

LOTS TO PLOTS: BUILDING AND INVENTORY
OF VACANT LAND IN MADISON, WI

By

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Abstract

As planners, politicians, organizations, and citizens increasingly recognize community gardens as a vital part of urban food production, efforts are necessary to systematically identify and assess urban vacant land that could be used as potential garden sites. This project uses an array of geospatial data and a site suitability index to analyze the spatial characteristics of existing community gardens in Madison, WI. This framework was applied to land in the Madison metropolitan area, resulting in an inventory of vacant land parcels. This publicly accessible database will help to move community gardening from a tolerated fringe activity to a planned and legitimized highest-and-best-use of vacant land.

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Introduction

As issues of food security and food deserts gain traction in both the public policy arena and the academic literature, community gardens have been increasingly touted as an integral part of community food production. Though they assume numerous forms and structures across varying urban landscapes, Glover (2003) has defined community gardens (CGs) as “organized initiatives whereby sections of land are used to produce food or flowers in an urban environment for the personal use or collective benefit of their members, who, by virtue of their participation, share certain resources, such as space, tools, and water” (191). Recent efforts have been made to identify and, where possible, quantify the multifunctional roles that CGs play in their respective communities. Among other benefits, the sharing of garden space has been shown to increase social capital (Glover 2005, Alaimo 2010) and contribute positively towards neighborhood revitalization, urban renewal and environmental justice (Glover 2003, Ferris 2001, Teig 2009). Shiner (2004) has found that CGs are unique spaces that positively promote interracial interaction, while Saldivar-Tanaka (2004) describes gardens as places where immigrants can link to their cultural past.

Beyond their potential effects on neighborhood and community health, CGs have demonstrable impacts on food security (Reid 2009), personal health, nutrition, and quality of life (Armstrong 2000, Twiss 2003). Litt (2011) found that CGs promote healthier eating, with gardeners consuming fruits and/or vegetables 5.7 times per day, compared to 3.9 times per day among non-gardeners. Alaimo (2008) found similar results, in which adults with a community garden affiliation consumed 1.4 times as many fruits and vegetables than

unaffiliated adults. Wakefield (2007) argues that, in addition to nutritional benefits, CGs provide a potential opportunity for physical fitness and improving mental health among gardeners. Kingsly (2009) confirms a pronounced sense of health and well-being among community gardeners, and posits that gardens provide their members with greater opportunities for contact with nature.

Despite their numerous contributions to public and individual well-being -- including CGs significantly positive impact on the value of adjacent properties (Voicu 2008) -- CGs have not proliferated and persisted without conflict. Describing the CGs on public parkland in Montreal, Canada, Bouvier-Daclon (2001) described CGs as “socially ambiguous” spaces, where land is considered public, but ultimately used by a limited number of people (507). Similarly, Schmelzkopf (1995, 2002) considers CGs to be “contested spaces” that can easily be at odds with developers (380). Smith (2003) has documented numerous controversies that have arisen in New York City over garden spaces being auctioned off for development; the land-use conflicts that result from community gardening make the establishment and protection of CGs an inherently political issue.

As this context of contested spaces and insecure tenure converges with the proliferation of multifunctional CGs, many cities have responded with efforts to systematically incorporate CGs into master plans and zoning regulations (Mukherji 2009). Instead of continuing a historically laissez-faire approach to CGs -- in which gardens are treated as fringe spaces left to the competing interests of developers and community groups -- these cities are increasingly making CGs codified and encouraged land uses.

The city of Madison, WI represents a particularly instructive example. In February 2011, the city's Common Council ratified a comprehensive sustainability master plan intended to set actionable goals for making the city more ecologically and socially sustainable. Among many focus areas, the plan highlights the promotion and fostering of local food systems as one of its four planning and design goals. In particular, the plan calls for "support[ing] existing community gardens and find[ing] places to establish new ones," with the intention of committing 4% of the city's total land area to some form of urban agriculture by 2020 (19). And while private back-yard gardens and a handful of small-scale market operations will doubtlessly comprise a significant portion of this 4% commitment, community gardens have been and will continue to be a popular and effective manifestation of urban agriculture in Madison.

Chapter 1: Building an Inventory of Vacant City Land

Toward this end, an effort was undertaken to build an inventory of vacant land within the city comprised of parcels that could serve as potential sites for community gardens. The land that was considered falls into a variety of categories, including public parkland, institutional grounds, land owned by religious institutions, storm-water retention areas, public rights-of-way, transportation corridors, land owned by businesses, and privately owned residential parcels.

The technical goal of this project was to build a parcel database of land that met minimum suitability parameters. This database will be freely and publicly accessible. End-users will

most likely include various city agencies, local non-profits who engage in urban agriculture, neighborhood organizations and/or associations, and citizen groups interested in establishing a recognized and lasting garden site. Users will be able to input a variety of parameters to the database -- such as size, distance from public transportation routes, walk-ability, or proximity to a given geographic location -- and generate a list of parcels satisfying their desired criteria. Further investigation of the generated parcel set, including a detailed soil analysis and investigation of potential site-specific land-use conflicts, will be necessary for actual site selection.

Full appreciation and utilization of this inventory is incumbent upon an understanding of the following assumption: since establishing community gardens is an inherently political and social endeavor, this report makes no recommendations for where gardens *should* be located. Rather, it is a first attempt to objectively collect and organize information about vacant land within the city that *could* be used for community gardening, assuming a satisfactory confluence of garden demand, biophysical conditions, monetary resources, land tenure, and support from the surrounding community.

Suitability Index

In order to assess the potential usability of vacant land, an initial suitability index was devised from interviews with several knowledgeable urban agriculturalists and community garden organizers in the Madison area: Joe Mathers, Community Gardens Development Specialist with Community Action Coalition of Southwestern Wisconsin; Heather Stouder, Planner with the City of Madison Department of Planning; Greg Rosenberg, Academy

Director of the National Community Land Trust Network; Claire Strader, Farm Manager of Troy Community Farm; Wajid Jenkins, organizer of Drumlin Farm; Mike Dailey, Principle Engineer with the City of Madison Office of Engineering; Martin Bailkey, Evaluation and Outreach Coordinator for Growing Power, Inc.; and Nan Fey, Chair of the City of Madison's Community Gardening Committee, and University of Wisconsin-Madison graduate students Lindsey Day Farnsworth and Robbie Greene.

Primary Criteria

Vacant land was initially identified from geospatial data provided by the City of Madison Tax Assessor's office. Updated quarterly, the database classifies vacant or untaxed land with the parcel use code "0." Using ArcGIS, an initial total of 3,650 vacant parcels were extracted from the city-wide database of 59,939 parcels and overlaid onto six-inch color, leaf-off digital orthophotos produced in 2006. Parcels from this first cut were evaluated by air photo interpretation and excluded from further consideration according to the following criteria:

- if parcel was already developed, implying a misclassification on the part of the city;
- if parcel was owned by a development corporation, implying a high likelihood of insecure land tenure, either via development or a prohibitively expensive path to land ownership;
- if parcel was owned by a non-development entity -- such as a private individual or family -- but located within a relatively new or clearly developing subdivision;
- if competing land uses were readily identifiable, such as a cemetery or golf course;
- if parcel was readily identifiable as part of a densely shaded area; or

- if parcel was a median strip in a road or a grassed island in a cul-de-sac.

Secondary Criteria

After this initial screening, 1,330 parcels remained, 790 of which were publicly owned, and 540 privately owned. Parcels ranged from less than one tenth of an acre to over eighteen acres in size, and averaged just short of two acres per parcel. Each of these were individually ground-truthed, which involved visiting the sites in person and assessing each according to the following selection criteria:

- Water: Madison receives just over 27” of rainfall during the growing season (beginning of April - end of October), which would be adequate for food production if distributed evenly through this growing period (Young 2010). But because precipitation is highly variable, dependable supplementary water access crucial for successful community gardening. Water access was assessed for each parcel according to the following categories:
 - Gutter downspouts from on-site or parcel-adjacent building roofs, allowing for the development of a rainwater collection system;
 - Faucets from on-site or parcel-adjacent buildings, allowing for a stable water-sharing arrangement, in which faucet water is metered and purchased from the city water authority on a monthly basis;
 - On-site or parcel-adjacent fire hydrants, which can be tapped and metered in a similar arrangement to faucets;
 - Water mains, which can be tapped and metered.

Each of these options is utilized by various community gardens in the city. Large gardens like Eagle Heights, Troy and Quann -- with garden plots in the hundreds -- have elaborate irrigation systems that tapped into an adjacent water main and required significant capital investments. Rainwater collection systems can be quite germane for small gardens with buildings close by, and, following an initial investment, have the lowest operating costs of all of the options. Faucets, while not frequently employed, often act as a bridge option while a more permanent water solution or investment is in development. Both faucets and rainwater collection systems require ongoing cooperation from the owners of the utilized buildings. Water mains offer the most stable water arrangement, but require the most expensive initial investment and use the most expensive water.

- Sunlight: Root and fruiting vegetables require full sun -- often defined as eight hours of direct sun exposure at the height of the growing season -- in order to reach maturity. Though leafy greens can tolerate less light exposure, nine of the ten most popularly grown vegetables in American gardens require full sun (Butterfield 2009). Sun exposure was visually estimated during site visits by hand-digitizing tree canopy and other obstructions onto orthophoto printouts of each parcel. These initial edits were corrected by an overlay of the City Sustainability Office's Solar Radiation map. Clipped to the vacant parcel boundaries, this raster dataset was able to consistently demarcate areas of parcels *not* receiving minimum sunlight exposure, which were excluded from the inventory. After making edits in ArcMap, parcels not containing 2,500 contiguous square feet of ground with full light exposure were excluded.

- Size: Considerable infrastructural investments -- for water access and soil amendments, in particular -- often accompany the establishment of a garden. Each additional garden plot that a parcel is able to support reduces the marginal cost of garden establishment. Reynolds Homestead Community Garden is the smallest of the city's current gardens. With a footprint of just 2,800 square feet, it supports twenty-six 8'x10' plots, or the equivalent of five 400-square-foot plots (designated by the Community Action Coalition of South Central Wisconsin as a standard plot size). Parcels significantly smaller than this would likely find it difficult to justify the marginal upfront investment, and often have undue tree canopy coverage or adjacent buildings that obstruct sunlight necessary for adequate plant growth. Thus, parcels smaller than 2,500-square-feet were automatically excluded from the inventory.
- Vehicular Accessibility: Most disturbed urban soils are either contaminated, compacted, or lack indigenous fertility sufficient for robust plant growth, thus necessitating off-site amendments in the form of topsoil or compost. Truck accessibility is therefore crucial during garden establishment, as well as for ongoing maintenance, including plant waste removal and the addition of soil amendments, and for the convenience of gardeners who do not live in close proximity. A parcel was considered to be vehicular-accessible if a path, roadway, or public right-of-way (wide enough for a small pickup truck) was readily identifiable between a public street and the parcel.
- Surface & Vegetation: The soil permeability and type of vegetation present on a given parcel are both basic indicators of the investment necessary for installing a garden. Parcels with extensive pavement, impervious materials, or highly compacted

soils will likely incur significant costs associated with either breaking up and/or removing those materials. Likewise, lots containing dense shrubs, small trees, or tall weeds/grasses will also require greater monetary and time outlays than a similarly sized parcel with a pervious, cleared surface. Parcels were classified according to the following surface types, ordered from most to least hospitable:

- g: mowed grass
 - tg: unmowed grass
 - grv: gravel; filled and/or partially paved
 - tw: annual or perennial weeds and shrubs
- Land-Use Conflicts: Parcels were either flagged or excluded according to observed or anticipated land-use conflicts. City-owned parkland was flagged -- but not excluded -- along with parcels contiguous to active railroad lines. A 15' buffer was applied to bike path centerlines in order to accommodate minimum safety and mowing guidelines. Land comprising conservation parks, prairie restoration sites, wetlands, or densely forested natural habitats was excluded. So too for parcels with active construction happening on them or a for-sale sign, indicating a high likelihood of future development. Portions or the entirety of parcels characterized by steep slopes or a high likelihood of flooding -- defined as all contoured areas within four vertical feet of a perennial or intermittent waterway -- were also excluded, along with golf courses, parking lots.

