COMMUNITY GARDEN SUITABILITY ANALYSIS FOR A SOUTH DALLAS COMMUNITY

by

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Abstract

COMMUNITY GARDEN SUITABILITY

ANALYSIS FOR A SOUTH

DALLAS COMMUNITY

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Community gardens have been proposed as a solution to combat the ongoing and escalating food desert problem in low-income communities. As planners, community leaders and residents look to implement this solution and convert vacant property into gardens they need to be aware of the potential conflicts that can arise when the area starts to develop.

This paper offers an analysis tool and uses it to determine vacant sites that are appropriate for community gardens in a particular South Dallas neighborhood that do not conflict with the future development of the area. It also identifies the grocery store gap in the area. Finally the paper provides policy recommendations to both guide the conversion of vacant parcels to community gardens and attract grocery store development.

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Chapter 1

Introduction

The U.S. Department of Agriculture (USDA) has deemed a number of neighborhoods in the south Dallas area food deserts. The USDA's definition of a food desert is "a *low-income census tract* where a substantial number or share of residents has *low access* to a supermarket or large grocery store" (Regan & Rice, 2012). Grocery stores and its larger counterpart, the supermarket, are the primary carriers of fresh produce. Therefore, the main issue of food deserts is that residents in low-income census tracts have low access to fresh fruits and vegetables (Regan & Rice, 2012), Moore & Diez Roux, 2006). An abundance of research has been conducted on the benefits of community gardens in low-income urban communities. These benefits range from improving public health to building social capital. A key benefit of community gardens in low-income urban communities is the granting of closer access to fresh produce (Twiss, Dickinson, Duma, Kleinman, Paulsen, & Rilveria, 2003), (Green Institute, 2006). Therefore, placing community gardens in these south Dallas neighborhoods becomes a small solution to address the food desert condition in those areas.

Another challenge is that some areas in south Dallas exhibit characteristics of urban blight. Urban blight is a common characteristic of low-income urban areas. The physical factors of blight include deteriorating infrastructure, diminished public services, unsafe or unsanitary conditions and vacant or abandoned property (Ken Schroeppel, n.d.). These factors are part of the reason for the lack of development in some areas within south Dallas (PolicyLink, 2007). Developing vacant parcels improves the condition of a low-income neighborhood by removing blight. Therefore, development of vacant land should be a highly prioritized goal in an effort to address the problems in low-income urban communities.

It is possible to conceive a conflict arising when determining the most appropriate use of eligible land in south Dallas neighborhoods. On the one hand, converting a vacant property, within the neighborhood, to a community garden would provide residents with closer access to freshly grown fruits and vegetables. On the other hand, this same property could potentially be the optimum site for the development of a grocery store, supermarket or some other use that would attract a fresh produce retailer to the neighborhood. In that case the community garden may actually hinder the development of the property and ultimately the neighborhood. Many cities have already been faced with this dilemma; which resulted in delayed development and/or removal of the community garden (Schmelzkopf, 1995). To avoid this conflict, each vacant parcel within a neighborhood should be analyzed to determine if a conversion to a community garden is the most suitable use or if it should be reserved for future development.

This report conducted such an analysis for a neighborhood in the south Dallas area. The results showed that vacant parcels most suitable for community gardens were within or adjacent to residential areas. The report also identified that the study area ultimately needs and will support one grocery store. While a community garden may serve as a small solution to address the immediate food supply needs of south Dallas area residents, economic development should still be the long term goal to remove blight and ultimately gain better access to fresh foods. The analysis identifies sites that can provide both short term and long term solutions to the issue of lack of food access.

Chapter 2

Literature Review

Food Deserts

Food deserts are defined as low-income areas that have limited access to healthy foods. The USDA definition narrows this down to low-income census tracts where a large number of residents have limited access to a supermarket or grocery store. This limited access is measured by walkability range. The walkability range is categorized as low if the nearest supermarket is more than a mile away (Economic Research, Food and Nutrition, & Cooperative State Research, 2009). However, an approximate fifteen minute walk (or one half mile distance) is the maximum distance that a pedestrian would be willing to travel to obtain groceries (Algert, Agrawal, & Lewis, 2006). The suburbanization of food retailers has contributed to the emergence of urban food deserts. Dallas County, Texas has the largest collection of food deserts in the U.S. and most of these areas are located in south Dallas (Regan & Rice, 2012). Healthy foods, including whole grains, dairy foods and fresh fruits and vegetables, may be less available and more costly in poor and minority neighborhoods. Research has shown that there is a correlation between the type of food store and the level of income in a community (Moore & Diez Roux, 2006). A study of food stores in relation to community income level shows that typically more grocery stores, convenience stores, meat and fish markets, bakeries, fruit and vegetable markets and liquor stores locate in low income communities. The study also shows that more supermarkets, natural food stores and specialty food stores locate in higher income communities (Moore & Diez Roux, 2006).

Blight

Blight, in addition to food deserts, is a prevalent issue in low income communities. Blight usually follows where there is an abundance of vacant and

abandoned property (Ken Schroeppel, n.d.). Some of the problems blight causes in a city are lack of tax revenue generation, increased tax dollars spent to maintain neighborhoods, crime, decreased property values, health risks, property owner neglect and deterred economic investment (Fraser, 2011). Physical factors of blight include: deteriorating structures, predominance of an inadequate street layout and public utilities, unsanitary or unsafe conditions and environmental contamination of buildings or property. In addition to these factors, it must be shown that the presence of these factors negatively impacts the surrounding areas and community as a whole (Ken Schroeppel, n.d.).

Blighted conditions caused by vacant and abandoned properties signal to the larger community that the neighborhood is on the decline, undermining the sense of community and discouraging any further investments (Alexander, 2011). In particular, the challenges for food retailers to open grocery stores in lower income neighborhoods are: crime or the perception of crime, low purchasing power, lack of large parcels for development sites, increased development costs, cumbersome approval processes, higher operating costs, lack of financing due to increased risk and providing for a diverse customer base (PolicyLink, 2007). The grocery store gap in blighted communities can be determined through a gap analysis. A gap analysis that measures current grocery sales leakage represents unmet demand. The leakage figure is calculated by subtracting the annual sales revenues of full-service grocers, within a certain distance, from the residents' annual grocery expenditures. The sales leakage expresses the gap between available retail within the neighborhood and the retail spending of neighborhood residents. In 2008, a grocer averaged $351 in sales per square foot each year. The resulting leakage calculation and annual sales/square foot can be used to estimate the

square footage of grocery store space currently unmet and needed in the blighted area (Social Compact, 2008).

Community Gardens

Community gardens are a potential solution to address the issues of both food deserts and blight. Many researchers have studied and summarized the multiple benefits of community gardens in low income neighborhoods. They have stated that community gardens enhance nutrition and physical activity, promotes public health, beautifies the community and builds social capital. They appeal to newly arrived immigrants that want to maintain cultural traditions and those committed to sustainable living. The important benefit for this report is that populations that do not have access to nutritious food sources gain access to fresh foods through community gardens (The Garden Institute, 2003), (Twiss, Dickinson, Duma, Kleinman, Paulsen, & Rilveria, 2003). They are also economically beneficial. A 2008 report from The American Real Estate and Urban Economics Association stated that the opening of a community garden positively impacts property values within 1,000 feet of the garden and that impact increases over time. These benefits were higher in low-income communities. The report also states community gardens can lead to increases in tax revenue of about a half million dollars per garden over a 20 year period (Voicu & Been, 2008).

Many community organizations and local and national associations have studied the neighborhood characteristics and demographics of community gardeners. Community gardens seem to be more prevalent in urban, low income, minority areas. Also, there is a relationship between the number of gardens present, race and poverty level. However, the presence of gardens is more strongly correlated by poverty than by race (Eckert & Alam, n.d.). In a 2009 survey, done in Cleveland, Ohio, of 124 gardeners the youngest was 14 and the oldest was 85. The mean age was 55; with an age range of

50-59. The mean annual household income was $20,000 to $40,000. The majority of the gardeners were women (58%) (Blaine, Grewal, Dawes & Snider, 2010).

The City of Dallas recognized the benefits of community gardens and, in February 2011, amended their development code to allow community gardens by right in all zoning districts; provided the garden complies with the regulations of the zoning district. The City of Dallas defines a community garden as an area of land managed and maintained by a group of individuals to grow and harvest food crops and/or ornamental crops for personal or group use, consumption or donation (City of Dallas, City of Dallas, 2011). Lake Highlands, located near the intersection of Goforth Road and White Rock Trail, is the City of Dallas' first city supported community garden (Lake Highlands Community Garden, 2013).

Although community gardens have a number of benefits, conflicts have arisen between community residents and city officials when the garden sites were slated for development. Several community gardens were established in the Lower East Side of New York in the 1970s. At that time, the land was perceived to have little economic value. When the economy changed in the 1980s, a dispute emerged between preserving the gardens and developing the land for low-income housing. These gardens become a conflict when the city wants to develop the land. Residents who participated in the community gardens in the Lower East Side of New York were interviewed to share their perspective of the conflict between them and the City of New York. The community garden conflict was summarized as a property rights dispute between the right to property and the right to space (Staeheli, Mitchell, & Gibson, 2003). The City of Dallas expressed concerns about conflicts with community gardens. In 2010 there was no specific use in the Dallas Land Development Code for community gardens and other

agricultural uses required a minimum of 3 acres of land. In addition, the city had concerns about the long term upkeep of the gardens (Jill Jordan, 2010).

Factors to consider when selecting a garden site are sunlight exposure, topography, drainage, soil type and condition, slope, surrounding vegetation, exposure, water, wildlife, property ownership and distance (American Community Garden Association, 2007). A good site gets over six hours of sunlight (Atlanta Regional Commission Area Agency on Aging, 2010). Flat land is preferable. However it is possible to create a garden on sloped land. Water access is an essential component of a garden. The preference is to look for land with an onsite water meter. Good visibility will enhance the safety and publicity of a community garden. Another consideration to make is regarding the need of the community. There will likely be more demand for garden plots in areas with many apartment buildings and limited garden space (Emerson, n.d.). When considering walking distances, studies show that one eighth of a mile is an optimum walking distance to provide immediate access to high density development. One eighth to one quarter of a mile provides easy and convenient access for residential land uses with supporting commercial and office uses. One quarter to one half mile provides a modest, yet walkable distance and is suited for medium density residential uses with pedestrian networks (Morris, 2004). Therefore, a garden site should be no more than one half mile away from a residential area.

