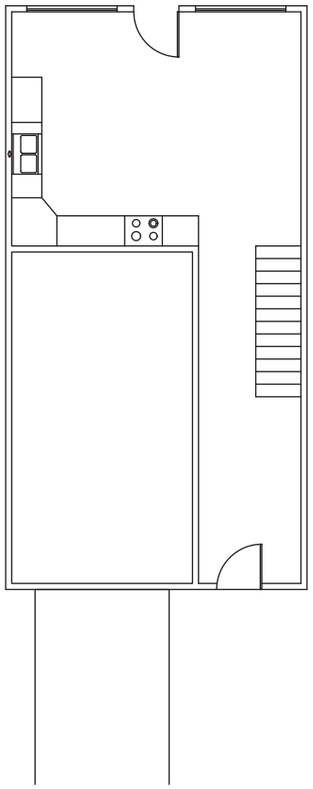
Garage: 292 sq. ft.

Room Dimensions:

Bedroom 1: 14′ 8″ x 16′ 2.5″

Bedroom 2: 12′ 9″ x 19′ 2.5″

Lower Floor



Upper Floor

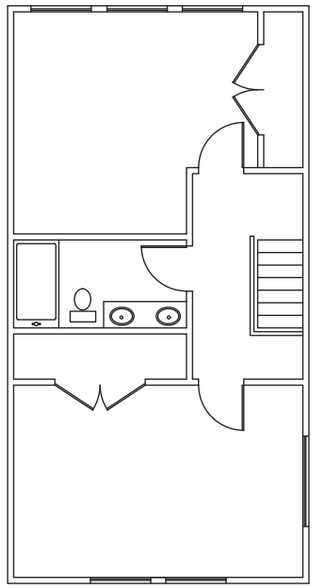


Figure 4.27: Townhome Floor Plan (Sharp 2023)

To focus on the design of the landscape, the homes and townhomes will be represented as white masses with pitched roofs. However, it is beneficial to see inspirational photographs and vision boards of homes and residential communities to communicate the design's intention.









Top Left- Figure 4.28: Highlands_langley_pocket_neighborhood "File:Highlands langley pocket neighborhood.jpg" by Jtmorgan is licensed under CC BY-SA 4.0.
Middle Left- Figure 4.29: Oak Terrace Preserve, a sustainable community" by North Charleston is licensed under CC BY-SA 2.0.
Bottom Left- Figure 4.30: "Ansley Park Neighborhood, Atlanta" by danxoneil is licensed under CC BY 2.0.
Right- Figure 4.31: "268/365 ~ Fair Oaks Park #fairoaks #california #park #playground #panorama #trees #people" by ray_explores is licensed under CC BY 2.0.

Willis Development Inspiration Board







Top- Figure 4.32: Prairie field southeast of the Blue Sage Barn, where the Willis Development design is located (Sharp 2023)
Above- Figure 4.33: Looking south into the site, showing non-native prairie and riparian forest. (Sharp 2023)
Right- Figure 4.34: Gravel road to the east of the site (Sharp 2023)

Blue Sage Barn & Willis Prairie at Prairiewood





Above- Figure 4.35: Blue Sage Barn at Prairiewood (Sharp 2022)
Left- Figure 4.36: Small gathering space near Blue Sage Barn at Prairiewood (Sharp 2022)
Bottom Left- Figure 4.37: Trails and scenic outlook in Willis Prairie at Prairiewood (Sharp 2022)
Bottom Right- Figure 4.38: Site Map showing site feature and existing trails. Information sourced from Google Earth (Sharp 2023)







Willis Development's Projected Design

The Willis Development is located just south of Wildcat Creek Road, southeast of the Blue Sage Barn. There is an existing road leading to the Blue Sage Barn and the Retreat House, which the design builds off. Taking advantage of existing infrastructure can help eliminate the need for excess materials. While the location of this development is close to a floodplain, from a tributary of Wildcat Creek, the riparian forest buffers the floodplain. The design of this residential co-housing community considers the floodplain, and keeps development set as far east as possible, to keep any homes safe from potential flooding during heavy rain events.

The design for the Willis Development, named after the surrounding prairie to the south of the site, contains two groups of six townhouses and five single-family homes. The design differs from the other developments, including townhomes rather than only single-family homes, but because of the smaller size of the site, the slope of the site, and the nearby floodplain, the townhomes help to increase density in this development.

Figure 4.39: Willis Development Plan Render (Sharp 2023)



Figure 4.40: Townhomes and prairie buffer at Willis Development (Sharp 2023)

The existing slope of the road is a major guiding force in the design of the Willis Development. Building the townhomes off the main entry road means that a drop of the slope occurs at the end back of the townhomes. The foundation of the homes can be built down to provide additional support, and raised decks extend behind the houses to give residents an outdoor gathering space connected to their homes.



Figure 4.41: Townhomes and Blue Sage Barn at Willis Development (Sharp 2023)

The proximity to the Blue Sage Barn is a significant amenity to this community. This indoor space can act as a common gathering place for residents of the Willis Development, like a common house in a co-housing community. Being able to host all community members and guests in one space is beneficial to host gatherings, host events, and hold meetings on matters relating to upkeep and community issues. The Blue Sage Barn currently is open to rent for weddings, parties, and other events. Keeping this as an option will help bring in revenue to the development and bring the public to the site, seeing how community and environment can be balanced in residential communities.

The connection of the homes and grouping the townhomes into groups of six can help reduce materials by sharing walls. Between the groups of townhomes there is a 25-foot break, to allow sunlight in. All the townhomes will have the same or mirrored layout, to simplify the construction process, and keep the units as affordable as possible. Each of the townhomes has a garage, deep enough to hold two cars, or can have one car and be used for extra storage. The parking lot for the Blue Sage Barn can be used for visitor parking when there are no events at the barn.

