

ABSTRACT

Title of Document: TRANSFORMING VACANT LAND:
 A GREEN INFRASTRUCTURE MASTER
 PLAN FOR THE NEIGHBORHOOD OF
 DRUID HEIGHTS, BALTIMORE

Che-Wei Yi, Master of Landscape Architecture,
2017

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Vacant properties often become an invitation for crime, dumping, and other unwanted activities and are associated with lower property values; increased municipal costs; and poorer health outcomes. However, vacancy can be viewed as an asset for the community and an opportunity for productive reuse. Well-maintained urban green spaces can reduce crime, strengthen social ties, and improve physical and mental health. The green infrastructure master plan for the neighborhood of Druid Heights is a response to findings from the site inventory and analysis and the community and stakeholder engagement process, which indicate a lack of recreational and natural amenities, poor public health outcomes, and high crime rates. By improving access to recreational and natural amenities and creating a connected series of green spaces, the design of this thesis

addresses the high vacancy rate of Druid Heights and promotes recreation and social interaction to improve the public health outcomes of neighborhood residents.

TRANSFORMING VACANT LAND: A GREEN INFRASTRUCTURE MASTER
PLAN FOR THE NEIGHBORHOOD OF DRUID HEIGHTS, BALTIMORE

By
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Thesis submitted to the Faculty of the Graduate School of the
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of the requirement for the degree of
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Chapter 1: Vacancy and Its Relevance for Public Health

Introduction

Many post-industrial American cities such as Baltimore, Detroit, and Philadelphia are facing the challenges of vacancy. The latter half of the twenty-first century saw the loss of manufacturing jobs, population decline, and the abandonment of residential and commercial properties in many of these legacy cities. The recent subprime mortgage crisis resulted in significant numbers of foreclosures and caused a dramatic increase in vacancy (Office of Policy Development and Research, 2014). Vacant properties present a financial burden for municipalities. It represents a reduction to the city's tax base and a revenue drain for maintenance, emergency services, and the demolition of vacant buildings (National Vacant Properties Campaign, 2005). For instance, each additional vacant property in Baltimore City costs the city \$1,472 per year (Winthrop & Herr, 2009). For communities with a high rate of vacancy, the impact of living near vacant properties goes beyond just the depreciation in property values. Vacancy and signs of abandonment have been linked to poorer health outcomes; higher crime rates; and decreased social capital (Garvin et al., 2013).

Urban greening, which could refer to the creation of green spaces as well as the "preservation, protection, and enhancement of existing natural areas," can help combat many of the negative outcomes associated with vacancy (Vacant Property Research Network, 2015). Instead of viewing vacancy through the lenses of blight, this thesis will explore how to repurpose vacant properties as urban green spaces to help improve the public health outcomes of local residents. To understand and address the issue of vacancy

and health outcomes for residents in the neighborhood of Druid Heights in Baltimore, Maryland, this thesis project will:

1. Research existing literature on health impacts of vacant properties and the restorative potential of urban green space and vegetation
2. Understand the neighborhood of Druid Heights through research, site inventory and analysis, and stakeholder and community engagement
3. Explore the reuse of vacant properties in Druid Heights for recreation, urban agriculture, and stormwater management to create a green infrastructure master plan for the neighborhood.

Vacancy and Its Impact on Public Health

Vacant properties, which are typically characterized by broken glass, trash, dumping, overgrown vegetation, and the remains of illegal activity, can negatively impact community well-being as well as physical and mental health. The unsanitary conditions of vacant properties attract rodents and increase the potential for injury and other health hazards for people cutting through the lot.

The visual cues of vacant properties suggest physical disorder, which is a signal that the residents are either unwilling or unable to take care of their neighborhood and that the area is vulnerable to criminal activity (Garvin et al., 2013). Vacant properties are associated with higher levels of drug use and sales, prostitution, arson, and assault (Winthrop, 2009; Schachterle et al., 2012; Branas, Rubin, & Guo, 2012). According to U.S. Fire Administration estimates, there were 28,000 fires annually in abandoned residences between 2006 and 2008, and 37 percent of these fires were set intentionally

(2010). In Buffalo, New York, 90 percent of all arson cases from January to October of 2017 occurred in abandoned properties (Schilling, 2008).

Research has demonstrated that people who live near vacant properties associate vacancy with higher levels of crime (Garvin et al., 2013). This perception, notwithstanding the actual crime rate, could cause fearful residents to stay indoors. Reduced social interaction as a result of residents staying inside their homes can increase anxiety in the neighborhood (Garvin et al., 2013). Indicators like social ties and collective efficacy, which is defined as the “linkage of mutual trust and shared expectations for intervening on behalf of the common good,” are negatively impacted by a neighborhood with a high level of physical disorder (Garvin et al., 2013, p. 413).

Vacant properties can also evoke a wide range of negative emotions, including sadness, depression, anger, and anxiousness, for the remaining residents (Garvin et al., 2013). Decreasing property values and higher insurance rates as a result of living near vacant properties could also create financial hardship and stress for neighboring homeowners. The stigma of living in a neighborhood with physical disorder can create anger and agitation, which are emotions that could lead to violence (Garvin et al., 2013; Kaplan, 1995). These negative emotions may result in unhealthy lifestyle changes like exercising and socializing less frequently (Stafford, Chandola & Marmot, 2007).

Restorative Properties of Urban Green Space

Utilizing vacant properties to create green spaces could help negate the effects associated with vacancy and improve the public health outcomes of residents who live near vacant properties. This greening could take many forms, but typically involve clearing, cleaning, and regular maintenance to reduce the appearance of neglect. Some

cities, like Detroit, Michigan and Philadelphia, Pennsylvania, are experimenting with innovative solutions for their vacancy issue and are featured in the Case Studies section. However, most vacant lot greening programs are relatively new at the time of this thesis project, and there is little research on the public health impact of greening vacant properties. Philadelphia's LandCare Program (PLC) is one of the largest vacant land greening programs in the U.S. and has been cleaning and caring for vacant lots since 1996. Consequently, many available studies on vacant lot greening analyze the effects of this program. PLC's treatment for vacant lots includes putting down lawn, planting trees, and installing low wooden fencing around lots. Mowing the lawn and repairing the fencing are included as part of the regular maintenance.



Figure 1. Vacant lot greening in Philadelphia.

To supplement the limited research on vacant land greening and its effects on public health, research on different greening strategies, such as parks and community gardens, and vegetation and their effects on public health are included in this section.

Physical Health

There is extensive research and recognition of the positive impact that urban green spaces have on public health outcomes. In addition to consuming carbon dioxide and producing oxygen, trees and other plant materials in urban green spaces can help improve air quality by reducing certain airborne pollutants like ozone, particulate matter, sulfur dioxide, nitrogen dioxide, and carbon monoxide (Nowak, Crane & Stevens, 2006). The presence of trees have been linked to lower risks of asthma, and in a study of approximately 575,000 adults in Ontario that took place from 1982 to 2004, access to urban green space was linked to reduction in mortality associated with respiratory illnesses (Lovasi et al., 2008; Villeneuve et al., 2012). Along with reducing air pollution, trees and other vegetation can also cool temperatures in the summer through shading and evapotranspiration, which can reduce heat-related illness and mortality (Nowak, 1998). This is especially relevant in urban environments with high impervious cover, which exacerbates heat island effect.

Increased access to green space is associated with increased physical activity, which is linked to improved health and reduced risk for all-cause mortality, and lower rates of childhood obesity (Mitchell & Popham, 2008; Paffenbarger et al., 1994; Blair et al., 1995; Cohen et al., 2007; Wolch et al., 2011; Nakashian, 2008). An estimated 200,000 to 300,000 premature deaths occur annually in the United States because of physical inactivity (McGinnis, 1993). Community gardens can also encourage healthier eating habits, and a study in Salt Lake City, Utah discovered that gardeners had lower BMIs than non-gardeners (McCormack et al., 2010; Litt et al., 2011; Zick et al., 2013).

Crime and Perceptions of Crime

Urban green spaces have been linked to reduction in criminal activities and an increase in neighborhood residents' perception of safety. With the removal of overgrown vegetation and trash, vacant lots that are converted to clean and green space lack the cover criminals need to conduct illegal activities (Garvin, Cannuscio & Branas, 2012). The same physical appearances that discourage criminals also allow residents to feel safer around cleaned and greened spaces.

Another way green spaces can lead to reduction in criminal activities is by reducing directed attention fatigue, which has been associated with "outbursts of anger and even violence" (Kuo & Sullivan, 2001, p. 543). Other studies support the idea that greener environments may reduce mental fatigue and aggression (Hartig et al., 1991, Kaplan, 1995).

Cognitive and Mental Health

Urban parks and green space can also improve mental health. When people are exposed to natural elements like trees, grass, and flowers, in park visits, they experience a positive influence on stress levels, mood, and self-esteem (Chiesura, 2003; Renema et al., 1999; Hartig et al., 2003; Ulrich, 1981; Ulrich et al., 1991; Barton & Pretty, 2010). A Dutch study from 2010 even suggested that green space could serve as a buffer from stressful life events (Van den Berg, Maas, Verheij & Groenewegen, 2010). The positive effect of well-tended vacant land on stress levels was supported by a study conducted in Philadelphia (South, Kondo, Cheney & Branas, 2015; Branas, 2011). Participants in the study walked around randomly selected neighborhoods, and the average heart rate of

participants who walked past cleaned and greened lots was lower than the subjects who walked past control sites that showed neglect. By reducing the appearance of neglect, greening also raises property values, which can alleviate financial stress for residents who live nearby vacant land (Wachter & Gillen, 2006; Voicu & Been, 2008; Heckert & Mennis, 2012).

Social Ties

Urban green spaces, such as parks and community gardens, create environments that are conducive to social interaction (Burgess, Harrison & Limb, 1988). Community gardens in particular attract people from all age groups and economic status (Tidball & Krasny, 2009). This interaction can aid the formation of neighborhood social ties, which is defined as the glue that “makes a collection of unrelated neighbors into a neighborhood” (Kuo, Sullivan, Coley & Brunson, 1998, p. 824). Research has shown that communities with stronger neighborhood social ties are more capable of defending against crime and political mobilization and organizing (Kuo, Sullivan, Coley & Brunson, 1998).

The study also found that stronger neighborhood social ties and higher levels of vegetation positively influenced the residents’ perception of safety and belonging (Kuo, Sullivan, Coley & Brunson, 1998). Green space, especially when it replaces vacant land, can reduce the perception of criminal activity for surrounding residents and create environments conducive to informal social contact between neighbors, which builds social ties (Gorham et al., 2009). Multiple studies have observed communities using garden for neighborhood gatherings for church events or community activism (Saldivar -

Tanaka & Krasny, 2004; Lawson, 2005). Participants in the interviews noted that the gardens were a way to address negative effects of the vacant lots, such as drug activity, and provide a space to connect to their community. Studies have also shown that gardeners tend to share their produce with neighborhoods and that gardens served as sites of social learning (Hanna & Oh, 2000; Travaline & Hunold, 2010).