Land Banks

The City of Dallas' land bank may provide an avenue for community residents to easily acquire a vacant property to convert into a community garden if the city expands the permitted uses for the property. Land banks are public authorities created to acquire, hold, manage and develop tax-foreclosed property. They often provide marketable title to properties previously impossible to develop due to complicated liens and ownership

history. A land bank usually does not serve as a developer for the properties in its inventory. Instead, it will either hold on to legal title of the property or convey the property to a transferee for use in accordance with the land banking policies (Alexander, 2011). Land bank entities have the authority to facilitate the resale of foreclosed properties or execute a redevelopment plan. The City of Dallas' Urban Land Bank Demonstration Program was created to acquire vacant and developable land for the production of affordable single-family housing (Regulatory Banks Clearinghouse, 2008). The City of Dallas Land Bank Program assembles tax-foreclosed properties and sells them at below market prices to for-profit and non-profit developers to build affordable housing (City of Dallas Land Bank Program, 2013). Based on the "Land Bank Owned Properties" map, the land bank owned properties are not currently located in the census tracts being studied in this report.

Suitability Analysis

A suitability map can be used to identify appropriate land uses by assessing how different characteristics or factors impact a piece of land. The outcome of the analysis is a set of maps, for each land use, showing which level of suitability characterizes each parcel of land (Hopkins, 1977); similar to what is shown in Figure 2-1. The series of maps are then overlayed to produce a composite suitability map. The traditional McHargian map shows areas that have multiple "most suitable" ratings in a darker gray and areas that are least suitable in light gray; similar to what is shown in Figure 2-2. There are many different suitability analysis methods. However, the main components of any method are 1. a procedure for identifying the parcels of land to be analyzed and 2. a procedure to rate these parcels with respect to suitability for each land use.

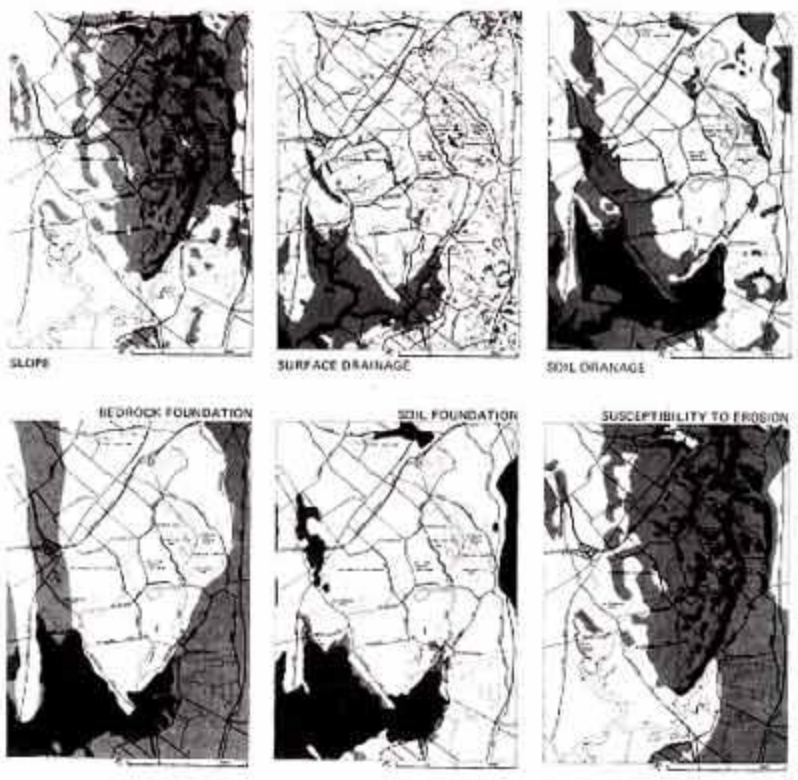

Figure 2–1 Series of Factor Maps Example (McHarg, 1969)

Figure 2–2 Composite Suitability Map Example (McHarg, 1969)

The Gestalt method is the simplest method and can be executed through field observation or through studying aerial maps. First, the study area is divided into regions (based on topographic similarities or other characteristics). Second, a table is created that describes the effects that will occur if each land use is located there. Third, a set of maps is drawn to show each region in terms of its suitability. There are a number of limitations in using the Gestalt method. The analyst typically does not have the local knowledge to be able to classify each region. Land suitability analyses, without an explanation of factor consideration, is difficult for decision makers to accept.

The Ordinal Combination method is sometimes referred to as the McHarg method because it is the method used in McHarg's Richmond Parkway study (Hopkins, 1977). The first step for this method is to map each factor. Then a table is created to indicate the level of suitability for each land use based on each factor. Suitability maps are then created for each factor. The final step is to overlay each map to generate a composite map. The biggest limitations of this method are that it implies that all factors are equally important and it does not account for interdependence in factors.

The Linear Combination method uses weighting in order to address this interdependence of factors. The factors of suitability are given an "importance" weight (Hopkins, 1977) and used as a multiplier for each factor. After the ratings for each factor are determined, it is multiplied by the weight. The resulting suitability rating is the sum of each weighted rating. Although the Linear Combination method addresses factor importance it still does not account for interdependence in factors.

The Rules of Combination method addresses interdependence of factors as well as factor importance. The suitability of a parcel is established through a set of rules. This method is described as a compromise between the nonlinear combination method and the factor combination method.

Chapter 3

Methodology

Location Selection

Census tract #48113003400 (which is located in the general zip code of 75215) is the primary neighborhood chosen for this analysis. This area is located southeast of downtown Dallas and shown in Figure 3-1. The USDA's Food Access Research Atlas states that this tract has 276 out of 552 (50%) households without vehicles that are more than one mile from a supermarket (Economic Research Service, 2013). It is identified as a low-access, low-income area. The tract is adjacent to three other food desert census tracts (48113004000, 48113004100 and 48113008900) which have smaller percentages of households with low access. These three census tracts were included in the study to ensure that there are enough vacant parcels to actually analyze. The Dallas Central Appraisal District database will be the source for the locational information for the parcels within the four census tracts. With the census tracts identified, the vacant parcels within these tracts will be located using GIS.

Figure 3-1 Project Census Tracts

Factors and Measurements

The next step in the analysis is to establish the factors and measurements that will be used in the suitability analysis. There are a number of physical and neighborhood characteristics that should be considered to determine if a site is most suitable for a community garden use. These characteristics range from natural features (like sunlight exposure) to locational features that would better serve commercial development (like the proximity to public transportation). The following factors will be used for this analysis to evaluate both community garden and commercial sites: sunlight exposure, access to water, zoning designation, property ownership, proximity to residential neighborhoods, site visibility, age range of residents, type of residential area, traffic volumes for adjacent roads and proximity to public transportation. Once the factors are established, measurements for each factor will be determined and used to locate vacant parcels that meet the factor criteria.

The following table is a summary of the suitability factors and measurements established for community gardens and commercial uses:

Table 3-1 Suitability Factors

Suitability Factors	**Measurements**		
Sunlight exposure	Parcels adjacent to buildings over 1 story	Parcels adjacent to 1 story buildings	Parcels over one acre and adjacent to other vacant parcels
Access to water	No waterline on site	NA	A waterline on site
Land Use	Commercial	Industrial	Residential
Property ownership	Privately owned with no liens	Privately owned with liens	City owned

Table 3.1-*Continued*

Residential Proximity	Over 0.25 miles away from residential	0.125-0.25 miles away from residential	Under 0.125 miles away from residential
Perceived Safety	Traffic count under 10,000 vpd and industrial zoning	10,000 vpd-30,000 vpd and residential zoning	Traffic count of over 30,000 and commercial zoning
Median age range of residents within 0.25 miles	Under 30 and Over 60 years old	30-39 years old	40-79 years old
Multifamily Residential Proximity	Over 0.25 miles away from MF residential	0.125-0.25 miles away from MF residential	Under 0.125 miles away from MF residential
Traffic volume on adjacent roadways	Over 30,000 vpd	10,000-30,000 vpd	Under 10,000 vpd
Proximity to public transportation	Under 0.125 miles away from transit	0.125-0.25 miles away from transit	Over 0.25 miles away from transit

A vacant parcel that receives at least six hours of direct sunlight, without obstructions from trees or buildings is most suitable for a community garden (Emerson, n.d.). Sunlight Exposure will be measured by comparing building heights on adjacent developed parcels in relation to each vacant parcel. Building height will be used as the variable because the more direct ways to measure sunlight (percent of possible sunshine, mean sky cover and mean number of days clear) are the same for all four census tracts (Geographic Research Inc., 2013). The assumption is that the height of the adjacent building will produce shade on the vacant parcel. The taller the building the more shade the vacant parcel would receive. The building height information will be retrieved from the Dallas Central Appraisal District (Dallas Central Appraisal District, 2013)

The parcels will be divided into three categories. The first category is vacant parcels that are larger than one acre or next to other vacant parcels. This category reflects parcels that would not be impacted by shade at all; and thus should have direct sunlight exposure. The second category is parcels adjacent to one-story buildings due to

the fact that one-story buildings would provide some shade coverage during the day; depending on the location of the sun. Vacant parcels adjacent to buildings over one story is the third category since the increased height would result in more shade cover to the adjacent vacant parcel and the least sunlight exposure.

Access to water is also an essential for the growth of vegetation (Emerson, n.d.). A vacant parcel that has a direct connection (through an irrigation line) to an existing waterline is suitable for both a community garden and commercial development. However, it is more beneficial for a community garden conversion considering neighborhood community gardeners may not have the money or resources to install a needed waterline.

To measure Water Access, vacant parcels adjacent to existing roadways will be identified. This is because the City of Dallas locates water and sewer utilities within the City's rights-of-way next to roadways (City of Dallas, City of Dallas, 2011). Therefore, parcels adjacent to roadways have direct access to water. There are only two categories for this factor; vacant parcels with access to water or parcels with no access to water. Street location information will be accessed through the City of Dallas GIS Department (City of Dallas, 2013).

Land Use will be measured by identifying the land use designation (residential, commercial, industrial) for the vacant parcels within the census tracts. The Dallas Central Appraisal District database (Dallas Central Appraisal District, 2013) will supply this land use designation information.

Property Ownership will be measured by identifying vacant parcels that are publically and privately owned. Parcel ownership information is accessed through the Dallas Central Appraisal District (Dallas Central Appraisal District, 2013). The vacant parcels will be separated into three categories. Parcels owned by the City of Dallas are most suitable for a community garden because they are owned and controlled by the very entity that is hypothetically encouraging the use. There is a higher likelihood that the process to acquire the land and secure the entitlements for this use will be quicker and easier than for privately owned property. Parcels that are privately owned but have liens was the second category. As it relates to community gardens, privately owned property may take longer and/or be more difficult to acquire than public property. However, it may also be less desirable for commercial development because the liens increase the purchase price of the land. Parcels that are privately owned with no liens was the third category. This type of property is more suitable for commercial development since there wouldn't be added costs to acquire the site and therefore is the most marketable land.

One eighth to one quarter of a mile provides easy and convenient access for residential land uses with supporting commercial and office uses (Morris, 2004). For this analysis, one quarter of a mile is the maximum distance that is considered walkable.