Figure 4.42: Community Garden at Willis Development (Sharp 2023)



Another amenity of the Willis Development is a community garden. Including a garden in the development will bring residents together in a shared activity and increase access to fresh food. Small herb and flower gardens can be planted outside of the homes for more personal gardening. The shared community garden is an opportunity to grow and share food among the residents of the development. The garden will include raised beds and in-ground planting, to make gardening more accessible to all people, and provide a variety of beds for different produce. To the north of the community garden, native trees, shrubs, and tallgrasses act as a visual and sound buffer from Wildcat Creek Road.

The orientation of the townhouses allows for evening light coming from the west, and the porches facing west allow residents to enjoy Kansas sunsets. The porch stairs lead down to the prairie and lawn behind the townhomes, where residents can grow their own personal flower and herb gardens.

To the west, down the hill on the development are five single-family homes. There is a four-bedroom home, two three-bedroom homes, and two two-bedroom homes, to allow for diversity of family sizes and residents. Due to the limited space in the development, there are no attached garages with these homes, instead there are parking spaces off the road, to the back of the homes. Sidewalks connect the homes and the parking lot and connect the homes to the community garden and townhomes.



Figure 4.43: Single-family homes at Willis Development (Sharp 2023)

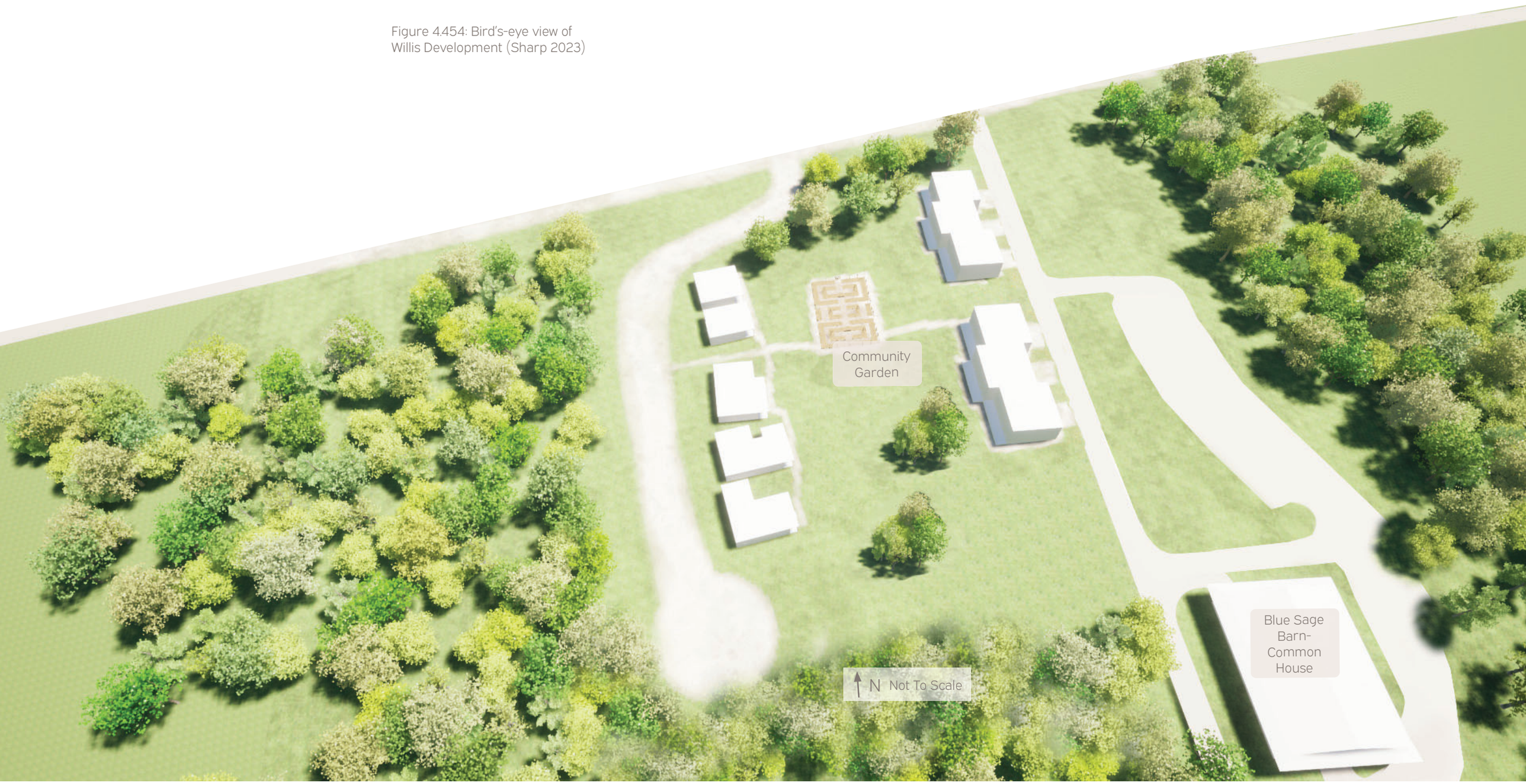


Figure 4.44: Townhomes and planting at Willis Development (Sharp 2023)

As previously mentioned, the existing roads at the Willis Development will be used for residents. Driveways for the townhomes branch off the west side of the main road, while the parking for the Blue Sage Barn extend off the east side of this road. The service road down the hill is expanded to accommodate the traffic from residents. Not only does using existing road eliminate the need for construction of an additional entry, but it also ensures fire access with the existing loop around the Blue Sage Barn parking. To ensure fire access and a turnaround space for residents of the detached single-family homes, a cul-de-sac is at the end of the road, sized to county regulations.