Tertiary Criteria

Further analyses of site suitability conducted for various subsets of the parcel database (see Chapter 3) included a preliminary soil screening and a map-based assessment of public parkland in order to determine mixed-use compatibility.

Testing urban soils for heavy metals, PAHs, PCBs, and other volatile organic compounds is a necessary precursor to the safe establishment of a garden site, where plant-uptake, dermal contact, or inhalation of contaminants can pose a significant human health risk. Since tests for a single site can easily cost hundreds of dollars, contaminant testing is often preceded by a site history analysis. Deemed a “Phase 1” soil test by the U.S. Environmental Protection Agency, site history analyses attempt to predict both the presence and approximate location of contamination. And while a Phase 1 test cannot conclusively or exhaustively detect contamination, it is an effective tool for deciding *which* contaminants to test for, as well *where* in a given parcel samples should be taken. Numerous archival resources exist that depict the location, function, and in some instances, the building materials used in structures that formerly occupied now-vacant sites. Sanborn insurance risk maps -- first drawn up for municipalities in an effort to determine the fire insurance liability of urban buildings -- are particularly useful in this regard, and date back to the 19th century in some parts of the city.

The following example illustrates the process and utility of a site history analysis. Figure 1 shows a side-by-side orthophoto comparison of 1910-1938 Roth street on Madison’s north-east side. While the site is currently vacant -- as depicted by the most recent orthophoto on the right-- it had various buildings on-site as recently as the 2006 orthophoto. A Sanborn map

from 1942 (Figure 2) shows various buildings belonging to the C.E. & P.A. Roth Coal & Fuel Company. The building in the northwestern quadrant of the parcel was a concrete block factory comprised of a concrete floor, wood trusses, and hollow cement blocks. Several 30'-tall concrete tanks, which contained coal, abutted the northern edge of the building. The map also depicts two metal-clad storage tanks to the east of the concrete block factory, along



Figure 1 – Aerial photographs of 1910-1938 Roth St from 2006 (left) and 2011 (right)

with a metal-clad pump house and six fuel-oil tanks. Finally, the map shows a tiled storage tank and, in the southernmost portion of the parcel, a brick-veneered office building and three large areas designated for storing piles of coal and building materials. Soil testing should, accordingly, be concentrated to the areas of the parcel where these structures once stood, and would need to include testing for volatile organic compounds because of historical land uses, in addition to ubiquitous urban contaminants such as lead.

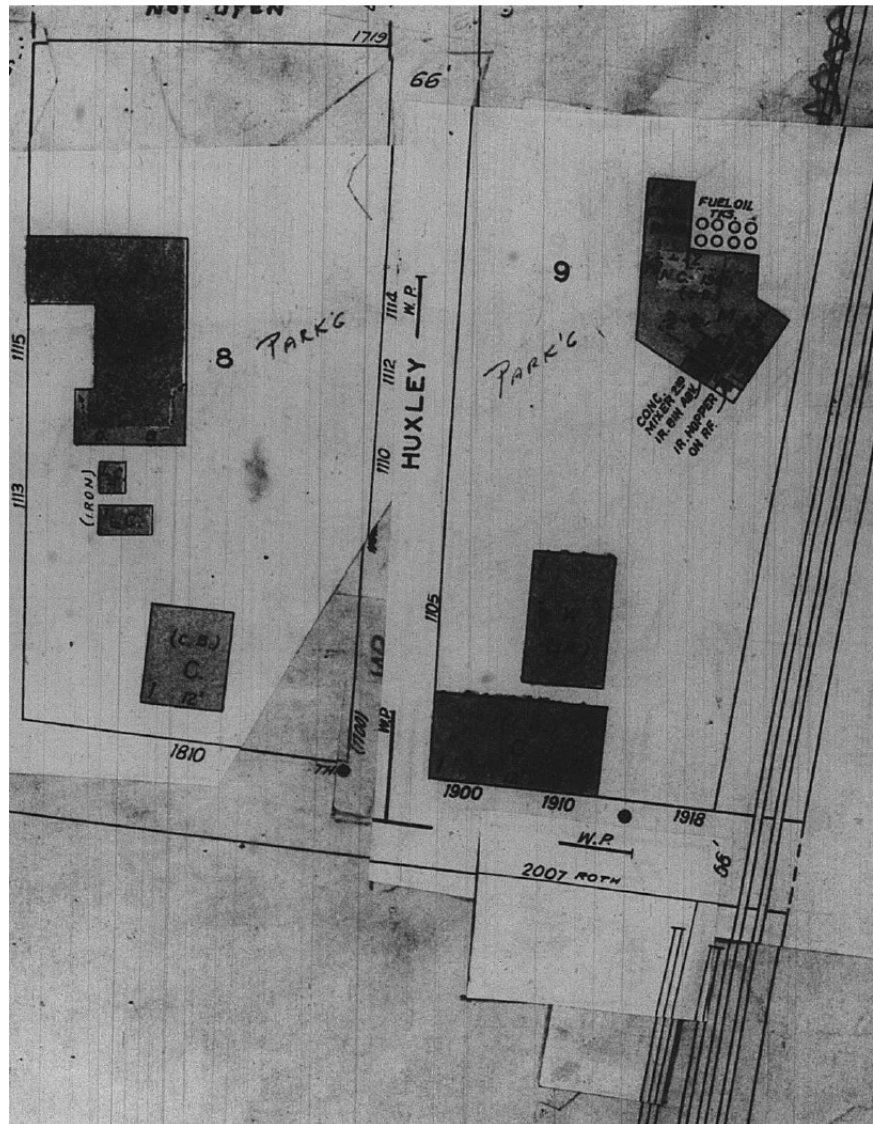


Figure 2 – 1942 Sanborn map depicting buildings and materials on the site of 1910-1938 Roth St

This inventory identifies portions of 136 city parks that could be used for gardening.

Locating areas in public parks compatible with community gardens is based primarily on an analysis of existing master plans. While some plans have been more recently updated than others, they provide at least a baseline delineation of existing and planned playing fields and paths. Based on this, general principles for siting gardens in parks include:

- a 30 ft minimum buffer around playing fields, including the construction of a short barrier fence (though if space allows, a 50 ft fenceless buffer is preferable);
- an arrangement such that planned or existing paths do not cut through potential garden spaces
- a title search by the city attorney's office for deed restrictions that might preclude the establishment of a garden, since gardens are considered to be an "exclusive use";
- a preliminary check with the Parks Department to determine whether the proposed space is regularly programmed events that, due to their intermittent or permitted use, do not show up on a master plan (i.e. areas used for outdoor summer concerts, or sloped areas used in the winter for sledding);
- and a call to the Digger's Hotline in order to check for buried utilities that may or may not be accurately portrayed by existing utility maps.

These principles, though by no means exhaustive, represent a general starting point for the garden-siting process. Ultimately, despite their best efforts to systematize the process, gardens in parks will still need to be judged on a case-by-case basis so as to include input from parks staff, parks users, and neighbors. Figures 3.1, 3.2, and 3.3 depict an example of the process of refining parkland in this inventory with park master plans, incorporating the principles laid out above. Figure 3.1 shows a digital orthophoto of Rennebohm Park, located on Regent St on Madison's west side, overlaid by a Parks Dept master plan depicting current and projected uses. Figure 3.2 adds three boundaries of land parcels deemed suitable for community gardening after an initial ground-truthing analysis. Figure 3.3 is the result of scrubbing the original garden site polygons according to a network of proposed paths

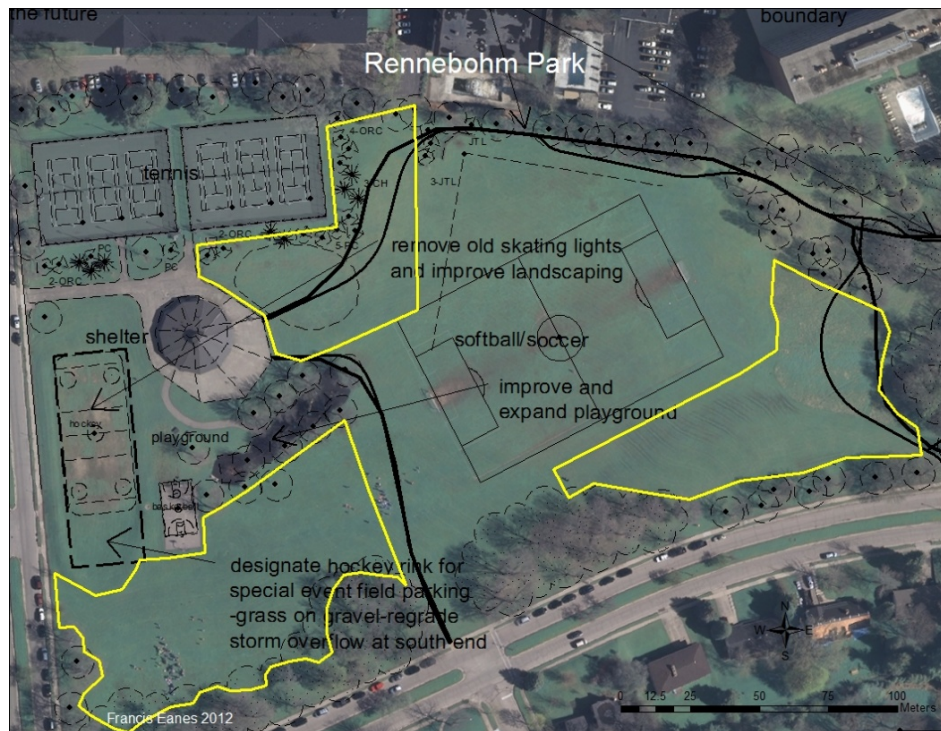


Figure 3.2 – Rennebohm Park and master plan, overlaid with sites deemed suitable for community gardening

