RESIDENTIAL DEVELOPMENTAL GUIDELINES FOR NORTHERN COMMUNITIES

by

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ABSTRACT

This paper focuses on the problems associated with rural sprawl in northern Michigan communities and demonstrates the visual impacts which different stakeholder desires can have on the development of a site. We create a set of tools for stakeholders to use when contemplating development, specifically focusing on a property in Oscoda county as our study location. The effects of rural sprawl were studied by looking at case studies in Osceola county and Greenwood township, both of which holds similar demographic and environmental characteristics to our study site. Exploring the rural sprawl epidemic in depth helped us to understand the issues and develop suggestions to ensure proper, responsible development of an area.

Based on the initial case studies and an analysis of both natural and cultural features of our study site, five alternative scenarios are proposed which balance the goals of identified stakeholders in various proportions. Based on the analysis, a proposal is selected which most evenly balances the desired goals of the stakeholders, while creating a successful 40 acre development.

The process that helps guide development used in this paper is summarized as a list of steps, which can be applied by various stakeholder groups. The summarized steps help open communication between municipalities and developers to ensure proper consideration is given to a rural site. Due to the unique location of our site, we focus our development methods around the Firewise Principle strategies, which are highlighted throughout the paper, to help guide materials, aesthetics, and locations of dwellings. By creating this paper, we have been able to bridge the gap in communication between different stakeholder groups and provide them with a starting point from which to begin to discuss future developments.

PRACTICUM PROGRESSION

We were fortunate to have the opportunity to work with a client in Mio, MI who was flexible in allowing the project scope and goals to evolve as the project progressed through the months. Initially our client, who is the owner of the 40 acre parcel in Mio, was interested in creating a more suitable bed and breakfast environment for visitors. As we began to understand the ultimate vision of the property, we felt this was a project we would like to undertake. As research progressed and we looked deeper into Northern Michigan developments, we started to see a clear lack of direction in regulation of the areas surrounding our study site. After speaking to Jim Eppink, of JEppink Partners in Clarkston, MI, a firm which specializes in new urbanism development, and in researching the growing issue of rural sprawl, we felt that a more suitable project would be to look at larger scale development (relatively speaking) and how we could help bridge the gap in communication between groups involved in developmental decisions. It was our hope that creating this open communication template, would eliminate, or at least reduce the rural sprawl epidemic in northern communities.

Expanding the scope of the project would not only allow us to incorporate the interests of our client, but would also allow us the opportunity to tackle a much larger issue in Northern Michigan development. Our study site's proximity to the Huron National Forest, increases the importance of proper fire resistant building materials and techniques due to the potential for wildfires. These techniques are highlighted and explained in our Firewise Principle section. Although we recognize that the 40-acre parcel is not the largest of potential developments, it gives us enough land to work out our developmental scenarios and gain meaningful data to be able to compare between the scenarios.

PROBLEM STATEMENT

A Master Plan is a guide which directs the development of a municipality toward an agreed upon goal. Creating a master plan is crucial to defining and maintaining the direction of development because it serves as a guide from which to make future decisions and settle disputes. According to Michigan legislation, a master plan accounts for issues including: public safety, environmental safety, recreation, and coordination among stakeholders (for complete list of topics addressed by a master plan see Appendix A). Numerous examples of cities which have grown without a master plan show the disorganization and inefficiency that comes from a lack of a united goal when confronted with a surge of development. These examples serve as warnings which stress the value of creating a coherent plan, especially when looking at municipalities in rural areas.

The goal of our study is to create a set of tools, illustrated by a case study example, for community planners to use when trying to juggle the interests of opposing stakeholder groups. Our study will focus on a 40 acre parcel of land in Elmer Township, Oscoda County, MI and will serve as a guide for development planning specifically in the Northern Michigan region.

One of the first issues with planning is balancing the opinions and desires of stakeholders. Balancing these varied opinions can be a difficult task. With the sheer number of stakeholders and the varying opinions of each group, it is impossible to comprehensively cover all scenarios within our hypothetical study. While extensive research in the form of case studies and professional interviews has gone into creating a scenario which is realistic, there are ultimately many assumptions we make throughout the paper. Where assumptions are made, they will be clearly noted. The tools we provide and the process we use can be applied to a wide variety of cases, however, we do not attempt to determine the best solution for all cases, but only for the specific case we present. While we recognize the complexity and number of interest groups involved, for this study we divided the stakeholders into two categories, the municipality and the developers. This division represents alternative interests, goals, and philosophies about how the surrounding region should be developed. The following descriptions of the goals of each category are assumptions made based on speaking to individuals in the field.

The "Developer group" is composed of people who promote new construction of the area. At the extreme end, this group is focused on achieving the maximum economic benefit from the land, while promoting a development that will have a quick absorption rate. They would like to maintain the character and value of the land to help stabilize property costs but holds the economic value of development as a higher priority in their list of

goals than the municipality group.

The "Municipality group" is comprised of members who are concerned with maintaining the character of the area in addition to its economic health. In contrast to the Development group who favors economic gains, this group places higher priority on local culture and tradition (ex. warbler festival, 'up north' landscape) and desires to keep the "Up North" feel even if it means giving up some economic incentives.

With these groups in mind, we created a set of tools to demonstrate how developers and municipalities can work together in order to achieve their differing social, economic, and environmental goals. We will be looking at the pros and cons of the various scenarios and set a standard measure for the developments to be able to compare and contrast monetary and environmental value. Through the use of these guidelines, we strive to open the doors of communication between stakeholders and ensure a development that benefits both the developer and the municipality involved.

Figure 1. Location of Oscoda County in Mighican (http://en.wikipedia.org/wiki/Oscoda_County,_Michigan)

RURAL SPRAWL EPIDEMIC

Many people are aware of the terms "suburban sprawl" and "urban sprawl" and even have some form of understanding regarding their meaning. In general, these two phenomena revolve around the problem of inflating populations and growth with uncontrolled and disconnected developments. Urban sprawl, which shares similar characteristics to suburban sprawl, is defined as, "the spreading of urban developments (as houses and shopping centers) on undeveloped land near a city" (Merriam-Webster On-line Database, 2013). Simply put, urban and suburban sprawl lead to a more automotive dependent lifestyle by expanding development towards adjoining areas with less populations.

Rural sprawl presents a separate set of problems for communities and is often difficult to define. According to a paper wrote by Professor Tom Daniels of State University of New York at Albany in 1999, "Rural sprawl takes two forms. The first is low-density residential development that is scattered outside of villages, suburbs, and smaller cities. The second type of rural sprawl is commercial strip development along arterial highways; leading into and out of villages, suburbs, and smaller cities" (p. 2). In general, rural sprawl is the movement of low density developments into areas that are not occupied by a large population of people, or infrastructure. Much of the rural sprawl epidemic is centered around smaller parcels of land (between 1-5 acres) being occupied by people for personal enjoyment, rather than an economical purpose.

Figure 2. Example of sprawling development (http://www.ecolibrary.org/images/full_image/Urban_sprawl_aerial_DP1004_1.jpg)

Rural sprawl creates many negative side effects, but the increase to property costs and the increase in infrastructure costs are two of the major issues. As newcomers to the area begin to search for larger residential lots, the flux in demand sparks an increase to property costs. As property costs rise, the price quickly becomes higher than a farmer, or forester is able to pay. Therefore, as property prices begin to rise farmers and foresters become more likely to sell their land for development purposes, such as house lots. The sale of the fringe land fragments the landscape and makes it increasingly difficult for remaining farmers/foresters to rent land for production (Daniels, p. 3, 1999).

The other side effect of rural development deals with infrastructure costs to the community. Since the new developments occur in "rural" areas, there is often times no infrastructure installed to manage the maintenance of these newly populated areas (i.e. sewers, electricity, trash removal, etc.). For instance, many rural homes rely heavily on

septic systems to help manage waste and newer developments may require larger waste management facilities to be built (Lopez and Hynes).

Sprawl also has serious impacts on farming. The largest complaint coming from farmers is that the newcomers to the area are often times not educated about the farming industry. There are often times complaints of trash dumping, trespassing, vandalism, theft of crops, and the harassment of livestock from family pets. On the other side of the argument, Daniels notes the frequent new residents frustrations with the, "farm odors, noise, dust, crop sprays, and slow moving farm machinery on local roads." Daniels continues on in saying that the increase in residents to highly forested areas often increases the likelihood of wild fire to the area (Daniels, p.3, 1999).

A CASE STUDY IN RURAL SPRAWL: OSCEOLA COUNTY

Osceola County, a northern Lower Michigan county, (highlighted in red in Fig: 1-2) has recently dealt with the issue of rural sprawl and has explored alternatives in order to combat these issues. Similar to the problems presented above, Osceola County was having difficulty managing their growth due to a severe lack of pro-active planning and zoning ordinances. The "hands off" approach that many Northern communities tend to follow put Osceola County in a difficult situation. As in many such situations, development began without consideration to utilities and infrastructure causing Osceola to play catch-up to try and resolve fundamental issues. Osceola County is dealing with an increase in rural size lots (between 1-5 acres) that are beginning to encroach on the agriculture and undeveloped lands of the area.

Figure 3. Locaion of Osceola County in Michigan
(http://en.wikipedia.org/wiki/Osceola_County,_Michigan)

Nate Engle, who received his Masters in Urban and Regional Planning from Grad Valley State University, studied the Osceola case in depth. He used results from a survey conducted by the West Michigan Regional Planning Commission (WMRPC) in cooperation with Osceola County to understand the current problems the county faces and possible solutions. The survey identified key individuals in the County and asked what they thought of their community and what they identifed as weaknesses. The following comments were identified as the threats the county faces in the future, "(1) lack of planning and zoning, (2) uncontrolled growth, (3) conflicts between agricultural and residential, (4) running out of buildable lots with road frontage/starting to feel crowded, and (5) houses built in the middle of fields" (Engle, p. 4, 2010).

Engle notes that, "Researchers have found that those who live in large-lot semi-rural areas generally share a strong environmental ethic and a desire to preserve open space. A visual preference survey of urban fringe development in Michigan in 1994 showed that respondents, regardless of the residential settings in which they lived, favored farm and forest landscapes, then farmhouses, followed by large-lot residential developments and multi-family complexes" (Engle, p.10, 2010). This is important to note because it relays the importance of setting up a plan for rural communities to follow in order to keep the aesthetics of the community intact. Surveying current residents of a city is an important step in the process of the development of a city plan. By allowing residents the opportunity to express what they think of their current town and determining what visually ranks as important with them will allow future development to occur in a controlled manner with less interference from the surrounding community members.

Engle summarizes a few ways that rural towns can remain just that, rural. Osceola County should create a strong urban center, which will allow for the less populated rural areas to remain largely intact. The urban center will act as the main attractant for the city, which will have the necessary infrastructure and utilities to be able to support an influx in residents. Another point that Engle makes is to elect strong political leadership. A strong political leadership team will help guide the community in the planning and development stages, and will provide help when creating a concise, clear plan for the community as a whole. This will ensure that the rural

characteristics that are currently being enjoyed by residents will remain unchanged, but will also cater to people who wish to move to the area (Engle, p. 12, 2010).

The last point that Engle addresses is the development of a master plan for the community. There are multiple sections that can make up a master plan, but important ones for a rural community include: "An overall community vision; a regional context statement; a floodplain development permit area; secondary housing; road network planning; development permit areas; development approval information areas; amenity zoning; light industrial and commercial areas; senior housing (if appropriate); youth facilities; parks and green space; agriculture land reserve issues; and land alteration issues" (Engle, p. 13, 2010).

OSCODA COUNTY, MI BACKGROUND

With the knowledge gained from our research, we began to look at our study location located in Oscoda County. Oscoda County is highly susceptible to rural sprawl due to a lack of regulations and a unifying master plan. For this reason it is imperative that the lessons learned from previous case studies are implemented on both a county and site scale. In order to develop a master plan for the site, we looked at the overall character and features of the surrounding county, stakeholder desires, and the specific characteristics of our 40 acre lot. Using this analysis, we proposed five alternative layouts which represent a gradient of development to meet stakeholder desires. From these layouts we were able to quantitatively measure and compare their effectiveness based on stakholder goals. Finally, we identify one of our 5 proposals as the most fitting solution for our site.

Figure 4. Location of Oscoda County in Mighican (http://en.wikipedia.org/wiki/Oscoda_County,_Michigan)

GROWTH

Growth in Oscoda County is both inevitable and desirable. The Developers see a market demand as the Baby Boomer generation moves closer to retirement and begins to look for property in Northern Michigan for their year-round retirement dwelling. This increase in demand will lead to an influx in development to help meet the needs of the population. The Municipality of Oscoda County also realizes the phenomena of the Baby Boomer generation and embraces it for the tax incentives that it will harbor for the region. The question is not will growth occur, but by how much. For this study, we are assuming a consistent growth pattern which will result in a need for housing development in the area.

NATURAL FEATURES

Oscoda County is home to some of the best natural attractions the State of Michigan has to offer. Its unique location in the Huron National Forest and in the Au Sable River Valley is one of the main attractions to the residents and tourists of Oscoda County. The Au Sable River, which runs through Oscoda County, is one of the top destinations for anglers and recreation enthusiasts who desire to be outdoors. The main season for the river is from late March until the end of August, which in turn, creates the heaviest tourist months (Census 2012).