While this development is small in its size and acreage, it fits 17 residences between the townhomes and the detached single-family homes. The Blue Sage Barn, community garden, and open lawn are all places where community members can gather and host a variety of activities for the development.

Figure 4.454: Bird's-eye view of Willis Development (Sharp 2023)



Wildcat Development Inspiration Board









Top- Figure 4.46: Canoe to paddle Wildcat Creek around Prairiewood property (Sharp 2023)
Above Left- Figure 4.47: Trail through the Bird, Bee, & Butterfly Sanctuary (Sharp 2023)
Above Right- Figure 4.48: Riparian forest surrounding the Bird, Bee & Butterfly Sanctuary. (Sharp 2023)
Right- Figure 4.49: Site Map showing site feature and existing trails. Information sourced from Google Earth (Sharp 2023)

Bird, Bee & Butterfly Sanctuary at Prairiewood









Top Left- Figure 4.50: Walnut Pond at the Bird, Bee & Butterfly Sanctuary at Prairiewood (Sharp 2023)
Top Right- 4.51: Trail surrounding the Bird, Bee & Butterfly Sanctuary at Prairiewood (Sharp 2023)
Above- Figure 4.52: Bird, Bee & Butterfly Sanctuary at Prairiewood (Sharp 2023)
Left- Figure 4.53: Wildcat Creek surrounding the Bird, Bee & Butterfly Sanctuary at Prairiewood (Sharp 2023)



Wildcat Development

The Wildcat Development is named after Wildcat Creek, which is just west of this development. This residential co-housing community is made up of twelve single family homes, a common house, and a community garden. This site is located just north of Wildcat Creek Road, to the west of the existing entrance that leads to Walnut Pond and the existing trail around the Bird, Bee, and Butterfly Sanctuary.

Figure 4.54: Willis Development Plan Render (Sharp 2023)



Figure 4.55: Community Garden at Wildcat Development (Sharp 2023)

While the site is located within the restored plantings of the Bird, Bee, and Butterfly Sanctuary, this space was still considered acceptable for development for this project based on the proximity to the existing roadway. Because the design for this site eliminates some of the restored prairie on site, additional plantings, and restoration of land in other parts of the site becomes a priority.

Like the Willis Development, the Wildcat Development also has a community garden for residents to come together and grow produce. Personal flower and herb gardens can be grown on front porches and surrounding the homes, but the community garden provides an opportunity for small scale agriculture and shared projects among residents. The community garden is located northeast of the common house and has nearby parking to allow residents to drop off plants and supplies easily. To the west of the community garden is a small grove of fruit and nut trees, increasing the amount of food and produce that residents have fresh and easy access to during the year.

Figure 4.56: Food Forest at Wildcat Development (Sharp 2023)

The Wildcat Development has a centrally located common house, like those in co-housing communities. The common house has a large kitchen for cooking shared meals, a gathering area to eat, and to host community meetings and events, several guest bedrooms to cut down on the footprint of individual homes in the development. A large front and back porch allow for several groups to have spaces to meet separately in the common house, weather permitting. The common house also has spaces for kids to play indoors, and study or workspaces for residents to take advantage of.

Providing these amenities in the common house not only eliminates the need for each home to have these spaces, but it also provides opportunities to interact with neighbors more often when using the shared resources. The common house also has laundry facilities. Each single-family home will have the space and utilities for a washer and dryer connection, but the appliances will not come with the house. Using the laundry facilities in the common house is another opportunity for neighbors to see each other in casual interactions, and sharing the laundry appliances can cut down costs and water usage for each single-family home.

Overall, the goal of the common house is to be a shared space for all residents, and to help facilitate daily interaction that builds community within the development. The resources provided by the common house are for all residents to use, cutting down on extra bedrooms, laundry appliances, and workspaces in individual homes.

The Wildcat Development is also closely located to all the trail networks at Prairiewood. The mile long trail that circles the Bird, Bee, and Butterfly Sanctuary is located just northwest of the site. To the southeast of the site, across Wildcat Creek Road, is a connection to the Willis Prairie, and its 3.5 miles of trails. At the Anderson Development, there is an additional 1.5-mile trail proposed, with two connections to the existing Bird, Bee, and Butterfly trail, one of which would be northeast of the Wildcat Development. This would give the Wildcat Development close access to all trail networks on site, totaling about 6 miles of trails throughout the site.



Figure 4.57: Common House at Wildcat Development (Sharp 2023)

Figure 4.58: Bird's-eye view of Wildcat Development (Sharp 2023)

N Not To Scale

Community Garden

Common House

The layout and design of the homes within the development was an important design aspect to consider when looking at the balance of public and private life when living in a community that has many shared resources.

The three cul-de-sacs in the Wildcat development each have four single-family homes, ranging from two to four bedrooms. The grouping of homes in this way can help to foster smaller communities and friendships among neighbors within the development.

Each of the cul-de-sacs are large enough to meet fire code regulation, and the primary road through the development is also designed for fire-code. Residents are able to park nearby their homes in the parking set off from each cul-de-sac. The circles of each cluster can host small block parties, barbecues, or outdoor neighborhood gatherings.



Figure 4.59: Cul-de-sac at Wildcat Development (Sharp 2023)



Figure 4.60: Cul-de-sac community connection at Wildcat Development (Sharp 2023)

The configuration of the three cul-de-sacs creates small communities within the development. The western most circle and the central circle are closely connected by green space, encompassed by the roads. The eastern and central cul-de-sacs face each other, and are connected by a crosswalk, allowing residents to safely cross the road. While there is not a central green space for gatherings, the large cul-de-sacs are able to host community gatherings. The common house is also located and surrounded by open space for children to play some games.