Residential Proximity will be measured by identifying the vacant parcels that are walking distance away from residential property. The data for this map is acquired from the Dallas Central Appraisal District (Dallas Central Appraisal District, 2013). Residential parcels within the four census tracts will be identified from the property data. By establishing 0.125 mile and 0.25 mile buffers around the residential parcels, the vacant parcels less than one eighth of a mile, within one eighth of a mile to one quarter of a mile and over one quarter of a mile will be determined.

Research suggests that individuals between age 40 and 79 make up the largest percentage of gardeners (Blaine, Grewal, Dawes, & Snider, 2010). Vacant parcels within block groups of this age range would be most suitable for community garden use. Vacant parcels within block groups with the median age between 30 and 39 (the second largest gardener age group) are moderately suitable community garden sites. Age ranges under 30 and over 80 represent the smallest percentage of gardeners. The Median Age measurement identifies vacant parcels based on the age range of the surrounding population. This is accomplished by first acquiring the median age range of the block groups within each of the four census tracts. This information can be accessed from the National Historical Geographic Information System website (National Historical Geographical Information System, 2010). With this data, block groups whose median age range is between 40 and 79 will be identified. This will be repeated for block groups whose median age range is between 30 and 39. The final block group is for median ages less than 30 and over 80. Vacant parcels within these three groups will then be identified and made into categories.

Site visibility is an important safety factor for community gardeners. If a site is perceived as unsafe it is typically not desired, by residents, to use it for community gardening (Emerson, n.d.). From a safety perspective a suitable site is one that can be seen from public view. Site visibility can be determined in different ways. One of the measurements considered for this factor was the amount of vegetation on the site. The interior visibility of the site would be dependent on the amount of vegetation around the site. However, a site can still be considered unsafe even if vegetation is removed. An alternative factor of perceived safety is the number of people that pass by and/or surround the site. Land use and traffic counts will be the measurements for the perceived safety of a site.

The Perceived Safety measurement will divide the vacant parcels into three safety categories. Parcels adjacent to streets with over 30,000 vehicles/day *and* designated for commercial use would be exposed to the most vehicular and pedestrian traffic during the day. Vacant parcels adjacent to streets with counts between 10,000 and 30,000 vehicles/day *and* designated for residential use would be exposed to a moderate number of vehicular and pedestrian traffic. This is the second category. The third category is vacant parcels adjacent to streets with counts under 10,000 vehicles/day *and* designated for industrial use. These sites would not have much pedestrian and vehicle traffic and therefore would be perceived by community gardeners as secluded and unsafe (Emerson, n.d.). The traffic count information can be acquired from the National Council of Governments website (North Central Texas Council of Governments, 2013). Land use information will once again be retrieved from the Dallas Central Appraisal District (Dallas Central Appraisal District, 2013).

Multi-family residents do not have the same access to open space as single family residents. Therefore, a centralized community garden would be of higher demand in neighborhoods with a higher percentage of multi-family dwellings (Emerson, n.d.). The Multi-family Proximity measurement identifies vacant parcels based on its proximity to multi-family residential development. The Dallas County Appraisal District website provides data on multi-family residential zoned parcels within the census tracts. By establishing 0.125 mile and 0.25 mile buffers around the multi-family residential parcels, the vacant parcels less than one eighth of a mile away, within one eighth of a mile to one quarter of a mile away and over one quarter of a mile away will be determined.

The Traffic Count measurement identifies vacant parcels that are adjacent to roadways with varying traffic counts. Parcels adjacent to roadways with over 30,000 vehicles/day are most suitable for commercial development (Kreiger, 2013). These are

typically classified as highways from the City of Dallas (City of Dallas, 2013). Parcels adjacent to roadways that carry between 10,000 to 30,000 vehicles/day (major arterials) could serve either commercial or community garden sites (City of Dallas, 2013), (Kreiger, 2013). The City of Dallas classifies minor arterials as roadways with traffic counts of less than 10,000 vehicles/day (City of Dallas, 2013). Parcels adjacent to minor arterials would be least desirable for commercial development. The traffic count information will be sourced from the North Central Texas Council of Government website (North Central Texas Council of Governments, 2013).

The final factor measurement is for Public Transportation Proximity. In terms of walkability, one eighth to one quarter of a mile provides easy and convenient access for residential land uses with supporting commercial and office uses. This walking distance is also an appropriate distance between commercial/office uses and public transportation access points (Morris, 2004). Therefore, parcels located over one quarter of a mile away from a bus and/or rail route are least suitable for commercial development. Conversely (as it relates to preventing commercial and community garden conflicts) these sites would be most suitable for community garden use. Parcels between one eighth of a mile and one quarter of a mile away may be suitable for either use. Parcels whose property boundary lines are up to one eighth of a mile away from these public transportation routes would be most suitable for commercial development.

The Public Transportation measurement identifies vacant parcels within close proximity to rail and bus routes. The roadways that served as bus and/or rail routes can be found through the Dallas Area Rapid Transit website (Dallas Area Rapid Transit, 2013). By establishing 0.125 mile and 0.25 mile buffers from these roadways, the vacant parcels less than one eighth of a mile, within one eighth of a mile to one quarter of a mile and over one quarter of a mile will be determined.

With the factors and measurements determined, ten separate factor maps will be created in order to locate the vacant parcels that meet each measurement criteria. To summarize, the factor maps will determine the following:

1. Vacant parcel adjacency to one story buildings, buildings over one story, parcels over one acre and other vacant parcels.
2. Vacant parcels with and without a waterline on site.
3. Vacant parcels zoned for residential, industrial and commercial uses.
4. Vacant parcels owned by the City of Dallas, privately owned with liens and privately owned without liens.
5. Vacant parcel proximity to residential property.
6. Vacant parcels zoned for residential, commercial or industrial use and adjacent to streets with traffic counts roughly ranging between 10,000 and 30,000 vehicles per day.
7. Vacant parcels located within 0.25 miles away from block groups with a median age range of under 30 and over 80, 30-39 and 40-79.
8. Vacant parcel proximity to multifamily residential property.
9. Vacant parcel adjacency to streets with traffic counts roughly ranging between 10,000 and 30,000 vehicles per day.
10. Vacant parcel adjacency to public transit stops.

Suitability Analysis

With the factors established and the locations of each characteristic determined the next step is to conduct the suitability analysis. The Rules of Combination method will be used because each land use on the vacant parcels can be evaluated based on the factor itself, importance of the factor and interdependence of the factors (Hopkins, 1977). The suitability analysis will be conducted through a series of spreadsheets.

A spreadsheet for each factor, which listed the associated characteristics, will be created. Each spreadsheet will list all of the vacant parcels by FID number. This parcel number (and the characteristic that it was assigned to) is easily identified through each factor map generated in GIS. For each parcel location, the community garden and commercial land uses will be rated for each factor on a scale of -10 to 10. The -10 value represents the factor having the highest negative impact on the land use. The 0 value represents the factor having no impact on the land use. The 10 value represents having the highest positive impact on the land use. As an example, a parcel identified as being within a block group with an average age of 40-79 will be rated 10 for community garden use. The median age factor has a high positive impact on this parcel; thus making the parcel very suitable for community garden use. This same parcel would be rated 0 for commercial use. Median age would not impact (negatively or positively) whether commercial development was a suitable use for this parcel.

With all of the parcels rated, an “importance weight” or multiplier will be established for each factor. This weighting is done to establish each factor’s level of importance within the analysis. Table 3-2 provides the factors and the assigned weights. In general, the factors that would strongly impact a community garden site (i.e. land use or sunlight exposure) are deemed to be of higher importance than factors that would strongly impact a commercial site (i.e. traffic counts).

Table 3-2 Importance Weights

Factor	Importance Weight (multiplier)
Land Use	1.0
Median Age	0.3
Multifamily Proximity	0.6
Perceived Safety	0.4
Property Ownership	0.9
Public Transportation Proximity	0.1
Residential Proximity	0.5
Sunlight Exposure	0.8
Traffic Count	0.2
Water Access	0.7

The weighted values will then be calculated for both the community garden land use and commercial land use for each vacant parcel. The final spreadsheet is a sum of all of the factor values for each use; as illustrated in Table 3-3.

Table 3-3 Final Land Use Assignment

Parcel Number	Community Garden Use	Commercial Use	Final Land Use
1	Sum of the weighted values for each factor	Sum of the weighted values for each factor	Use with the highest value

The final land use will be assigned to each parcel and the data transferred to GIS to create a suitability map for community garden and commercial uses.

Note that there are limitations to this methodology. There are many other factors that could be used to evaluate the suitability of community garden or development sites. Also, the accuracy of the data will affect the analysis of each parcel. Lastly, the method of rating a parcel and determining the importance of each factor is a subjective approach.

Further enhancement of the analysis may include adding more factors that are relevant to development. Another enhancement to the analysis would be to eliminate vacant residential sites. This would result in a pure evaluation of vacant commercial sites suitable for community garden conversion; which is more likely where a conflict would occur.

Gap Analysis

The final step of the land suitability/gap analysis is the gap analysis. The purpose of the gap analysis is to identify the number of food retailers that the four census tract community can support. Hypothetically the grocery store(s) would develop on the commercial sites identified through the land suitability analysis.

The current grocery sales leakage for the study area must be determined in order to identify the community's food retailer needs. The sales leakage represents the gap between available retail within the neighborhood and the retail spending of neighborhood residents. This is calculated by subtracting the annual sales revenues of full-service grocers, within one quarter of a mile, from the residents' annual grocery expenditures. The household and grocery spending information for the 75215 zip code will be retrieved from the U.S. Department of Labor Consumer Expenditure Survey (United States Department of Labor, 2013). By using Google Maps, the number of supermarkets or grocery stores within the four census tracts can be determined.

The resulting leakage calculation will be used to estimate the square footage of grocery store space needed for the area. The Urban Land Institute provides the sales per square foot information (Urban Land Institute, 2008). The grocery store floor space estimate will be referenced from the Food Marketing Institute (Food Marketing Institute, 2013).

The equations are shown below:

Gap = Total grocery spending – Total area grocery sales

= (Household population * Median household income * Percentage of grocery spending) – Total area grocery sales

Number of Supportable Stores = (Gap/Sales per sqft) / Grocery store floor space

Chapter 4

Results

The vacant parcels within the study area are shown in Figure 4-1.