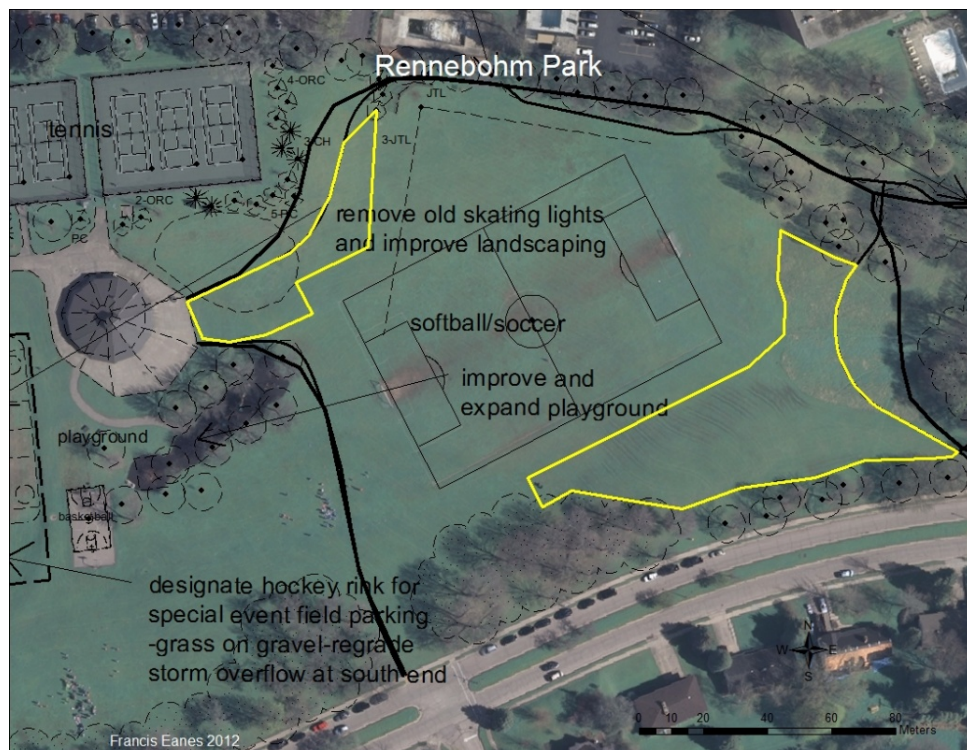


Figure 3.3 – Potential garden site locations, buffered according to siting restrictions and existing land-use conflicts.

Chapter 2: Index Validation & Community Gardens Survey

While the primary, secondary, and tertiary criteria used for site selection are generally intuitive, three approaches were taken to justify their inclusion. First, selection criteria from two existing land inventories -- in Oakland, CA, and Portland, OR -- provided sound conceptual approaches for locating and analyzing vacant land, as well as a basis for comparing what was done in other communities with similar goals. Second, an analysis of Madison community gardens helped to validate and bound the index parameters. Finally, a survey of current Madison community gardeners helped to link various social and proximity criteria, as well as ground the index in Madison's unique social and geophysical context.

Existing Land Inventories

Initial suitability criteria input came from conversations with Joe Miller and Nathan McClintock, both former graduate student contributors to land inventories in Portland and Oakland, respectively. Portland's *The Diggable City* (Balmer 2005) uses one-foot digital orthophotos to assess site suitability according to "tree canopy, the presence of buildings and parking, the type of agricultural potential and a subjective suitability rank based on a visual assessment of the site," along with water accessibility, size, and surface type (GIS-1-3). Oakland's *Cultivating the Commons* (McClintock 2010) employs similar selection criteria, but also includes an assessment of slope, proximity to public transportation and schools, and existing zoning allowances for agriculture.

The key to both inventories was the cooperation of public agencies in the process,

particularly their willingness to share geospatial data, including tax parcels, water mains, digital elevation models, and existing and future management plans. Public bureaus were particularly integral to Portland's inventory, as each bureau compiled lists of vacant properties under their purview, allowing the inventory to proceed from a focused bank of land. Tax parcel data from the city tax assessor's office provided the backbone of Oakland's inventory and offered a key starting point for systematically identifying urban land. Since their releases, both reports have influenced food and urban agricultural policies in their respective cities. The City of Oakland's Food Policy Council -- convened in an effort to build upon the work of the land inventory -- has crafted a policy roadmap document that states as its primary objective the creation of "zoning definitions and operating standards for both civic and commercial urban agriculture" [citation]. Portland's City Council has formally adopted the recommendations proposed in the *Diggable City* report, including the creation of an urban agriculture commission, the adoption of a formal policy on urban agriculture, and a review of policy and zoning obstacles (59). Both inventories have been subsequently updated, both in terms of each parcel database's compatibility with city agencies' master plans, as well with revisions made after more extensive and thorough ground-truthing.

Both land inventories contain several notable limitations. In both cases, only a small fraction of the parcels that were identified, analyzed, and ultimately included in the inventories were ever assessed in person; most parcels were virtually assessed, either with downloaded digital orthophotos or GoogleEarth (including the StreetView application). While Google's imagery is often quite current and regularly updated, the limited shelf-life of orthophotos, combined with the limitations of accurately interpreting actual surface conditions via imagery,

underscores the importance of extensive ground-truthing.

Moreover, the parameters used by Oakland's report seem, at face value, rather arbitrary.

Constraining criteria included requiring parcels to be within a ten-foot buffer from a water main, as well a minimum parcel size requirement of five hundred square feet; these are given no apparent justification in the report. No analysis of existing community gardens in either city was used to calibrate site selection parameters.

Finally, both inventories consider only public land. Vacant land owned by private individuals, entities, or religious or other non-profit institutions was not considered. Even though the Madison inventory was only able to assess a small portion of privately owned land -- parcels that encompass significant pieces of vacant land, but, due to development on a portion of the parcel, do not register as "vacant" on the tax rolls -- that acreage comprises a significant portion of all of the land included in the final database. And while paths to stable, long-term tenure may indeed differ among privately and publicly held parcels, the inclusion of private vacant land represents a valuable and significant departure.

While the site selection criteria utilized by both the Oakland and Portland inventories informed the core of the suitability index described in this report, several departures were made. The Madison inventory included a mixed-use compatibility assessment for public parkland, and preliminary soil testing in the form of a site history analysis. Social variables -- including median household income, food security, population density, tenured access to arable land, and neighborhood characteristics -- of a given context are invariably integral to

the site selection process, but can be used later in the process. It is incumbent on the individuals or groups involved in the process to identify which social variables are important to their particular intentions and constituents, and then to gather the necessary information -- whether via public records, neighborhood surveys, or public meetings -- to determine an appropriate site. Thus, the primary and secondary criteria employed by this index, which primarily assesses vacant lots' physical characteristics, simply provide a menu of site options from which more nuanced conversations and decisions can emerge.

Community Gardens Analysis

Twenty-four Madison community gardens were ground-truthed according to the criteria set forward in the suitability index. The following represent the combination of GIS processing and field observations used to create maximum and/or minimum thresholds for various criteria in the ultimate suitability index.

The *Near* tool in ArcGIS was used to determine that the average and maximum distances from a water main to the edge of a community garden parcel are 30m and 120m, respectively. These parameters were then applied to the set of vacant parcels (Final_merge.shp), producing a new column in the attribute table (Near_Dist) denoting the shortest distance between a water main and the parcel's edge.

Slope parameters were based on an analysis of the maximum slope present in area community gardens. A 1m digital elevation model -- clipped to the community gardens layer (Gardens_poly) and analyzed with the Slope tool -- showed slopes ranging from 0 to 16%

across all community garden. The majority of Atwood Community Garden -- a narrow parcel wedged between St. Paul street and the Capital City Trail bike path -- is uniformly comprised of 16% slopes, making it a valid representative of a realistic upper slope boundary in a relatively flat city such as Madison. For the sake of inclusivity, and since NRCS soil mapping units contain a 12-20% slope classification category -- this inventory includes parcels containing slopes up to 20%. Above this slope, gardeners would need significant erosion-control measures.

Community Gardens Survey

In order to further assess the validity of including various site suitability criteria -- particularly those used to construct the hypothetical scenarios described in Chapter 3 -- a short survey was constructed and distributed to a random cross-section of current Madison-area community gardeners. In particular, the survey aimed to understand how the location of gardens impacts the garden experience -- in terms of personal safety, accessibility, and food production -- for participants. The full text of the survey in English is included in Appendix A.

Surveys were distributed in English, Spanish, and Hmong to volunteers participating in community garden work-days during September and October, 2011, with the permission of garden coordinators. Respondents were asked: how far away they live from their garden; what mode(s) of transportation they use to access their garden; whether and why they feel unsafe at their garden site; whether and why they experience theft of food or flowers; what they do with the food and flowers they grow; whether they are aware of any soil

contamination issues; and finally their age and gender. In total, 200 responses were gathered from gardeners representing ten area gardens.

Results indicate that the majority (64%) of gardeners live within two miles of their respective gardens, while roughly a quarter (24%) live more than three miles away. Although almost 60% access their garden at least some of the time by car, 49% and 43% of gardeners bike or walk, respectively, to their garden. Another 5.5% ride the bus at least some of the time. Fully 63% of respondents from Eagle Heights Community Garden reported accessing their garden by bike, while another 8% reported using the bus regularly. And while this higher rate of bike travel could be due in part to a younger-than-average gardener demographic -- 58% of respondents under the age of 35, compared to 22% for all other gardens -- Eagle Heights is located on a spur of a bike and pedestrian right-of-way and across the street from a bus stop, making it one of the most easily accessible gardens in the city. Locating gardens on or near public greenways, sidewalk networks, dedicated bike routes, and bus stops ought to be, therefore, a reasonable priority.

Most gardeners reported having no knowledge of soil contamination issues at their garden sites. Among the 3% of respondents who reported contamination, only one attributed the issue to the underlying indigenous soil --in this case, a former roadbed which had been removed and overlaid with compost and topsoil, but apparently had left some residual chemicals. All other contamination responses indicated extra-soil sources. One noted that fellow gardeners sometimes used synthetic pesticides -- contrary to garden bylaws -- which spread to other plots. Another noticed an exceptionally high buildup of road salt at one end of

the garden, where snowplows usually piled snow removed from an adjacent parking lot. Still another mentioned the presence of chemical herbicides in the garden's compost pile, ostensibly from grass clippings from treated lawns.

Further surveying -- particularly about the history of individual garden sites -- is necessary to more accurately understand whether soil contamination ever was an issue at current garden sites, whether soil tests were ever conducted, whether significant remediation was required, or if time and continual off-site additions of topsoil and/or compost created an effective buffer over contaminated areas. Since some of the city's community gardens are more than fifty years old, information about the garden establishment process -- particularly about soil conditions pre-establishment -- and potential contamination issues noticed by early gardeners is likely difficult to obtain. A site history analysis, while far short of an empirical soil test, may indeed be the most tenable resource pertaining to historical soil conditions at a given site.

Siting gardens in prominent, reachable locations -- in addition to allowing for ease of access - - generally promotes feelings of personal security. Eighty-five percent of respondents expressed feeling safe at their garden all of the time, while the remaining 15% reported feeling safe most of the time. When individuals in this latter group do not feel safe, it is because of: passersby (52%); lack of visibility from public streets or occupied houses (22%); perceived remoteness of their garden (17%); and other gardeners (9%). While a garden's location has little influence on whether a respondent feels safe around fellow gardeners, the responses above highlight a valid tension inherent to garden visibility: more prominent and

accessible gardens, while assuaging *some* gardeners concerns about personal security, will ostensibly have a greater number of passersby who might potentially contribute to other gardeners' anxiety.