Another popular attraction during the summer months is the Huron National Forest (HNF). The HNF is one of only two National Forests in Lower Peninsula Michigan and combined with the Manistee National Forests, contains nearly one million acres of public land. Having hundreds of miles of trails makes the HNF a great place for a plethora of activities, but the most common include: hiking, camping, hunting, birding, and riding all-terrain vehicles (Unites State Department of Agriculture 2013).

Oscoda County is considered rural in nature, which is reflected in the Census gathering of population and demographic information. According to 2012 Census numbers, Oscoda County is home to over 8,500 people with nearly 97% of the population being Caucasian in race with a median age of 49 (Census 2012).

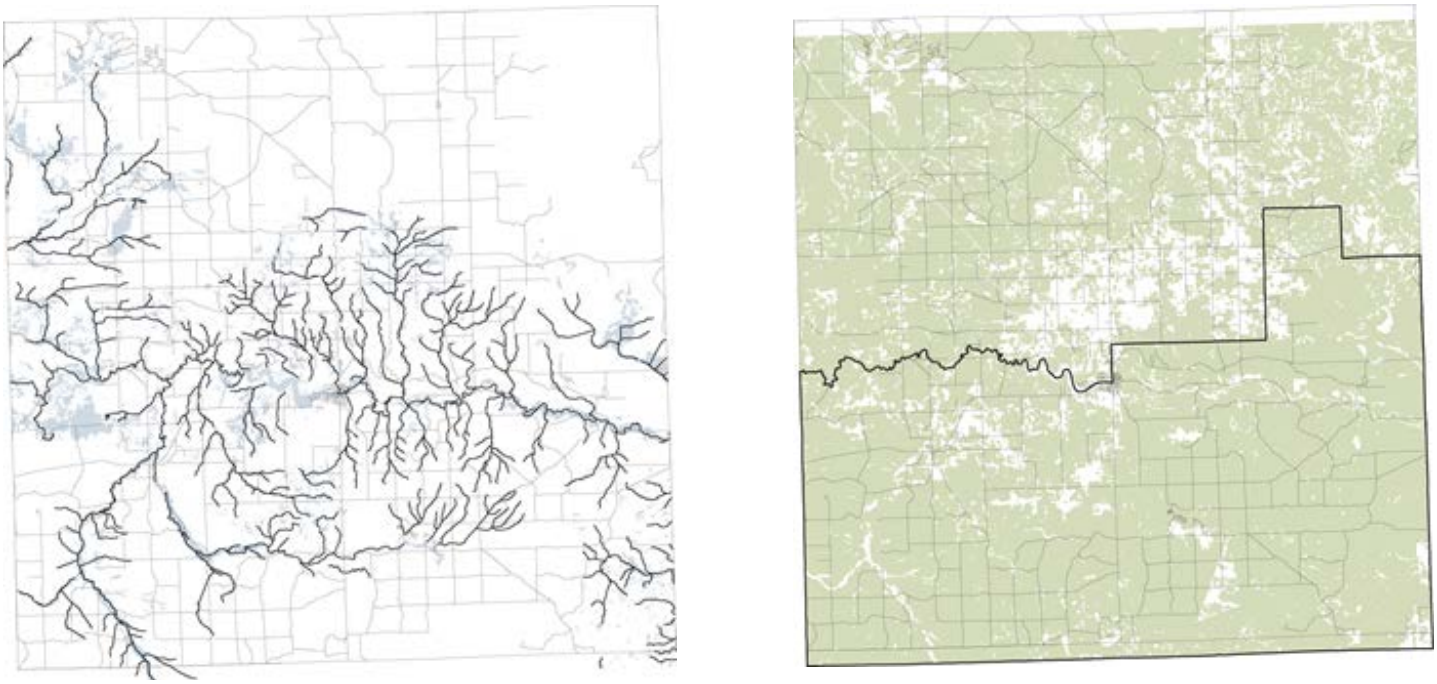


Figure: 5. Au Sable River watershed and Huron National Forest
(Derived from SEMCOG shapefile data)

CLIMATE

The mean annual temperature is 42.2 degrees with a peak summer temperatures averaging around 70 degrees in late July and peak winter temperatures averaging 18 degrees in January. The average frost season is 101 days long extending from around June 5th to Sept 14th (Oscoda County Emergency Management, Chapter 02, 2006)

The average annual precipitation (both rain and water equivalent of snow) is 29 inches (Oscoda County Emergency Management, Chapter 02, 2006) with an average of 1-3" of precipitation monthly (City-Data, 2010). August is the wettest month with 3.5" or rain on average (City-Data, 2010). There is an average of 56.5 inches of snow annually with more snowfall moving north through the county. While snow is seen from May through September (Oscoda County Emergency Management, Chapter 02, 2006) the greatest snowfall occurs in January and averages about 20 inches throughout the month (City-Data, 2010).

The county is located in the tornado belt, however, there have only been 5 tornadoes documented in the 15 years from 1991- 2006 and they are not considered a significant threat. Thunderstorms occur on average 25 days out of the year, and of those only 1 or 2 are associated with high winds. On average there are 3.3 winter weather hazards per year. These include blizzards, freezing rain, or heavy snow. The county is 80% forested and there are about 8 wildfires per year. There are 7 dams located in the county. Only one of these (the Mio Dam) is classified as a high hazard dam. The others are classified as low hazards (Oscoda County Emergency Management, Chapter 06, 2006).

FOREST AND WETLAND RESOURCES

Being so close in proximity to the Huron National Forest, it is not shocking that over 80 percent of the county is forested. The tree species vary depending upon the soils, moisture, and historic activities that may have taken place in the area (logging, natural fires, and land clearing). Jack pine, aspen-birch and oak are the most common forest types, which can be seen throughout the county.

According to the MIRIS Land Cover/Use Inventory (Michigan Geography Data Library, 2002), the most prevalent forest type in Oscoda County is the jack pine forest, which covers over 34 percent of the landside. The low fertility sandy soils, found in outwash plains and channels, supported pre-settlement jack pine forests that

for thousands of years were perpetuated by wildfires. Today, residential development has encroached into wildfire prone areas, which has led to a decrease in the amount of natural wildfires due to fire suppression. The decrease in wildfires has been the largest reason of the decrease of jack pine stands which, According to the 1800's vegetation circa map, used to account for nearly 63% of tree cover for the county.

Other tree species that are common to this area include: red and white pines, bigtooth aspen, quaking aspen, white birch, red maple, red oak, white oak, black oak, northern pin oak, sugar maple, red maple, American beech, basswood and yellow birch. The tree species present in Oscoda all have a similar characteristic of being able to grow in harsher environments and do not require the more fertile soil that can be found in other areas of the state.

KIRTLAND'S WARBLER

The Kirtland's Warbler is a rare and endangered songbird that resides in a very limited area of the State, including Oscoda County, as well as in Wisconsin and Canada. The bird nests only within a small area, centered on Mio. Public agencies are managing over 18 square miles of forest area for the use as the Warbler's nesting area. Many birdwatchers come to this area in order to view this bird. A "Kirtland's Warbler Festival" is being held annually at the Kirtland Community College (near Roscommon) as a tribute to this bird. This weekend festival includes many activities for individuals and families designed for better environmental awareness and appreciation (U.S. Fish and Wildlife Service, 2012).

According to Federal Fish &Wildlife Service's 5 Year Recovery Plan (U.S. Fish and Wildlife Service, 2012), the Kirtland's Warbler required habitats are jack pine forests. Jack pine forests are disturbance-dependent ecosystems that were historically maintained by naturally recurring fire. Jack pine dominated forests of the historic northern Great Lakes Region experienced large, frequent, and catastrophic stand-replacing fires. Kirtland's warblers generally occupy jack pine stands that are 5-23 years old and at least 30 acres in size. The most obvious difference between occupied and unoccupied stands is the percent canopy cover. Stands with less than 20% canopy cover are rarely used for nesting. Kirtland's warblers will also use stands with significant components of red pine (Pinus resinosa) and pin oak in very short durations.

Optimal habitat can been characterized as large stands (> 80 acres) composed of 8 to 15-year old jack pines that regenerated after wildfires, with 35 to 65% canopy cover, and more than 7,500 stems/ha (Probst 1988; Probst and Weinrich 1993). These attributes may be important to the Kirtland's warbler as they relate to the nesting biology and foraging ecology of this ground-nesting species (Probst 1986; Byelich et al. 1985; Probst and Donnerwright 2003).

Population trends from 1951 to 2011:

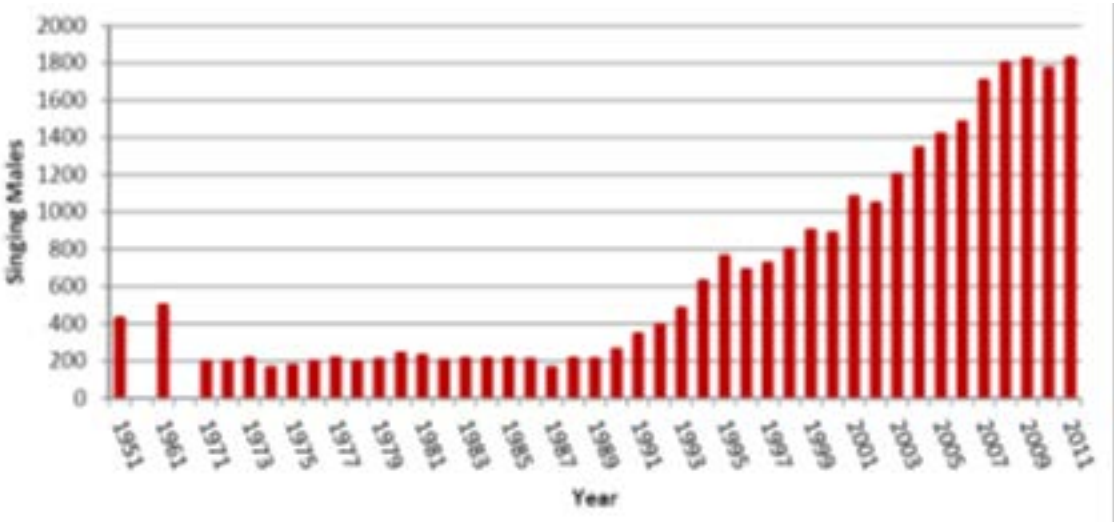


Figure 6. Kirtland Warbler Population Numbers
(http://www.fws.gov/midwest/endangered/birds/Kirtland/Kwpop.html)

Threats to Kirtland's Warbler (U.S. Fish and Wildlife Service, 2013):

1. With fire suppression techniques improving with advances in technology, the amount of fires that are taken place are on an irregular interval. This decrease in fires has put stress on the jack pine because the tree needs the fire to release the seeds in its cones. Therefore, there has been a dramatic decrease in the number of jack pines, especially young jack pine stands that cover the region. This is a problem in regards to the Kirtland's Warbler because the bird only nests in stands of young jack pines.

2. The second greatest threat to Kirtland's warbler survival is the brown-headed cowbird, which lay's eggs in other bird's nests and removes one of host's eggs. The cowbird egg hatches a day before the others, getting a head start on growth. The young cowbird is bigger and able to claim more food than other nestlings, and may crowd or push the other baby birds out of the nest.

FIRE

Fire is a major force in any wooded areas. As described above, fires can be beneficial and even necessary for maintaining certain ecological communities, specifically the jack pine forests, home to the endangered Kirtlands Warbler. While beneficial in some aspects, wild fires can have devastating effects on human communities in which they occur. There is a history of fires in the forested communities of Northern Michigan. The second largest fire in Michigan history occurred in Oscoda County in 1980. The fire burned through 25,000 acres, consumed 44 homes, and killed one fire fighter. More recently, in 2006, a fire near Mio spread through 6,000 acres and consumed 23 structures. This fire smoldered for almost 2 weeks and cost about $1 million in suppression efforts. These 2 fires represent extreme examples of the kinds of fires which occur in the area. More common, however there are smaller, easily contained fires which occur on a regular basis (Michigan State University 2012).

Figure 7. Image of wildfire
(http://blogs.smithsonianmag.com/smartnews/2013/05/westW)

While fire has the potential to devastate, there are methods which can be used to mitigate the damage done to human communities. These strategies can be implemented at every scale of development, from county wide planning to specific plant selection around individual structures. A series of "Firewise Principles" are put forward by the USDA Forest Service and the National Fire Protection Association provides guidance for communities and home owners seeking to protect themselves from fire damage (National Fire Protection Association 2009). See Appendix B for a summary of firewise principles and an example of how they can be applied to a development.

FIREWISE PRINCIPLES

As mentioned above, the "Firewise Principles", which are put forward by the USDA Forest Service and the National Fire Protection Association, provide guidance for communities and home owners seeking to protect themselves from fire damage (National Fire Protection Association 2009). On average, there are 800-1,000 homes lost each year due to fire nationally (Safer From the Start, pg.4). Many of these dwellings are located in areas with high potential for fire and were built without the precautions necessary to protect them from wild fire. While, the Firewise Principle publications explore building materials such as roof shingles, siding, decking, and windows, our study focused mainly on how landscaping can be used to protect houses. The Firewise Principles promote the use of vegetation which has fire resistant qualities, and a layout which includes using zones around the house to determine safe plant characteristics at various distances from the structure.
Below we have identified the key characteristics to each of the zones and how these zones come into play in terms of development when locating dwellings near each other and with planting selections.