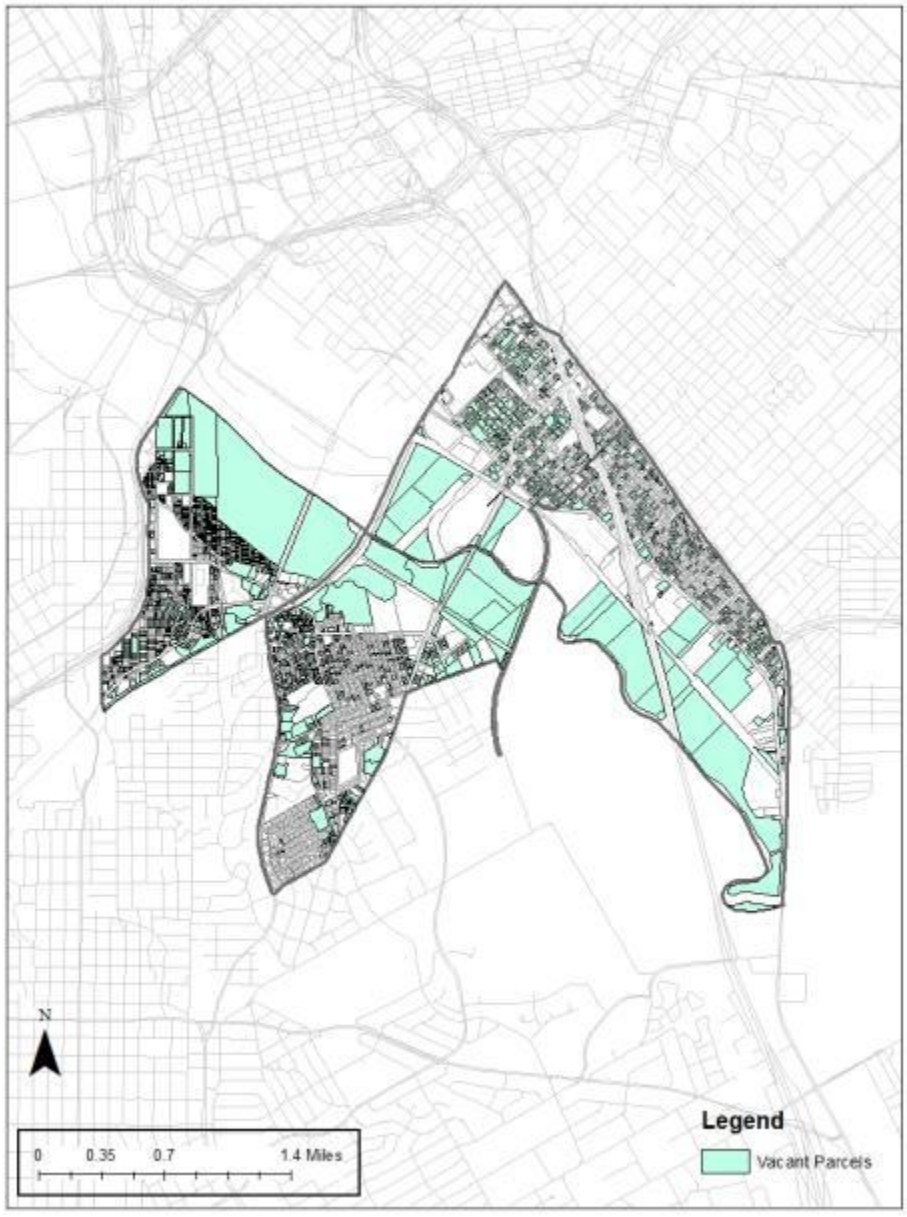

Figure 4-1 Vacant Parcel Map

Factor Maps

The first factor map created is for Sunlight Exposure. The map, shown in Figure 4-2, identifies the vacant parcels based on surrounding building heights.

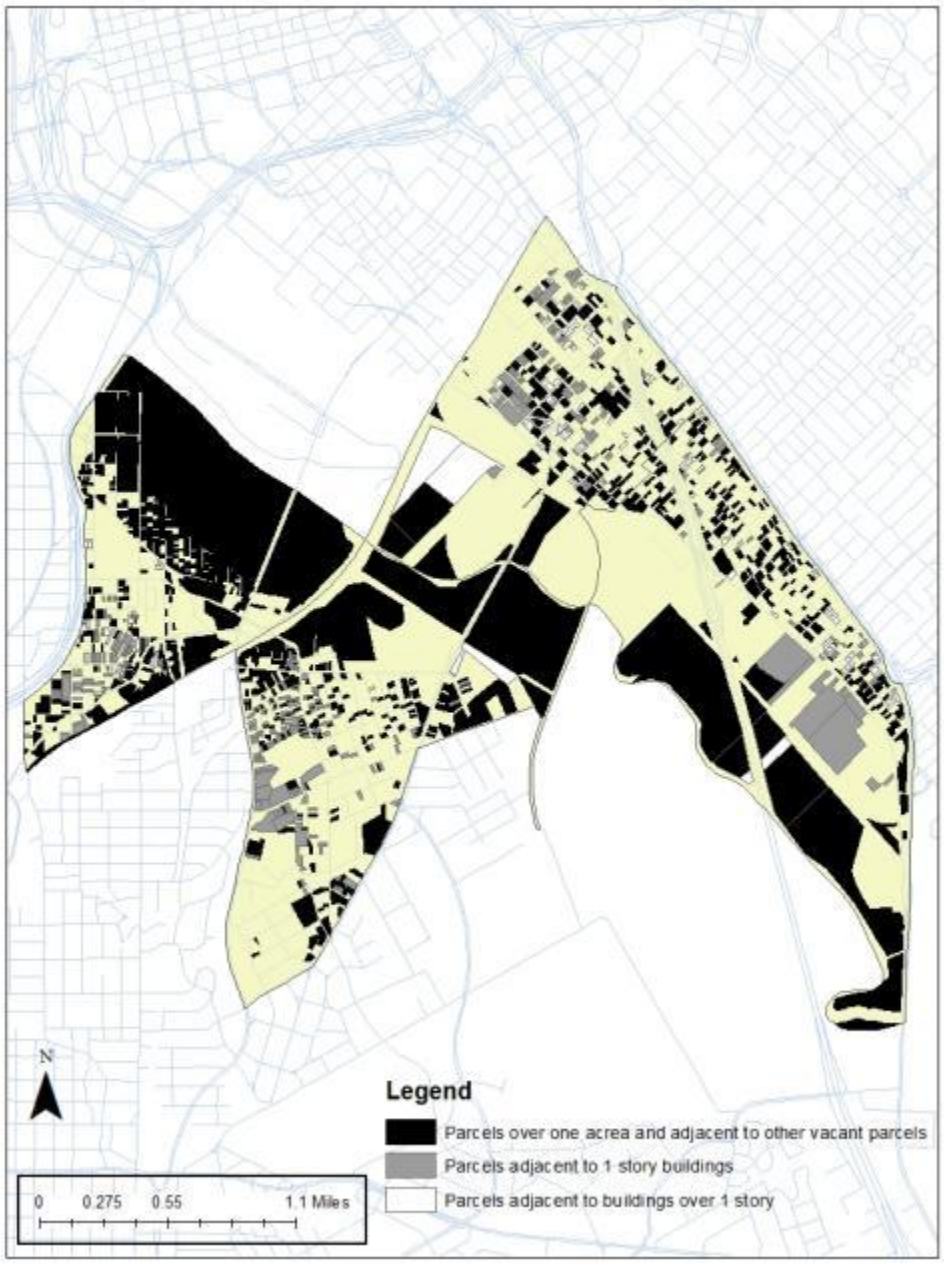

Figure 4-2 Sunlight Exposure Factor Map

The Water Access factor map is shown in Figure 4-3. The map identifies vacant parcels with access to water and parcels with no access to water.

Figure 4-3 Water Access Factor Map

The Land Use, shown in Figure 4-4, identifies the vacant parcels currently zoned for residential use, commercial use and industrial use.

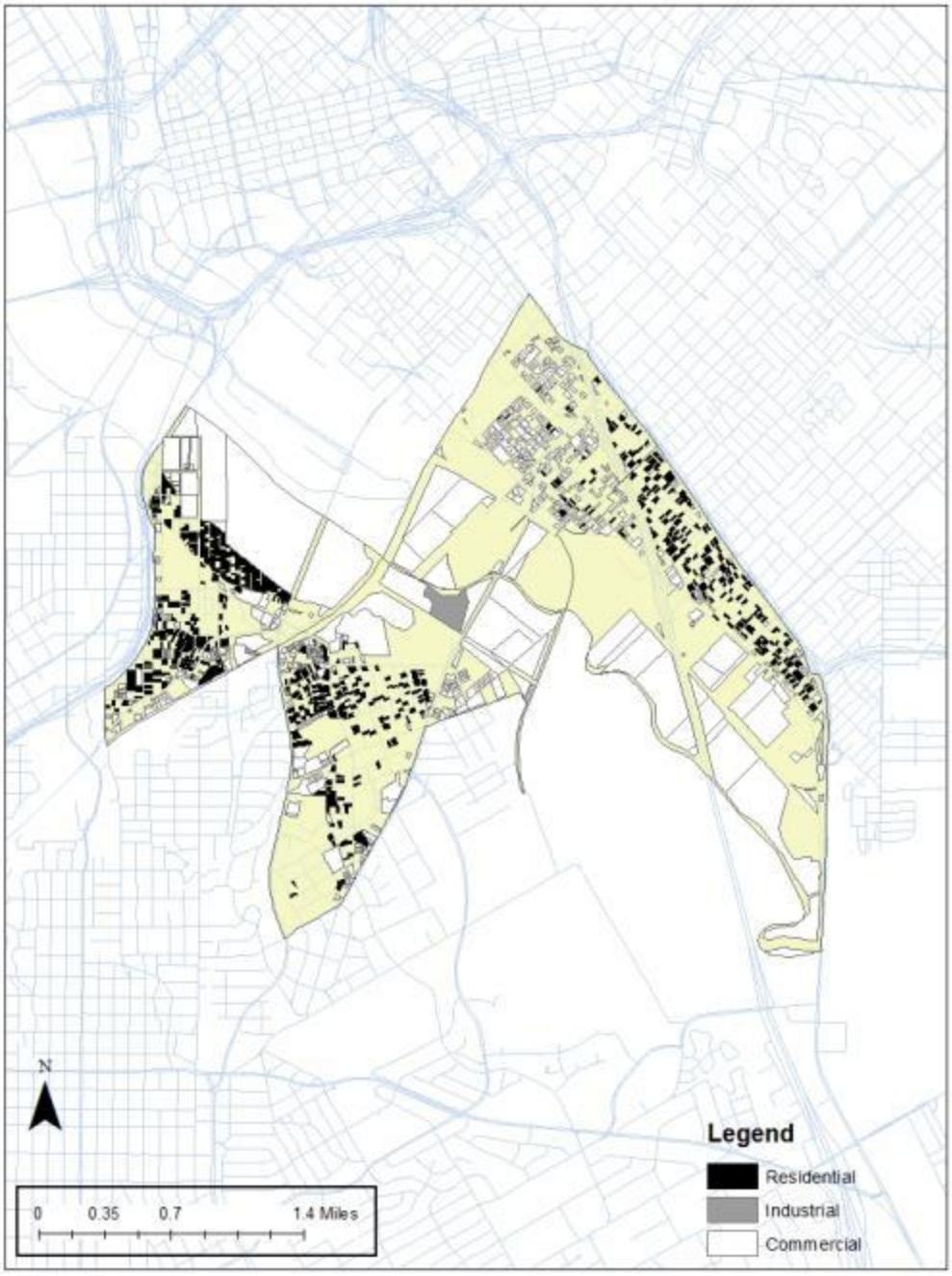

Figure 4-4 Land Use Factor Map

Figure 4-5 shows the vacant parcels that are owned by the City of Dallas, privately owned with liens and privately owned with no liens.