The issue of food theft further heightens the tension between privacy and visibility. Thirty-six percent of gardeners reported experiencing food and/or flower theft, and attributed the occurrence to: passersby (44%); other gardeners (32%); their garden being *too* accessible to the public (13%); and the lack of a fence or other security mechanism (11%). Perhaps a more remote garden that is less easily accessible would have fewer passersby and potentially less food theft; such remoteness, though, could amplify some gardeners' feelings of personal insecurity as well as compromise the walk-ability, bike-ability, and bus-accessibility that currently characterizes area community gardens.

Greene (2012) explores the interplay among visibility, garden security, and neighborhood dynamics in Madison. He notes that the city's various action plans on community gardens assume that the close proximity of occupied houses will reduce vandalism and crime, but points out that these action plans fail to take into account the attitudes of the neighbors towards a particular garden. In interviews with residents surrounding existing gardens in the city, he recorded opposed gardens on the grounds of messy aesthetics, asserting that "the plots, tools and occasional lack of cohesive garden design led to eyesores on the landscape" (59). From this he concludes that, when siting a garden, "the factor of visibility might have some influence, but without a prior survey of neighbors adjacent to potential garden sites, it

is difficult to tell if visibility would encourage or discourage placement of a CG” (59-60).

While the suitability index used in this inventory is particular to the context of Madison -- and thus not generalizable in its exact form -- the multi-pronged approach used in the development of the index has broader applications. Other cities wishing to inventory and classify their vacant land resources can adapt the process for developing site selection criteria from this and other inventories and directly use some of the factors. Criteria like water access, available sunlight, surface type, and vehicular accessibility will likely form the core of any index, regardless of a particular city’s vagaries. The decision to include other criteria - - such as whether a parcel is publicly or privately owned, slope, or a minimum size threshold -- will depend upon a more nuanced understanding of a given city’s context. Surveying community gardeners, collaborating with city agencies charged with moderating garden establishment processes, and collecting data on a city’s existing community gardens are essential for effectively validating the inclusion of site selection criteria, as well for calibrating those criteria’s parameters. Still other criteria -- particularly a parcel’s proximity to various transportation options, to schools, or to certain neighborhood demographics -- will likely vary even within a city, and ultimately depend on the specific needs and interests of stakeholders involved in the establishment of actual gardens. Chapter 4 will more thoroughly explore the possibility of adapting this site selection process to other urban environments.

Chapter 3: Results, Application, and Usability of the Inventory

Results

Exclusions made via ground-truthing yielded a tally of 640 parcels for inclusion in the current inventory, totaling 1,065 acres (Figure 4). This represents 1.3% of Madison's current land base (Figure 5). Parcels range in size from 2,500 square feet to over eighteen acres, and average 1.8 acres per parcel. Among the different ownership classifications, average parcel size ranges from 0.7 acres/parcel among land owned by homeowners associations, to 2.2 acres/parcel among land owned by Dane County (Figure 7). Publicly owned land comprises 715 acres, just over 67% of the total, and 383 of the 640 unique parcels (Figure 6). At 387 acres, city parkland makes up the largest share of public parcels. Land owned by the city's Engineering department represents the second largest share of public land, and includes parcels managed by that department's Stormwater Utility, Streets, Water Utility, Sewage, and Walkways & Bike-paths divisions (Figure 8).

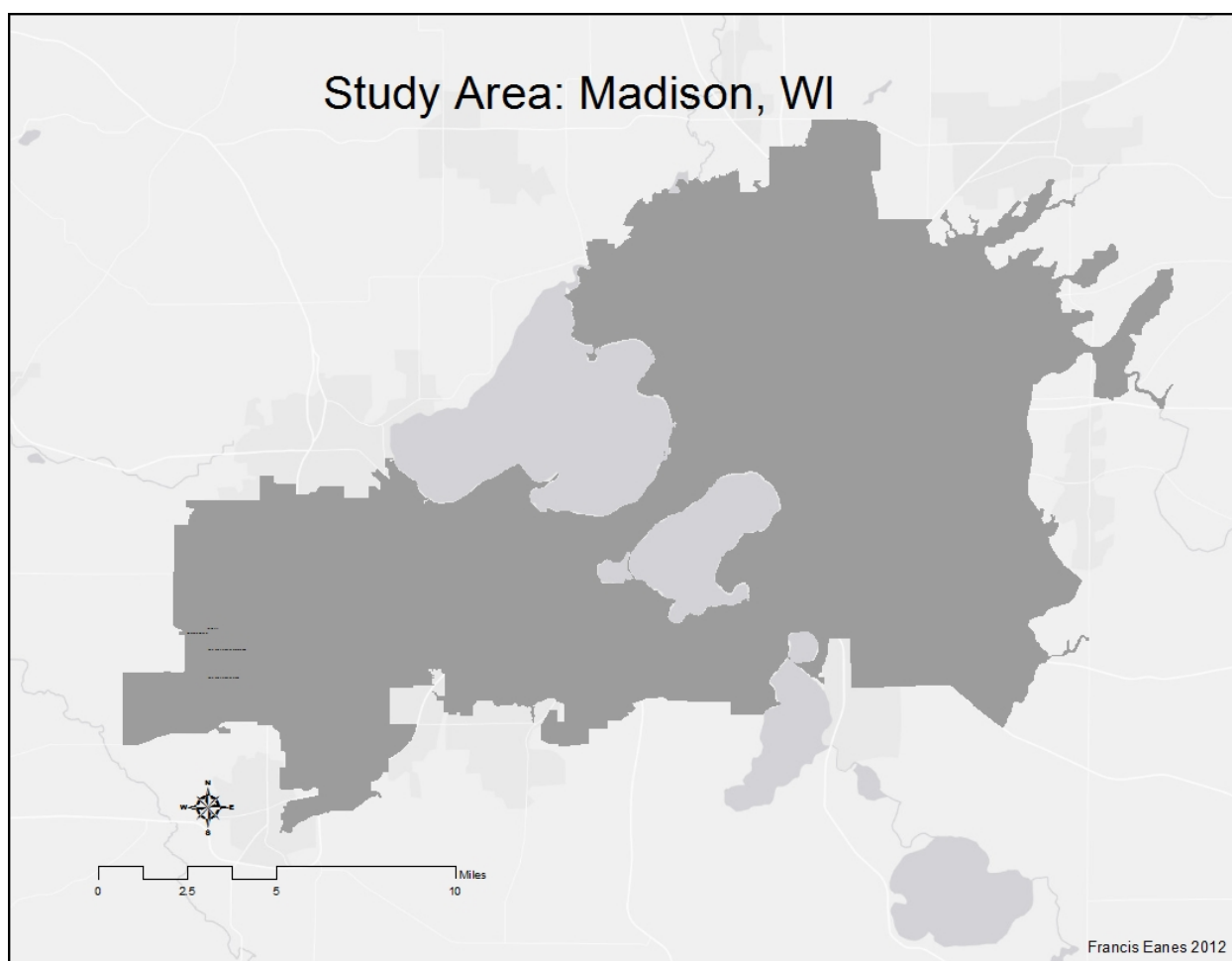


Figure 4 – Study area (dark grey)