As explained by the Firewise Principles Guide to Landscaping: "The primary goal for Firewise landscaping is… limiting the level of flammable vegetation and materials surrounding the home and increasing the moisture content of remaining vegetation. This includes the entire 'home ignition zone' which extends up to 200 feet in high hazard areas." (Firewise Landscape Construction, pg. 2). For a complete copy of the Firewise Principles Guide to Landscaping see Appendix B.

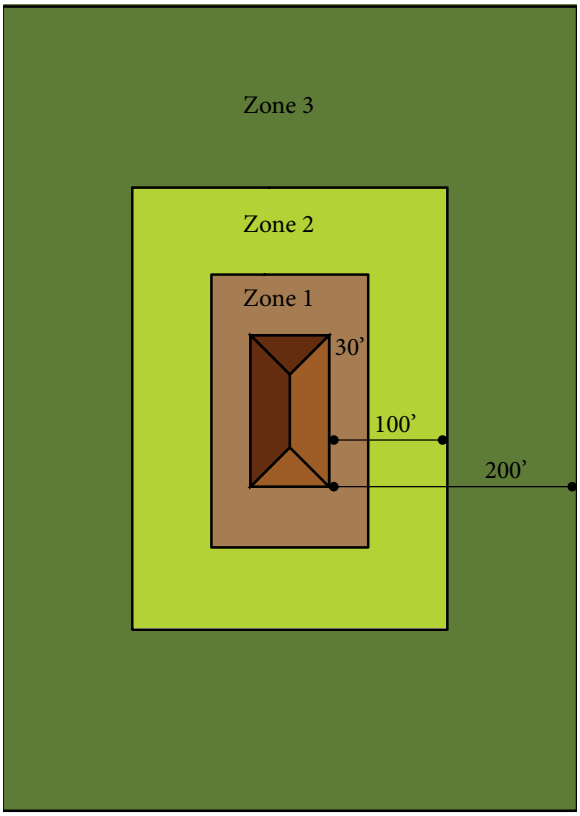


Figure 8. Firewise Concept of Individual Parcel

This excerpt from the Guide explaines the characteristics of each of the three zones.
"Zone 1 (All Hazard Areas) This well-irrigated area encircles the structure and all its attachments
(wooden decks, fences, and boardwalks) for at least 30 feet on all sides.
1) Plants should be carefully spaced, low-growing and free of resins, oils and waxes that burn
easily.
2) Mow the lawn regularly. Prune trees up six to ten feet from the ground.
3) Space conifer trees 30 feet between crowns. Trim back trees that overhang the house.
4) Create a 'fire-free' area within five feet of the home, using non-flammable landscaping
materials and/or high-moisture-content annuals and perennials.
5) Remove dead vegetation from under deck and within 10 feet of house.
6) Consider fire-resistant material for patio furniture, swing sets, etc.
7) Firewood stacks and propane tanks should not be located in this zone.
8) Water plants, trees and mulch regularly.
9) Consider xeriscaping if you are affected by water-use restrictions.

Zone 2 (Moderate and High Hazard Areas) Plants in this zone should be low-growing, well irrigated, and less flammable.
1) Leave 30 feet between clusters of two to three trees, or 20 feet between individual trees.
2) Encourage a mixture of deciduous and coniferous trees.
3) Create 'fuel breaks', like driveways, gravel walkways and lawns.
4) Prune trees up six to ten feet from the ground.

Zone 3 (High Hazard Areas) Thin this area, although less space is required than in Zone 2. Remove smaller conifers that are growing between taller trees. Remove heavy accumulation of woody debris. Reduce the density of tall trees so canopies are not touching"
(Firewise Landscape Construction, pg. 2)

STUDY LOCATION WITHIN OSCODA COUNTY

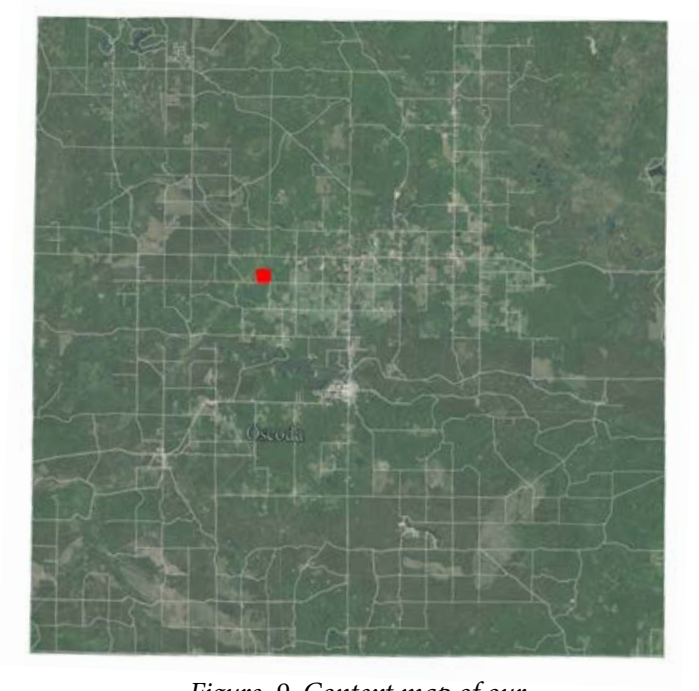


Figure. 9. Context map of our site located within Oscoda County

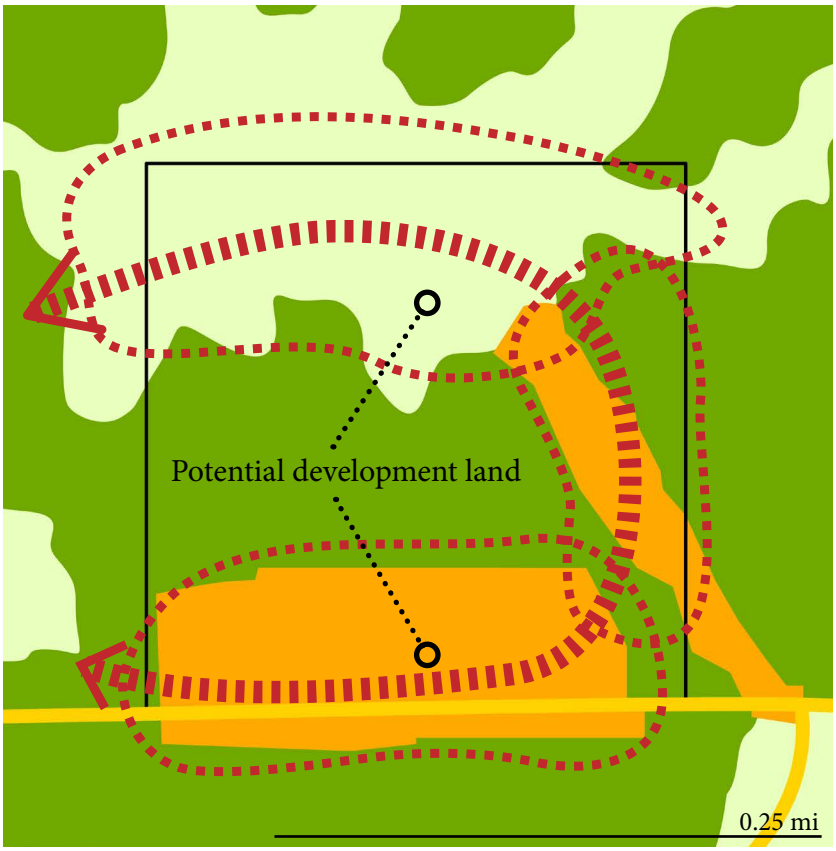
Figure 10. Site aerial map

Our study site is located on Kneeland Road, in the northwest corner of Oscoda County four miles away from the county seat. It is a 40 acre forested site, which contains a man-made pond as well as a firebreak power line crossing. The water on the site should be protected because it has value both as natural habitat and a visual amenity, which is difficult to replicate. Building will be limited below the power line corridor due to the height of the lines and the necessity of maintenance access. While no jack pine stands are currently located on the site, the forested areas provide potential corridors for local wildlife.

The following maps (figures 9-10) show an analysis and inventory of conditions on this site and culminate in a suitability map from which development can be guided.

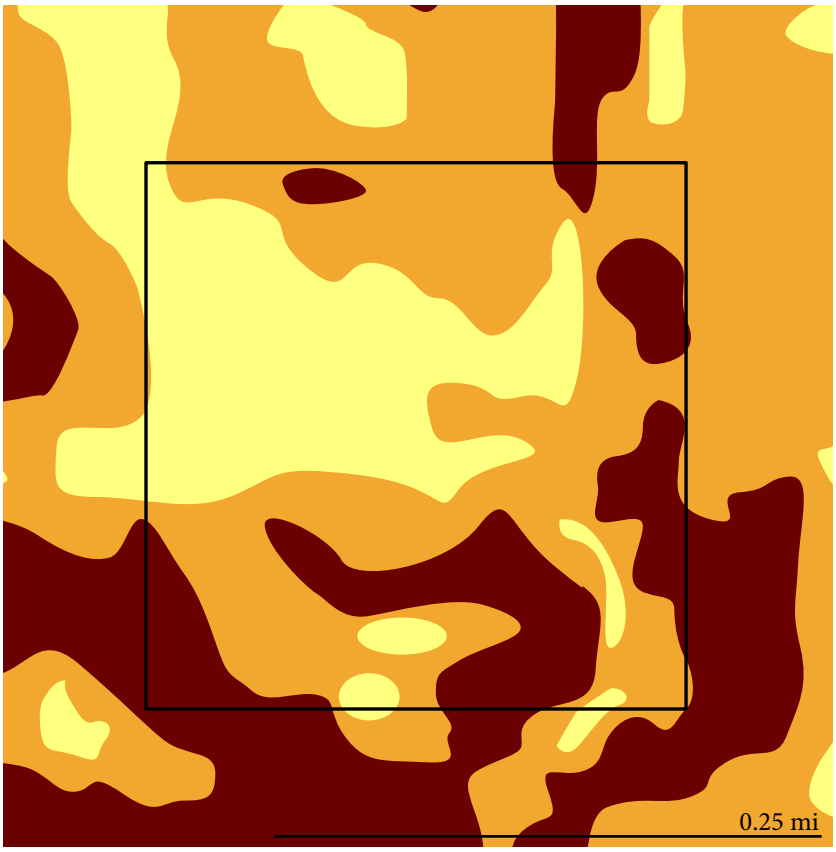
INVENTORY AND ANALYSIS- LAND

Figure 11. Land Use



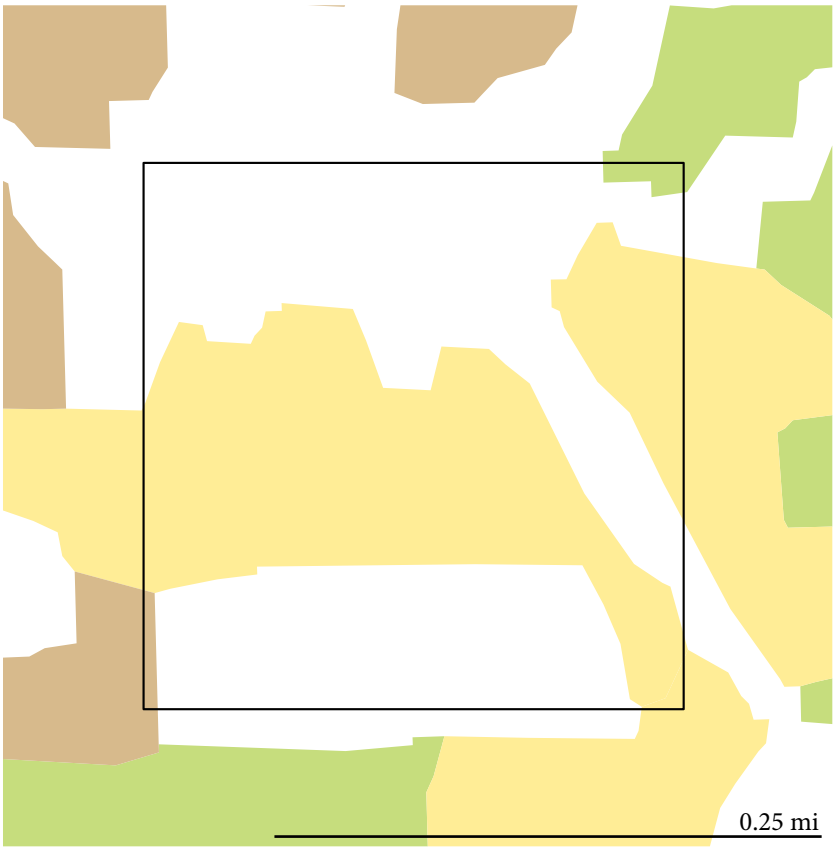
Currently, there is built up land in the southern and eastern portions of the site. This existing infrastructure could be used as the base for new development, eliminating some of the construction damage to the surrounding area.