The connections between the different groupings of homes allow for several levels of community connections. There is the connection between neighbors within the same circle, connections among neighbors between adjacent circles, and connections between neighbors across the entire development. The layout around the circles allows the development to stay confined close to the northern road, giving room for a planting buffer between the development and Wildcat Creek Road.

Anderson Development Inspiration Board





Top- Figure 4.610: Looking southwest towards Prairiewood Farms from Anderson Ave (sharp 2023)
Right- Figure 4.62: Site Map showing site features and existing trails. Information sourced from Google Earth (Sharp 2023)
Below- Figure 4.63: Prairiewood Farms, looking south from Anderson Ave (Sharp 2023)

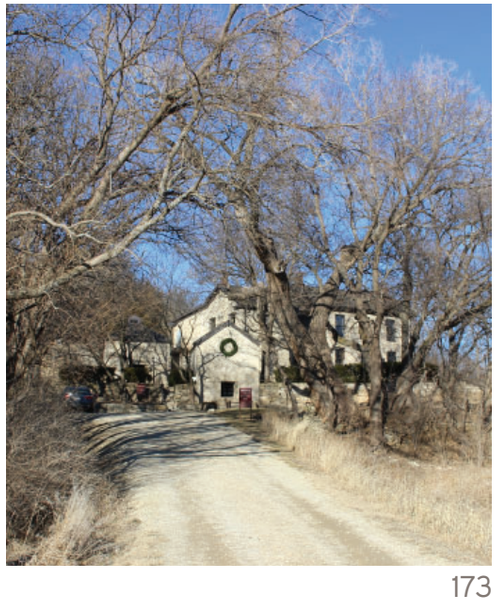








Top (2)- Figure 4.64 & 4.65: St. Luke's Lutheran Church located west of Prairiewood Farms, south of Anderson (Sharp 2023)
Above- Figure 4.66: Current residence located west of Prairiewood Farms, south of Anderson (Sharp 2023)
Right- Figure 4.67: StoneHouse at Prairiewood, north of Anderson (Sharp 2023)





Anderson Development

The Anderson Development, named after its location, south of Anderson Avenue, is the furthest north development of the site. The land is currently called Prairiewood Farms, which is owned by Prairiewood, but leased out to a local farmer.

Transforming the northern part of Prairiewood Farms to the third development, and the rest of the site into restored prairie, adds over 80 acres of prairie to the entire site. The additional acreage of prairie makes up for the loss of some prairie where the Wildcat Development is designed. The Anderson Development also includes a new trail, circling the new prairie, and connecting to the existing trail around the Bird, Bee, and Butterfly Sanctuary.

Figure 4.68: Willis Development Plan Render (Sharp 2023)

The Anderson Development is made up of single-family homes and a common house, similar to the Wildcat Development. Unlike the Wildcat Development, the Anderson Development has 18 single-family homes. There are three different outdoor amenities included here: an open lawn, a community garden, and a nature playground. Garages attached to each home allow for additional storage for residents.

Figure 4.69: Single-family home at Anderson Development (Sharp 2023)



Figure 4.70: Nature playground at Anderson Development (Sharp 2023)



The various outdoor amenities are grouped around different clusters of houses but are all easily accessible to all residents within the community. The nature playground features natural materials, such as dirt, wood, rope, and stone, rather than synthetic materials such as plastic. With the environmental focus on land preservation throughout the site, the playground activates the theme of connecting with nature. Allowing various levels of risk in a playground encourages children to push themselves when playing, in a safe way of course. The playground allows children to climb on hills, rocks, and rope structures, testing their climbing abilities and balance from a safe distance. Swinging equipment helps kids understand movement and speed. Allowing children to play in creative ways is important for their physical and mental development, as does encouraging imaginative play.