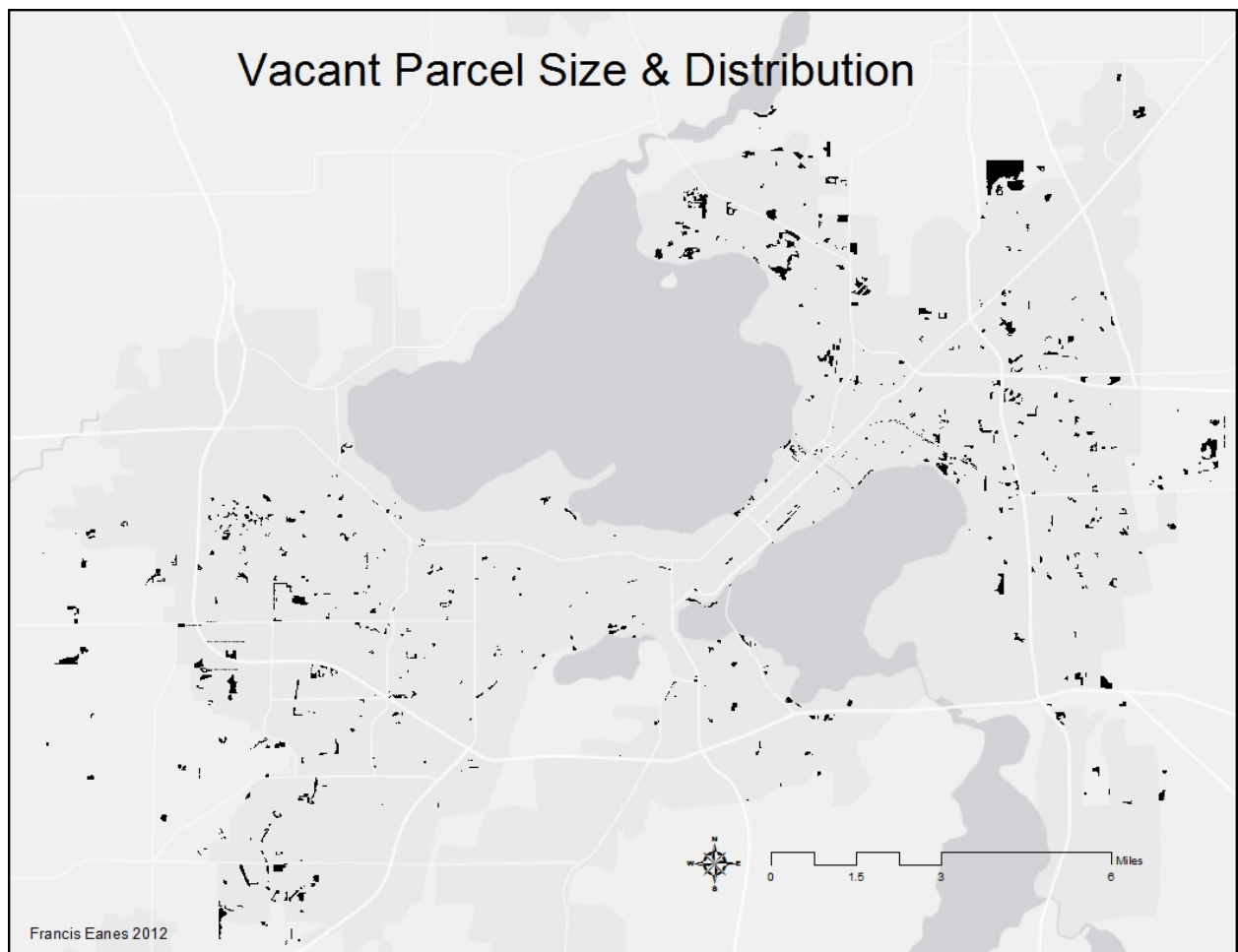


Figure 5 – Size and distribution of 640 parcels included in the final inventory

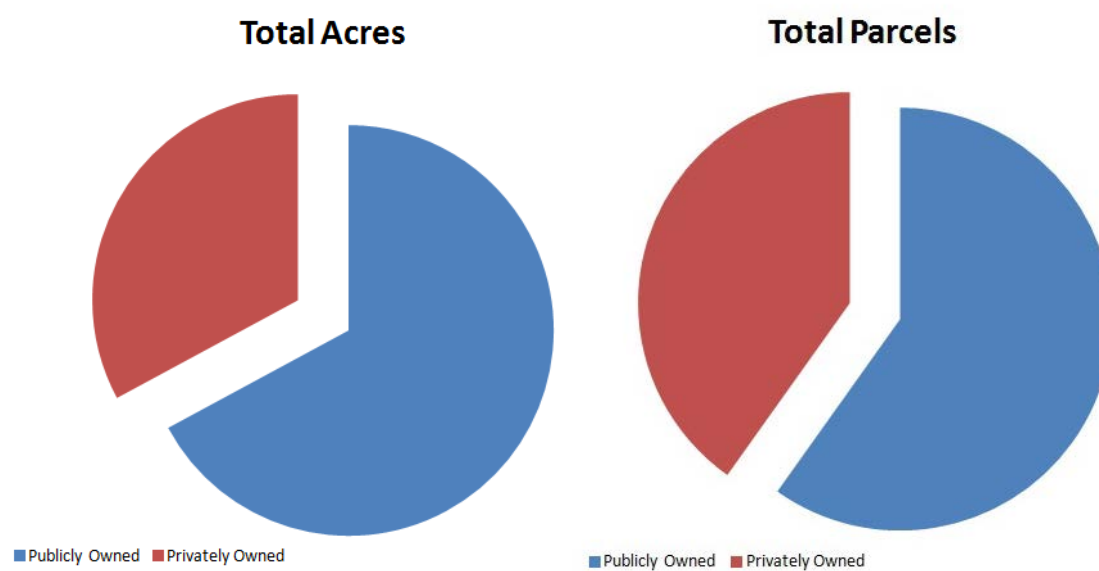


Figure 6 – Distribution of parcels and total acreage between public and private ownership

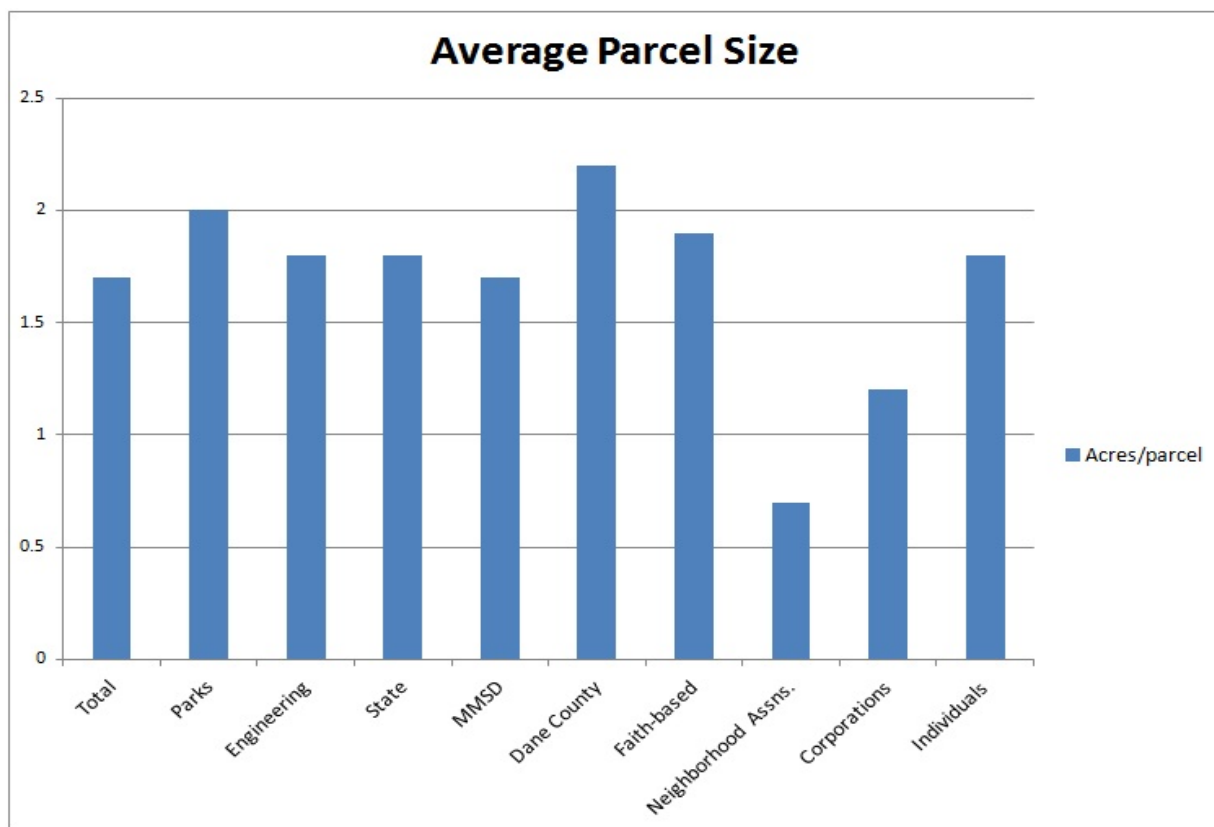


Figure 7 – Average parcel size according to selected ownership categories

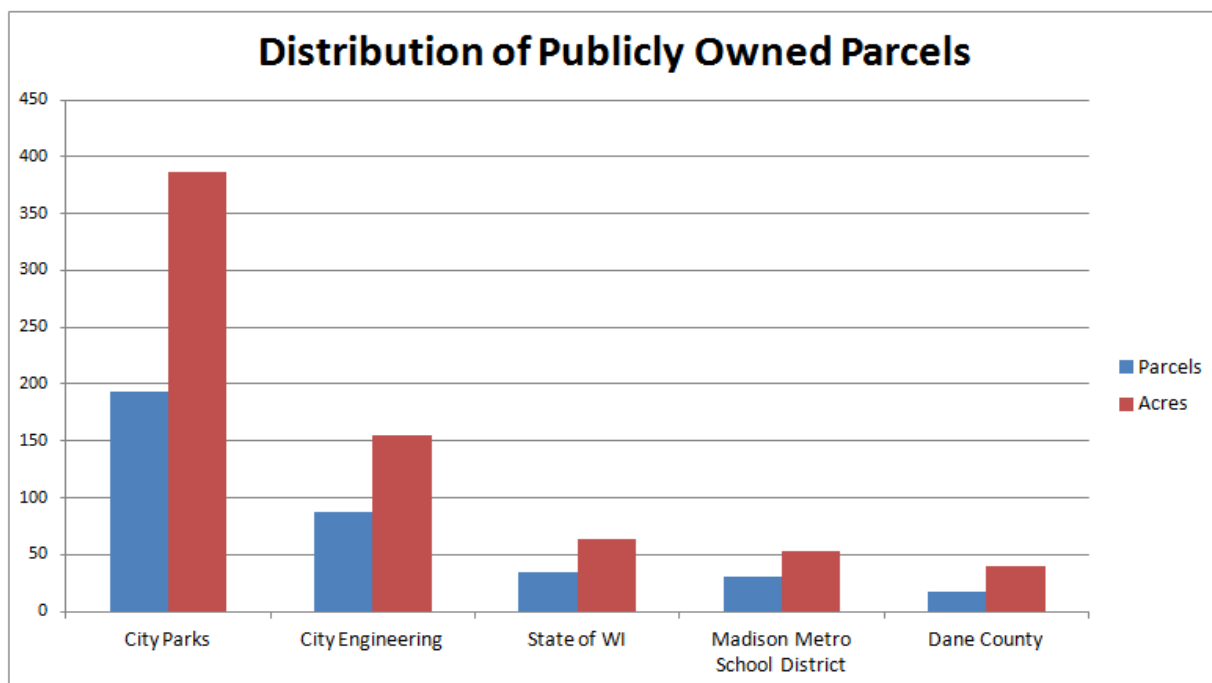


Figure 8 – Number of acres and parcels belonging to various public entities

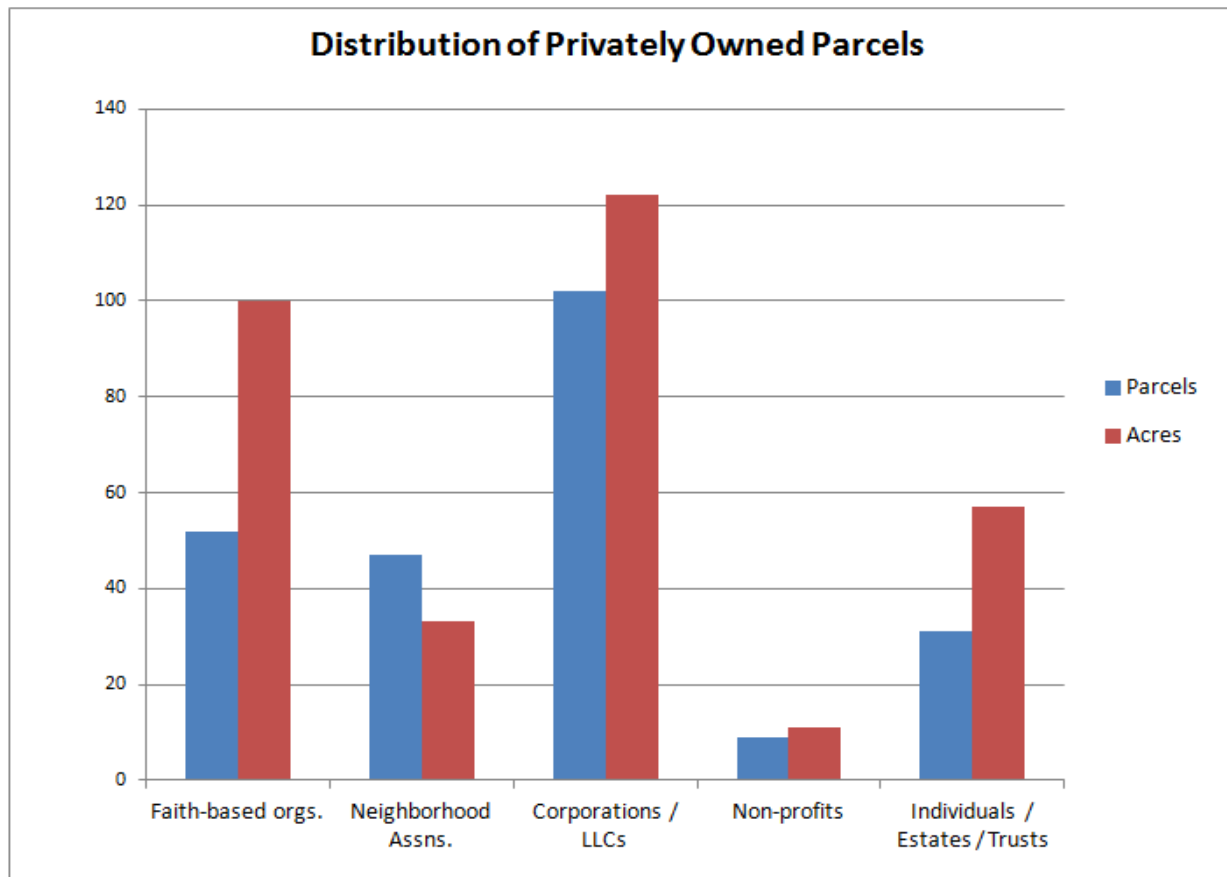


Figure 9 – Number of acres and parcels belonging to various private entities

Privately owned land makes up just under one third of the total acreage in the inventory, and is predominantly comprised of land owned by businesses, faith-based organizations, and homeowners associations (Figure 9). Non-profit organizations and a varied assortment of individuals, estates, and trusts make up a much smaller but still significant share of the total private land base. The inclusion of privately owned land in this inventory represents a significant departure from similar inventories in other cities, which tend to focus on public parks and rights-of-way as the most readily available and tenure-secure sources of vacant land. And while the dynamics of the political conversation about siting a garden on church or company grounds may play out differently than the process for establishing a garden in a

public space, ownership classifications within the private land base present several potential advantages.