Vacancy in Baltimore

Similar to other post-industrial urban centers with declining populations in the United States, Baltimore City's increase in vacant properties is a result of the loss of manufacturing jobs and migration of residents to the suburbs. Between 1950 and 1990, the city lost 75,016 manufacturing jobs, which accounted for two-thirds of its total employment in the manufacturing sector (Friedman, 2003). Much of this loss can be attributed to the decline of the city's largest employer after the Second World War, Bethlehem Steel, which employed 45,000 workers at its peak during the war (Friedman, 2003). With a population of just over 622,000 residents in 2013, Baltimore City only houses one third of the number of residents at its peak in 1950 (U.S. Census).

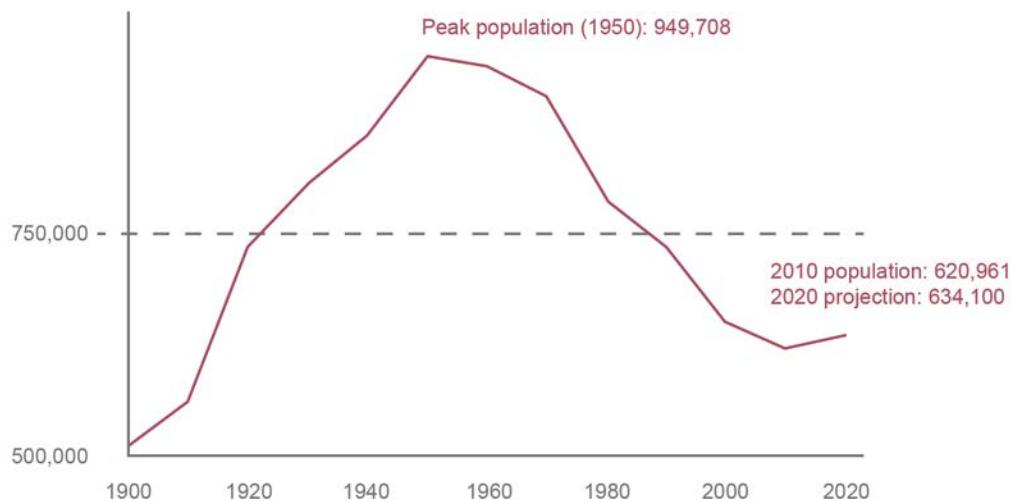


Figure 2. Baltimore's historic population (data source: U.S. Census).

This loss of population is reflected in the city’s larger number of vacant buildings and lots. The Baltimore Housing Department defines a vacant building as “any unoccupied structure that is unsafe or unfit for human habitation or other authorized use,” and according to their estimates, the city has 16,000 vacant buildings and 14,000 vacant lots (See Figure 3) (Baltimore Housing Department).

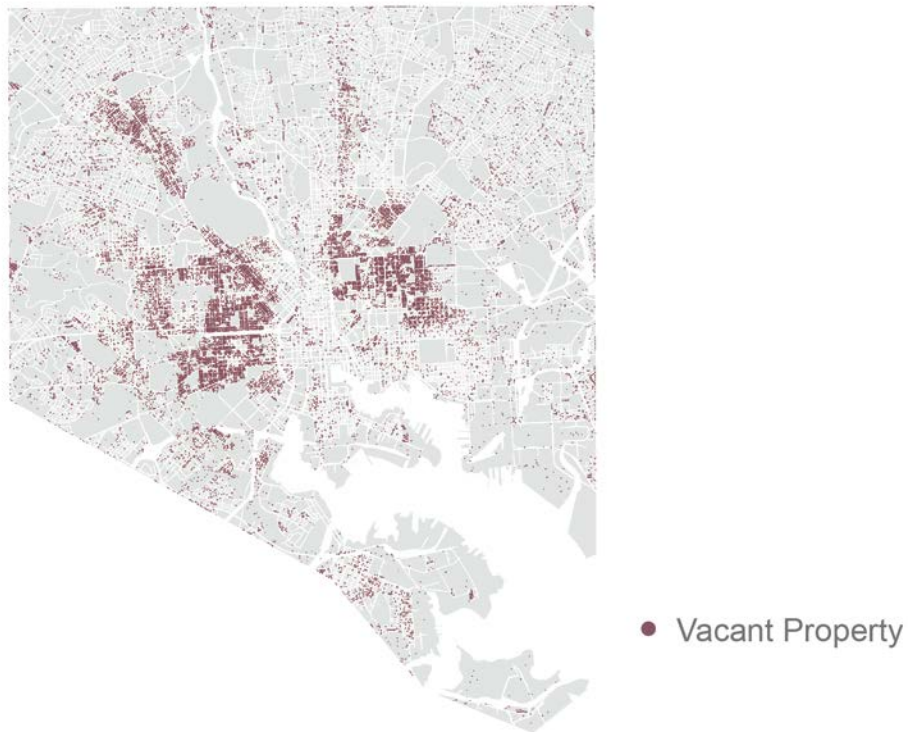


Figure 3. Vacant properties in Baltimore City.

Vacancy and the negative economic and health effects associated with it do not affect all of the remaining city residents equally. The City of Baltimore has a history of de jure and de facto housing discrimination and was the first municipality to legally separate its city into “white” and “colored” blocks via housing segregation ordinances of 1910, 1911, and 1913. Other practices, such as housing covenants that forbade the sale of property to African Americans; redlining of black neighborhoods; and blockbusting, which is the practice where houses were bought cheaply from whites and sold to blacks at

a premium (Pietila, 2010), also reinforced this segregation. These restrictions resulted in African Americans living in housing of poorer condition and landlords lacking incentives to make improvements. The legacy of segregation lingers today, and neighborhoods that are predominantly African American with lower median income have much higher concentrations of vacant property (Ransome, 2007).

The legacy of residential segregation also impacted the distribution of park resources for today's African American communities. An extensive park system was developed for Baltimore in 1930s and 40s, but there was a noticeable lack of recreational resources in areas with black residents (Boone et al., 2009). When white and middle-class black resident left the city and moved to the suburbs, the remaining black residents inherited the park spaces previously intended for its white users. While these inherited park spaces may appear to indicate a just distribution of recreational amenities, the programming of the parks may not be attractive and may not cater to the recreational needs of today's African Americans (Boone et al., 2009).

City Plans for Addressing Vacancy

Demolition

Baltimore City is currently employing a two-pronged strategy for addressing vacancy. Due to the high number of abandoned houses and their poor condition, one of the city's tools for addressing vacancy is to demolish derelict buildings to reduce the appearance of blight. In 2016, Governor Larry Hogan and the city pledged \$94 million to demolish 4,000 vacant houses as a part of Project Creating Opportunities for Renewal and Enterprise (C.O.R.E.). Even though taking down the vacant buildings will reduce the

visual impact of broken and boarded up windows and caved-in roofs, empty lots are left behind.



Figure 4. Project C.O.R.E. demolition in Sandtown-Winchester (Department of Housing and Community Development, 2016).

Reusing Vacant Properties

In addition to demolishing the vacant properties, the city is also organizing multiple programs aimed at temporarily or permanently repurposing vacant land. The city's Adopt-a-Lot program allows private and public entities to adopt vacant lots for use. The city also partnered with the US Forest Service (2015) to publish the "Green Pattern Book," which describes eight different vacant lot reuse typologies and summarizes the process for adopting and rehabilitating vacant lots. Competitions like the Growing Green Initiative and Lots Alive also encourage innovative solutions for the reuse of vacant land. These programs offer resources to communities to take control and improve the vacant land in their neighborhood.

In the summer of 2016, the city's Planning Department and the Office of Sustainability started the process of creating a Green Network Plan for revitalizing neighborhoods. The plan's vision is to utilize vacant properties for the creation of an interconnected system of green spaces throughout the city. Since the introduction of the project in June, the planning department has hosted community meetings to solicit feedback for the plan. This emphasis on community engagement is an effort to address the lack of connection between existing park resources and the recreational needs of the community.



Figure 5. Map depicting existing green spaces and vacant properties (Office of Sustainability, 2016).

The planning department also emphasized the potential for vacant land to be used stormwater management. For instance, several of the grants funding available to help rehabilitate vacant land, such as the Growing Green Initiative and the Chesapeake Bay Trust Green Streets, Green Jobs, Green Towns (G3) Grant, have stormwater management requirements. Additionally, the city is currently working with the Parks and People Foundation to implement stormwater management projects that address vacancy as a part of the Watershed 263 Project. The project is focused on implementing stormwater management practices in Watershed 263, which is a 930-acre storm drain area that encompasses many underserved neighborhoods in West Baltimore, to help revitalize communities. The plan includes tasks such as planting trees, cleaning and greening vacant lots, improving city parks, removing impervious surface, installing bioretention basins, and supporting community stewardship. The goal is to help revitalize these neighborhoods by beautifying and reusing vacant land for stormwater treatment.



Figure 6. Pavement removal and planting as part of Watershed 263 efforts.

Chapter 2: Case Studies

West Philadelphia Landscape Project

The West Philadelphia Landscape Project (WPLP) is an organization that has been working in the neighborhood of Mill Creek since 1987 to address the challenges and opportunities of a highly vacant urban landscape. Their mission is to restore natural and human environments through “strategic design, planning, and education projects” (West Philadelphia Landscape Project website). The organization has been working with Spirn and her design studios at University of Pennsylvania and MIT since 1988. By virtue of the neighborhood’s proximity to Schuylkill River and the buried stream of Mill Creek, this collaboration of students, teachers, residents, and public officials has focused on improving water quality as a way to secure funds for rebuilding the neighborhood.

The history of vacancy in Mill Creek and Baltimore are similar. Redlining and migration of the middle-class to the suburbs led to the current neighborhood makeup of primarily African American and poor residents. The population of the neighborhood declined by 27% from 1950 to 1970, and by 1980, the “outward flow of population and capital and the inward flow of sewage and groundwater” resulted in an abundance of vacant and abandoned properties (West Philadelphia Landscape Project). The vacant properties invited criminal activities, including drug use, arson, and violent crimes.

In 1991, WPLP published *The West Philadelphia Landscape Plan: A Framework for Action*, which lays out five main recommendations. The number one recommendation in the framework is a call to utilize vacant land in the Mill Creek floodplain for stormwater management and recreation, thus addressing two major needs in the neighborhood. WPLP also advocates for the reestablishment and management of the

urban forest. The framework notes that vacant land could be utilized to grow trees and that vegetation, including fruiting trees and meadows, can be ornamental and serve important roles in science education.