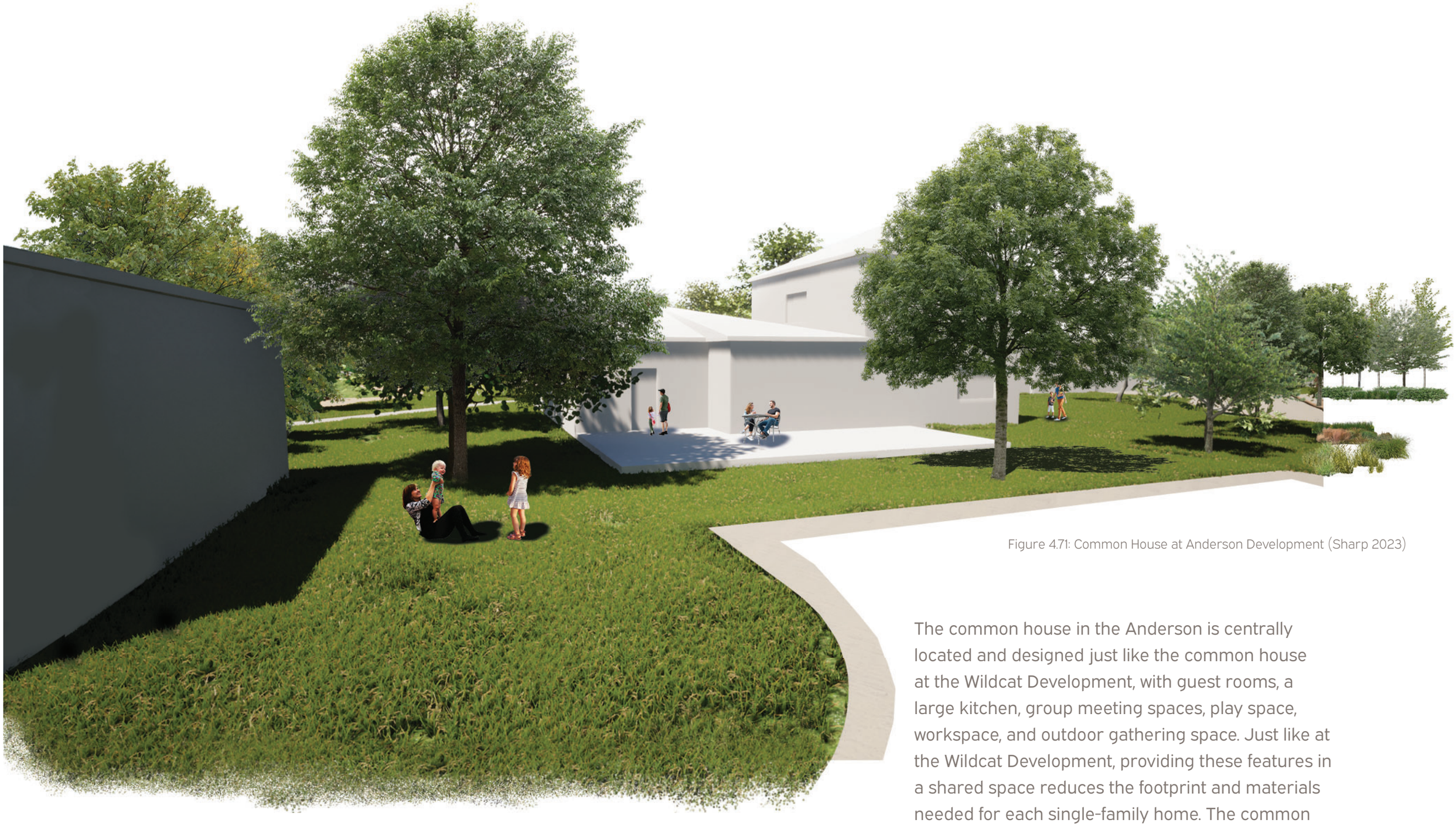


Figure 4.71: Common House at Anderson Development (Sharp 2023)

The common house in the Anderson is centrally located and designed just like the common house at the Wildcat Development, with guest rooms, a large kitchen, group meeting spaces, play space, workspace, and outdoor gathering space. Just like at the Wildcat Development, providing these features in a shared space reduces the footprint and materials needed for each single-family home. The common house also encourages community building through the activities and interactions that take place there. Parking spaces to the north of the common house allow residents to readily bring groceries and supplies to the common house before shared meals.

Just like the other two developments, the Anderson Development features a community garden. Sidewalks connect all the homes in the development to each other and to the community garden. Fruit and nut trees are planted to the north of the common house. There is an opportunity to include additional planting and more extensive gardening and small-scale agriculture planting to the south of the site.

The land, which is currently part of Prairiewood Farms, is used for agriculture and very fertile, perfect for growing produce. This also opens an opportunity to host produce sales and farmers markets on the site, at the common house. Not only could this bring additional revenue into the development, but it would increase exposure to the development practices and nature conservation goals at the co-housing development.

Figure 4.72: Community Garden at Anderson Development (Sharp 2023)



The Anderson Development's entry intersects with Anderson Avenue. The road surrounding the development is a two-way road, designed according to fire access ordinances. The road's loop creates a circular layout for the development. The closed loop makes this development pedestrian friendly, with sidewalks connecting the houses and green amenities across the community.

Within the closed loop, children can play safely in the open lawn or nature playground, without the danger of losing a ball in the street or worrying about busy traffic, as the houses provide a safety buffer. The front porches face inward towards the green amenities, so neighbors can keep an eye on what is happening within the community, making the development safer and more connected.



Figure 4.73: Lawn at Anderson Development (Sharp 2023)



Figure 4.74: Bird's-eye view of Anderson Development (Sharp 2023)

Community Gardens

Each of the new co-housing developments at Prairiewood features a community garden. Community gardens can have many benefits—social, environmental, physical, and more. Below are examples of the benefits that community gardens can provide.

- Brings the focus to the group, rather than the individual, promoting community, (Turner 2011).
- Helps gardeners connect to their earth, working with the dirt can bring a stronger connection to the earth, (Turner 2011).
- Increase of fresh produce, and knowledge of what you're eating (Turner 2011).
- Bring awareness to the community and its surroundings (Hite et al. 2017).
- Provides teaching and mentoring opportunities (Hite et al. 2017).
- Links to increased health, youth education, social capital, food security, crime prevention, neighborhood beautification, outdoor recreation, social engagement, community organization, and more (Draper and Freedman 2010).

The layouts shown in the conceptual renderings and images of the projective design are placeholders and templates to inspire readers of what is possible. Some techniques used in co-housing communities and conservation developments with community gardens can be seen in figures 4.75-4.77.



Figure 4.75: Tryon Farms Community Garden (Skabelund 2022)



Figure 4.76: Shadowlake Village Community Garden (Skabelund 2022)



Figure 4.77: Oakcreek Community Garden (Alexander 2023)






Figures 4.78-4.81: Nature play at Shaw Nature Reserve (Sharp 2022 & Skabelund 2022)

Nature Play

The Anderson Development features a nature playground. Nature play has several benefits for children, which are elaborated on below:

- Play, especially nature play, gives children a break from learning, while keeping their imagination active (Pellegrini & Bohn 2005).
- Nature play can increase children's imagination, and is linked to increased social interaction, (Spencer 2006).
- Nature play is linked to the 6 C's: curiosity, choice, content, collaboration, challenge, and context (Moor 2014).
- When participating in unstructured play, there is no fear of failure, as there are no rules (Gray 2013).
- Nature play is linked to increased independence and self-reliance in children (Barker et al. 2014).
- A study found that children playing on nature playground played for longer and did not spend time waiting for line to use equipment, as opposed to fixed playgrounds (Herringbone & Brussoni 2015).