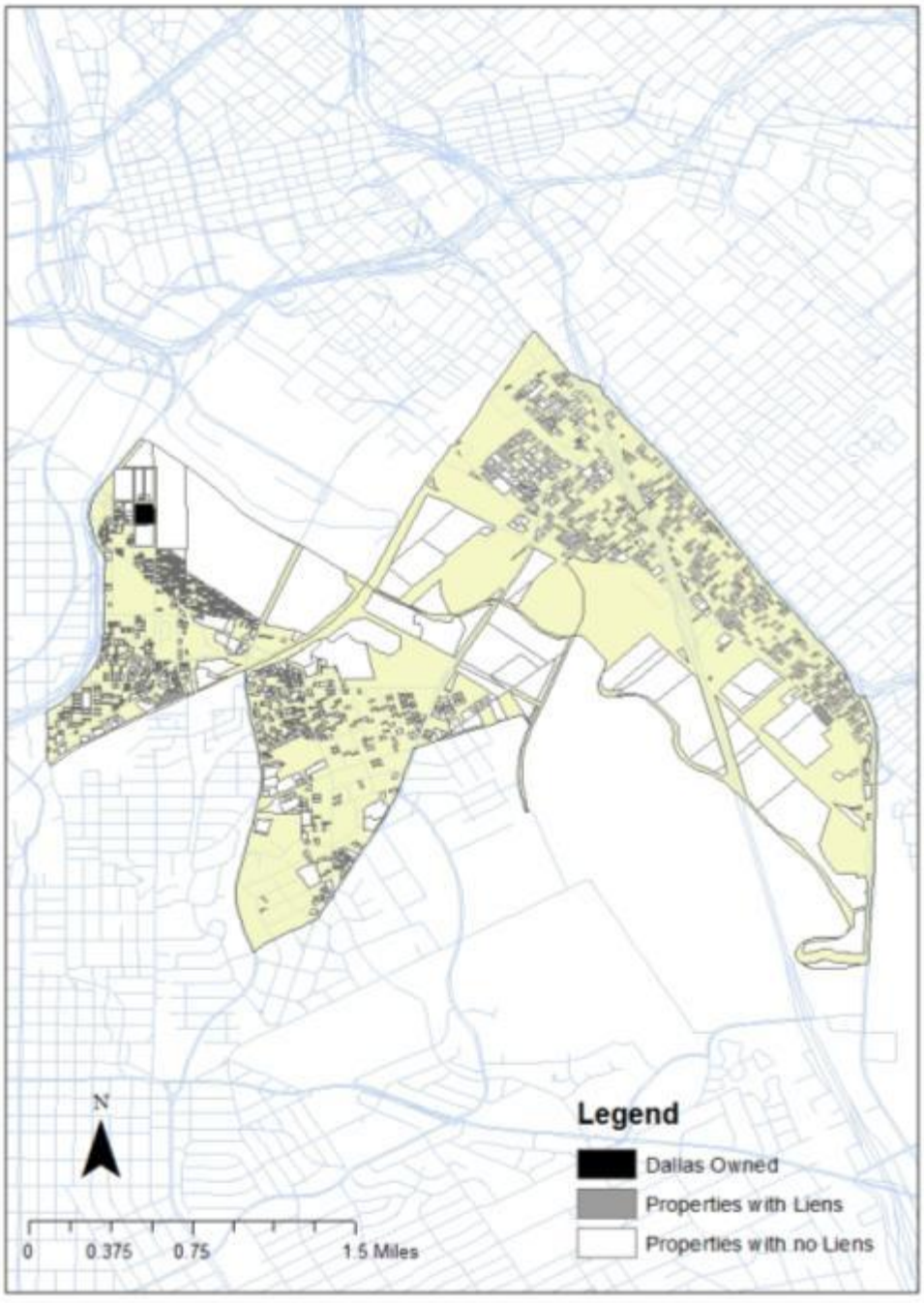

Figure 4-5 Property Ownership Factor Map

The Residential Proximity factor map, shown in Figure 4-6, identifies the vacant parcels that are less than one eighth of a mile, within one eighth of a mile to one quarter of a mile and over one quarter of a mile away from residential property.

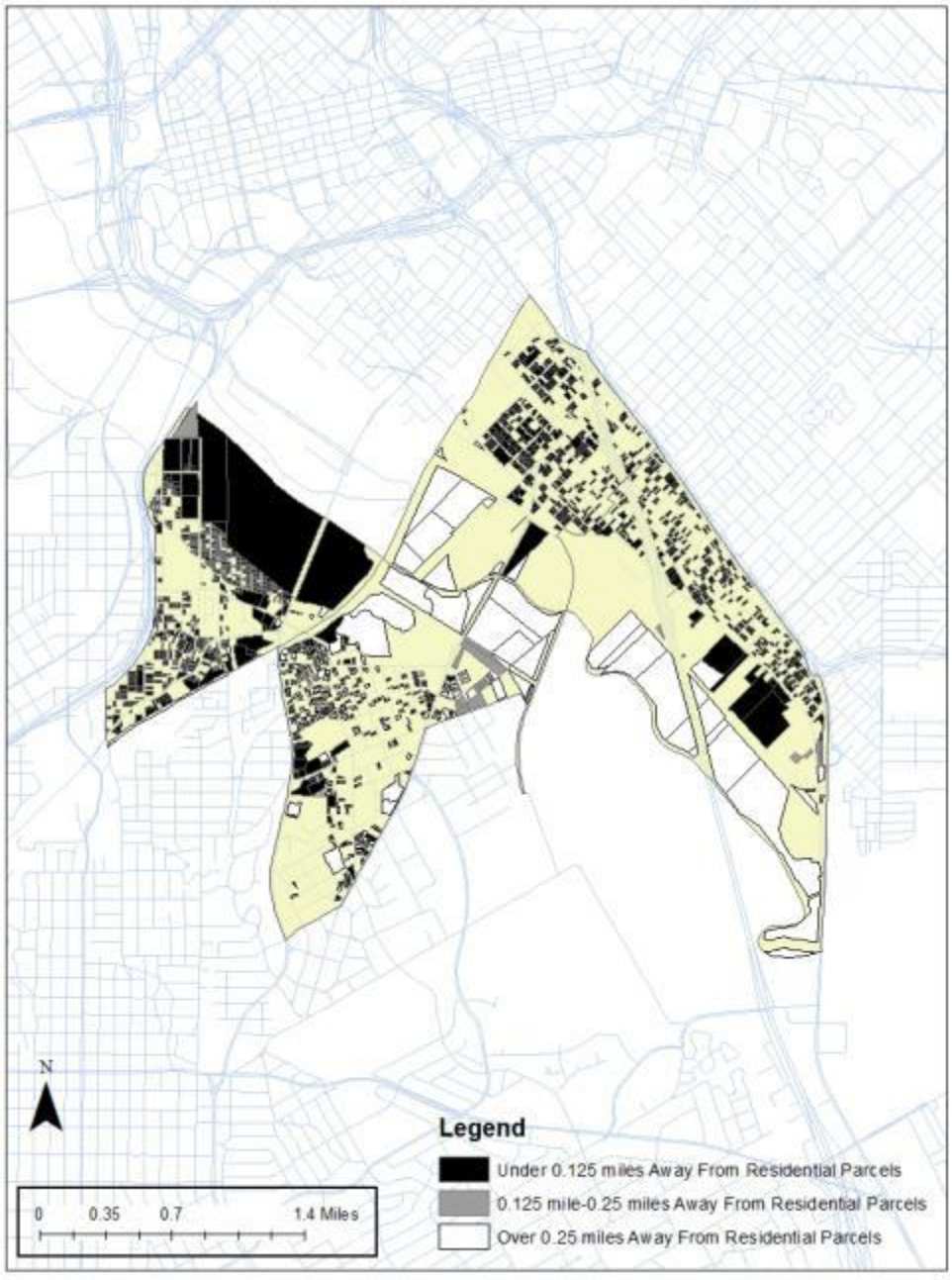

Figure 4-6 Residential Proximity Factor Map

The Median Age factor map is shown in Figure 4-7. This map identifies vacant parcels based on the age range of the surrounding population.