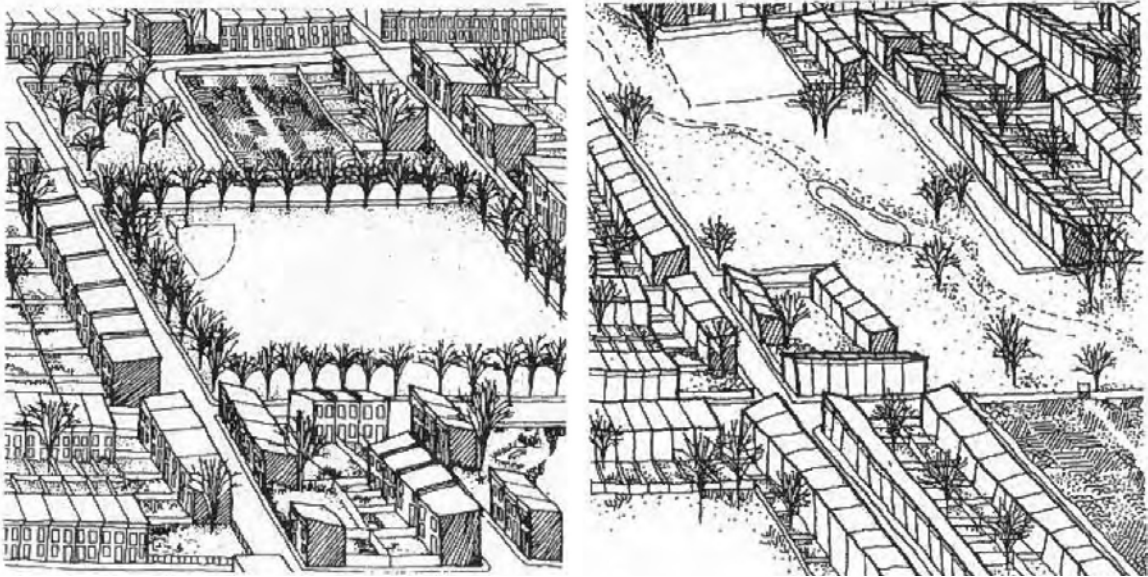


Figure 7. Strategies for reusing vacant land: play field (left), stormwater management (right) (WPLP 1991).

Another important recommendation that influenced the design of this thesis project is the suggestion that smaller vacant lots could be set aside for local residents as Community Managed Open Spaces (CMOS). Instead of infilling the lot with more housing, this allows residents to transform these smaller vacant lots for their own use. The process of building and maintaining these gardens will strengthen pride and ownership in the community, and empower residents to tackle more ambitious projects like housing rehabilitation.

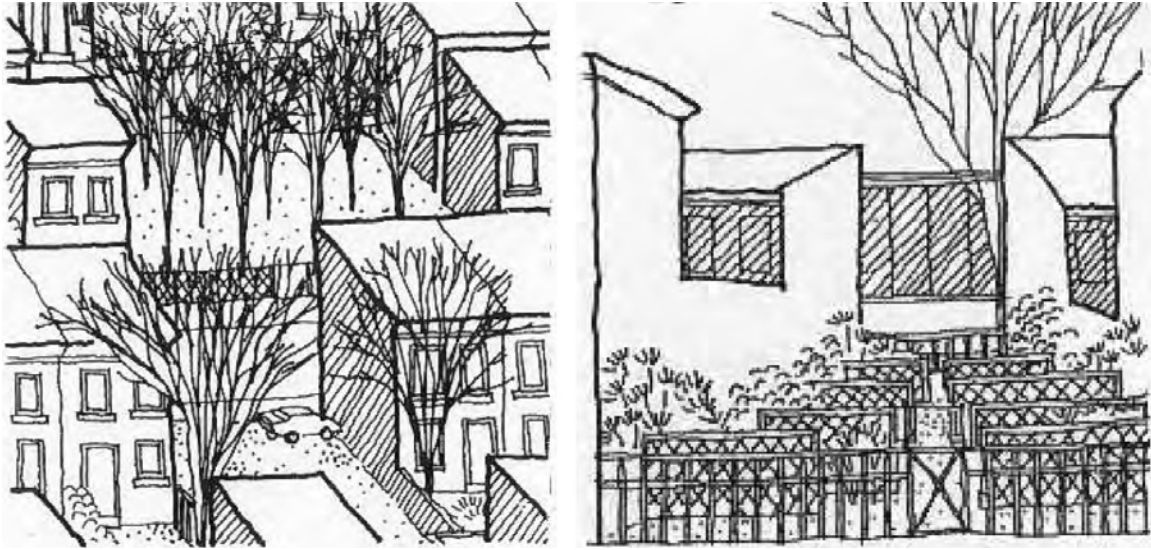


Figure 8. Strategies for reusing vacant land: urban forest (left), community managed open space (right) (WPLP 1991).

Repurposing Vacant Lots for Stormwater Management in Detroit, MI

Detroit used to be the fourth most populous city in the United States, but today the city houses just over a third of the population it had in 1950. The dramatic population loss, deindustrialization, and foreclosure crisis have resulted in an overabundance of vacant land. The blight problem is so challenging that the emergency manager of Detroit declared a blight emergency in 2013. Detroit's strategy for addressing vacancy has been to demolish abandoned buildings, file nuisance lawsuits against privately owned vacant properties, and encourage neighbors to adopt adjoining vacant lots.

Detroit's main strategy in dealing with the abundance of vacant land is encouraging homeowners to purchase adjacent lots for just \$200, and to help residents beautify and take care of their lots. Detroit Future City, a nonprofit organization, released "Working With Lots: A Field Guide" in 2015. The guide includes 34 lot designs that residents can choose from depending on their experience, manpower, budget, and level of

maintenance (Detroit Future City, 2015). The guide also has stormwater management focused lot type called Stormwater Superstars, which include designs with rain gardens, forest patch, permeable pavers, and cisterns. The guide encourages people to involve their community and customize the lot design to suit the community needs. Not only can a beautified lot reduce blight and stormwater runoff, but the process of involving others in the lot design can also help bring people in the neighborhood together.

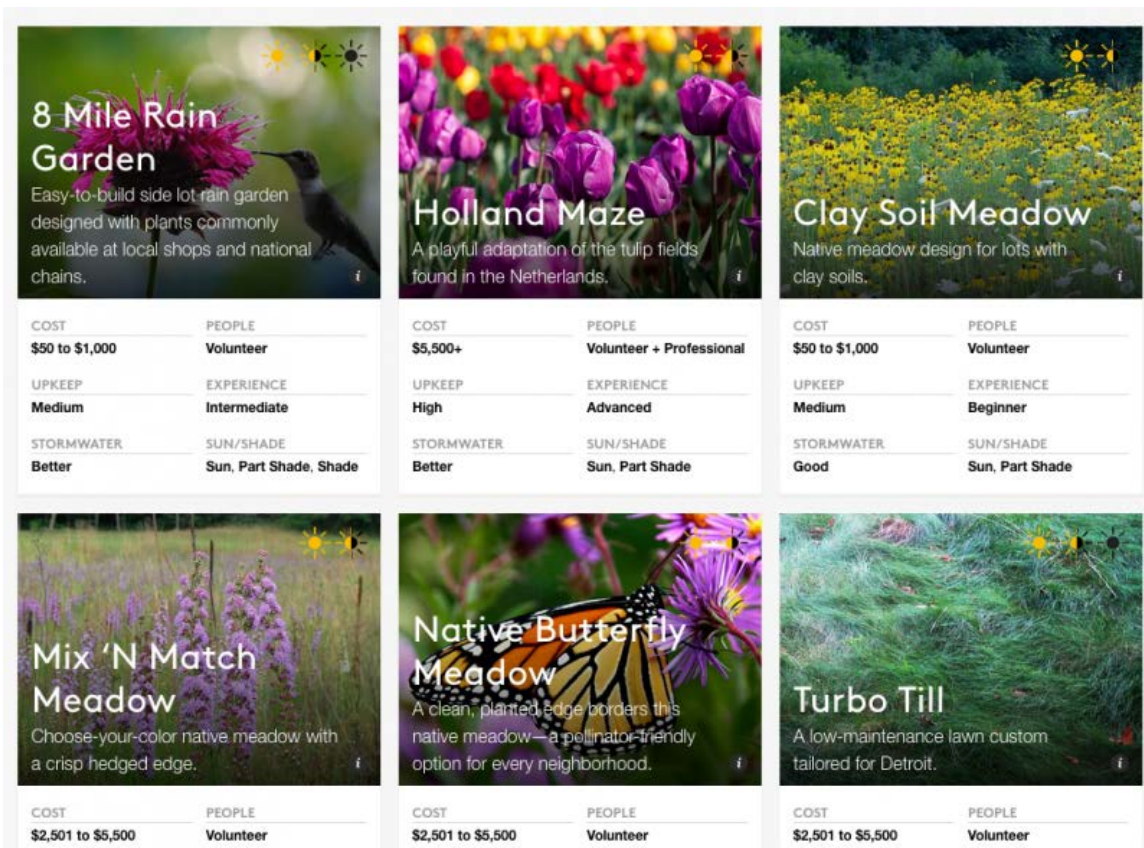


Figure 9. Design templates from "Working With Lots: A Field Guide" (Source: Detroit Future City, 2015).

Another reason for people to landscape their home's adjacent lots is to reduce flooding in their own basements. Detroit has a combined sewer system, and heavy rain event could lead to overflow and flooded basements. In the spring of 2016, Nassauer and a team of graduate students from the University of Michigan worked with the Detroit Water and Sewerage Department to design and install stormwater retention gardens in

four vacant lots. The design filled the basement of the demolished homes with highly porous engineered soil so that the gardens can retain close to 2.3 inches of rainfall. Above the engineered soils of the gardens, common spaces were created for the neighbors to gather. Instead of attracting trash and criminal activities, these vacant lots are capturing and treating runoff from the street.



Figure 10. Retention garden in the footprint of a demolished house (Dave Brenner).

The Greening of Detroit, which is a nonprofit that is implementing green infrastructure projects in vacant lots, is utilizing a different strategy when dealing with the vast amount of vacant land. The organization is planting urban forests and prairies in city parks and vacant land. According to Dean Hay, the infrastructure director for the nonprofit, mature trees can absorb up to 5,000 gallons of stormwater annually and is another way of keeping basements from flooding (Butler, 2013).

Tha Flower Factory

Walker Marsh started Tha Flower Factory with a \$63,800 grant from the Growing Green Initiative. His vision of a flower farm won the program’s design competition in 2014, and today the half-acre operation occupies a prominent location in the neighborhood of Broadway East in east Baltimore. Its siting at the intersection of three streets means residents and visitors passing through the neighborhood sees the previously unused lot transformed with flowers and herbs. One resident described the farm as giving the community hope and “a thing of beauty in a desolate area” (Franciotti, 2016). Marsh hires nine teenagers, who were recruited from the juvenile justice system, to help out in the summer and sells the flowers to cafes, floral design studios, and neighbors. Marsh stated in an interview with the Baltimore Sun that the goal for his farm is to “beautify, to continue to employ folks and to grow the economy” (Pitts, 2016).



Figure 11. Tha Flower Factory in Broadway East.

Chapter 3: Methods

The Introduction section demonstrated how vacancy is associated with poorer public health outcomes and established the connection between access to green space and positive physical, mental, and social health outcomes. In order to explore how vacant properties could be repurposed as green spaces to help improve the public health outcomes of residents in Druid Heights, it is crucial to understand the context and characteristics that shape the neighborhood. The methods employed in the thesis, which includes the justification for selecting Druid Heights; inventory and analysis of relevant neighborhood characteristics; results of the community and stakeholder engagement process; and the design goals and programs, will guide and inform the design solution for the neighborhood.