Figure 12. Slope



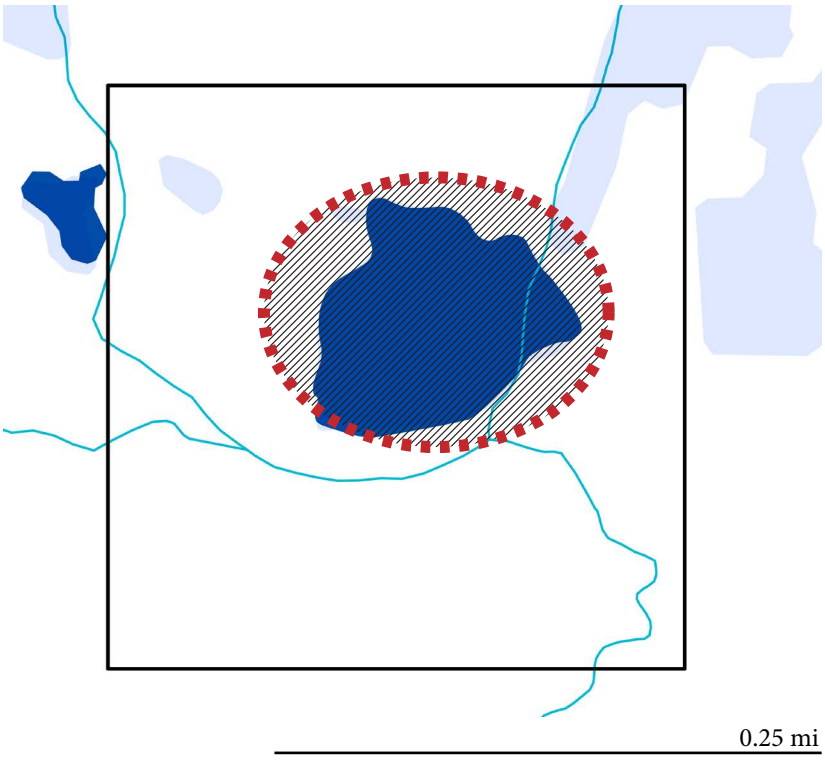
This map shows that most of the site is relatively flat and suitable for construction.

Figure 13. Forest



The dominant vegetation type on our site is lowland hardwoods. Even though there are no jack pine forest habitats on our site, we have the opportunity of adding stands of this species in order to form stepping stone habitats for the Kirtland's Wabler.

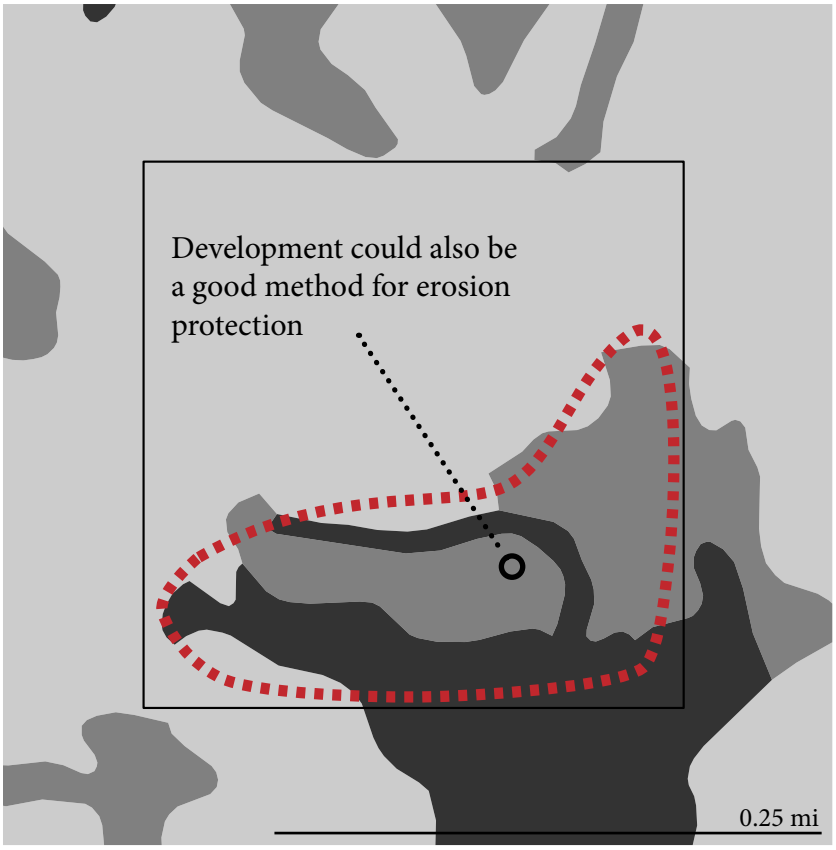
Figure 14. Hydrology



In order to maintain the riparian ecosystem, no development should occur within a buffer zone around the central lake. In addition to it's environmental function, the lake will also serve as a recreational amenity attracting consumers and elevating commercial quality.

The stream will also be preserved as much as development density allows. Trails will be designed along the streams to provide residents with an enjoyable living environment.

Figure 15. Soil Erodibility



The high soil erodibility in the southern portion of site is due to the semi-barren land, including soil and sand surfaces without vegetation. This land could be suitable for preparation of development; however, it is important to institute a protection method to prevent new erosion via disturbance.

Low erodibility means there is more vegetation cover in that area. This means that while the soil is good for building we would want to avoid the destruction of vegetation. Depending on the demand for residential density, development should extend from high erodible land to the low erodible land in an effort to ensure the maximum safe utilization of land.

INVENTORY AND ANALYSIS - SUITABILITY

Figure 16. Development Suitability- Site

Generally speaking, the suitability of construction in the site confirms the initial guess that area adjacent to the lake should not be developed and that big area around the lake will be a valuable resource for new residents.

This suitability map is generated based on factors belonging to three aspects: environment: wetland restoration, avoiding exiting industrial land, forest, river, wetland and lakes and their buffers; society: being adjacent to urban center district and high population density area, avoiding vacancy; and finally the economic: keeping enough accessibility, adjacent to commercial and other social services facilities. Even though the proposed site has been confirmed, this map still shows its role among the whole county in terms of development potential.

GOALS FOR DEVELOPMENT

After considering the natural features, we looked to the social aspect of development and determined the various stakeholders and their desires through which we created a set of goals for our design. Unfortunately, Elmer Township, in which our site is located, does not have a Master Plan from which to reference social needs. With this being the case, we looked towards Greenwood Township as a comparable guide. Greenwood Township is a neighboring township of Elmer and holds many of the same social, environmental, and economic characteristics. Greenwood Township's Master Plan does an excellent job explaining the importance of planning and how it helps to guide a township through future development.

We have based many of our municipality and developer goals on the survey administered by Greenwood Township representatives in 2011 to the residents of Greenwood. This survey covers many issues and helps define the townships goals for the future. (See Appendix C for a copy of the Greenwood Township community survey and Appendix D for the goals derived from the survey). In order to apply these goals to our scenarios, we simplified the list keeping those which can be quantitatively measured when comparing the site plans for the two groups we have created: Municipalities and Developers.

Using the goals determined in Table 1 we developed five design alternatives which balance the goals in various proportions. The scenarios are found on the following pages.

GOALS DETERMINED FOR ELMER TOWNSHIP DEVELOPMENT

THEME	GOAL	MEASURE	MUNICIPALITY IMPORTANCE	DEVELOPER IMPORTANCE
Recreation	Access to natural areas via trails	sf of trails created, or maintained	High: Increase the number of trails on site	High: Increase the number of trails on site
Wildlife	Create wildlife corridor connecting surrounding forest stands (potential for jack pine)	Yes or no for connected patches of undisturbed land	High: Introduce corridor connecting established stands	Low: Maintain trees in key locations
	Avoid Development on sensitive areas	Avoid building within 100' of Pond	High: Maintain highest proportion of sensitive land preservation possible	Moderate: Maintain a modest amount of sensitive land
	Limit impervious surfaces	Square feet of impervious surface developed	High: Limit the amount of impervious surfaces introduces	Low: Not of high importance
Residential	Establish a max Lot Size	Acres of lot size	Moderate: More concerned about adding to rural sprawl, so keeping lot under 2 acres	High: Want to maximize development so desire smallest lot size
	Develop minimum housing standards based on firewise building practices	Development designed in fire wise manner? Yes or No	High: Follow more principles to create a safer environment	Low: To maintain affordable housing and healthy profit margin
Community Character	Maintaining rural character	Acres of undeveloped land	High: Keep current environmental appeal	Moderate: Would like to maintain the appeal of the area, but is more willing to make sacrifices to the natural area if it can increase profit.
Economic	Increase Tax Values	Assume amount of tax per unit	High: Would like to see an increase in tax revenue	Low: They don't have a vested interest in tax values once sold
Development	Develop near existing roads to minimize amount of infrastructure	Developing towards front of lot within 200'	High: Would like to see development along road edge to preserve character of space	High: Would like to see development in the center to allow for nice drive/ scenery
Infrastructure	Develop adequate infrastructure	Linear feet of infrastructure	Low: Is not worried about how much infrastructure needs to be developed	High: Does not want to spend unnecessary money on infrastructure costs

Table 1. Project Matrix: Community Goals

Scenario 1

Figure 17. Scenario 1 Illustrative Plan

Number of Townhomes	17
Number of Single Family Homes	0
Amount of Trails Created	4,904 linear ft
Potential for a Wildlife Corridor	Yes
Avoided Development on Sensitive Areas	Yes
Total Impervious Surface Created	146,344 sf
Max Lot Size Under 2 Acres	Yes
Designed using Firewise Principles	Yes
Acres of Undeveloped Land	29.9
Tax Units Created	51
Devleoped near Existing Roads	No
Estimated Cost of Infrastructure	$89,240

In scenario 1, development is restricted to 20% of the land for an average density of 10 people per acre. The site contains 17 townhouses and 0 single family homes for a total of 51 units and 51 tax credits. This scenario maintains the maximum amount of undeveloped land at 29.9 acres, on which 4,904 linear feet of trails are created. The undeveloped land protects sensitive areas, by maintaining a 100 ft buffer around the pond and is connected in a continuous way that has the potential to be maintained as a wildlife corridor. Despite not developing immediately close to the road, this scenario creates the least amount of impervious services at 146,344 sf, and has the minimum estimated infrastructure cost at only $80,240. Developer profit (price of units sold- infrastructure costs) totals $930,760.

In this scenario people have the least amount of personal land because development is restricted to 20% of the site. The trade-off for this high density is less impact on the existing environmental conditions and increased opportunity for public recreation in a natural setting.

Aside from the low tax credits, this scenario most fully fulfills the municipality's desires.

Scenario 2

Figure 18. Scenario 2 Illustrative Plan

Number of Townhomes	12
Number of Single Family Homes	15
Amount of Trails Created	5,585 linear ft
Potential for a Wildlife Corridor	Yes
Avoided Development on Sensitive Areas	No
Total Impervious Surface Created	245,446 sf
Max Lot Size Under 2 Acres	Yes
Designed using Firewise Principles	Yes
Acres of Undeveloped Land	20
Tax Units Created	66
Devleoped near Existing Roads	Yes
Estimated Cost of Infrastructure	$203,360

Scenario 2 develops 35% of the land for an average density of 5.7 people per acre. The site contains 12 townhouses and 15 single family homes for a total of 51 units and 66 tax credits. This scenario maintains the second largest amount of undeveloped land at 20.0 acres, on which 5,585 linear feet of trails are created. Sensitive areas are not protected because there is development within the 100 ft border around the pond, however the undeveloped land is connected in a continuous way that has potential to be maintained as a wildlife corridor. Development begins close to the existing road and creates the creates the second smallest amount of impervious services at 245,466 sf, and has an estimated infrastructure cost of $203,360. Developer profit (price of units sold- infrastructure costs) totals $1,941,640.

In this scenario, there is an increase in personal private space as the average density decreases by 43% from 10 people per acre to 5.7 people per acre. Even with fewer undeveloped acres than scenario 1, the layout allows for a slight increase in the amount of trails created. The tax points increase 29%, however the infrastructure costs also increase by 127% or $114,120 from scenario 1.