First, fewer entities tend to compete for the use of a privately owned space (if it is even regularly used at all) compared to a public park, transportation corridor, or right-of-way. While the latter primarily exist to serve the needs of a large and diverse constituency, the former often belong to more homogeneous and hierarchically organized entities. Moreover, the missions of private entities are often separate from the functionality and utility of the physical space (including the vacant land) which they occupy. This diverges from many public spaces whose physicality and functionality are much less separable. Thus, while the decision-making process within, say, a particular church can certainly be fraught with contentiousness or the absence of consensus, the conversation about allowing a community garden is more likely to turn on the issues of aesthetics, liability, and ongoing garden maintenance, rather than a conflict among regular users of the space. Finally, privately entities may allow for a more streamlined conversation, with one owner/gatekeeper, compared to the public process, which almost certainly involves neighborhood meetings, neighborhood surveys, and the involvement of several public agencies and the political representative for a given area. These advantages may hold true for some private entities or types of private entities, but should not be assumed write large. But since garden siting is only the first stage in the establishment of a successful garden, further research is necessary to accurately explore whether or not gardens with private lease arrangements are more secure over time than publicly owned gardens.

Usability

Two key measures of this inventory's utility is are its accessibility and usefulness to ultimate end-users. While the final parcel database will be freely and publicly accessible -- ideally via a web-based platform -- end-users will most likely include the following: various city agencies, including the planning, parks, and engineering departments; local non-profits who engage in urban agriculture, such as the Community Action Coalition of South-Central Wisconsin, the Center for Resilient Cities, and Community GroundWorks; neighborhood organizations and/or associations, and citizen groups interested in establishing a recognized and lasting garden site. If delivered in the form of a web-based tool, users will be able to input a variety of parameters to the database -- such as parcel size, distance from public transportation routes, walk-ability, or proximity to a given geographic location -- and generate a subset of parcels satisfying their desired criteria. Further investigation of the resulting subset -- including a detailed soil analysis, the existence of potential land-use conflicts, and an assessment of neighborhood dynamics -- will be necessary precursors for actual site selection. The following provides some examples of how this database and data query process might work.

Application: Scenario 1

The current Sheboygan Community Garden is located on Madison's west side on land owned by the Wisconsin Department of Transportation (WISDOT). Due to WISDOT's intention to develop the garden parcel, the garden's organizational body is interested in finding an alternative site. Ideally, the new parcel would have similar spatial characteristics as the

current garden, meaning it must be: within a reasonable distance of the current garden; of equal or greater size (~37,000 sq ft); within 60m of a water main; and accessible by a truck.

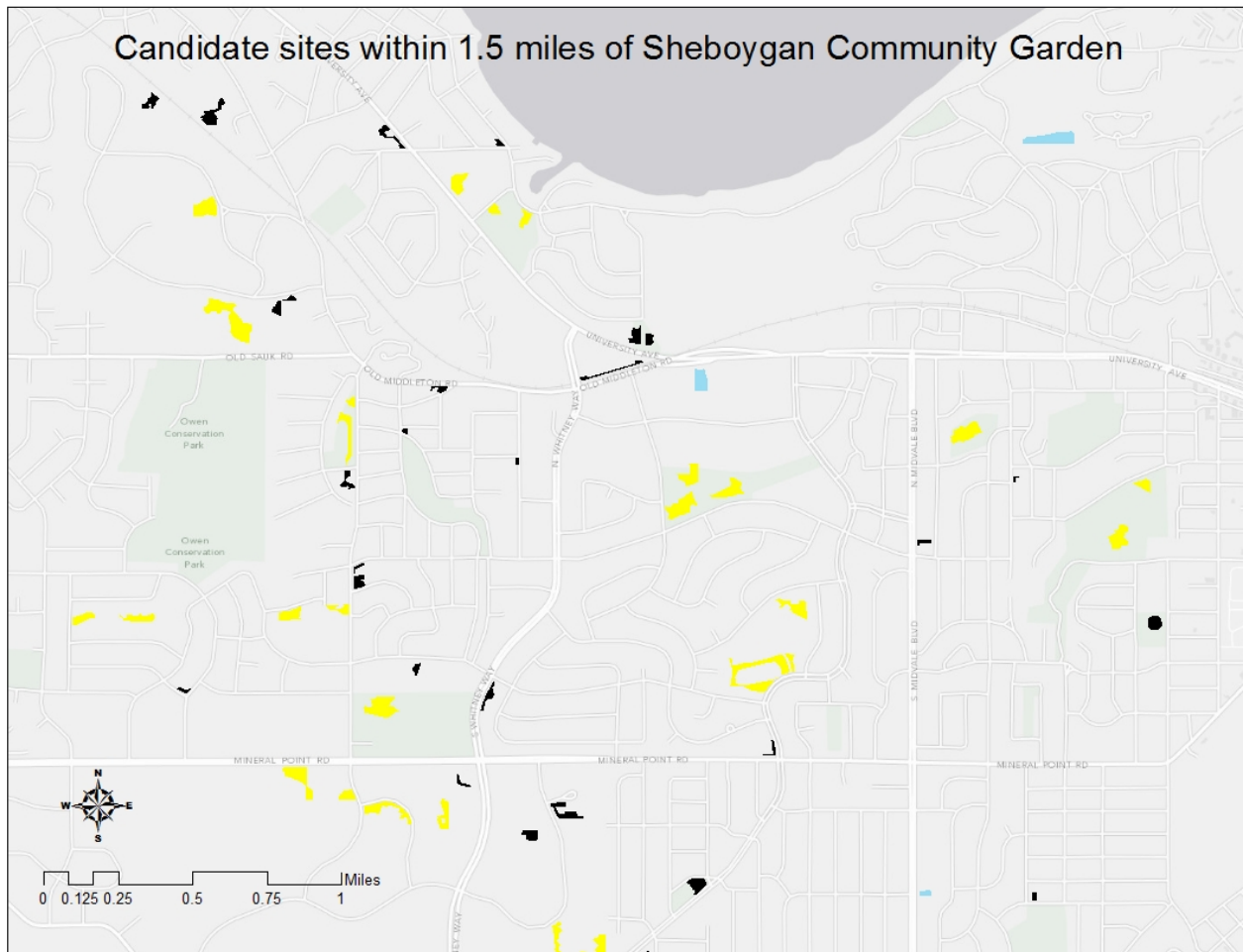


Figure 10 – Distribution of all vacant parcels within 1.5 miles of Sheboygan Community Garden (blue rectangle in center), and distribution of parcels that are of greater or equal size to that garden (shown in gold)

Given these parameters, a 1.5-mile search radius was applied to the current garden site, yielding a total of 45 vacant parcels (Figure 10). Of these, 18 are of equal or greater size to the current garden site (displayed in gold in Figure 10). All 18 are located within 60m of a water main, and all but two have a water main that is less than 100 feet from the vacant parcel's edge. Even though the current garden does not use rainwater catchment or nearby

water faucets for its irrigation needs, those options are available at some of the sites; of the 18 parcels satisfying the size criteria, eleven have nearby water faucets, and seven are spatially arranged such that rainwater catchment is possible (though it should be noted that further assessments would be necessary to determine whether or not the roofs in question are large enough to generate sufficient irrigation water). All 18 parcels are accessible by a truck, and all but one are highly unlikely to be developed in the near future. Finally, all parcels are within a ¼-mile of a bus stop, and all but two are within an ⅛-mile of a stop. Eleven of the 18 are publicly owned -- six are city parks, three are schoolyards, one is owned by the city's Stormwater utility, and one by the University of Wisconsin -- while the rest are privately held.

Application: Scenario 2

The adjacent East Buckeye and Elvehjem neighborhoods on Madison's east side do not currently have community gardens; both Eastmoreland and East High School community gardens are almost a mile from the nearest border of Elvehjem, and more than two miles from the nearest border of East Buckeye. Accordingly, a search was undertaken within these neighborhoods for available land meeting the following hypothetical parameters: capable of supporting thirty standard 20'x20' plots, which, including pathways, requires a minimum of 13,000 square feet; are within ¼-mile of a bus stop; are truck-accessible; and have either rainwater catchment, faucet, or fire hydrant potential.

Twenty-four vacant parcels are contained in East Buckeye and Elvehjem (Figure 11), seventeen of which meet the minimum size threshold (Figure 12). Fourteen of those

seventeen have a fire hydrant either within or adjacent to the parcel, and all have rainwater catchment potential or an outdoor faucet on a nearby house (Figure 13). All are truck-accessible and within ¼-mile of a bus stop, eleven of which are within ⅛ mile of a stop. Parcel ownership breaks down as follows: eight of the fourteen parcels that have fire hydrant access are publicly owned, including five by the Madison Parks Dept, two by the city's Stormwater utility, and one by the school district; and the remaining six are owned by various churches.