Site Selection

Site Location



Figure 12. Context map for Druid Heights

The neighborhood of Druid Heights is approximately 57 acres and located in the Old West Baltimore historic district. The neighborhood was chosen as the focus of this investigation for the following reasons:

1. The Upton/Druid Heights community statistical area (CSA) has the second highest residential property vacancy rate among all neighborhoods of Baltimore (BNIA).
2. Druid Heights has inadequate existing recreational and natural resources to serve its residents.
3. Over half of the neighborhood is considered a food desert.
4. Health outcomes, including life expectancy, heart disease rate, and diabetes death rate, for the Upton/Druid Heights CSA rank well below the city average.
5. Violent crime and arrest rates for the CSA are higher than city average.

Site Inventory and Analysis

Vacancy in Druid Heights

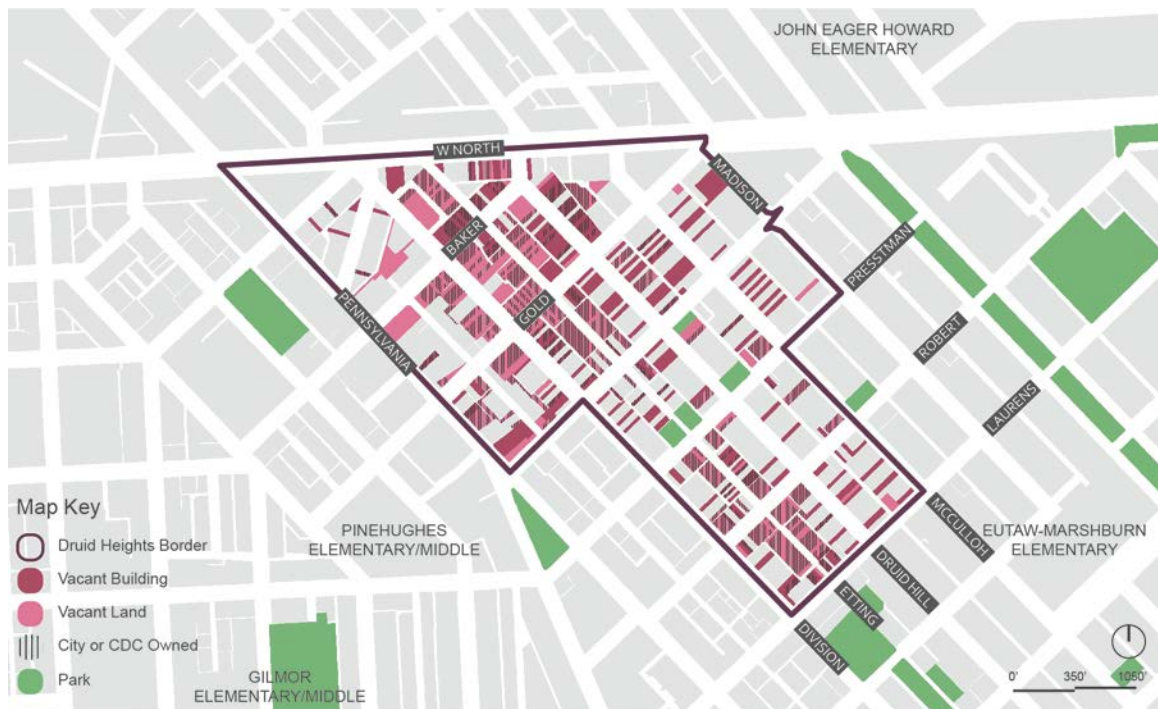


Figure 13. Vacancy map of Druid Heights.

The Upton/Druid Heights CSA has the second highest residential property vacancy rate (34.2%) among all neighborhoods in the City of Baltimore (BNIA). The only neighborhood with a higher vacancy rate is Sandtown-Winchester (35%), which is located directly west of Druid Heights. In Druid Heights, there are 316 parcels of vacant land totaling 7.95 acres, and an additional 6.33 acres of land hosts 228 vacant buildings. This translates to a combined vacancy rate of 42.7 percent. The City of Baltimore and the Druid Heights CDC owns nearly half of the vacant properties, and 16 vacant buildings are scheduled for demolition as a part of Project C.O.R.E.



Figure 14. Vacant buildings and lots in Druid Heights.

Despite the challenges posed by the neighborhood's high vacancy rate, the Druid Heights Community Development Corporation (CDC) has successfully transformed several vacant properties into neighborhood parks and affordable housing. In 2000, the Druid Heights CDC adopted a community plan with 4 focus areas: safety and sanitation, amenities, housing, and commercial and retail. The plan took into account the declining

population of neighborhood residents and suggested lowering housing density and increasing green space.

In the 16 years since the adoption of this plan, the Druid Heights CDC has rehabilitated several rowhouses along McCulloh Street and Druid Hill Avenue and constructed 17 units of lower density rowhouses along Baker Street. These new rowhouses offer more indoor and outdoor space than the traditional alley houses and is set further back from the street. In the fall of 2015, the CDC was awarded a Growing Green grant to install Peace Park, which replaced part of a vacant corner lot on the southeast corner of the Druid Hill Avenue and Bloom Street intersection. In addition to providing the community with a place to play, meet, and relax, the park also utilizes rain gardens and permeable pavers to capture and treat stormwater runoff.



Figure 15. New Baker View housing (left) and Peace Park (right) in Druid Heights.

The Druid Heights CDC's future plans for revitalizing the neighborhood includes strengthening the historic rowhouse street of Druid Hill Avenue through rehabilitation, expanding the Baker Street community, and increasing the amount of park space in the neighborhood. Today, the community is working closely with the city planning

department and the Office of Sustainability on how the Green Network Plan could be implemented within Druid Heights.

Recreational and Natural Resources

There are 3 public parks totaling 0.44 acres in the neighborhood of Druid Heights. This represents 0.7 percent of the neighborhood land area. The existing parks have amenities for gathering like benches and tables but are small and do not offer much opportunity for physical activity or play. Within a half-mile radius of the neighborhood centroid, the amount of park space increases to 21.7 acres, which is 4.3 percent of the land area. Even though this may suggest there are recreational resources accessible to neighborhood residents just beyond the neighborhood border, this figure is still less than half of the city park coverage of 9.4 percent. With over 7 acres of vacant land, Druid Heights could address its green space deficiency by cleaning and repurposing its vacant land so it can be utilized for recreational purposes. |

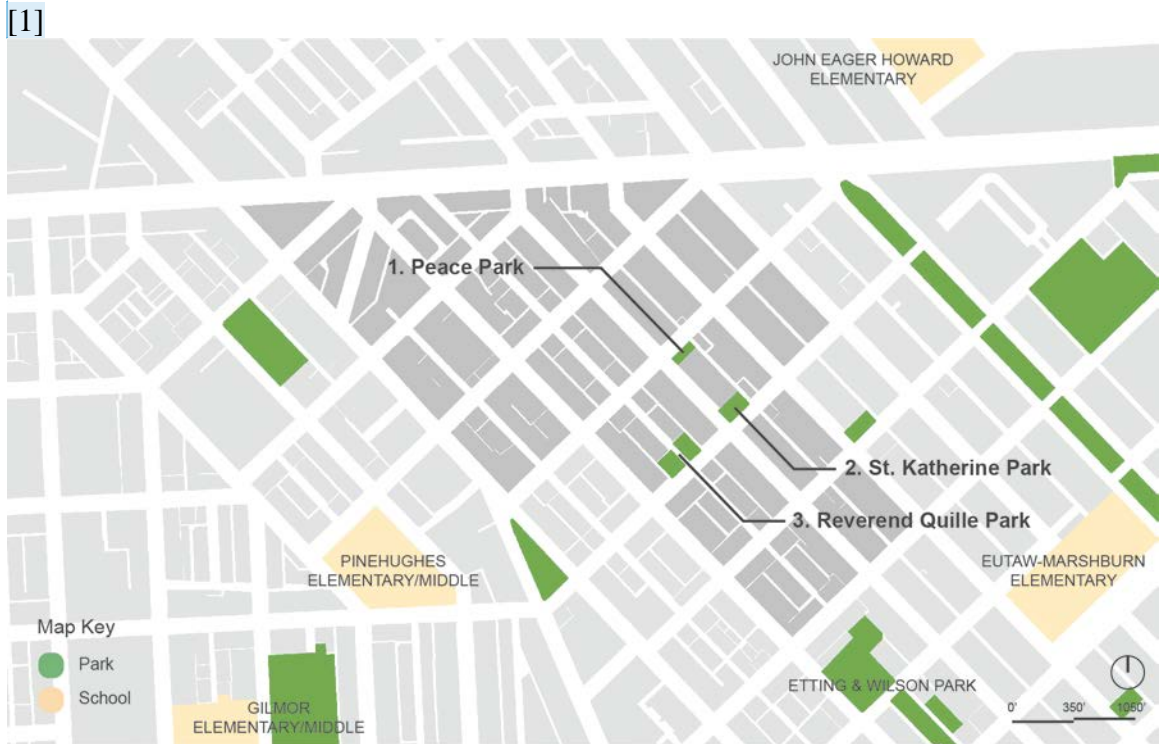


Figure 16. Parks in Druid Heights.

Another way to provide greater park access for Druid Heights residents is to improve pedestrian connections to Druid Hill Park, which is located approximately a half-mile north of the neighborhood (See Figure 17). Druid Hill Park is a 745-acre city park and contains a wide variety of recreational and natural amenities, including playgrounds, basketball courts, tennis courts, swimming pool, ball fields, picnic pavilions, botanical garden, and loop trails. W North Avenue, which is the northern limit of the neighborhood, currently acts as a barrier for residents who wish to walk to Druid Hill Park. The issue of W North Avenue as a barrier is addressed in the transportation section. Along with creating a safer and more comfortable pedestrian environment in the neighborhood, ensuring safer pedestrian crossing at W North Avenue is crucial for increasing park accessibility.