Scenario 3

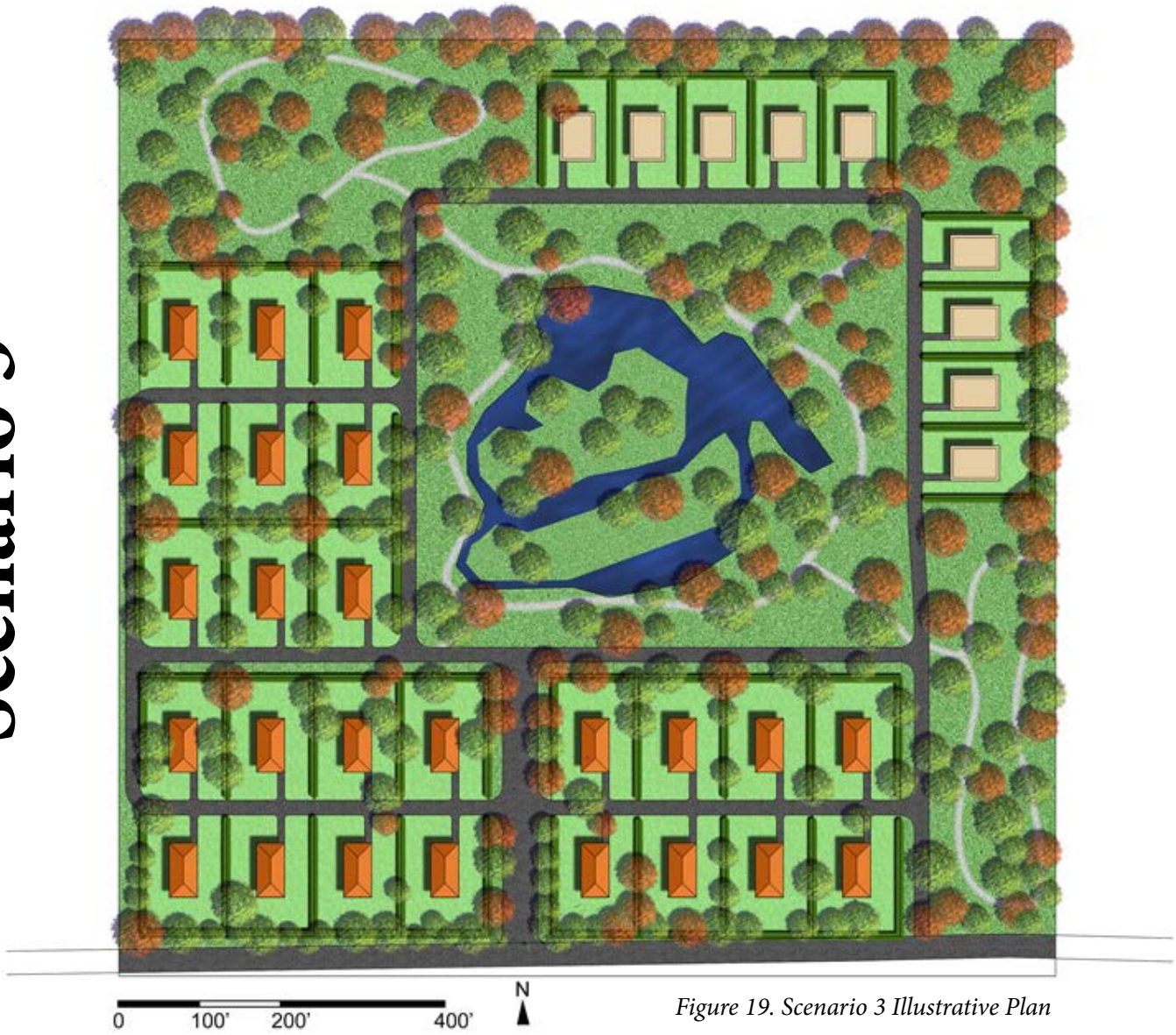


Figure 19. Scenario 3 Illustrative Plan

Number of Townhomes	9
Number of Single Family Homes	25
Amount of Trails Created	4,576 linear ft
Potential for a Wildlife Corridor	No
Avoided Development on Sensitive Areas	Yes
Total Impervious Surface Created	274,454 sf
Max Lot Size Under 2 Acres	Yes
Designed using Firewise Principles	Yes
Acres of Undeveloped Land	17.3
Tax Units Created	77
Devleoped near Existing Roads	Yes
Estimated Cost of Infrastructure	$235,000

In scenario 3, development is restricted to 50% of the land for an average density of 4 people per acre. The site contains 9 townhouses and 25 single family homes for a total of 52 units and 77 tax credits. This scenario maintains 17.3 acres of undeveloped land, on which 4,576 linear feet of trails are created. The undeveloped land protects sensitive areas, by maintaining a 100 ft buffer around the pond however it is distributed in a way which is disconnected and not of suitable potential to be maintained as a wildlife corridor. Development begins close to the road and creates 274,454 sf impervious services and has an estimated infrastructure cost of $235,000. Developer profit (price of units sold- infrastructure costs) totals $2,680,000.

Despite being the first scenario to disrupt the wildlife corridor, the undeveloped land still provided space for a trail system for residential recreation. Development sprawls toward the north on single loaded streets. These single loaded streets not only increase the total infrastructure cost but will also increase lot costs for future residence.

Scenario 4

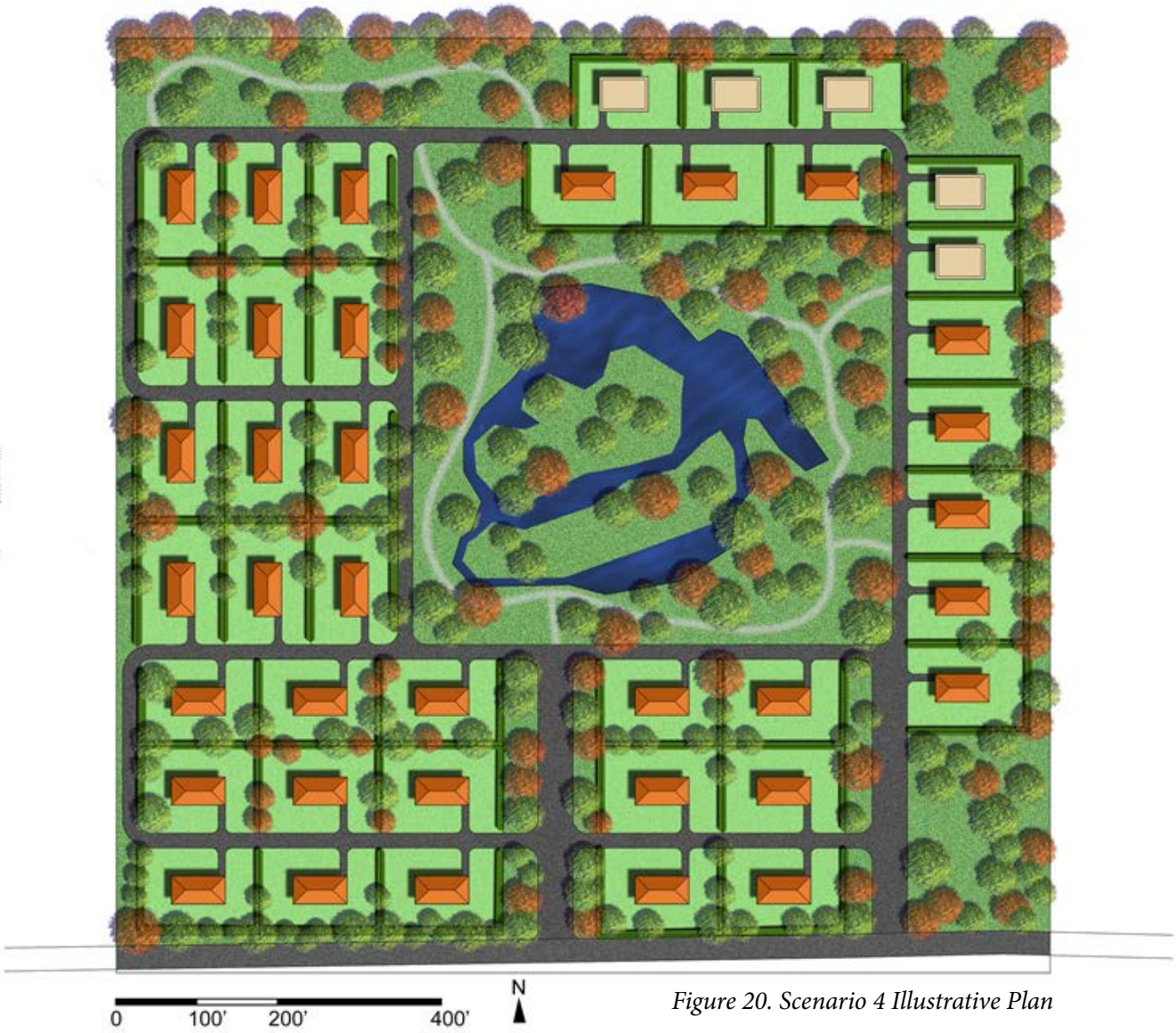


Figure 20. Scenario 4 Illustrative Plan

Number of Townhomes	5
Number of Single Family Homes	35
Amount of Trails Created	2,672 linear ft
Potential for a Wildlife Corridor	No
Avoided Development on Sensitive Areas	Yes
Total Impervious Surface Created	321,864 sf
Max Lot Size Under 2 Acres	Yes
Designed using Firewise Principles	Yes
Acres of Undeveloped Land	14
Tax Units Created	85
Devleoped near Existing Roads	Yes
Estimated Cost of Infrastructure	$254,560

In scenario 4, development is restricted to 65% of the land for an average density of 3.8 people per acre. The site contains 5 townhouses and 35 single family homes for a total of 50 units and 85 tax credits. This scenario maintains 14.0 acres of undeveloped land, on which 2,672 linear feet of trails are created. The undeveloped land protects sensitive areas, by maintaining a 100 ft buffer around the pond however it is distributed in a way which is disconnected and not of suitable potential to be maintained as a wildlife corridor. Development begins close to the road and creates 321,864 sf of impervious surfaces at and has an estimated infrastructure cost of $254,560. Developer profit (price of units sold- infrastructure costs) totals $3,370,440.

Continuing the trend seen in scenario 3, development is pushed further north on the site. Streets become double loaded as the total number of units increase from 34 to 40. This double loading decreases the relative cost of infrastructure per unit to the developers. The increase in developed land allows for more private space, however, there is less land available land for public trails.

Scenario 5

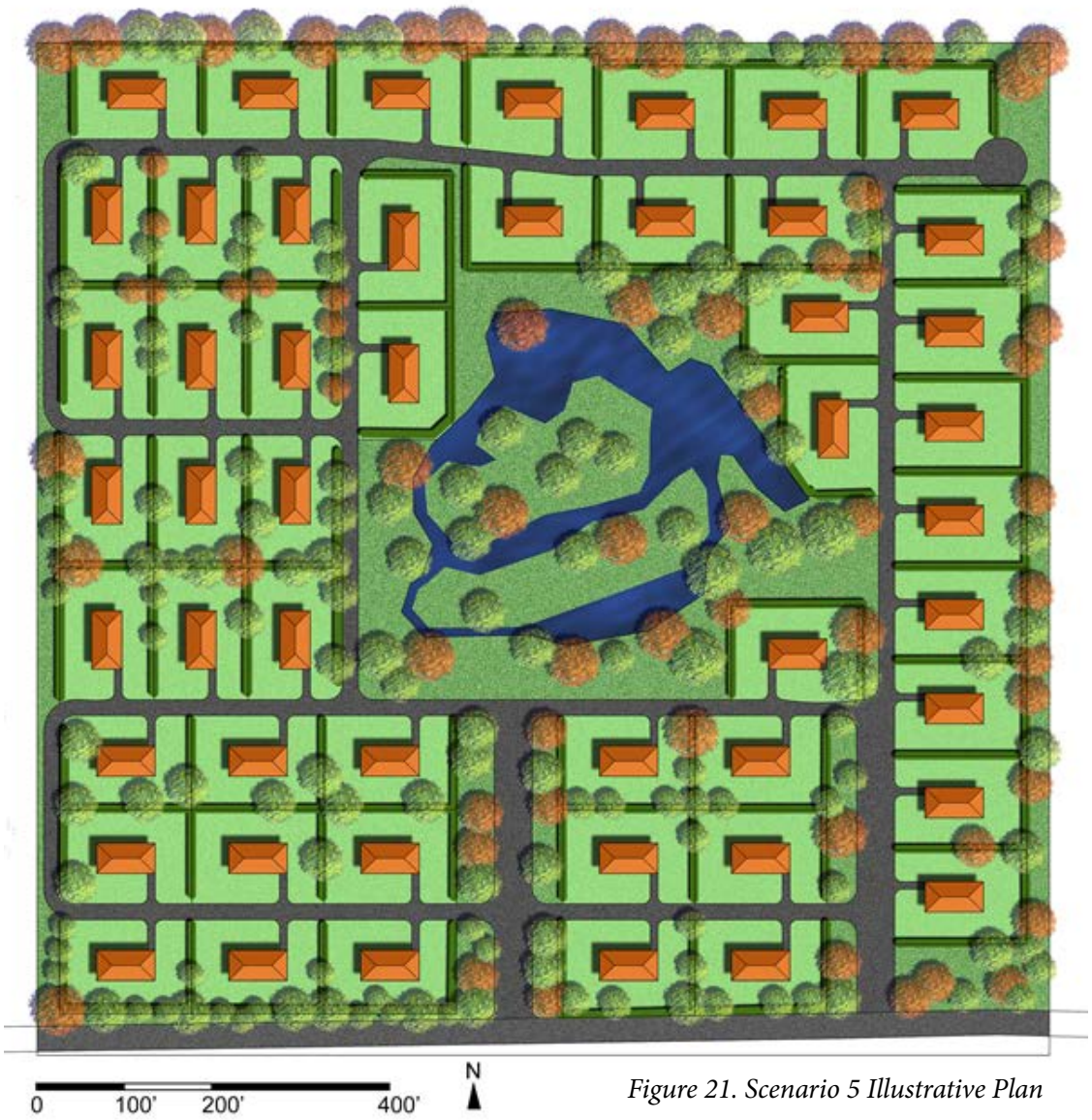


Figure 21. Scenario 5 Illustrative Plan

Number of Townhomes	0
Number of Single Family Homes	49
Amount of Trails Created	0 linear ft
Potential for a Wildlife Corridor	No
Avoided Development on Sensitive Areas	No
Total Impervious Surface Created	356,750 sf
Max Lot Size Under 2 Acres	Yes
Designed using Firewise Principles	Yes
Acres of Undeveloped Land	8
Tax Units Created	98
Devleoped near Existing Roads	Yes
Estimated Cost of Infrastructure	$264,320

In scenario 5, development is restricted to 75% of the land for an average density of 3.1 people per acre. The site contains 0 townhouses and 49 single family homes for a total of 49 units and 98 tax credits. This scenario maintains 8.0 acres of undeveloped land which is not suitable for trail creation. The undeveloped land is not sufficient to protect sensitive areas and there is development within the 100 ft buffer around the pond and it is distributed in a way which is disconnected and not of suitable potential to be maintained as a wildlife corridor. Development begins close to the road and creates 356,750 sf impervious services, and has an estimated infrastructure cost of $264,320. Developer profit (price of units sold- infrastructure costs) totals $4,390,680.