The nature playground shown in the renderings for this project are used for inspiration. Examples of nature playgrounds can be seen in figures 4.78-4.81.

Major Takeaways from the Design

Balance of environmental and community design

Additional 80 acres of restored prairie, helping make up for the loss of approximately 11 acres at the new Wildcat Development.

1.5 miles of new trails, connected to the existing 4.5 miles of walking and hiking trails.

Three community gardens, a nature playground

32 single family homes, 12 townhomes, 2 new common houses in three distinct co-housing developments

Design was done without fragmenting the Prairiewood site as a whole, and all three developments have access to nearby public water and wastewater utilities and are located outside of the floodplain.



Figure 4.82: Site Plan (Sharp 2023)

Assessment of the Projected Design

Reflecting on the precedents and guidelines discussed in the previous Methodology chapter, the projected design for Prairiewood has many of the features highlighted in the precedent studies and follows the guidelines in various ways.

Environmental Guidelines and Considerations

The guidelines recommend a site of at least 50 acres, with a minimum of 20 acres left undeveloped, following the definition of conservation development for percentage of preserved land. The site at Prairiewood is approximately 355 acres, and there are about 33.87 acres of development when combining the existing development and proposed development. After the projected design, there is still over 90% of the site left undeveloped, which is within the upper range of the guidelines and the definition used by the author for conservation development.

Zones of Development at Prairiewood



Figure 4.83: Developed Zones at Prairiewood (Sharp 2023)

The next environmental guideline is trail design. Trails should show the characteristics of the site without causing damage to the site. If trails go through sensitive parts of the site, such as areas prone to erosion or home to endangered plant or animal species, then designers should consider closing or moving trails to protect these conditions. At Prairiewood, there are 4.5 miles of existing trails, and the projected design includes an additional 1.5 miles of trails. The trails at Prairiewood, existing and proposed, show the characteristics of the site, meandering through the rolling hills, prairie, riparian forests, and creek that paint the site. The proposed trails are connected to the existing trail by bridges over Wildcat Creek, like the bridge at Konza Prairie.

All the co-housing developments for the projected design use clustered development. The development near the Willis Prairie totals 8.35 acres, including the existing development of the Blue Sage Barn and the Retreat House. The existing development north of Wildcat Creek Road, extending from the barn and maintenance buildings, to the HomePlace, and the proposed Wildcat Development, totals 11.54 acres. The Anderson Development takes up approximately 9 acres of land, and to the north of Anderson Avenue, the existing StoneHouse and surrounding roads and structures take up about 4.98 acres. Understanding the total acreage and location of development throughout Prairiewood gives designers a clear understanding of how each site allows for both housing for people and conserved habitat for wildlife.



Figure 4.84: Bridge at Konza Prairie (Sharp 2023)

The projected design developments are kept close to existing development on site or existing roads to reduce the fragmentation of natural land. Using existing roads as connection points reduces the materials needed for construction of new paved or gravel roads.

When looking at home design, all the units are kept under 1500 square feet, with some units as small as 925 square feet. This helps keep homes affordable for middle and lower-middle income residents who may want to live in a co-housing development. Garages and additional bedrooms increase the square footage of homes. This is one guideline that could be improved upon, with the assistance of architects or interior architects to advise on home design and maximizing usage of space in homes. The common houses in the Wildcat and Anderson developments can help reduce the need for additional bedrooms as guest rooms.

Community Guidelines and Considerations

The developments in the projected design are designed to bring community members together. The layout of homes not only responds to site conditions, but also are laid out to increase opportunities for neighbor interactions when parking or walking to or from cars, or at the many shared community amenities.

All the communities feature a shared space for community meetings and gatherings. At the Willis Development, this is the existing Blue Sage Barn, and at the Wildcat and Anderson developments, there are proposed common houses for the community to use. The layout for the common houses at the Wildcat and Anderson developments include a great room, recreation room, large kitchen, laundry room, storage, guest rooms, and outdoor porches. Residents can have shared meals, community meetings, and other activities at the common house. The single-family homes across all three co-housing developments use the same layouts. The bedrooms and bathrooms are kept at the back of the units, and the kitchen, dining space, and living room are kept towards the front of the house, to direct views out towards the rest of the community. The design of the homes in this manner also creates a division between the public and private spaces in each home.

The developments have a variety of outdoor gathering spaces. The Willis Development includes an open lawn and a community garden. The Wildcat development has a community garden as well as large cul-de-sacs to host activities, such as sports, games, or cook outs. The Anderson development includes an open lawn, a community garden, and a nature playground.

The three developments are connected to each other and accessible through the trail networks across the Willis Prairie, the Bird, Bee & Butterfly Sanctuary, and Prairiewood Farms. There is a connection between the Willis Prairie trail network and the Bird, Bee & Butterfly Sanctuary trail across Wildcat Creek Road, near the drive that leads towards Walnut Pond. As previously mentioned, the proposed trail at Prairiewood Farms would be connected to existing trails with bridges over Wildcat Creek.

Identifying what makes these developments co-housing communities is important. Typically, at co-housing communities, residents own their private home, and all residents own equal shares of the common house. Community members may also share costs for upkeep and maintenance of the common house and shared outdoor spaces. This financial element can help communities with co-housing developments, as residents are paying for the shared amenities. There are often required meetings for residents to discuss community concerns and plan events. Residents of co-housing communities are also very intentional about deciding to live in a co-housing community. These elements differentiate a co-housing community from other developments with shared resources.