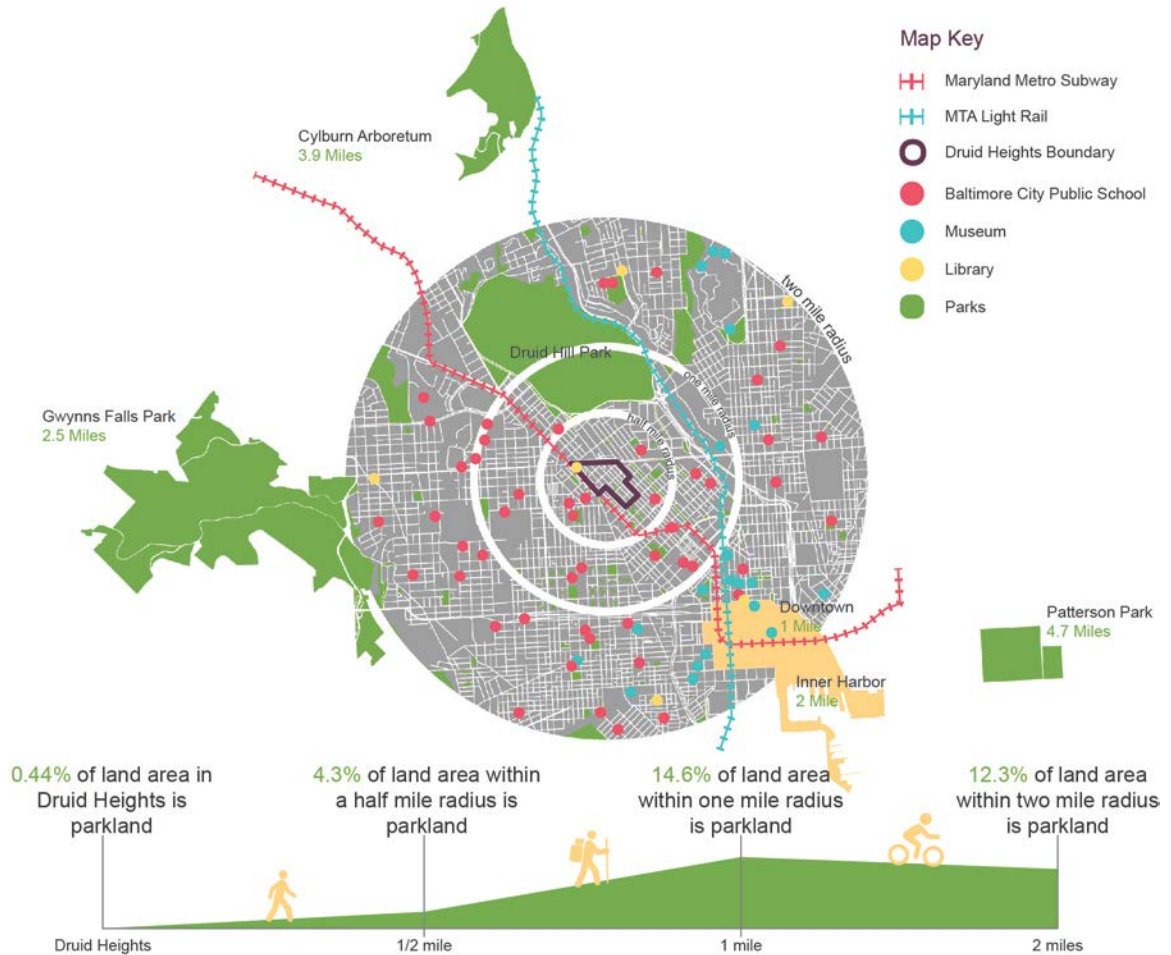


Figure 17. Recreational context of Druid Heights shows greater park access past the half-mile radius.

In addition to lacking recreational resources, Druid Heights also has very low tree canopy coverage. The neighborhood’s tree canopy coverage of 14 percent is almost half of the city’s tree canopy coverage of 27 percent. The disparity is even greater when Druid Heights is compared to wealthier neighborhoods like Roland Park, which has tree canopy coverage of 61.7 percent. Trees can positively impact the air and water quality of its surrounding environment. Druid Heights as well as the City of Baltimore will need an extensive tree planting effort to reach the city’s canopy coverage goal of 40 percent.

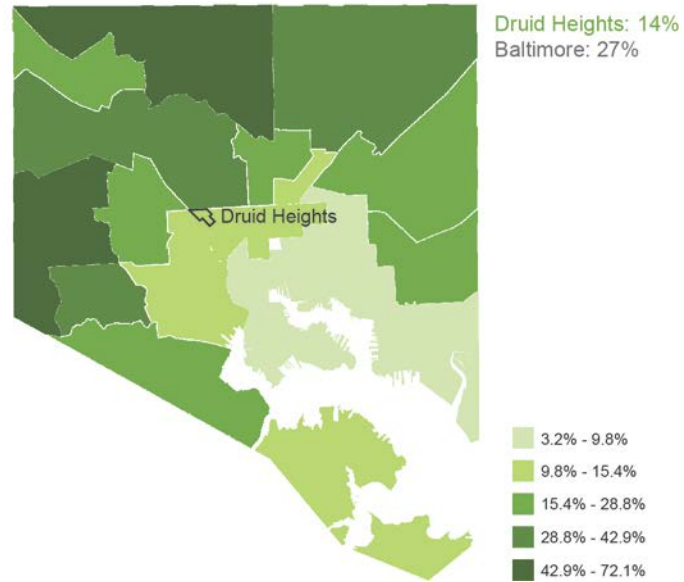


Figure 18. Tree canopy of Baltimore community statistical areas (data source: BNIA).

Food Security

54 percent of the land area within Druid Heights is identified as a food desert (See Figure 18). Mapping of the food desert environment in the city is conducted by the Johns Hopkins Center for a Livable Future, which uses the following criteria when defining a food desert:

1. An area where the distance to a supermarket or supermarket alternative is more than ¼ mile
2. The median household income is at or below 185% of the Federal Poverty Level
3. Over 30% of households have no vehicle available
4. The average Healthy Food Availability Index (HFAI) score for all food stores is low

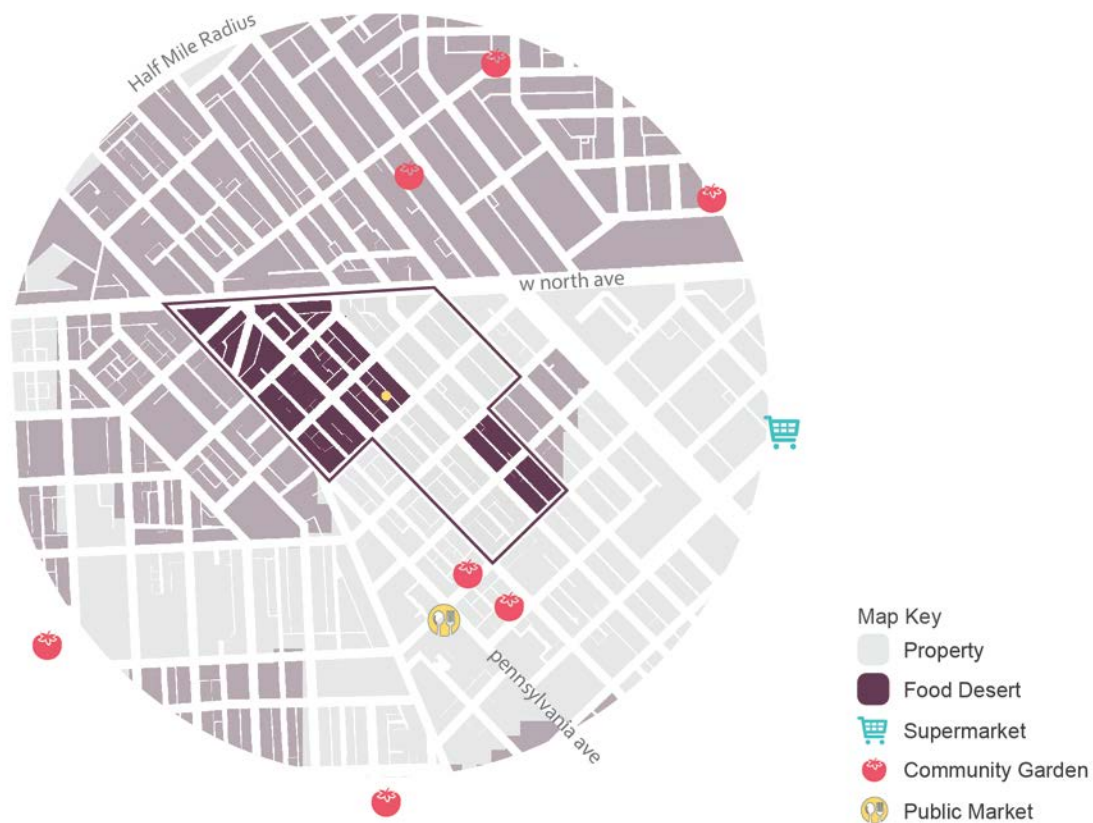


Figure 19. Food desert map for Druid Heights.

There are no fresh grocery options in Druid Heights. The closest supermarket is a Save-A-Lot, which is located approximately half a mile from the neighborhood centroid. Avenue Market, which is a public market that offers a weekly fresh produce stand, is located two blocks from the southwest corner of the neighborhood. There are no community gardens located within Druid Heights, but there are a few community gardens as well as an urban farm just outside the neighborhood limits. Without other healthy food options nearby, residents rely on fast food stores with poor nutritional values, which can lead to poor health outcomes such as obesity and diabetes. If vacant land in Druid

Heights were allocated for food production, then food security and health of neighborhood residents could be improved.

Health Outcomes

The life expectancy of a person living in the Upton/Druid Heights CSA is 68.8 years, which is five years shorter than the city average (BNIA). In the 2011 Neighborhood Health Profile report, the city health department ranked the CSA second to last on All Causes mortality rate. Upton/Druid Heights also ranked poorly on other health indicators. The percentage of avertable deaths, heart disease death rates, and diabetes death rates in the CSA are all significantly higher than city and state rates (Baltimore City Health Department). Utilizing vacant land to create recreational space, filter pollutants from the air and water, and produce fresh vegetables and fruits could help improve the physical health outcomes of the neighborhood residents.

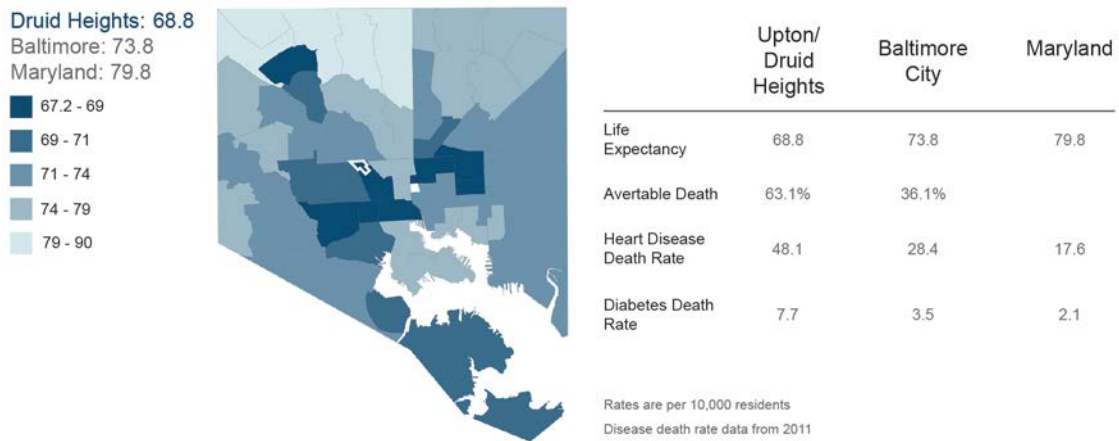


Figure 20. Health outcomes comparison (data source: BNIA, Baltimore City Health Department).

Crime and Safety

Research has linked higher vacancy rate to higher levels of crime, and crime statistics for Druid Heights appears to support this relationship. Property and violent crime rates as well as arrest rates for the Upton/Druid Heights CSA are higher than the city average. The juvenile arrest rate, which is more than triple the city average, is especially disconcerting (BNIA). One Druid Heights resident described in the Baltimore Brew that one time it took “a while” to find a body in an alley because it was so overgrown (Sweeney, 2015).

The diagram in Figure 21 highlights several locations the community residents have identified as high drug activity areas. The cleaning and repurposing of vacant land for productive uses, which could provide employment for neighborhood residents, promote outdoor recreation, and encourage social interaction, could help discourage criminal activity.



Figure 21. Crime statistics and mapping for Druid Heights (data source: BNIA).