Scenario 5 sees dramatic increase in developed private space. The trade-off for this is the encroachment of development onto the pond buffer and the elimination of any land for public trails. In addition, by limiting the housing options provided to only single family houses this scenario limits the demographics of the potential future residents. In this scenario the tax credit is the highest, however, it is the least desirable to both groups due to a combination of high infrastructure cost and almost no public natural land for recreation or marketing.

RECOMMENDATION SUMMARY

For the purposes of this study, we have concluded that scenario 2 most adequately fulfills the goals previously presented by developers and municipalities in our township. Looking specifically at the reasoning behind this decision, we will explain how scenario 2 can satisfy the expectations for both parties.

The largest increase in developer profit occurs between scenario 1 and 2 with a 108% increase. The next largest increase occurs between scenario 2 and 3, however the increase is only 38%. While the developer enjoys a large increase in profit there is still a large portion of the natural land remaining intact and the scenario has the second lowest ratio of impervious surface per unit built. This undeveloped land is utilized to create a long uninterrupted trail system, as well as a wildlife corridor in the north pleasing the municipalities. Although the corridor does not rank high on the developers goals, the undeveloped land provides a marketable amenity in the form of trails which increase the appeal of the units.

The development pattern in this scenario cuts into the 50' buffer around the pond, however the intrusion allows for increased access and views of the lake. The increase in impervious surface is largely due to an increase in dwellings and the road that encircles the pond. Because the roadway is provided for scenic purposes and is not expected to support a lot of traffic, alternative paving options could be considered, thereby lowering the total impervious square footage and pleasing the municipalities.

As in the other four scenarios, scenario 2 keeps the lots sizes under 2 acres to eliminate urban sprawl, and takes into account the various Firewise Principles when designing landscaping. These characteristics are important to note as they have dramatically affected the layout of the dwellings on the site. Both stakeholders value these as important and are satisfied with the results displayed in scenario 2.

Keeping in line with the character of the land, it is important for the scenario we choose to focus on preserving a large portion of undeveloped land. Scenario 2 did an excellent job at developing closer to the existing road, which helped eliminate the sprawl of dwellings throughout the site. This also helped ensure that nearly 22 acres of the 40 acre lot would remain unaltered. While additional buildings would lead to additional tax revenue for the municipalities and increased profit for the developer, undeveloped land is also a high value for both parties and the amount of undeveloped land which would be destroyed in order to build the additional units is not worth the trade-off.

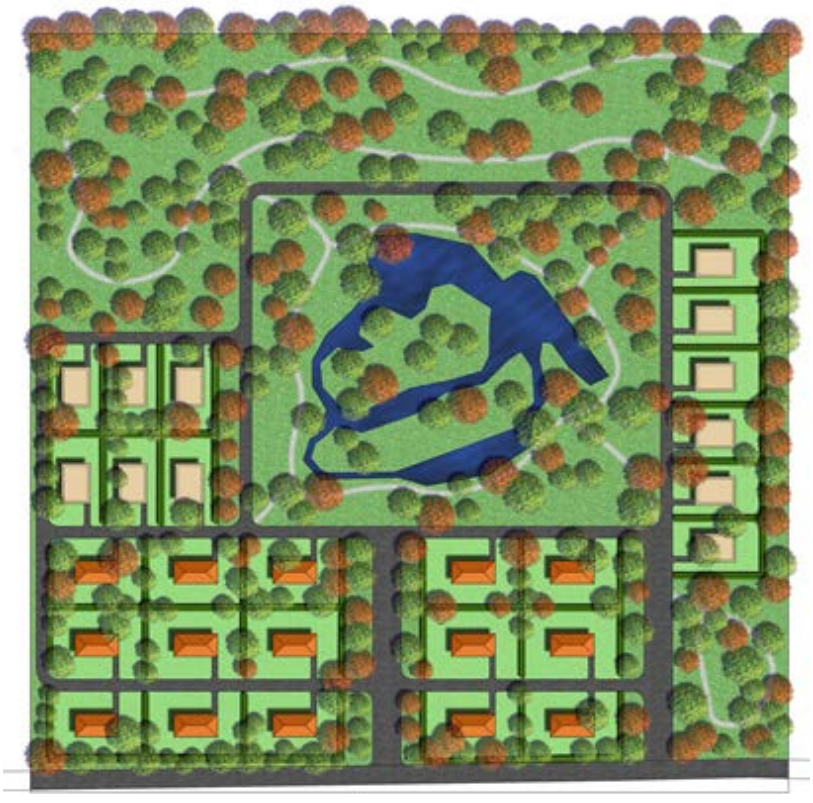


Figure 22. Recommended Scenario For Further Development - Scenario 2

SITE DESIGN

BLOCKS

Taking a closer look at our site plan and highlighting key Firewise principles (zonal breakdown and individual home planting plan) we have provided visual representation of how these aspects would appear on a site. Based on the development intensity and type, the general size of a parcel will be 124 feet by 174 feet, and the recommended size of each single house will be 40 feet by 74 feet. Below is an example of a typical neighborhood layout showing the overlapping of zones.

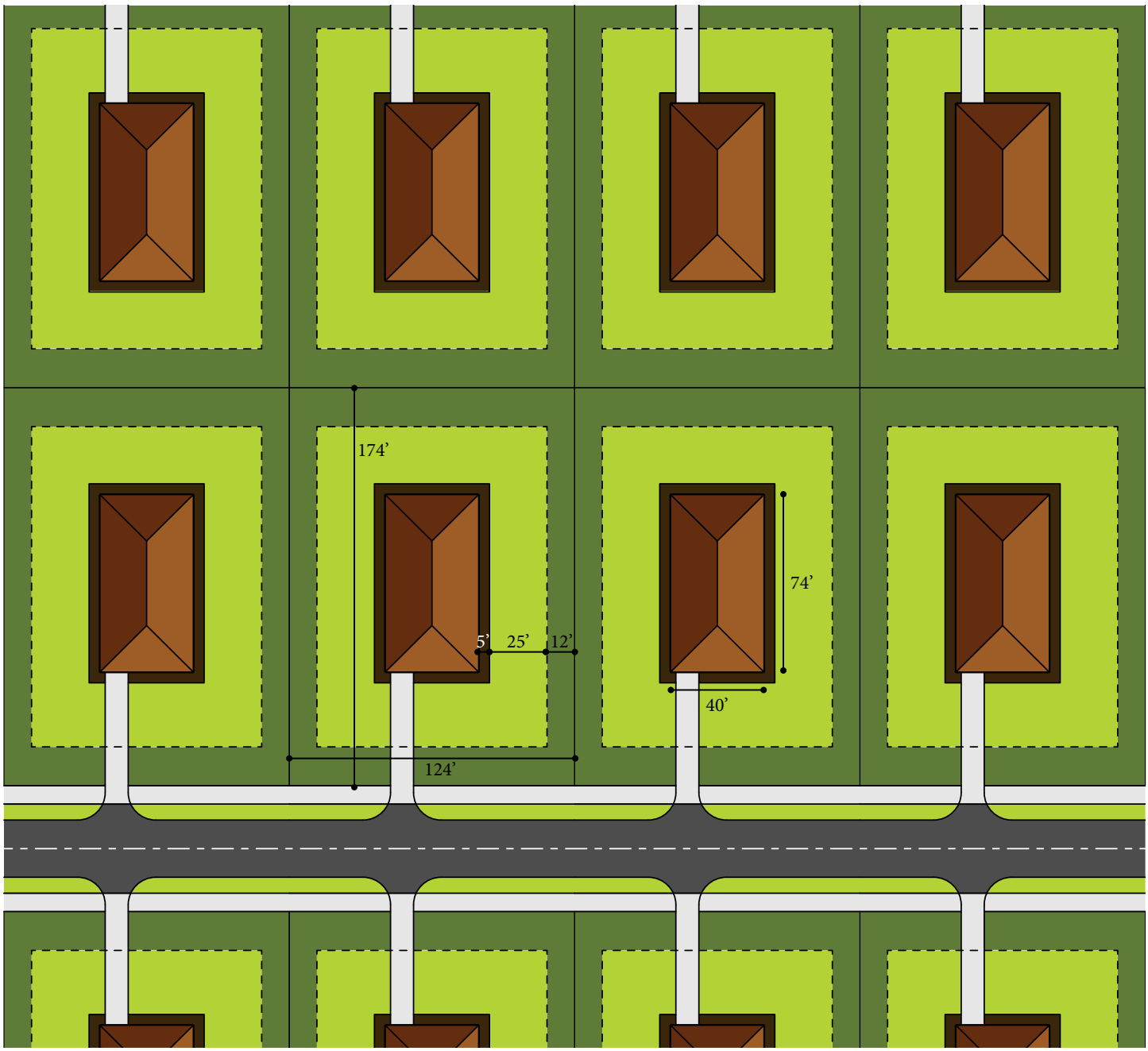


Figure 23. Paradigm of Firewsie Neighborhood Development Plan

PARCEL PLANTING DESIGN

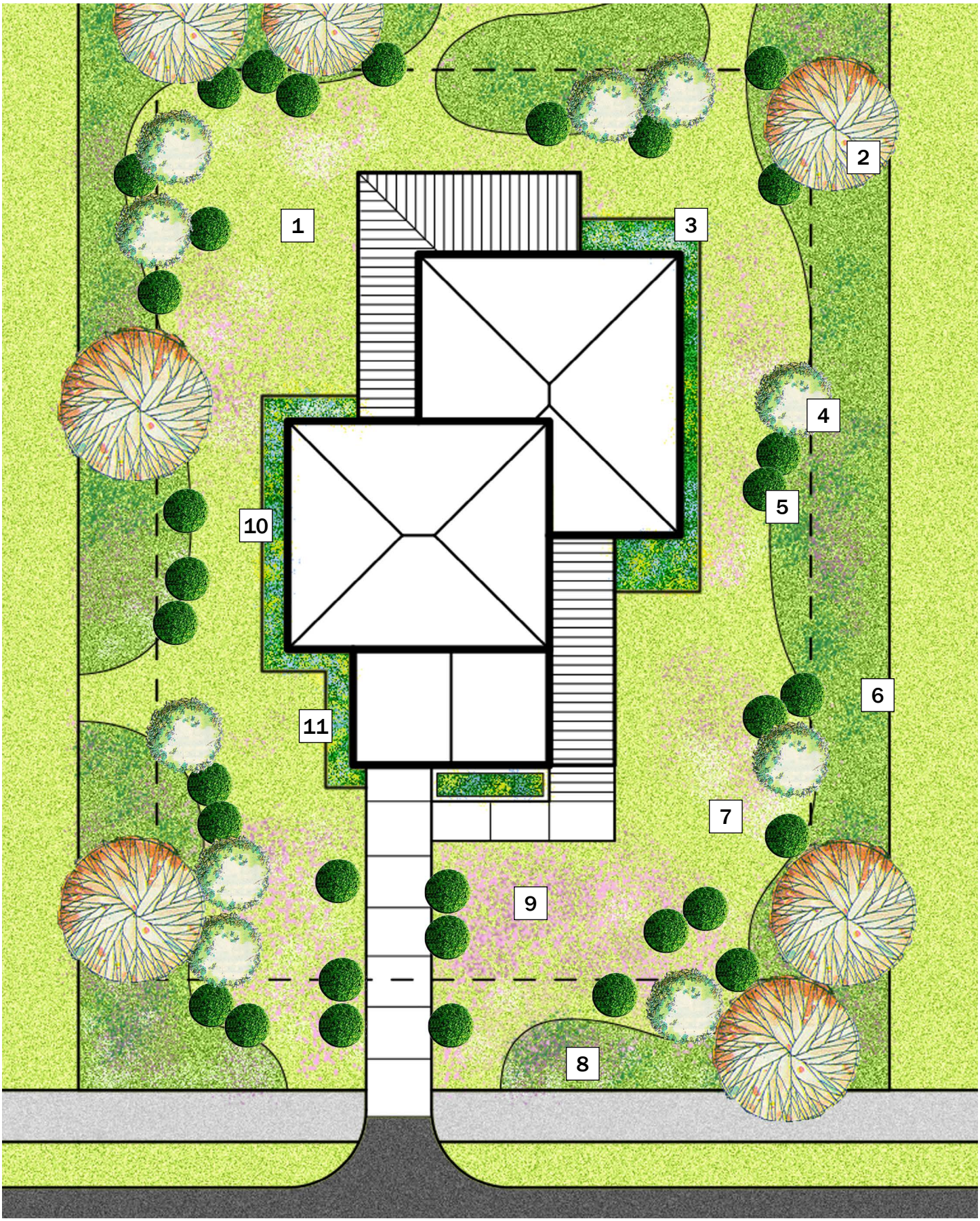


Figure 24. Parcel Planting Design

Based on the Firewise residential development archetype, three zones are created using different planting design strategies. Large trees are permissible in the fringe of zone three, however they must be spaced at an appropriate distance to avoid fire jump. In zone 2 scattered shrubs and tall herbaceous species serve as barriers to emergent fire, aesthetic enjoyment for householders and visual screens. The area inside zone 1 should be lawn or turf to serve as a buffer against fire. It is recommended that water based plants, such as succulents, be planted adjacent to the house in wet soil to form an additional fire buffer around the dwelling.