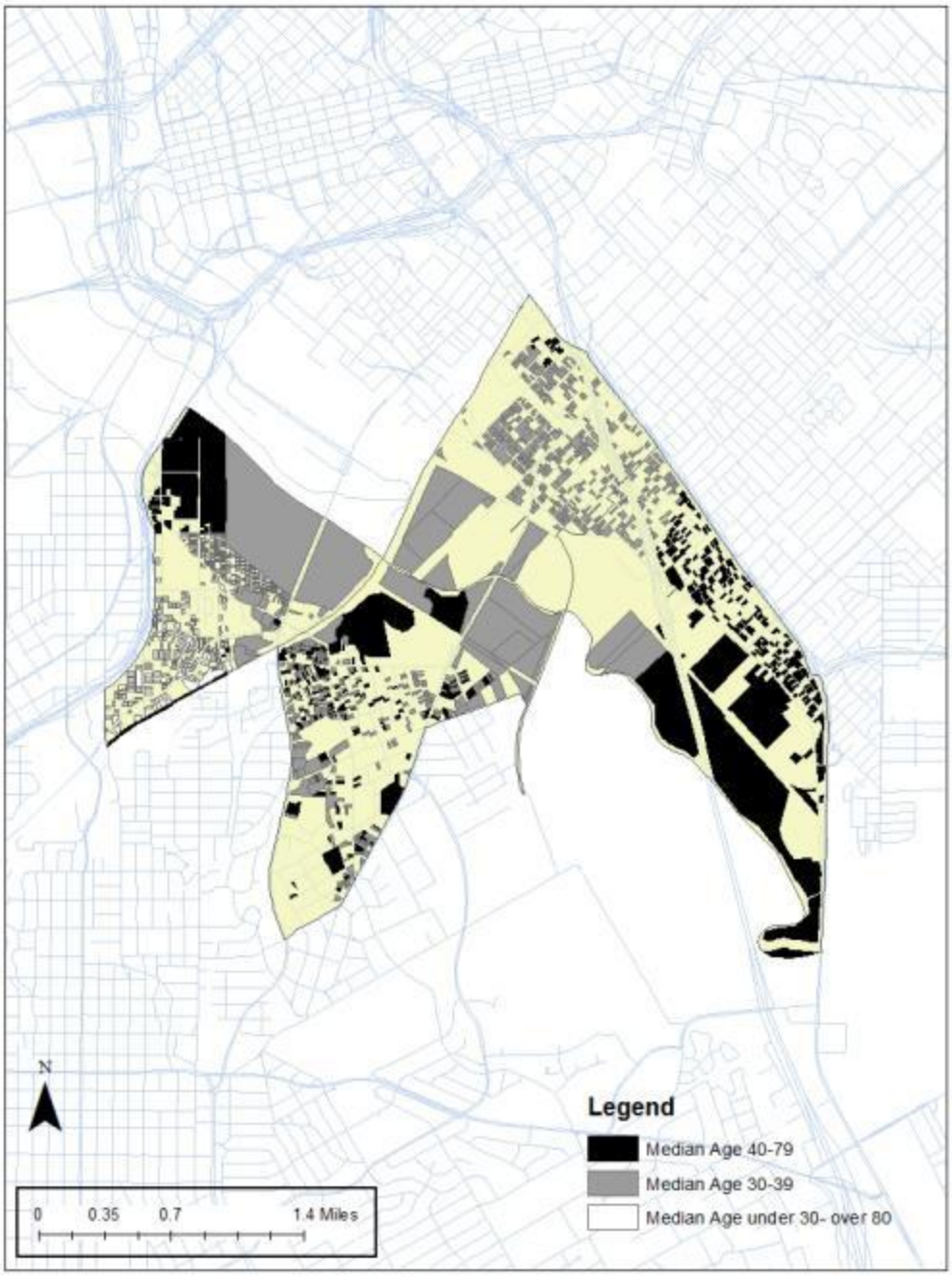

Figure 4-7 Median Age Range Factor Map

Figure 4-8 is the Perceived Safety factor map. It shows the vacant parcels within the three safety categories; which were measured by land use and traffic counts.

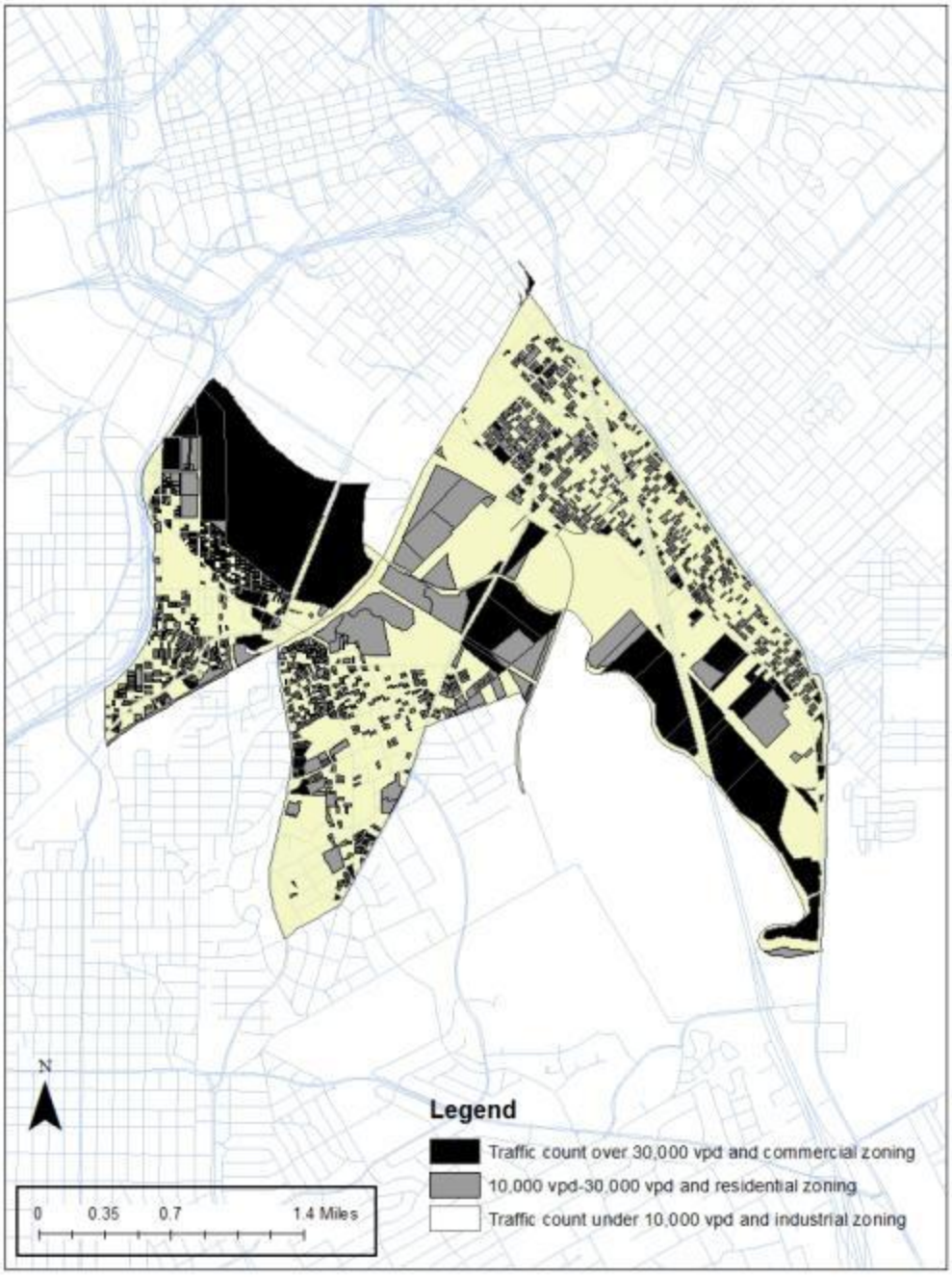

Figure 4-8 Perceived Safety Factor Map

Figure 4-9 shows the vacant parcels in the four census tracts that are within walking distance away from multi-family residential areas.

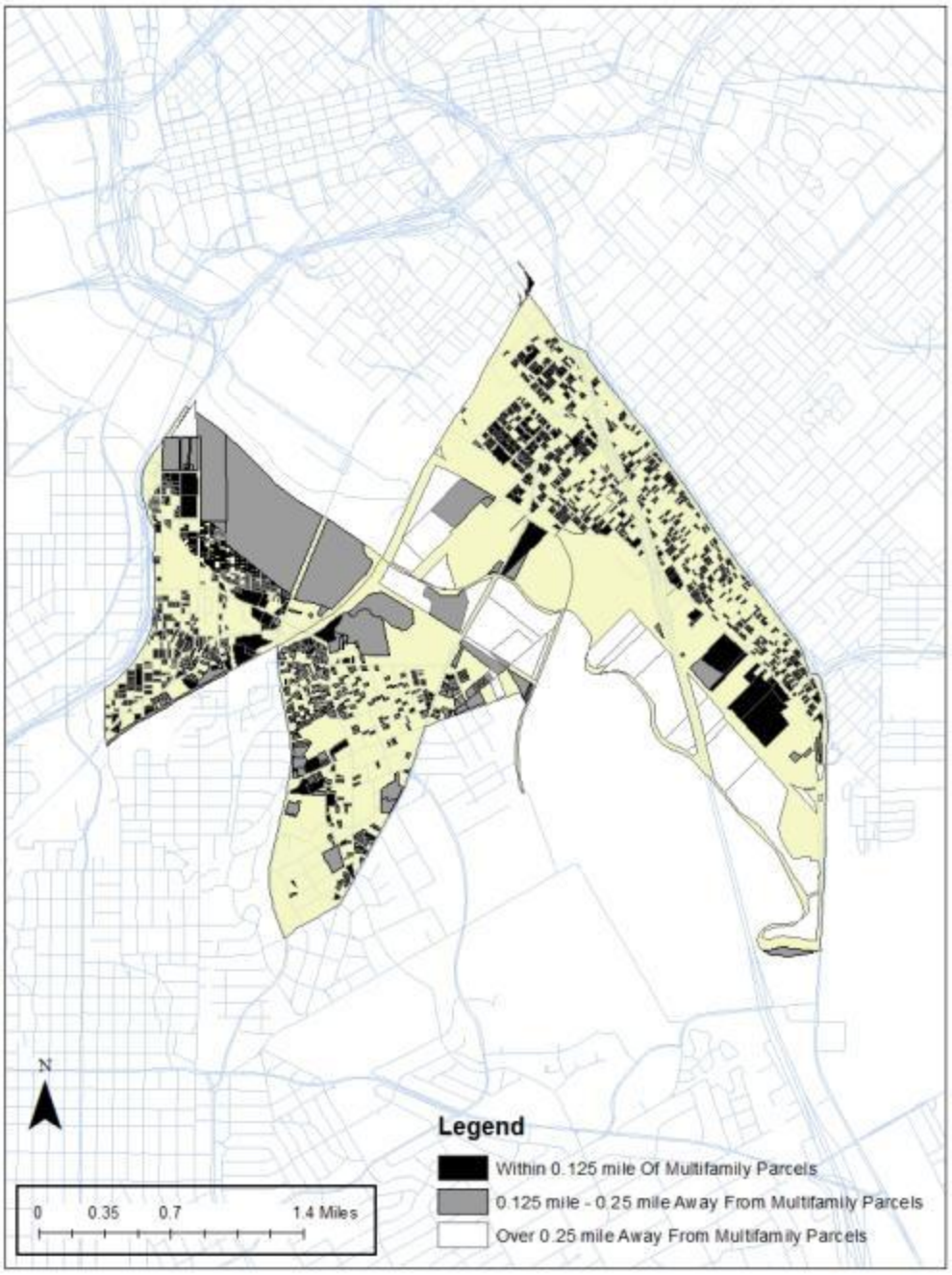

Figure 4-9 Multi-family Proximity Factor Map

The Traffic Count factor map is shown in Figure 4-10. It identifies vacant parcels that are adjacent to roadways that carry over 30,000 vehicles/day, 10,000 to 30,000 vehicles/day and under 10,000 vehicles/day.

Figure 4-10 Traffic Count Factor Map

The final factor map is for Public Transportation Proximity, shown in Figure 4-11. This map identifies vacant parcels roadways within walking distance to rail and bus routes.