Demographics

The population of Druid Heights has declined dramatically since 1980, which is the first year that census data for neighborhoods were recorded. From 1980 to 2010, the number of neighborhood residents decreased from 3,596 to 1,497, which is a reduction of 58 percent over the 30-year period. The City of Baltimore, which has also experienced steady population decline, lost approximately 21 percent of its population over the same time period.

Druid Heights is located within the Old West Baltimore Historic District, which was the premier African American community in the city. Today, the racial composition of the neighborhood remains predominantly African American. The age composition of the neighborhood residents is similar to the city, and 31.3 percent of the households in Druid Heights have children less than 18 years of age (U.S. Census).

Druid Heights
Age



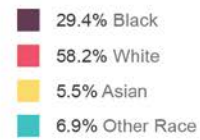
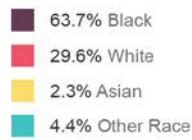
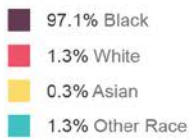
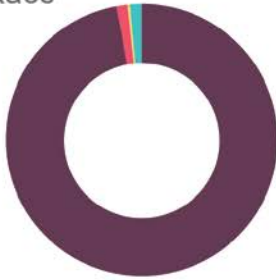
Baltimore



Maryland



Race



Education

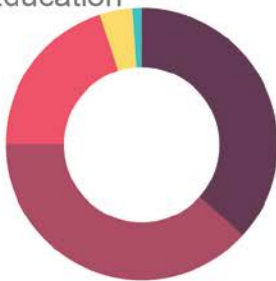


Figure 22. Demographics of Druid Heights.

Druid Heights residents have generally lower socioeconomic status (e.g. education, employment, and income). Among residents over the age of 25, more than a third do not have high school diplomas and only around a quarter have more than a high school education. In 2014, 13.8 percent of the population in the Upton/Druid Heights CSA was unemployed and looking for work. This figure is higher than the city’s unemployment rate of 10 percent. Additionally, less than half of Druid Heights residents between the ages of 16 and 64 are in the labor force. The neighborhood’s labor force participation rate is the lowest amongst the 55 CSAs and much lower than the city average (See Figure 23). Residents of Druid Heights also generally earn less. In 2010, the median household income of Druid Heights was \$22,000, which is much lower than the city’s median household income, and 26.9 percent of neighborhood residents live in poverty. Cleaning and greening vacant lands in the neighborhood and implementing urban agriculture projects could provide much needed training, jobs, and income for residents in Druid Heights.

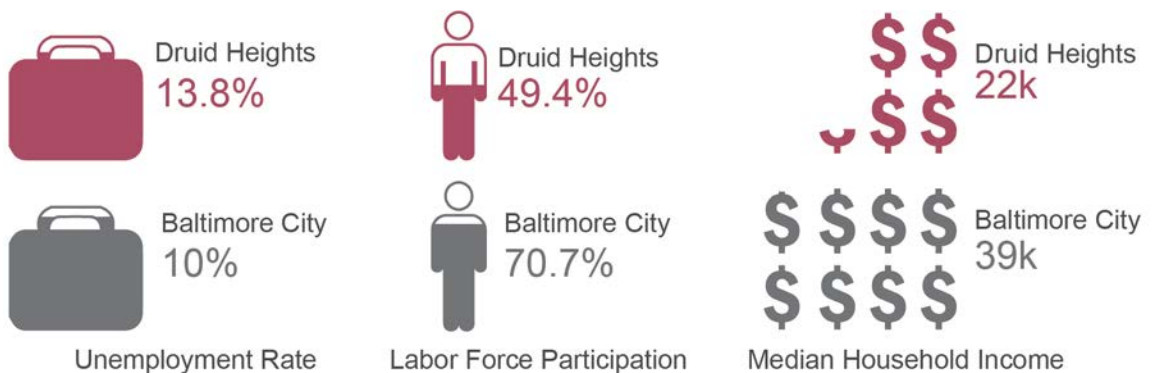


Figure 23. Unemployment, labor force participation, and median household income in Druid Heights.

Transportation

Over 67 percent of the households in the Upton/Druid Heights CSA do not have access to a vehicle, and the residents depend on public transportation (BNIA). According to the Baltimore Neighborhood Indicator Alliance, 38.8 percent of the population use public transportation to get to work. The neighborhood is well served by public transportation systems. Bus routes run north-south along Druid Hill Avenue and Pennsylvania Avenue as well as east-west along W North Avenue, and bus stops are located within a quarter mile walk from anyplace in the neighborhood (See Figure 24). Druid Heights is also located within walking distance from two Baltimore Metro Subway stations. The Penn North subway station, which serves more than 5,500 people each weekday, is located on the northwest corner of the neighborhood at the intersection of Pennsylvania Avenue and W North Avenue (Department of Planning). The other subway station at Upton-Avenue Market is located just two blocks from the southernmost point of the neighborhood. The subway conveniently connects neighborhood residents to Downtown (5 minutes) and east Baltimore (9 minutes).



Figure 24. Public transit map of Druid Heights.

People without access to vehicles have to walk to reach their destination.

WalkScore.com awards Druid Heights a walk score of 88, but this score is measured by population density, block size, intersection density, and destinations. The website’s score does not take into account other important walkability factors such as safety, comfort, and walkway conditions. The sidewalks in Druid Heights are relatively wide, but significant sections of them are in poor condition. Additionally, many sidewalks lack street trees for shading. As previously mentioned, West North Avenue presents a major obstacle for people who want to walk to Druid Hill Park. This six-lane road, which marks the northern limit of Druid Heights, experiences high traffic volume and unpredictable traffic patterns and has no street trees.



Figure 25. Map of city's proposed bike routes.

Currently, there are no designated bike lanes in Druid Heights, but the city bicycle master plan (Baltimore City Department of Transportation) does suggest primary bicycle routes along major streets such as W North Avenue, Pennsylvania Avenue, Druid Hill Avenue, and McCulloh Street. The plan also proposes a minor bicycle route that runs east west along Gold Street. According to the Druid Heights CDC executive director Roscoe Johnson, the proposal matches the existing travel pattern of bicyclists, who typically bike through Druid Heights from other neighborhoods to downtown. Mr. Johnson does not believe a significant portion of residents in the community use or will use bicycles for travel and does not believe the city's plan to install a bikeshare station at the Penn North subway station will serve the community.

Hydrologic Context

Druid Heights lies within the Jones Fall watershed, which drains into the Inner Harbor and eventually the Chesapeake Bay. The high point of the neighborhood is located in the northwest corner and the lowest point is the southeast. Conversations with the Druid Heights CDC and city planning department staff revealed a historic stream in the blocks between Etting Street and Druid Hill Avenue. The stream used to flow parallel to two streets through the neighborhood before turning east and flowing into Jones Fall. It is unclear whether the stream was buried or filled, but there is no evidence of it causing subsidence or flooding issues along its floodplain. Vacancy rate along the path of the historic stream is typical or lower than the rest of the neighborhood.

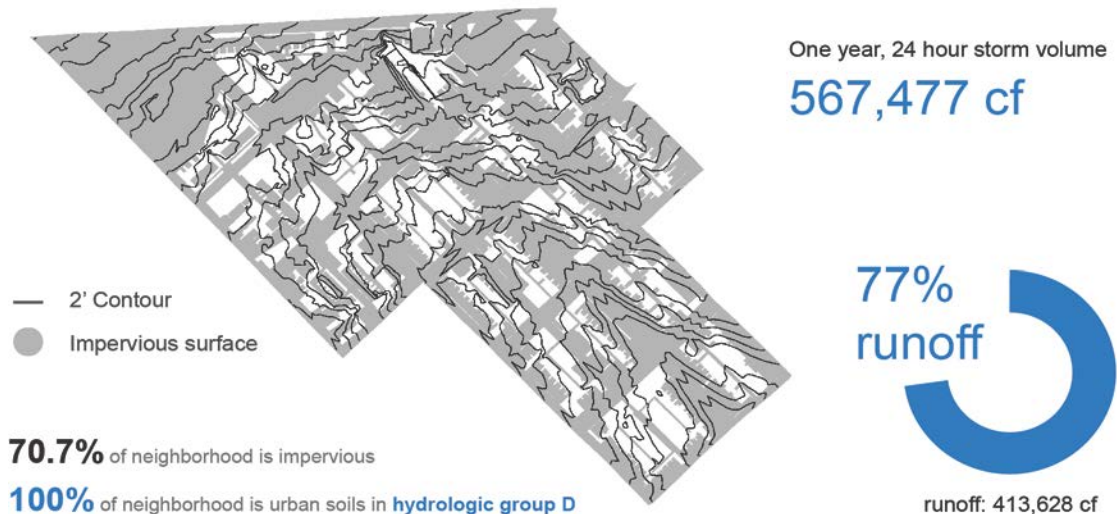


Figure 26. Impervious surface and stormwater runoff in Druid Heights.

According to the U.S. Department of Agriculture Web Soil Survey, the soil in the neighborhood are designated as urban land and classified as hydrologic group D, which means the soil has low infiltration rates and high runoff potential. Additionally, the neighborhood is over 70 percent impervious, and pervious cover consists of fallow and compacted yards and vacant lots. These conditions further exacerbate stormwater runoff

issues. Stormwater runoff volume for the neighborhood was calculated using TR-55, and the neighborhood currently produces approximately 413,628 cubic feet (3,094,152 gallons) of runoff for a one-year, 24-hour storm event. The large amount of vacant land in the neighborhood presents an opportunity for stormwater capture and treatment in an urban setting.

Stakeholder and Community Engagement

Community Feedback

Druid Heights is an underserved neighborhood with limited resources, and resident buy-in is crucial to the success of design implementation. Consequently, it is crucial that the design proposal accurately reflects the needs of the community. Druid Heights Community Development Corporation's executive director, Roscoe Johnson, and director of community resources, Anthony Pressley, were the primary partners throughout the design process, and in order to develop a fuller picture of the neighborhood, the designer communicated with them continually and met with them at least once a month throughout the design process. In meetings with the CDC staff, the designer presented and discussed neighborhood inventory and analysis findings as well as design ideas. Observations and concerns that the CDC staff and community members discussed with the designer are described below.

1. Mr. Johnson, Mr. Pressley, and the community identified addressing the lack of outdoor recreational space as a priority.
2. According to Mr. Johnson and Mr. Pressley, the primary modes of transportation for residents are driving, utilizing a car-sharing service,

riding the bus, or taking the subway and residents typically do not bicycle. However, accommodations for bicyclists are encouraged because people who bicycle through the neighborhood might visit one of the local shops or see a house they are interested in.

3. Mr. Johnson and Mr. Pressley provided insight on bicyclists travel patterns and the new bikeshare station at the Penn North subway station. This information is available in the Circulation section.
4. Gold Street is one of the busiest streets in terms of vehicular and pedestrian traffic because it is a shortcut for those who are coming from the east on W North Avenue and going to Pennsylvania Avenue. The high traffic volume has led to a higher concentration of drug activity along the street.
5. The 2000 master plan for Druid Height suggested a senior housing complex along Pennsylvania Avenue. Although it is not a priority, Mr. Johnson confirmed senior housing is still needed in the neighborhood.
6. Darian Kelly, the CDC's Youth Coordinator and Community Organizer, shared information on several potential vacant lot greening projects in the neighborhood. The projects include a playground on 2204-2216 Etting Street, a senior meditation garden on 2117-2119 Druid Hill Avenue, and a nature play space on 1924-1926 McCulloh Street. These programs are reflected in the thesis design.
7. Residents and the CDC leaders raised concern about rats frequently throughout the process. They are especially concerned about unmaintained

community gardens or other forms of food production attracting rodents and generally do not support these strategies for the neighborhood.