1. Lawn

2. Red maple, *Acer rubrum*

3. Snow in summer, *Cerastium tomentosum*

4. Serviceberry, *Amelanchier spp.*

5. Michigan holly, *Ilex verticillata*

6. Coral Bells, *Heuchera sanguinea*

9. Creeping phlox, *Phlox subulata*

8. English ivy, *Hedera helix*

11. Yarrow, *Achillea spp.*

10. Wild blue iris, *Achillea spp.*

Figure 25. Species Images

PARCEL HARDSCAPE DESIGN

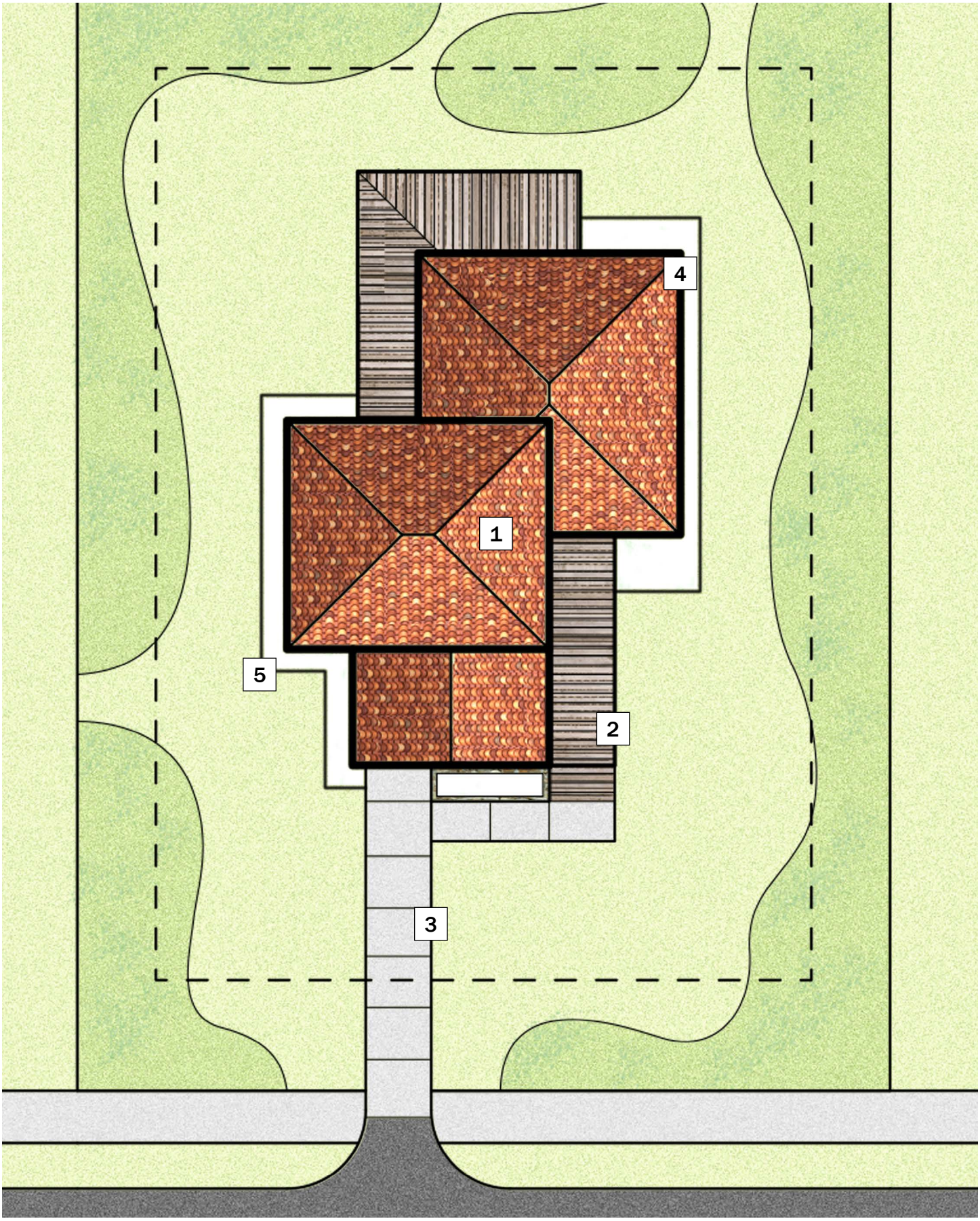


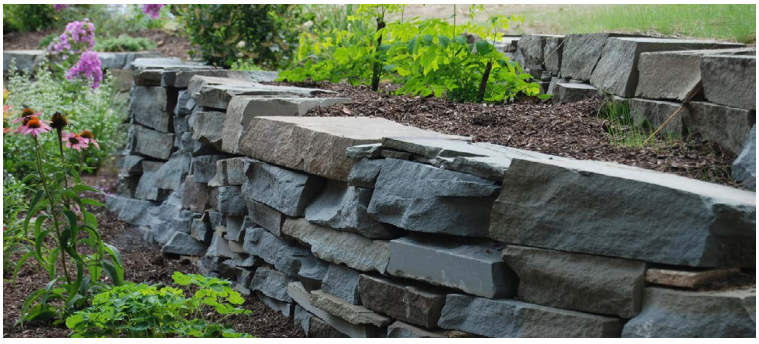
Figure 26. Parcel Hardscape Design

1. Tile roof

2. Treated plank

3. Concrete sidewalk as fire buffer and barrier

4. Stone wall skirt to protect the wooden wall body



5. Stone low wall in garden as barrier

Figure 27. Material Example

CONCLUSIONS

In colnclusion, this study proved to be benefitical for various reasons. We were able to determine two main elements required for a successful development in rural areas:

1. There needs to be a process of open communication between the main stakeholders. In our case, the main stakeholders included developers and municipalities.
2. In areas susceptible to rural sprawl, it is important to have a development plan in place which will help to mitigate potential damages. This does not mean that development should be looked at as a terrible thing, but rather it ensures that development is done in a smart manner, with sensitivity to the needs of both the stakeholders and the environment.

Creating a site master plan early in the development process makes sure that the goals of the project are clearly articulated. This ensures that the stakeholders goals are met and and that suitable land is designated to accommodate the project in an environmentally friendly way. To help identify the tools facilitate communication between stakeholders, we have created a summarized list below. This list serves as an iterative process, which may require many revisions along the way.

1) Identify Key Stakeholders (Community Groups, Municipalities, Developers, etc.)
2) What are the Stakeholder Goals? Find this information through interviews, focus groups, meetings, etc.
3) Weight the stakeholder goals in order of importance
4) Identify areas of similar interest between the groups and note the areas where interests conflict.
5) Create an agreed upon rubric that takes the goals of the groups and computes them to a measureable value.
6) Create a gradient of conceptual plans alternative. The extremes will show each stakeholders' ideal scenario. In between these lay out a gradient of three other plans, which will serve as a plan that will visualize a "give and take" approach with the two sides. (e.g. We will give you a little more of A, but you have to give us some more of B)
7) Be able to compare and contrast the plans using key measurement tools that will be based on stakeholder goals.
8) Present your findings to the stakeholder groups and have an open discussion of the plans and what reit erations they would like to see made.
9) Re-work the goals and master plan based on this meeting and re-create additional scenarios to show the process.
10) Continue the communication process and the iterations of designs until both parties are satisfied and the proposed development falls in conjuncture with the township, or city master plan.

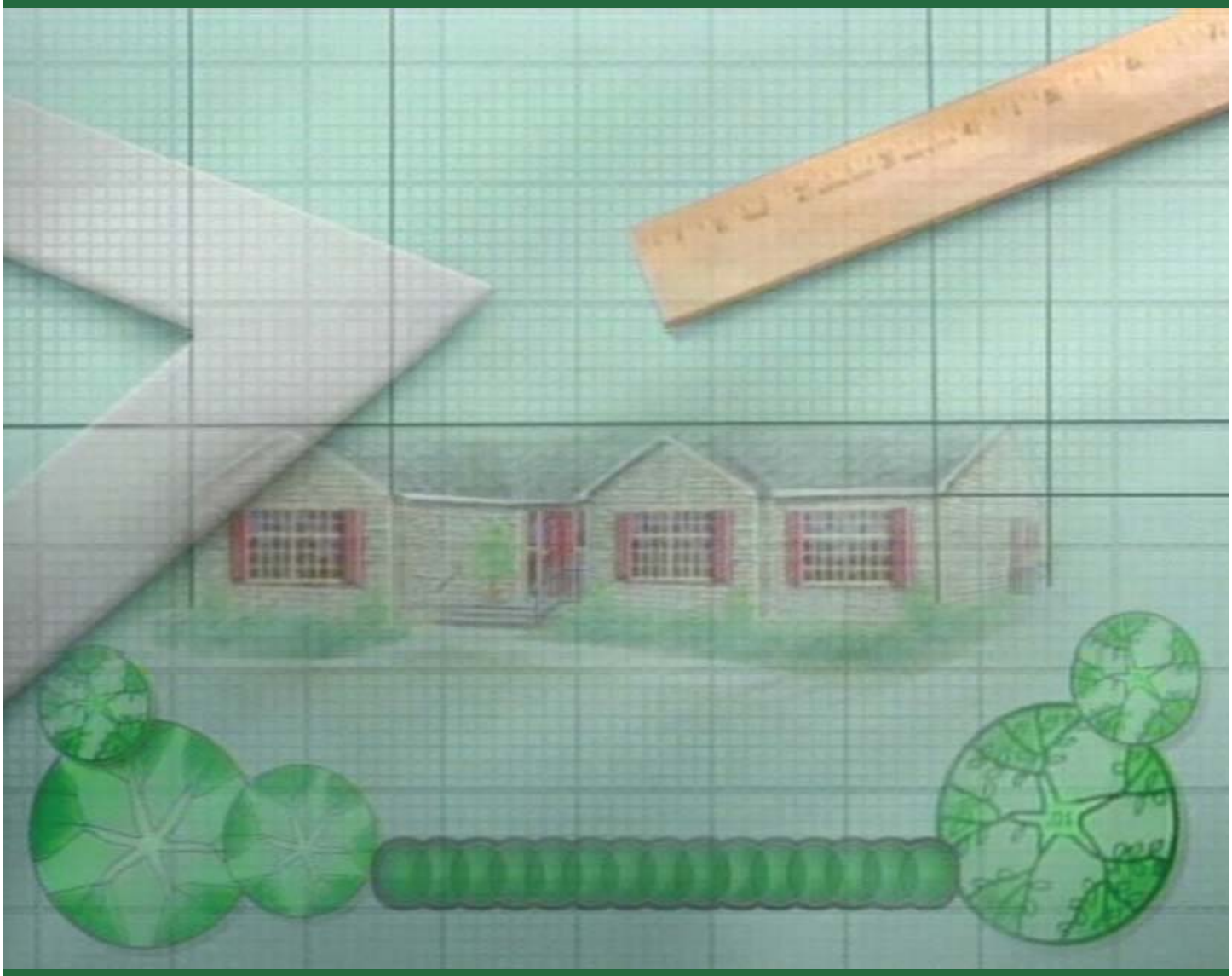
Although the issues of rural sprawl are complex, with forethought and planning it can be managed and the effects mitigated to create new developments that help preserve the esential qualities of rural communities. We hope that this masters project will provide an initial guide to help facilitate the communication between stakeholders. This open communication will help with the overall development process and will increase the chances of producing a successful project that limits rural sprawl.

APPENDIX A

The Michigan Planning Enabling Legislation, P.A. 33 of 2008, as amended:

"The general purpose of a master plan is to guide and accomplish, in the planning jurisdiction and its environs, development that satisfies all of the following criteria:
(a) Is coordinated, adjusted, harmonious, efficient, and economical.
(b) Considers the character of the planning jurisdiction and its suitability for particular uses, judged in terms of such factors as trends in land and population development.
(c) Will, in accordance with present and future needs, best promote public health, safety, morals, order, convenience, prosperity, and general welfare.
(d) Includes, among other things, promotion of or adequate provision for 1 or more of the following:
(i) A system of transportation to lessen congestion on streets.
(ii) Safety from fire and other dangers.
(iii) Light and air.
(iv) Healthful and convenient distribution of population.
(v) Good civic design and arrangement and wise and efficient expenditure of public funds.
(vi) Public utilities such as sewage disposal and water supply and other public improvements.
(vii) Recreation.
(viii) The use of resources in accordance with their character and adaptability.