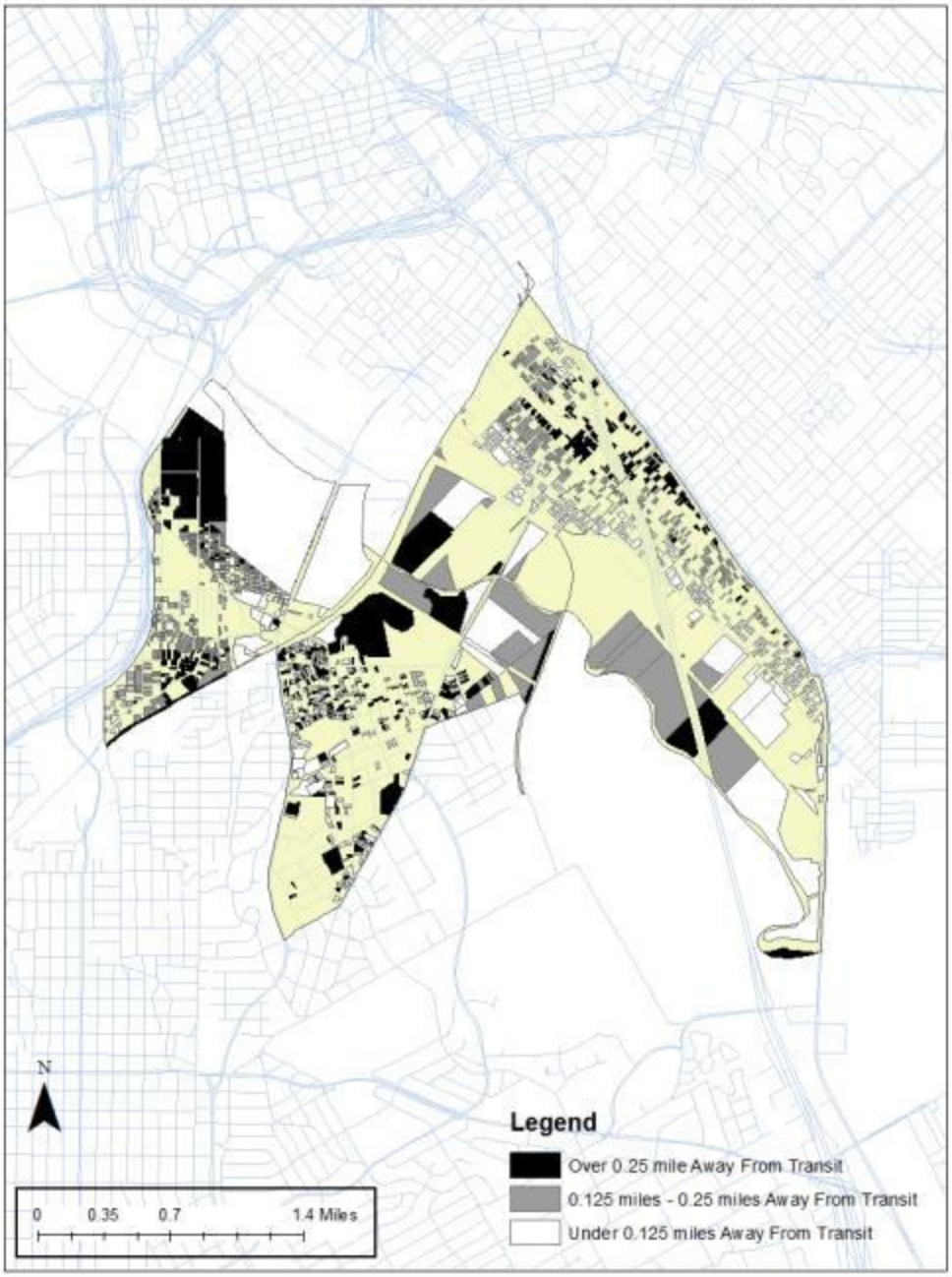

Figure 4-11 Public Transportation Proximity Factor Map

Suitability Map

The resulting Suitability Map (shown in Figure 4-12) identifies the vacant parcels in two categories; sites suitable for community garden use and sites suitable for commercial use. For this report, parcels adjacent to the Trinity River floodway were removed from the resulting map. This is because the floodway is not suitable for community garden or commercial uses. The map indicates that 57% of the parcels (1,044) are suitable for community gardens in the four census tracts. These parcels are generally located on the periphery of each tract. The majority of the parcels are within or adjacent to residential areas. The remaining 43% of the parcels (792) are more suitable for commercial use and should be reserved to prevent conflicts between temporary community garden conversions and future development of the area.

Figures 4-13 through 4-16 are enlargements of each census tract. Tract #48113003400, which is the study tract, has the least amount of suitable community garden sites and most suitable commercial site.

Some factors to consider when evaluating the results are:

- Census tract # 48113003400 contains a large percentage of commercially zoned parcels.
- There are not many highly visible parcels in tract # 48113003400.
- There are few parcels within tract #48113003400 which are within a block group with the median age of 40-79. This age group is the largest among community gardeners (Blaine, Grewal, Dawes, & Snider, 2010).
- There are more vacant parcels within tract # 48113003400 that do not have adequate sunlight exposure than in the other three tracts.

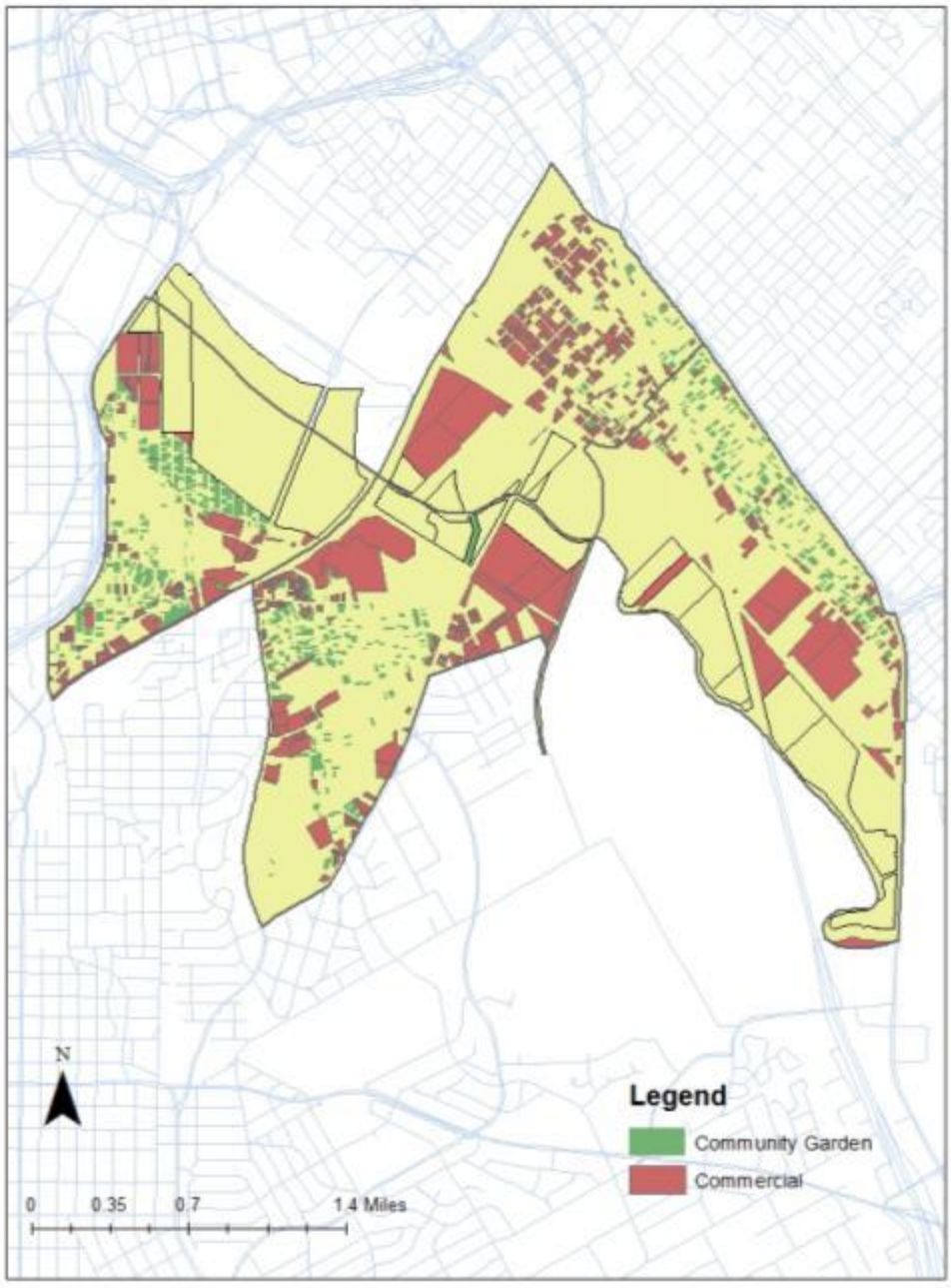

Figure 4-12 Suitability Map for Community Garden and Commercial Sites

Figure 4-13 Suitability Map Enlargement (Census Tract # 48113003400)

Figure 4-14 Suitability Map Enlargement (Census Tract # 48113004100)