8. Mr. Johnson and Mr. Pressley mentioned the possibility of a buried creek under Etting Street in a conversation in October. The existence and location of this buried stream was confirmed in November when the designer came across a Legacy Green Network map created by the city's planning department.

9. Prior to the involvement of the designer, the Druid Heights CDC conducted a survey to gauge the community's preferences and needs for their neighborhood parks. The results of the survey indicate that:

- a. Just over half (55%) of the residents have a favorable view of their neighborhood, and a large majority (73%) is proud of their community. This pride is important to emphasize and reflect in the design because the community's pride is a positive emotion that can promote positive health outcomes.
- b. 58 percent of the residents think the neighborhood is dirty, but only 21 percent of the survey participants have participated in neighborhood cleanup efforts. The vast majority (83%) believes the city is entirely responsible for the cleanliness of the neighborhood.
- c. 73 percent of the survey participants want to see more parks and playgrounds in the community.

- d. Survey participants commented on drug activity in the neighborhood.
- e. Another comment requested the employment of young people in the neighborhood.[2]

10. 28 residents attended the community meeting on February 25, 2017.

Residents were asked to mark where they would like to see new parks and what activities and programs they would like to see in the parks.

- a. Residents wanted to clean and beautify vacant lots with perennials and other flowering plants, especially at entrances into the neighborhood.
- b. Several residents requested a fitness park that incorporated exercise equipment along a trail.
- c. One family wanted to see safe havens for children and commented that families do not allow their children to walk to parks by themselves.

Stakeholder Feedback

In addition to the community meeting and ongoing conversation with the neighborhood CDC staff, the designer also met or spoke with stakeholders and experts from the Parks and People Foundation, Baltimore City Planning Department, Office of Sustainability, Blue Water Baltimore, and Casey Trees.

- 1. Chad Hayes from the city planning department provided the designer with a proposed land use diagram for Druid Heights. While the designer's

design solution did not adhere to the city's land use proposals, the diagram provided by Mr. Hays was helpful in assessing the city's vision for the neighborhood. The next section offers a detailed critique of this land use plan.

2. On November 9, 2016, the designer attended a meeting with the Department of Planning director, Tom Stosur, and community leaders from neighborhoods adjacent to Druid Heights, including Upton, Penn North, and Reservoir Hill. Mr. Stosur introduced the city's effort to study the reuse of vacant land as green open space to create green connections throughout West Baltimore.
3. The designer also attended the Green Network Plan community meetings on November 30, 2016 and January 18, 2017. The designer noted several observations, concerns, and insight discussed by the community members and city staff.
 - a. Several community members stressed the need for training and job creation for people within the communities in West Baltimore. They lamented the outsourcing of landscaping work to contractors in the counties when the city could be training and employing West Baltimore residents.
 - b. One of the maps provided by the city staff in the first meeting was a Legacy Green Network map. The map showed a historic stream that flowed along the rowhouse blocks between Druid Hill Avenue and Etting Street. The designer followed up with the planning

department's GIS Analyst Michael Galdi, who provided the historic stream data.

- c. The designer asked the project manager of the Green Network Plan, Amy Gilder-Busatti, about the current condition and future plans of inner block parks in Harlem Park. Ms. Gilder-Busatti noted that the lack of visibility into these inner block parks was an issue and Parks and People Foundation, which is leading the revitalization of Harlem Park, has proposed the demolition of northern and southern blocks of rowhouses to open up views into the park. Steven Preston, who is the Project Manager for Parks and People Foundation working in Harlem Park, later confirmed this observation.
4. Brian Mayell, who is the General Manager for Casey Trees's farm, provided some general insight into the layout and harvest potential for a street tree nursery.

Department of Planning's Land Use Proposal for Druid Heights

As previously mentioned, the city's planning department provided me with a land use proposal map for Druid Heights (See Figure 27). The map shows proposed land uses as well as proposals by the Druid Heights CDC, Upton Planning Committee, and The Community Builders Inc., which is a private non-profit developer working with the neighborhoods.

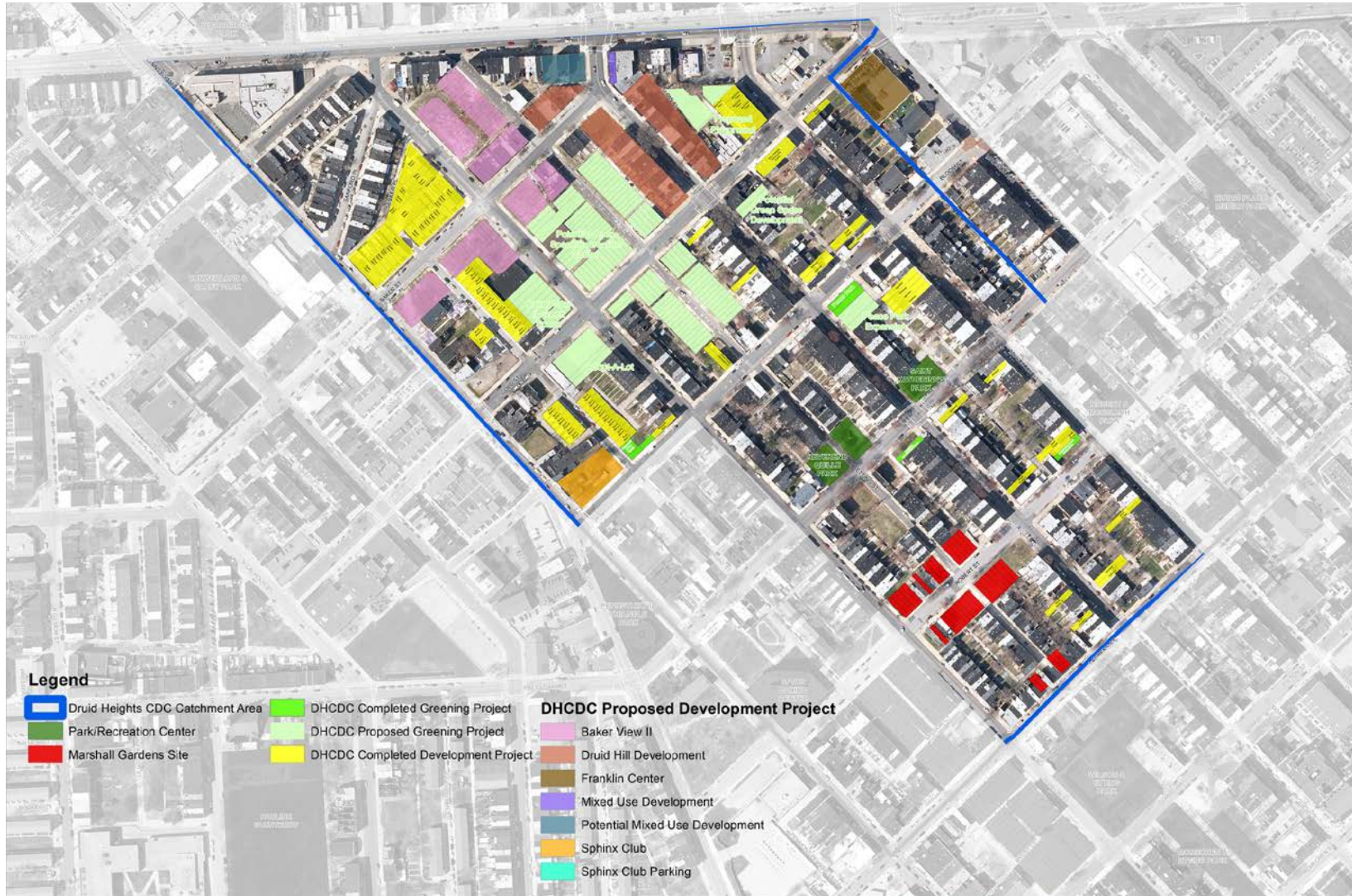


Figure 27. Current proposals for Druid Heights (City Planning Department).

There are several reasons why the design solution of this thesis differs from the city's proposals. First, the city's proposed park spaces do not create a unified park system to support the "green network" that the city is planning to create. While the parks are mostly concentrated in the northern half of the neighborhood, busy street like Gold and Division Street fragment them into small lots. Druid Heights already has several small parks with playground and seating amenities, but residents do not have a large contiguous lawn space to support a variety of activities. So the proposals should address this need rather than create more small parks.

The block bordered by Division Street, Baker Street, Gold Street, and Etting Street is almost completely vacant and presents an opportunity to create open lawn space. Instead of taking advantage of this opportunity, the CDC is considering expanding the Baker View housing development into the northern end of the block. The community should explore the alternative option of leaving the whole block as green space and organizing housing development around this centrally located park space. This would create a more desirable condition where the new housing faces a park.

Another major concern with the current proposal for the neighborhood of Druid Heights is the infill and rehabilitation of rowhouses (colored red on diagram) along Robert and Laurens Street by The Community Builders and the Upton Planning Committee. These efforts are not addressing the vacant lots inside the blocks, and if the blocks are visually enclosed with new housing as is currently proposed, the designer strongly believes this will create a situation similar to the inner-block parks of Harlem Park from the 1960s. History of these inner-block parks indicates that the lack of

visibility, ownership, and maintenance could encourage illegal activities like drug use and sales as well as dumping.

Chapter 4: Design Concept and Program

Findings from the neighborhood inventory and analysis and stakeholder and community engagement process reveal several challenges that the design solution will need to address, including:

1. High vacancy rate
2. Lack of recreational opportunities
3. Low tree canopy coverage
4. Poor health outcomes for Druid Heights residents
5. High rate of criminal activities in the neighborhood

To address these challenges, the design solution is to establish a series of connected green spaces through the reuse of vacant properties. The following design elements will be included in this green infrastructure master plan for Druid Heights:

1. Repurpose large contiguous vacant lots as neighborhood parks to increase access to recreational amenities.
2. Implement tree nursery and flower farm to increase canopy cover and create training and employment opportunities.
3. Set aside smaller vacant lots as community managed open spaces.
4. Apply crime prevention through environmental design techniques to deter criminal activities.
5. Utilize bump outs, marked crosswalk, street trees, and material change to improve pedestrian comfort and safety.

Chapter 5: Design

Design Thinking

Analysis of vacant properties in the neighborhood revealed a concentration of vacant lots and buildings along Etting Street, which is a narrow one-way street running north south through the neighborhood. The vacant buildings along Etting Street are all smaller two-story alley houses and generally in poor condition. In certain building blocks, all of the houses are vacant and several even have caved in roofs that threaten the structural integrity of the adjacent houses. In response to this high concentration of vacant properties along Etting Street, I propose the demolition of highly vacant rowhouse blocks and the creation of a connected series of green spaces along the street. Factors such as size and visibility of each contiguous lot impacted its proposed reuse.