Figure 4.85 : Trail at Willis Prairie (Sharp 2022)



Figure 4.86: Trail at Bird, Bee & Butterfly Sanctuary (Sharp 2023)



Figure 4.87: Trail at Bird, Bee & Butterfly Sanctuary (Sharp 2023)

Economic Guidelines and Considerations

The economic part of this project is limited, but several of the guidelines are still applicable to this project. The location of Prairiewood is far enough away from the City of Manhattan that it feels rural and tranquil, but not so far to be inconvenient to go into town. Each of the developments are about 15-minutes away from the Kansas State University Union by car.

The homes on site are designed to be smaller than average, in order to reduce costs for construction and materials. Within the co-housing community contracts, each resident would own their home, and an equal share of the common house. To make communities like the ones shown in the projective design more affordable for all people, it should be written in the contract that 20-30% of the homes on site should be priced below 80% of the Median Family Income for the area.

The projected design does not include restaurants or shops, but the existing structures at Prairiewood, such as the Blue Sage Barn, RetreatHouse, HomePlace, and StoneHouse, would be able to continue being rented to bring in additional visitors and revenue into the site. Other possible ways to bring revenue into the site include renting rooms for overnight stays, renting the common houses for small meeting or conference spaces for non-resident groups.

Strengths and Weaknesses of Each Development

Another important element of analysis following the projective design is identifying strengths and weaknesses of each of the designs. The following figures look at each of the developments and their strengths and weaknesses.

One of the aspects that would need additional consideration during design would be universal access to homes, gardens, and non-hiking trails.

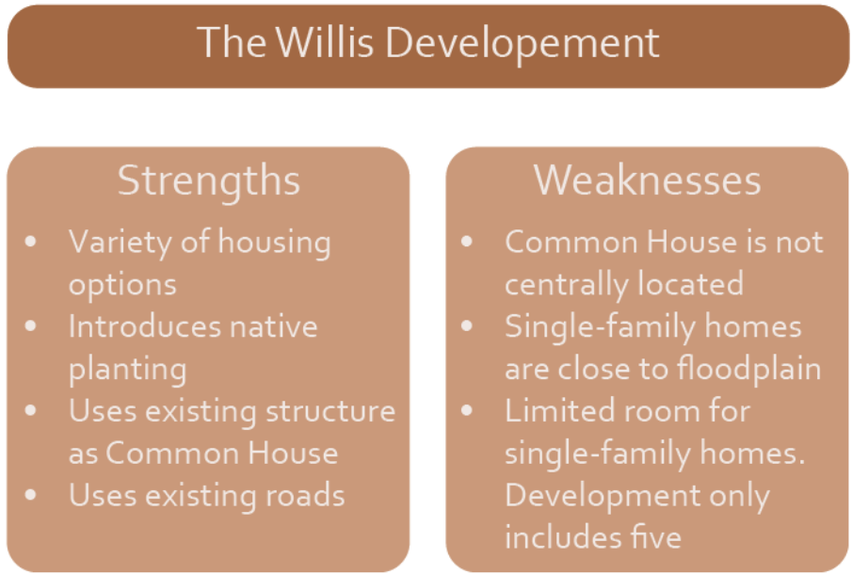


Figure 4.88: Willis Development Strengths & Weaknesses (Sharp 2023)

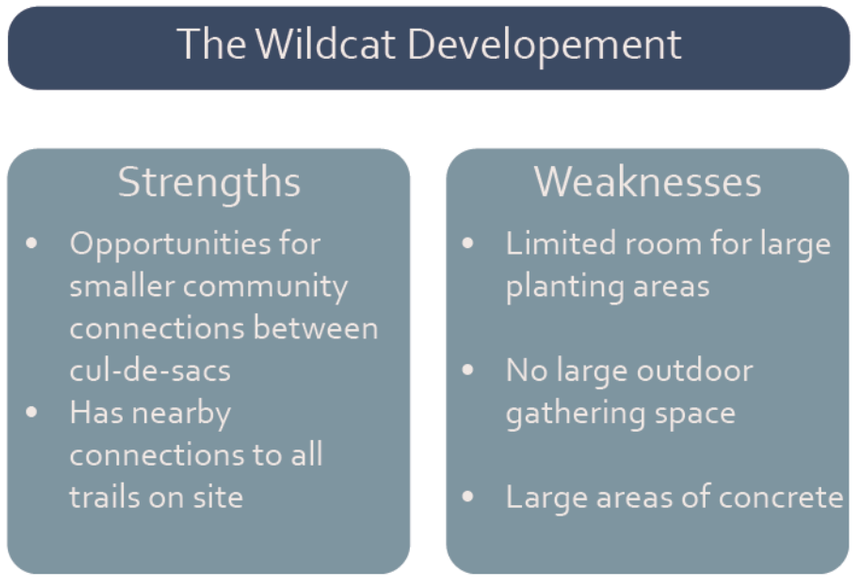


Figure 4.89: Wildcat Development Strengths & Weaknesses (Sharp 2023)