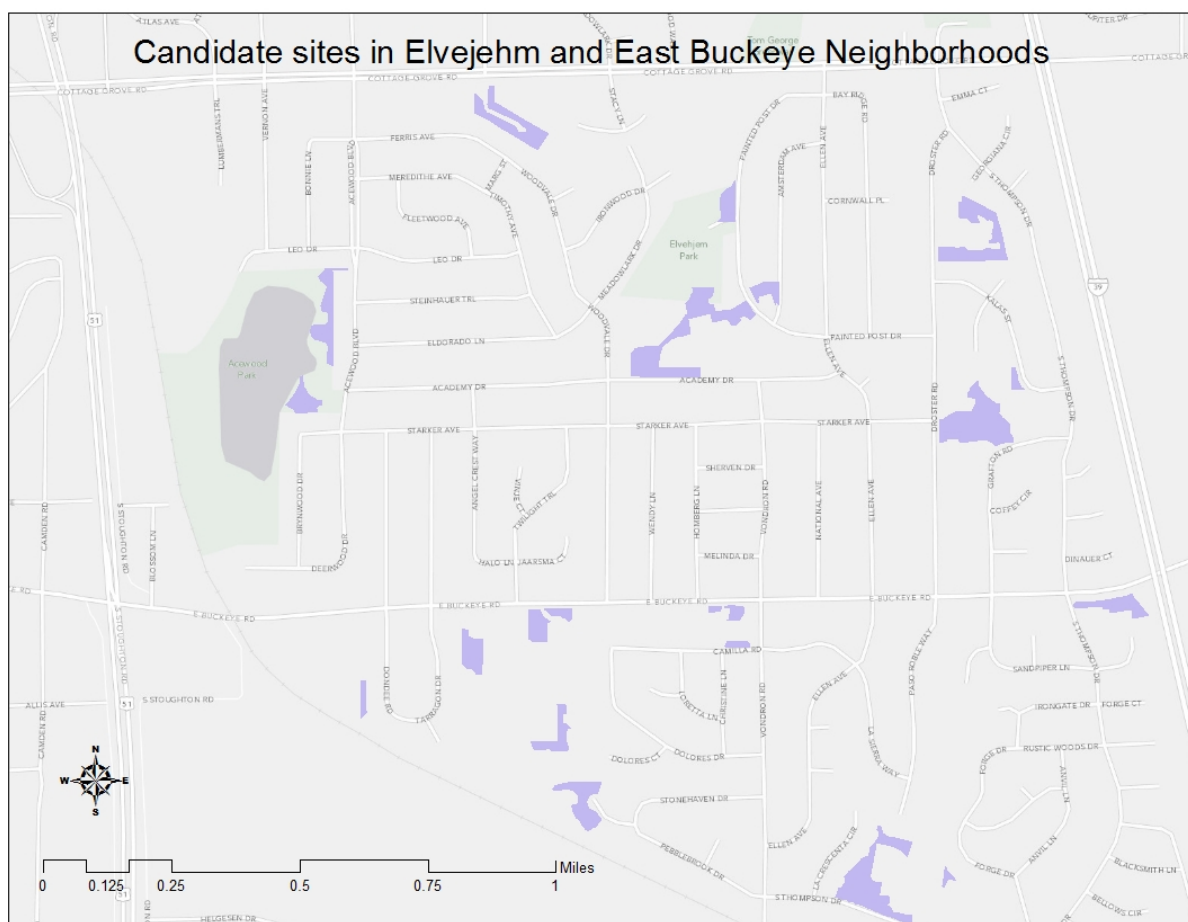


Figure 11 – All 24 parcels contained in the Elvejehm and East Buckeye neighborhoods

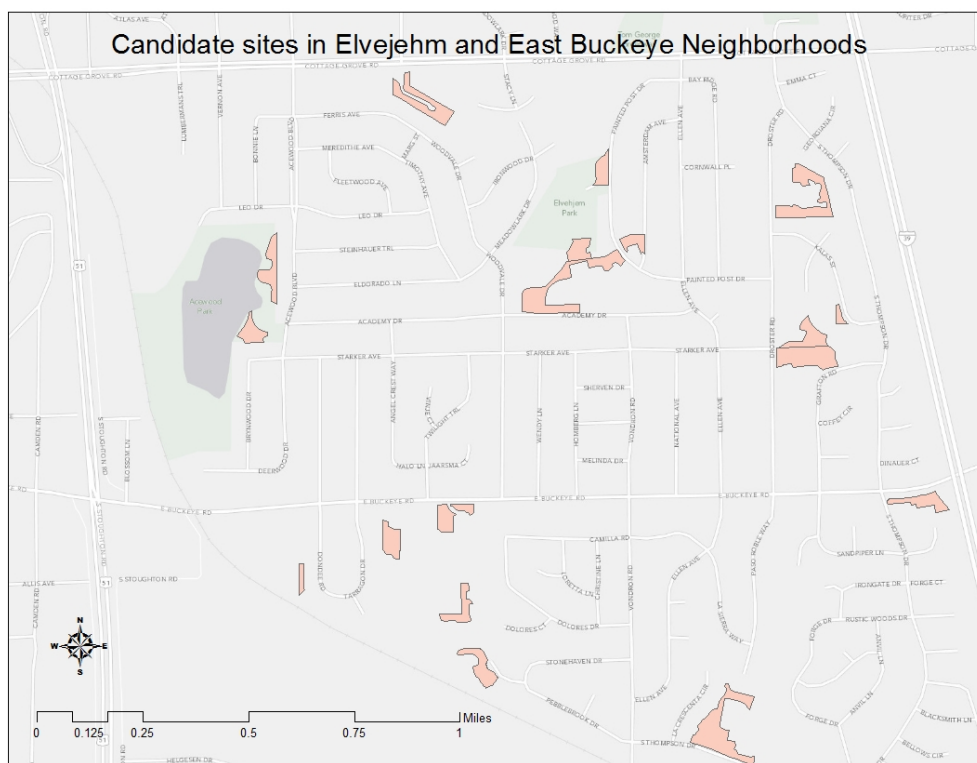


Figure 12 – Parcels meeting minimum size requirement

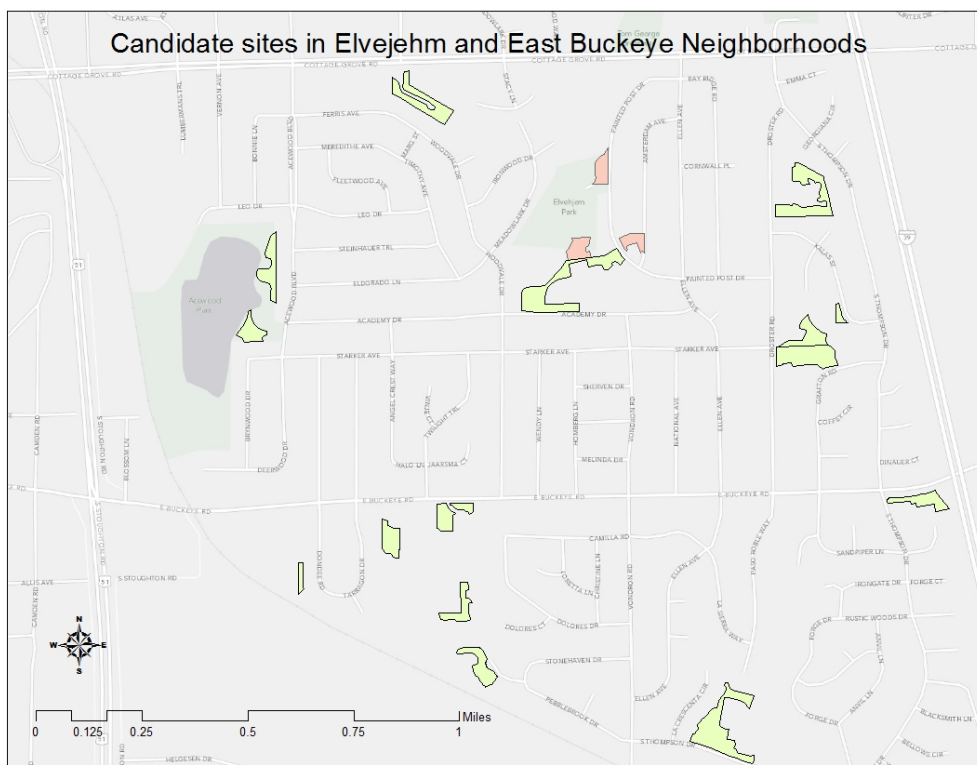


Figure 13 – Parcels meeting both size and water parameters

Chapter 4: Moving Beyond Madison

While the site selection model as it appears in this inventory is calibrated to the context of Madison, its general criteria are adaptable and applicable to other urban environments. Issues like water access, sunlight availability, accessibility, surface and soil conditions, and tenure are central to successful urban agriculture in any location. Creating parameters to represent relevant criteria, in addition to characteristics like size and proximity to transportation routes, is where the vagaries of a certain city will influence the particularities of the model. Such flexibility is the key to ensuring that the model adequately responds to the priorities and motivations of the individuals and groups on the ground; finding workable sites that meet their needs and specifications is ultimately what matters most.

Comparative Case Study: Urban Tree Connection in Philadelphia, PA

A parallel case study is particularly instructive for illustrating the suitability index's adaptability. I am currently completing a comparative land inventory in a small neighborhood of Philadelphia, PA. Urban Tree Connection (UTC), a Philadelphia-based non-profit urban agriculture organization, has recently been looking to expand their garden operations in the Haddington neighborhood. Located in the northwestern quadrant of the city, Haddington constitutes roughly twenty-five city blocks. The neighborhood is largely residential, and continues to experience severe urban blight; of 1,431 residential buildings in the neighborhood, 397 are considered by the city to be currently vacant and/or abandoned, a rate of 28%. Vacant land comprises another 97 properties.

UTC's mission is to "assist urban, low-income communities to revitalize their neighborhoods by transforming abandoned open spaces into safe and functional places that inspire and promote positive human interaction [citation]." But while much of UTC's gardens to date have focused on education programming for youth and neighborhood adults, recent efforts have been taken to increase food production, primarily through UTC's Neighborhood Foods CSA. Under this model, UTC intends to assist local resident-growers in establishing a network of satellite food production sites, the produce of which will be aggregated and sold through the CSA. Several food production sites currently exist in the neighborhood, but UTC hopes to significantly expand into other sites. This, then, is both the impetus and context for the neighborhood land inventory.

Like the model used to assess vacant land in Madison, the Philadelphia suitability index rates potential parcels based primarily on water access, available sunlight, truck accessibility, standing vegetation, and potential on-site or nearby land-use conflicts. Though additional factors were taken into consideration, several significant differences among even these criteria are worth pointing out. Since the median vacant parcel size in Haddington is less than 5,000 square feet (compared to over 35,000 square feet in Madison) tapping into existing water mains is prohibitively expensive due to the high initial cost of creating connections relative to the lower overall yield potential on any given lot. Accordingly, UTC relies primarily on inexpensively designed and constructed rainwater catchment systems, as well as fire hydrants and water-sharing arrangements with adjacent houses. Having at least one occupied house next to any given parcel is therefore crucial to that parcel's potential usability; negotiating water-purchasing arrangements or permission to install a rainwater

catchment system, after all, assumes the presence of either tenants or owner-occupants.

Sunlight, like water, was also assessed differently in Philadelphia. Whereas a digital solar radiation map was available for the Madison area, no such data currently exists for Philadelphia. Instead, an algorithm was utilized in which the height and orientation of buildings adjacent to a vacant parcel were used to generate the number of hours of sunlight that intercept the center of the parcel on June 21st (the summer solstice). Since buildings of relatively uniform height -- most structures in the neighborhood are two- or three-storey row houses -- comprise the bulk source of shade, the algorithm is both accurate and user-friendly across an array of vacant parcels.

Beyond departures in assessing water and sunlight, the Philadelphia model incorporates two significant layers: a measure of a given city block's social cohesion, and a simple analysis of a parcel's pathway to and cost of acquisition. The impetus for measuring social cohesion arises from UTC's gardening experience and close relationships with Haddington residents. Like other organizations and urban agriculturalists, UTC has observed that gardens established on blocks with engaged residents who have some sort of relationship with or favorable opinion of UTC are most likely to avoid vandalism and food theft. With neighbors lending a watchful eye, these gardens have historically been the ones that thrived the most. Measurable indicators of a given block's social cohesion -- and, consequently, the best predictors of a potential garden's successful integration into the neighborhood -- are as follows:

- the presence of a successful, well-managed garden or green space on the block;
- a greater proportion of owner-occupied housing versus rentals (the neighborhood as a whole is almost evenly divided, with 54%/46% owner-occupied/rental split);
- UTC staff know residents on the block, who regularly participate in UTC events and programs;
- there is a functional block captain (a liaison between the city and block, who is elected by the block with at least 75% of the vote) who:
 - facilitates regular block meetings that are attended by residents
 - collect dues from residents on their block
 - organize a block party
 - engage in city-wide street clean-up days, which happen two to four times a year
 - helped to organize a free summer lunch program for kids on the block, administered by Philadelphia Parks & Recreation;
- a significant number of children on the block, who, as potential participants in UTC youth gardening programs, represent one of the fastest and most reliable ways of making inroads in the adult community;
- and the presence of former southern black farmers who, UTC has found, are the most likely to be highly engaged in a garden venture, and have a wealth of food production knowledge.