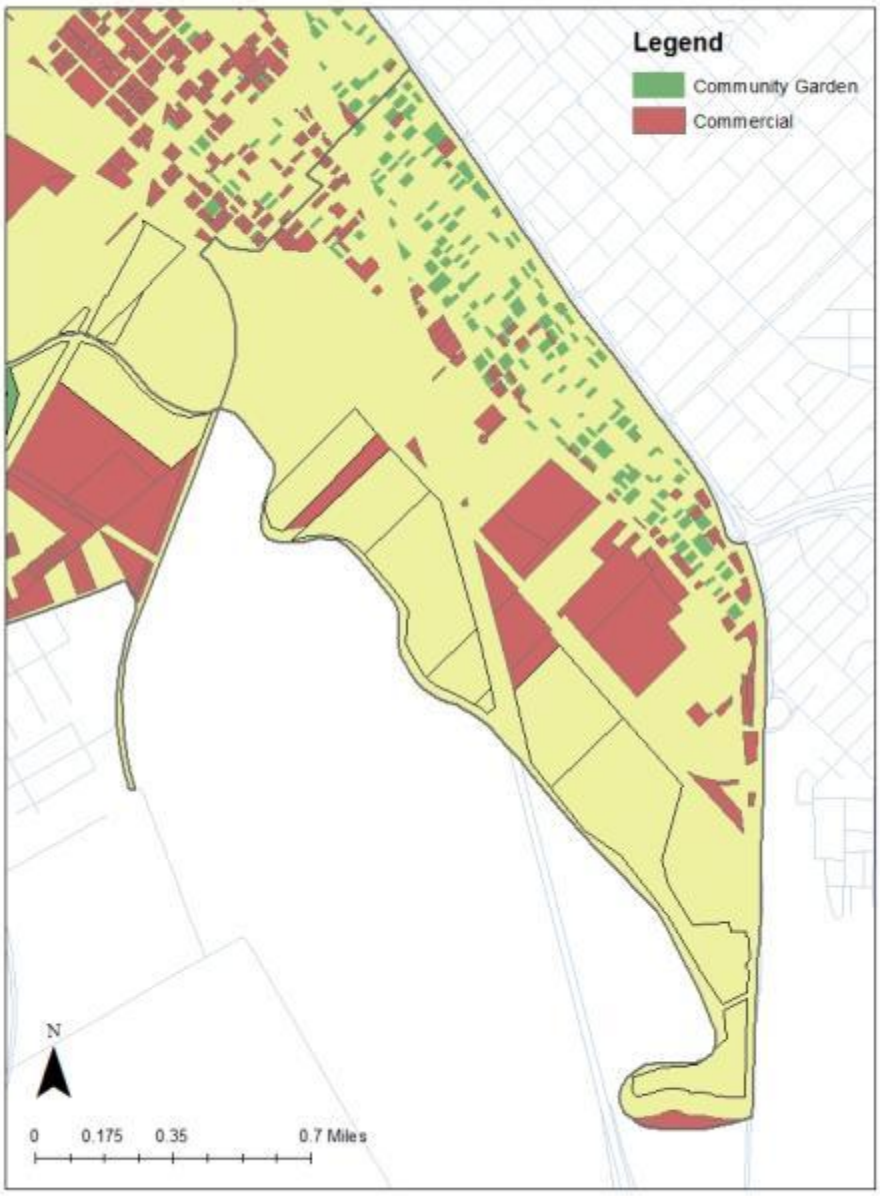

Figure 4-15 Suitability Map Enlargement (Census Tract # 48113004000)

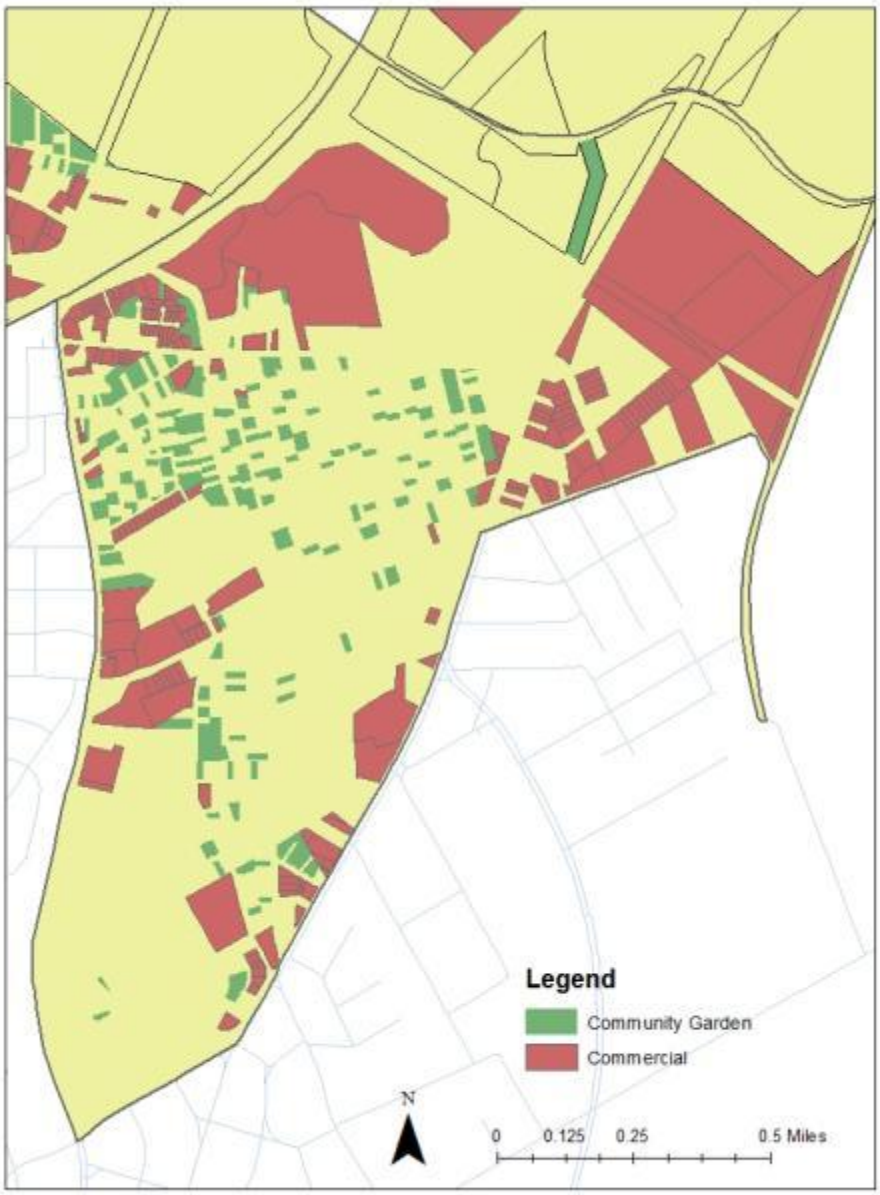

Figure 4-16 Suitability Map Enlargement (Census Tract # 48113008900)

Gap Analysis

The gap analysis calculations are shown below:

Gap = Total grocery spending – Total area grocery sales

= (Household population * Median household income * Percentage of grocery spending) – Total area grocery sales

= (14,648*$20,892*9%) - $0

= $27,542,341

Number of Supportable Stores = (Gap/Sales per sqft) / Grocery store floor space

= (27,542,341/$353.55) / 50,000

= 1.55

Through the gap analysis calculations, it was determined that the four census tract area can support **one** large grocery store.

Chapter 5

Policy Recommendations

The results show that there are suitable community garden parcels within the study census tract as well as within the surrounding census tracts. This section proposes policy recommendations to help regulate and promote community gardens in these areas while also encouraging grocery store development.

The City of Dallas currently permits community garden uses in all of its zoning districts (City of Dallas, City of Dallas, 2011). However, the suitability analysis shows that the best sites for community garden conversion and use are within residential areas. It is recommended to change the zoning to limit the use to these targeted areas. Community gardens should be permitted by right only in residentially zoned areas and permitted with the acquisition of a specific use, conditional or temporary permit in commercial areas that are close to residential. This change in zoning would accomplish two things. First, this zoning would essentially direct potential community gardeners to residential sites by entitling the use in residential areas. Second, specific use, conditional or temporary permits are established by zoning. These permits typically require staff review and City Council approval of a proposed use at a specific location. A conditional or temporary permit can also regulate the duration of the use. The approval process will be longer, more costly and carry more risk to place a community garden on commercial property that has zoning restrictions (specific use, conditional permit, temporary permit). Thus possibly redirecting community gardeners back to residential sites.

A “general merchandise or food store” use is permitted by right in all commercially zoned districts (City of Dallas, Development Services, 2013). The challenges of food retailers to open grocery stores in lower income neighborhoods are: crime or the perception of crime, low purchasing power, lack of large parcels for

development sites, increased development costs, cumbersome approval processes, higher operating costs, lack of financing due to increased risk and providing for a diverse customer base (PolicyLink, 2007). To overcome some of these challenges in the study area a tax increment financing (TIF) or urban enterprise zone (EZ) should be established for this area in addition to the zoning entitlement. The funding provided through a TIF or EZ zone would offset the development and/or operational costs for a grocery store or other commercial development. The zones would act as an incentive to attract development that would otherwise overlook this area.

Community Development Corporation funding is another tool that could be used to attract grocery store development. Type A and Type B tax funds may not be used directly for the development of a grocery store (Moore J. , n.d.). However, these funds can be used towards needed infrastructure expenses such as roadway, building and utility improvements. This financial assistance would reduce the developer's initial costs and, again, make these sites more attractive.

It is also recommended to expand the City's existing Land Bank Program. The City of Dallas' Land Bank Program assembles tax-foreclosed properties and sells them at below market prices to for-profit and non-profit developers to build affordable housing (City of Dallas Land Bank Program, 2013). If the eligible uses included community gardens and food retailers, land could be offered at a discounted rate. This would be a benefit to both uses and the community as a whole. Note that the amended zoning (as proposed earlier) should be adhered to in order to reduce the potential conflict between the two uses.

The community would benefit from having both community gardens and grocery stores in the area. The suggested tools should not be interpreted as the single mechanism to address the food desert problem. Development in low income areas is

more successful through City initiated actions than through passively waiting for private developers or community activists to arrive (Pothukuchi, 2005). The following are recommended steps that should be initiated if the City wishes to make the food desert condition in these four census tracts a priority issue:

1. Community Outreach
2. Land Assembly
3. Store Recruitment

The suitability/gap analysis shows that over 50% of the vacant parcels in the four tracts can be converted to community gardens. With this size of land inventory, several gardens could be established that suit each tract, block group, neighborhood, etc. However, these sites more than likely will not be utilized in this way if residents are not aware of this land availability or the City's support in converting them. City planners should reach out to community leaders and residents to inform them of the steps to create a community garden as well as suitable sites.

The suitability/gap analysis shows that approximately 40% of the vacant parcels are suitable for commercial development. However, many of these parcels are too small for the development of a large grocery store. A City initiated land assembly program can assist with making eligible land attractive to grocery store developers by creating sites that are "construction ready".

The suitability/gap analysis also shows that one 50,000 square foot grocery store can be supported by the four census tract area. The Trinity River essentially divides the area into two sections. To ensure that both sections gain access to a grocery store it is proposed to target a number of smaller/independent grocery stores instead of a single large grocery chain. To incentivize these smaller stores, development processes could be put in place to shorten review/permitting time or reduce development fees.

Chapter 6

Conclusion

The purpose of the combination suitability/gap analysis was to provide a tool for City of Dallas planners to determine:

1. Vacant parcels appropriate to convert to community gardens.
2. Vacant parcels that should be reserved for future commercial development.
3. The number and type of food retailers needed to sufficiently serve “food desert” categorized communities; which can then be targeted for the vacant commercial sites.

The results of this analysis identified suitable community garden sites predominately within or in close proximity to residential areas. This is consistent with the philosophy that community gardens should be located within walking distance to the residents of the community it serves (American Community Garden Association, 2007), (The Atlanta Urban Gardening Program, 2010), (Green Institute, 2006). The results imply that some of the physical elements that make suitable community garden sites are the same for suitable residential development sites.

This analysis can be conducted for any urban area that contains a large number of vacant or abandoned properties. The most beneficial result of the analysis is the identification of community garden and commercial sites that do not conflict with one another. It is a tool that can assist planners with strategic planning to eliminate neighborhood food deserts or simply make a decision as to whether a single vacant parcel is adequate for community gardening.

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