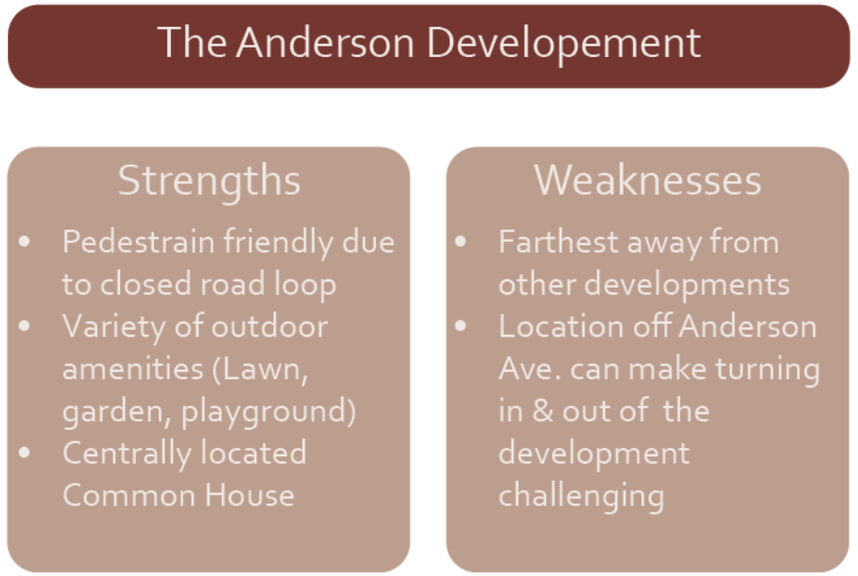


Figure 4.90: Anderson Willis Development Strengths & Weaknesses (Sharp 2023)

Conclusion

FINAL REFLECTIONS

The conclusion of the report examines the takeaways, limitations, future research opportunities, and personal reflections.

Takeaways

A major takeaway from this report should be the importance of natural land, both environmentally and socially. The Tallgrass Prairie is endangered by non-native plant and animal species, plowing, and land fragmentation. Only 4% of the original ecosystem remains, mostly in the Flint Hills, (FHDC, n.d.). Understanding the importance of the Flint Hills is the first step to protecting the remaining tallgrass prairie.

Another takeaway from this report are the many benefits of conservation development and co-housing communities. The precedents examined in this report show how both conservation development and co-housing model the environment and social benefits of preserved and protected land. The guidelines and projected design look further into the combination of the concepts discussed in the literature and demonstrated in the precedents.

Development is a big part of the design industry. But designers need to protect endangered landscapes and should design carefully to maintain the character of the land that they are working on. Landscape architects have the opportunity to advocate for the earth. Studying a site, looking into precedents and past designs, and designing around sensitive land can all be ways to improve a design, and make it more responsive to its environment.

Limitations

One of the biggest limitations of this design and that there was no specific community to design for, which is a key factor for co-housing design, as well as any new development. Big ideas on conservation co-housing development have been drawn from precedents and literature, but a more effective and personalized design with feedback from a community would have been possible when working with a group of potential residents and other interested stakeholders.

Another limitation of the study was the cost analysis. Comparisons on housing size and styles can be made to study affordable housing, but clear price points are challenging to determine with fluctuations in material costs. Not only would the cost of materials for construction fluctuations affect the cost of the developments, but cost of labor and the price changes in the housing market also make it challenging to gauge estimations for the design. Because of these factors, the developments are much more theoretical, responding to the landscape of the site, rather than the housing market and the cost of materials and site and home construction.

Future Research

With additional time and resources to continue this study, more research could be conducted on cost projections, to give better insight into the affordability into the design. Working with development groups in the region would give further insight into more details on putting together a residential development.

If I were to continue this study, I would want to get IRB permission to conduct interviews, visit the precedents to talk to community members, interview development managers, and put together a focus group of community members in the region to get feedback on the projected design.

Future research could also investigate additional development styles and techniques to include preserved land in residential communities. Furthermore, examining preserved land in developments besides residential communities would be another topic to examine. Green or outdoor spaces in suburban neighborhoods could be studied to examine what types of green amenities are most effective for community building, which could be applied to co-housing site design.

The research for this report was limited regarding analysis for zoning and development codes within Manhattan, Kansas and Riley County. Further research or a related report, as well as collaboration with planning authorities could explore the process of development zoning restrictions, and the process of changing zoning regulations to allow for clustered developments for the design of conservation developments and co-housing communities.

Another opportunity to bring additional disciples and designers into future research would be to collaborate with architects and interior designers to improve the layouts of the townhomes, single-family homes, and the common houses. Being able to further reduce footprints of the proposed structures would allow more space to include additional homes or increase planting and undeveloped land on site.

Personal Reflection

This report has opened by eyes to the connection of many aspects of design. The exploration of precedents for the methodology helped me gain an understanding of the complexity and diversity of conservation developments and co-housing communities. Finding six communities to study for this report was somewhat challenging because of the vast amount of communities that work to preserve land, live within intentional communities, or both. I hope to be able to visit the communities included in this report one day, but I am grateful to faculty, my alumni network, and friends who were able to take photographs of some of the sites.

Through the years in Kansas State's landscape architecture program, I have worked on large sites, and I have worked on detailed and small-scale projects, but this report pushed me to look at over 350 acres of design, from a large-scale level, down to floorplans and small-scale considerations. The variety of levels and the scope of this report has improved by design abilities. Having the opportunity to visit Prairiewood allowed me to gain a more thorough understanding of the site, which led to a better design that responds to the landscape.

When I decided to join the landscape architecture program, I did not see myself having any interest in residential design. Instead, I was curious to learn about urban parks or botanical gardens. My education has shown me the importance of studying land preservation, ecology, community-based design, which led me to selecting my topic for this report. I enjoyed being able to design residential communities from a landscape architecture point-of-view, thinking about how to engage communities in the landscape. I think that residential spaces can be an excellent opportunity to engage people's curiosity on the natural environment, from the comfort and convenience of their own neighborhood.

Most of the project's I have done in school or during my internships have been limited to several weeks or months, so working on the same topic and project for about eight months allowed me to explore many different subjects within the umbrella of my research questions. I enjoyed being able to learn about land preservation, prairie restoration, the tallgrass prairie eco-region, conservation development, co-housing communities, and my site for the projected design in a very thorough manner.

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