At present, efforts are underway to quantify and validate these indicators so that they can be consistently applied across the neighborhood. Ideally, each block will be assigned a relative

social cohesion score that, weighted with the a score for each parcel's physical characteristics, will produce an aggregate parcel score. Though UTC is deeply embedded socially in the neighborhood, collecting valid and usable social data will take considerable time and energy, and is beyond the scope of this report. Once finalized and tested, UTC hopes that this component of the model can be adapted for use in other parts of the city.

In addition to a social cohesion component, parcels in the Philadelphia inventory will be assessed according to their means of acquisition. Parcels will be broken down into various ownership categories, including [insert categories here]. Some parcels require an insurance policy to be carried before any gardening can occur, while others have significant tax liens associated with their acquisition, making their purchase prohibitively expensive. For each parcel, the sum of the insurance policy, tax liability, and market price will be weighed against the size of the parcel, producing a uniformly comparable per-square-foot cost of acquisition. Taken together, these three dimensions -- a parcel's physical characteristics, surrounding social context, and cost of ownership and operation -- will allow UTC to make objective decisions about where to most effectively allocate their resources for expanding their satellite gardening operations.

Improvements to Site Selection

Since land included in the Madison inventory was identified using tax assessor data, only parcels coded as "0" (for unimproved land) were captured for assessment. In the process of ground-truthing, additional parcels were identified and assessed according to the site selection model, but that process was incidental and by no means systematic. Many corporate

and industrial entities own vacant or rarely used land beyond their immediate building(s). But because the building represents a taxable improvement, the vacant portions of the parcel will never show up as such on the tax rolls. Developing a tool for systematically identifying vacant land within already developed parcels seems like a logical next step, as this category of land represents a potentially significant opportunity that, absent a few notable examples, remains largely underutilized.

One such example is the American Family Insurance workplace garden. Founded in 2011, the garden is situated on the grounds of American Family Insurance's Madison campus, on the city's east side. It supports 118 ten-by-ten-foot plots for American Family employees, a 1,000 square-foot orchard, and 2,500 square feet allocated for members to grow various summer squash, winter squash, and pumpkins. Eighty percent of first-year gardeners have signed up for a second year, and demand for plots currently outpaces availability.

According to garden coordinator Josh Feyen, the land was last farmed twenty years ago, was relegated to a grass/weed mixture, and has been mowed once a year in the intervening years prior to garden establishment. Rocks and uncollected construction debris have been readily discovered throughout the plots by gardeners, though no soil contamination issues have thus far been reported. While some gardeners amended their plots' soil with compost, others maintained successful gardens with the native soil. The garden area is mostly flat, but beyond the currently cultivated space, steep slopes unsuitable for gardening will limit future expansion. Company funds were used to bury irrigation pipes from a site-adjacent fire hydrant to several water spigots throughout the plots. Due to the absence of trees and distant

proximity to the company building, the garden receives full sun. Thus far, no one has expressed any feelings of insecurity or fear for personal safety. According to Feyen, the space “is located on company grounds that are regularly patrolled by our company protection and safety department. It is visually hidden behind an earthen berm and unless someone is looking for it, they’re unlikely to find the garden.”

While this garden’s establishment and successful persistence owe as much to the company’s donation of land and financial support as to the dedication and creativity of the garden’s founders, American Family Insurance’s workplace garden does not have to be an anomaly. The communal, physical, and mental health benefits of gardening set forth in this paper’s introduction hold as true in this arrangement as in any other setting. If anything, workplace gardens have the unique advantage of being conveniently located in very close proximity to a destination that is, in all likelihood, already frequented five times per week. Though further research is needed to investigate whether or not this apparent convenience results in better-tended garden plots and increased gardener satisfaction (compared to community gardens in less accessible locations), the vacant land owned by businesses remains a significant -- if largely untapped -- resource.

Conclusions

The land inventory in its current form represents a useful snapshot of the land within Madison that could potentially be used for community gardening. The process of identifying and analyzing the land, moreover, holds principles that could be useful to other urban areas

interested in inventorying their vacant land assets. The following comprise some of the lessons learned throughout different phases of the project.

Data Availability and Utility

Tax assessor data was useful for quickly and systematically collecting an initial cut of vacant land parcels. Though purportedly updated quarterly, numerous demarcated as vacant on the tax rolls were found to be occupied by some sort of land-use incompatibility. These inconsistencies underscore the importance of a virtual parcel analysis, whereby the initial cut of vacant parcels was cross-checked with digital orthophotos in order to eliminate land with readily identifiable land-use conflicts. The orthophotos used during this phase were essential throughout the entire project, though their utility also merits qualification; the rapidly changing urban landscape gives the data a limited shelf-life, and an aerial view captures only a limited portion of actual ground conditions. This makes a thorough ground-truthing effort all the more vital.

The remainder of the geospatial data used throughout the project was both readily accessible and quite useful. Slope, bus stop, street centerline, and water main data provided an easy means of analyzing the spatial characteristics of existing community gardens, and ultimately establishing upper and lower parameters for assessing vacant land. Despite its large file size, which made for time-consuming analytical operations, the solar radiation data allowed for vacant parcels to be consistently judged according to their available sunlight. The capabilities of ArcGIS were sufficient for the analytical needs of the project with one exception: since it is significantly more expensive to tap into a water main that is across a street from a potential

garden plot (compared to a parcel-adjacent main), it would have been helpful to use a tool that can determine whether or not a street centerline lies in between a vacant parcel and its nearest water main.

Site-Selection Model Validity

The multi-pronged approach was helpful for developing a site selection model that was both thorough and robust. Input from developers of existing land inventories was particularly instructive for developing the meta-framework of the inventory, such as data sources, baseline criteria, and data processing operations. The geospatial analysis of existing community gardens in the Madison proved to be the most effective means of imposing upper and lower bounds among the site selection data, such as sunlight, water access, slope, and size, analyzed after the ground-truthing phase. This refinement and validation process was the key to making the existing land inventory as relevant to the Madison context as possible. Finally, the survey of Madison area community gardeners provided some approximate input to general garden siting guidelines, particularly those associated with the accessibility, safety, and visibility of potential garden locations. Though the survey data did not directly impact the systematic inclusion or exclusion of parcels, the feedback will be useful to end-users of the inventory as they navigate the political and territorial dynamics associated with actually establishing a garden. A more extensive survey, including a greater number of respondents from a stratified subset of gardens, would be necessary in order to statistically correlate response trends with the spatial characteristics of those respondents' gardens.

Usefulness to End-Users

Both the methodological approach and the inventory itself have utility for a variety of end-users. The former will be most instructive for other urban areas interested in identifying and classifying their vacant land resources. The particularities of the site selection model will vary from one city to another, as the inclusion of specific criteria as well as the parameters associated with those criteria depends on the social and geographic context of any given place. But the means of validating a site selection model -- by analyzing existing models, assessing the spatial characteristics of existing and functional community gardens in the area, and surveying the priorities and perceptions of a subset of community gardeners -- are widely applicable, regardless of urban context.

In addition to other cities, this inventory is useful to public agencies, private organizations, and schools in the Madison area. The Parks Dept has expressed particular interest in the database as a means for streamlining the garden-siting process in public parks. They are also interested in its capability to show prospective garden groups that a variety of non-park site options are available, sites which may ultimately be more preferable and less logistically complicated in the long run than a highly programmed public park. The city's Engineering and Planning Depts will find the inventory instructive for prioritizing gardens as a highest-and-best use of certain parcels of land in their purview. Concentrations of vacant land could help inform the city's process of identifying urban agriculture overlay districts, where certain agricultural practices, including zoning allowances for permanent greenhouse structures, are permitted. Though the land captured in the final phase of this inventory comprises just 1.3% of the city's land base, far short of the 4% goal set out in the city's sustainability master plan,

community gardening is just one expression of urban agriculture. Even the city's Chamber of Commerce may find utility in the inventory, using the successful example of American Family Insurance Inc.'s workplace garden to pass a resolution that encourages garden siting on land owned by private businesses in the area – both those identified in this inventory, and those that do not.

Similarly, the Madison Metropolitan School District can use this inventory for systematically appropriating, not only for community gardens, but for educational gardens used primarily by students. Finally, this inventory will aid the work of nonprofit organizations whose missions are oriented not only to the ongoing support of existing community gardens, but to meeting the ever-growing demand for additional gardens. Particularly when delivered via a queryable web-based platform, this inventory will present these groups with a range of options that satisfy their location and accessibility priorities, as well as their financial limitations, and in doing so laying the foundations for an informed and objective garden-siting process.

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Appendix A: Madison Area Community Garden Survey

The purpose of the research is to better understand basic information about community gardens, including (but not limited to) how gardeners get to their gardens, what they do with the produce they grow, and other perceptions of personal and physical safety. This study is anonymous. Neither your name nor any other identifiable information will be recorded.

1. Approximately how far do you travel to get to your garden?
 - a) less than 1 mile
 - b) 1 - 2 miles
 - c) 2 - 3 miles
 - d) 3 - 4 miles
 - e) more than 4 miles
2. What mode(s) of transportation do you use to travel to your garden (circle all the apply)?
 - a) walk
 - b) bike
 - c) car
 - d) bus
 - e) other (please specify) _____
- 3) Do you feel safe at your garden?
 - a) all of the time
 - b) most of the time
 - c) some of the time
 - d) rarely
- 4) When I do not feel safe at my garden, it is because of (circle all the apply):
 - a) N/A (I generally feel safe at my garden)
 - b) other gardeners
 - c) passersby (not other garden members)
 - d) remoteness of my garden
 - e) lack of visibility from public streets or occupied houses
 - f) other (please specify) _____
- 5) The food and/or flowers I grow in my garden plot are respected by other people:
 - a) all of the time
 - b) most of the time
 - c) some of the time
 - d) rarely
- 6) If problems of food or flower theft occur in my garden, it is because of (circle all the apply):

- a) I generally do not have problems with food/flower theft
 - b) other gardeners
 - c) passersby (not other garden members)
 - d) my garden being too accessible to the public
 - e) lack of fence or other security mechanism
 - f) other (please specify) _____
- 7) The food or flowers I grow are (circle all the apply):
- a) consumed by me and/or my family
 - b) given away to friends, relatives, or a local food bank
 - c) sold to others
- 8) Are you aware of any past or current problems with soil contamination at your garden site?
- a) no
 - b) yes (please describe the problem and any actions taken) _____

- 9) My age falls into the following range:
- a) 24 or younger
 - b) 25 - 34
 - c) 35-44
 - d) 45-54
 - e) 55-64
 - f) 65+
- 10) Gender:
- a) female
 - b) male
- 11) Name of community garden where I have my plot: _____