Firewise Guide to Landscape and Construction



NFPA®
www.nfpa.org

FIREWISE COMMUNITIES®
www.firewise.org

Guide to Landscaping

The primary goal for Firewise landscaping is fuel reduction — limiting the level of flammable vegetation and materials surrounding the home and increasing the moisture content of remaining vegetation. This includes the entire 'home ignition zone' which extends up to 200 feet in high hazard areas.

Use the Zone Concept

Zone 1 is the 30 feet adjacent to the home and its attachments; Zone 2 is 30 to 100 feet from the home; Zone 3 is 100 to 200 feet from the home.

Zone 1 (All Hazard Areas) *This well-irrigated area encircles the structure and all its attachments (wooden decks, fences, and boardwalks) for at least 30 feet on all sides.*

1) Plants should be carefully spaced, low-growing and free of resins, oils and waxes that burn easily.
2) Mow the lawn regularly. Prune trees up six to ten feet from the ground.
3) Space conifer trees 30 feet between crowns. Trim back trees that overhang the house.
4) Create a 'fire-free' area within five feet of the home, using non-flammable landscaping materials and/or high-moisture-content annuals and perennials.
5) Remove dead vegetation from under deck and within 10 feet of house.
6) Consider fire-resistant material for patio furniture, swing sets, etc.
7) Firewood stacks and propane tanks should not be located in this zone.
8) Water plants, trees and mulch regularly.
9) Consider xeriscaping if you are affected by water-use restrictions.

Zone 2 (Moderate and High Hazard Areas) Plants in this zone should be low-growing, well-irrigated, and less flammable.

1) Leave 30 feet between clusters of two to three trees, or 20 feet between individual trees.
2) Encourage a mixture of deciduous and coniferous trees.
3) Create 'fuel breaks', like driveways, gravel walkways and lawns.
4) Prune trees up six to ten feet from the ground.

Zone 3 (High Hazard Areas) Thin this area, although less space is required than in Zone 2. Remove smaller conifers that are growing between taller trees. Remove heavy accumulation of woody debris. Reduce the density of tall trees so canopies are not touching.

Maintaining the Firewise Landscape

- ✓Keep trees and shrubs pruned six to ten feet from the ground.
- ✓Remove leaf clutter and dead and overhanging branches.
- ✓Mow the lawn regularly and dispose of cutting and debris promptly.
- ✓Store firewood away from the house.
- ✓Maintain the irrigation system regularly.
- ✓Familiarize yourself with local regulations regarding vegetative clearance, debris disposal, and fire safety requirements for equipment.

Use grass and driveways as fuel breaks from the house.

Use faux brick and stone finishes and high-moisture-content annuals and perennials.

Use groupings of potted plants that include succulents and other drought resistant vegetation.

Create a cinder block wall around the perimeter of your yard and use grass and slate to break up the landscape.

The use of pavers and rock make for a pleasing effect and creates a fuel break.

The roof is the most important element of the home. Use rated roofing material.

Cover openings with 1/8" metal screen to block fire brands and embers from collecting under the home or deck.

Use non-flammable fencing if attached to the house such as metal.

"When considering improvements to reduce wildfire vulnerability, the key is to consider the home in relation to its immediate surroundings. The home's vulnerability is determined by the exposure of its external materials and design to flames and firebrands during extreme wildfires. The higher the fire intensities near the home, the greater the need for nonflammable construction materials and a resistant building design." – Jack Cohen, USDA-Forest Service

Use Rated Roofing Material. Roofing material with a Class A, B or C rating is fire resistant and will help keep the flame from spreading. Examples:

- ✓ Composition shingle
- ✓ Metal
- ✓ Clay
- ✓ Cement tile

Use Fire-Resistant Building Materials on Exterior Walls. Examples include:

- ✓ Cement
- ✓ Plaster
- ✓ Stucco
- ✓ Masonry (concrete, stone, brick or block)

While vinyl is difficult to ignite, it can fall away or melt when exposed to extreme heat.

Use Double-Paned or Tempered Glass. Double-pane glass can help reduce the risk of fracture or collapse during an extreme wildfire. Tempered glass is the most effective. For skylights, glass is a better choice than plastic or fiberglass.

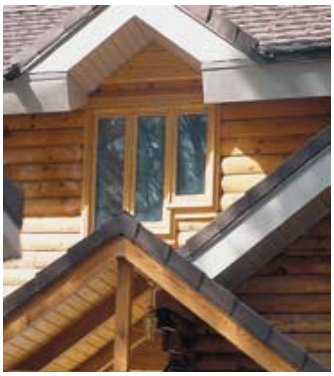
Enclose Eaves, Fascias, Soffits and Vents. 'Box' eaves, fascias, soffits and vents, or enclose them with metal screens. Vent openings should be covered with 1/8" metal screen.

Protect Overhangs and Other Attachments. Remove all vegetation and other fuels from around overhangs and other attachments (room additions, bay windows, decks, porches, carports and fences). Box in the undersides of overhangs, decks and balconies with noncombustible or fire-resistant materials. Fences constructed of flammable materials like wood should not be attached directly to the house.

Anything attached to the house (decks, porches, fences and outbuildings) should be considered part of the house. These act as fuel bridges, particularly if constructed from flammable materials.

1) If a wood fence is attached to the house, separate the fence from the house with a masonry or metal barrier.
2) Decks and elevated porches should be kept free of combustible materials and debris.
3) Elevated wooden decks should not be located at the top of a hill. Consider a terrace.

Use glass skylights; plastic will melt and allow embers into the home.



Enclose eaves and soffits.

Enclose under decks so firebrands do not fly under and collect.

I can make my home Firewise® by:

Use sprinklers or garden hoses regularly to keep vegetation moist.

Use a concrete patio instead of a wooden deck and rubber mats instead of natural fiber.

Use pebbles instead of mulch near the home's foun dation where possible.

APPENDIX C

COMMUNITY OPINION SURVEY FOR GREENWOOD TOWNSHIP

Greenwood Township is in the process of updating their Master Plan. As part of this update, the Planning Commission is asking for your opinion about issues related to land use and any other thoughts and ideas you may want to offer as input in this process.

Please take a moment to fill out this survey, adding your personal comments anywhere you wish and return it to the Township Office by June 30, 2011. Thanks very much for your help!

1. Why do you own property in Greenwood Township? Please check all that apply.
a. Close to work _____ c. Close to family _____
b. Like the environment _____ d. Grew up here _____
e. Other (please describe)_____

2. How long have you owned property in the Township?
a. 0-5 years _____ d. 16-20 years _____
b. 6-10 years _____ e. over 20 years _____
c. 11-15 years _____ f. Seasonal resident _____

3. Please indicate your property interests (Check all that apply):
a. Own Home _____ e. Rent Home _____
b. Rent Farm _____ f. Own Cabin/Seasonal Residence _____
c. Rent Cabin/Seasonal Residence _____ g. Own Business _____
d. Own Hunting Land _____ h. Own Vacant Land _____

4. More commercial development is needed in the Township.
a. Strongly Agree _____ c. Disagree _____
b. Agree _____ d. Strongly disagree _____

If you agree, what kind of commercial development should be encouraged?

	Yes	No	No Opinion
e. Offices/research/medical uses	____	____	____
f. Neighborhood shopping	____	____	____
g. Large retail stores	____	____	____
h. Restaurants and fast food	____	____	____
i. Malls	____	____	____
j. Auto related retail and repair	____	____	____
k. Other _____	____	____	____

5. More industrial development is needed in the Township.
a. Strongly Agree _____ c. Disagree _____
b. Agree _____ d. Strongly disagree _____

If you agree, what kind of industrial development should be encouraged?

	Yes	No	No Opinion
e. Light manufacturing only	____	____	____
f. Heavy manufacturing only	____	____	____
g. Warehousing and distribution only	____	____	____
h. Packaging and assembly only	____	____	____
i. Other _____	____	____	_ _ _ _

5. More industrial development is needed in the Township.

a. Strongly Agree _____ c. Disagree _____
b. Agree _____ d. Strongly disagree _____

If you agree, what kind of industrial development should be encouraged?

	Yes	No	No Opinion
e. Light manufacturing only			
f. Heavy manufacturing only			
g. Warehousing and distribution only			
h. Packaging and assembly only			
i. Other _____			

6. Check up to 5 additional services that you would like improved or initiated in the township:

a. Cellular service _____ e. Roads _____ i. Senior center _____
b. Gypsy Moth control _____ f. Fire Dpt. _____ j DSL _____
c. Mosquito control _____ g. Water _____ k. Ambulance _____
d. Recycling _____ h. Police _____ l. Other _____

7. Should Greenwood Township develop more recreational facilities?

a. Strongly Agree _____ c. Disagree _____
b. Agree _____ d. Strongly disagree _____

If yes, what type of facilities is needed? Please check all that apply.

e. Natural Areas _____ h. Picnic Areas _____
f. Trail Head _____ i. Senior Citizen Activities _____
g. Ball Field/Court _____ j. Other _____

8. Would you support collaboration with other municipalities to provide these services if it saved the township money? a. YES _____ b. NO _____

9. Please rate the following, according to your level of satisfaction.

10. What is the BEST thing about owning property in Greenwood Township?

11. What is the WORST thing about owning property in Greenwood Township?

12. Please tell us your vision about how you feel Greenwood Township should plan for Future Land Use.

We appreciate your time to fill this out and return it. In an effort to help us save money on postage, please return this survey by dropping it off at the outside mailbox to the Township Hall by 6.30.11
OR
Mailing it back to Greenwood Township
4030 Williams Rd.
Lewiston, MI 49756-0129

THANKS VERY MUCH!

Greenwood Township Planning Commission

APPENDIX D

COMMUNITY SURVEY EXAMPLE

COMMUNITY OPINION SURVEY FOR GREENWOOD TOWNSHIP

Greenwood Township is in the process of updating their Master Plan. As part of this update, the Planning Commission is asking for your opinion about issues related to land use and any other thoughts and ideas you may want to offer as input in this process.

Please take a moment to fill out this survey, adding your personal comments anywhere you wish and return it to the Township Office by **June 30, 2011.** Thanks very much for your help!

1. Why do you own property in Greenwood Township? Please check all that apply.
   - a. Close to work _____
   - b. Like the environment _____
   - c. Close to family _____
   - d. Grew up here _____
   - e. Other (please describe)_____

2. How long have you owned property in the Township?
   - a. 0-5 years _____
   - b. 6-10 years _____
   - c. 11-15 years _____
   - d. 16-20 years _____
   - e. over 20 years _____
   - f. Seasonal resident _____

3. Please indicate your property interests (Check all that apply):
   - a. Own Home _____
   - b. Rent Farm _____
   - c. Rent Cabin/Seasonal Residence _____
   - d. Own Hunting Land _____
   - e. Rent Home _____
   - f. Own Cabin/Seasonal Residence _____
   - g. Own Business _____
   - h. Own Vacant Land _____

4. More commercial development is needed in the Township.
   - a. Strongly Agree _____
   - b. Agree _____
   - c. Disagree _____
   - d. Strongly disagree _____

If you agree, what kind of commercial development should be encouraged?

	Yes	No	No Opinion
e. Offices/research/medical uses	____	____	____
f. Neighborhood shopping	____	____	____
g. Large retail stores	____	____	____
h. Restaurants and fast food	____	____	____
i. Malls	____	____	____
j. Auto related retail and repair	____	____	____
k. Other _____	____	____	____

5. More industrial development is needed in the Township.
   - a. Strongly Agree _____
   - b. Agree _____
   - c. Disagree _____
   - d. Strongly disagree _____

If you agree, what kind of industrial development should be encouraged?

	Yes	No	No Opinion
e. Light manufacturing only	____	____	____
f. Heavy manufacturing only	____	____	____

g. Warehousing and distribution only ____ ____ ____
h. Packaging and assembly only ____ ____ ____
i. Other _____ ____ ____ ____

6. Check up to 5 additional services that you would like improved or initiated in the township:

a. Cellular service	_____	e. Roads	_____	i. Senior center	_____
b. Gypsy Moth control	_____	f. Fire Dpt.	_____	j DSL	_____
c. Mosquito control	_____	g. Water	_____	k. Ambulance	_____
d. Recycling	_____	h. Police	_____	l. Other _____	

7. Should Greenwood Township develop more recreational facilities?

a. Strongly Agree	_____	c. Disagree	_____
b. Agree	_____	d. Strongly disagree	_____

If yes, what type of facilities is needed? Please check all that apply.

e. Natural Areas	_____	h. Picnic Areas	_____
f. Trail Head	_____	i. Senior Citizen Activities	_____
g. Ball Field/Court	_____	j. Other	_____

8. Would you support collaboration with other municipalities to provide these services if it saved the township money? a. YES _____ b. NO _____

9. Please rate the following, according to your level of satisfaction.

	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied
a. Overall level of development of township					
b. Maintenance by Road Commission					
c. State and Federal Land Management					
d. Township Management					
e. Police					
f. Fire Department					

10. What is the BEST thing about owning property in Greenwood Township?

11. What is the WORST thing about owning property in Greenwood Township?

12. Please tell us your vision about how you feel Greenwood Township should plan for Future Land Use.

We appreciate your time to fill this out and return it. In an effort to help us save money on postage, please return this survey by dropping it off at the outside mailbox to the Township Hall by 6.30.11
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THANKS VERY MUCH!

Greenwood Township Planning Commission

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