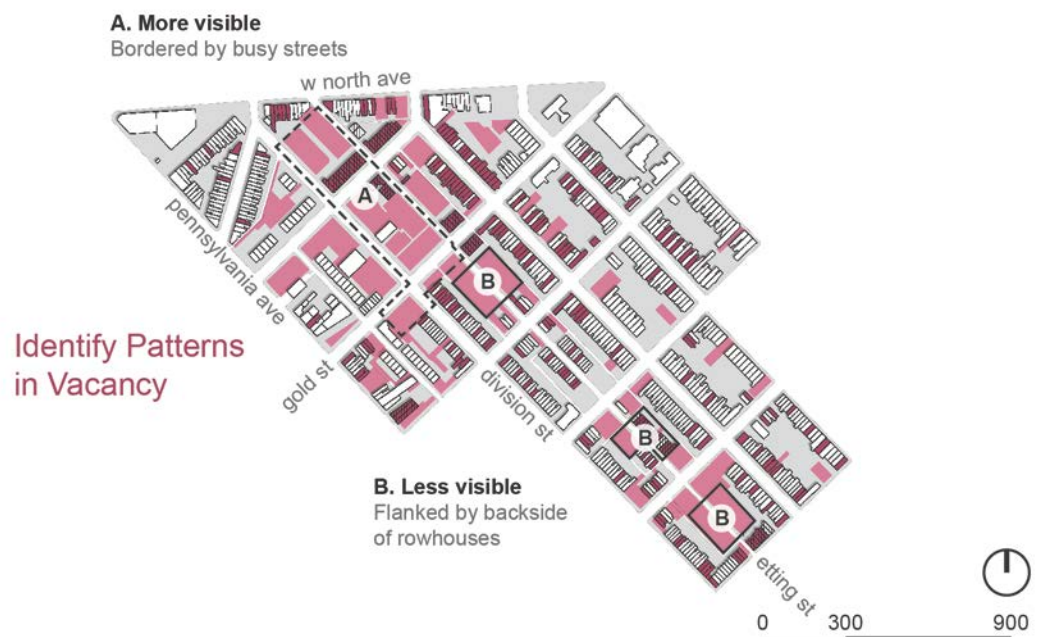


Figure 28. Identifying patterns in vacancy.

Visibility is an important factor because of its influence on crime and the perception of crime. As discussed in the introduction section, parks that are more visible

will have more eyes on it, which will help discourage criminal activity. Park users also perceive more visible parks as safer and as a result are more likely to utilize the park. Greater number of users means even more surveillance.

The large vacant blocks in the northern half of the neighborhood are bordered by busy streets like Gold Street and Division Street and are more visible than the vacant lots south of Gold Street. The vacant lots south of Gold Street are located at the inner block and the backside of existing rowhouses, which limits their visibility. Furthermore, Etting Street, which runs through these inner block vacant lots, is a one-way, one-lane street that experiences low vehicular and pedestrian traffic. Due to the higher visibility of the vacant blocks along Gold and Baker Street and the potential for constructing new housing that faces these blocks, I propose these blocks be repurposed as neighborhood parks, which would be constructed and maintained by the city.

The street grid is also reorganized such that a large contiguous lot is created to accommodate a multipurpose field for sport activities. I believe this reorganization of the blocks is a necessary and practical solution for several reasons. First, the residents need access to a large multipurpose field. Currently, the closest park with a large open field is Druid Hill Park, which is a 15-minute walk from the neighborhood. Aside from the play fields in Druid Hill Park, there is no other open space where residents can play catch, kick a soccer ball, or simply run around in an open lawn space. The second reason for this reorganization is to minimize inner block space and to create a condition where all the surrounding rowhouses are facing the park. This arrangement provides more eyes on the park to discourage potential criminal activities. Lastly, community residents did not identify Baker Street as a major thoroughfare and no bus routes run through Baker Street,

so interrupting the street should not cause too much disruption to residents and might even calm the traffic around the proposed park.

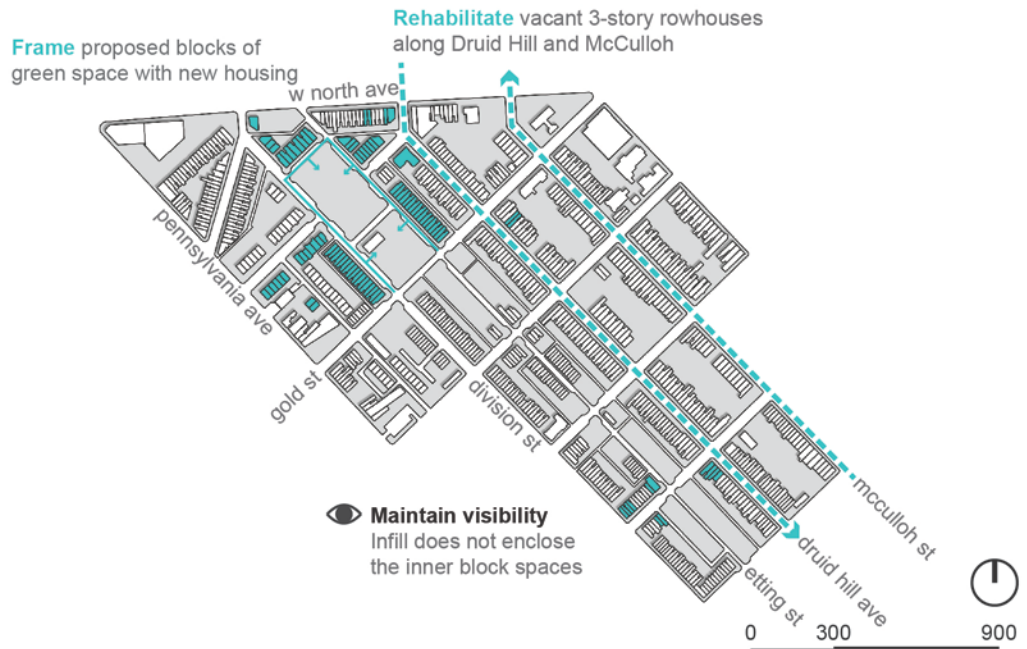


Figure 29. Strategic framing and infilling.

The lack of visibility for the vacant lots south of Gold Street is just one of several reasons why neighborhood parks were not proposed. Concern about maintenance is often brought up during conversations with community leaders and stakeholders. These conversations also revealed the limited resource of the city’s Recreation and Parks Department for park maintenance. The proposed public neighborhood parks north of Gold Street is highly visible, so residents are more likely to take care of the park. Moreover, the city is directly benefitting from the new tax base of the proposed housing and the likely rise in property value around the park, so it makes sense for the city to utilize its resources to maintain these parks.

On the other hand, if the vacant lots along Etting Street are transformed into public parks, then there is a strong likelihood that the city would fail to maintain them.

These lots have limited visibility, and their long proportions and fragmented character limit their use as recreational spaces. Without the city's resources for maintenance, the lots south of Gold Street, which are located at the inner blocks like the failed inner block parks of Harlem Park, could become havens for criminal activities.



Figure 30. Determining green space uses.

One possible solution to address the maintenance concern is to propose a use that necessitates regular upkeep and attention like urban agriculture. If nonprofit organizations or private companies invest in and operate these large contiguous vacant lots, then it is more likely that these inner block spaces will be maintained regularly. The inner block nature of these lots is also ideal for working vehicles because Etting Street has low vehicular traffic and existing alleys, which used to provide access to the demolished rowhouses, can serve as access routes for working vehicles and equipment.

Master Plan

As mentioned earlier, the neighborhood master plan (Figure 31) incorporates three major types of green spaces: neighborhood parks, urban agriculture, and community managed open spaces. More specifically, the plan includes the following elements

1. Multipurpose field
2. Baker View Park
3. Gold Street Park
4. Expanded Peace Park
5. Tree nursery and flower farm
6. Senior housing and garden
7. St. Katherine's community garden



Figure 31. Master plan rendering for Druid Heights.

Druid Heights Neighborhood Parks



Figure 32. Proposed neighborhood parks.

The proposed neighborhood parks for Druid Heights includes two larger blocks of park space and two smaller corner lots of community gathering spaces. The northernmost block is a large multipurpose field that provides residents with a space for a variety of active and passive activities. Street trees, cobble crosswalks, and stormwater bump outs are utilized to slow down vehicles and protect pedestrians and park users. In addition to calming traffic, the trees and stormwater bump outs will also capture and treat runoff as well as provide visual interest for park users.



Figure 33. Perspective depicting cobble crosswalk with stormwater bump out and multipurpose field

The second large block of green space is composed of different activities designed around the existing Patterson Asbury Zion Church. The proposed Baker View Park, which is named after the most recent housing project completed by the Druid Heights CDC, includes a nature play space, basketball court, and community garden. The existing church serves as the social center for these activities and could offer programs, such as gardening and cooking classes or after school care, to encourage interactions between neighborhood residents. Instead of crossing W North Ave and walking 15 minutes to Druid Hill Park, residents now have access to a large open play field, basketball court, and more play spaces right in the heart of their neighborhood.

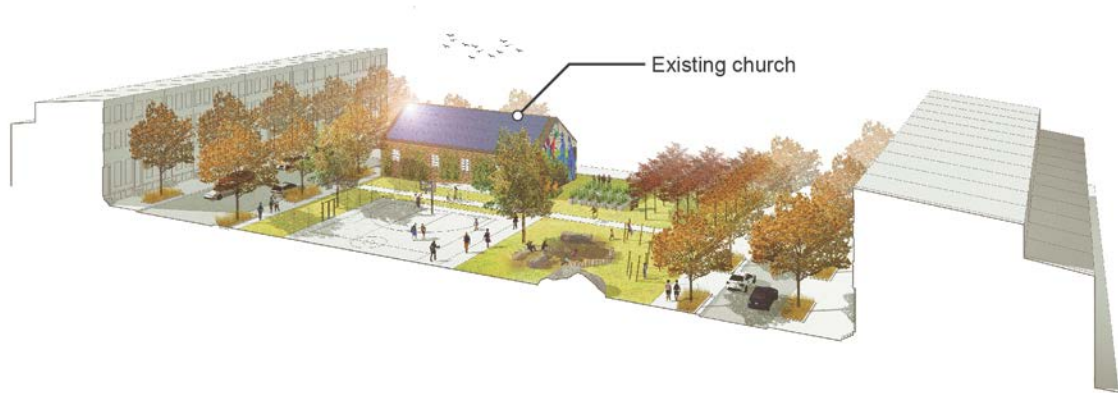


Figure 34. Section perspective of Baker View Park.

The smaller neighborhood parks, Gold Street Park and Peace Park, address one of the needs expressed by the neighborhood residents: safe havens for children. Similar to Baker View Park, Gold Street Park is also located adjacent to a church and provides play and seating amenities to serve local residents and churchgoers. Peace Park, which was implemented in 2015, is expanded in the proposed master plan to incorporate the adjacent vacant lots. Both of the smaller parks are likely to be funded through grants so will likely incorporate stormwater management practices such as rain gardens, swales, rain barrels, and permeable pavers.



Figure 35. Perspective of Gold Street Park.

Productive Reuse: Etting Street Tree Nursery and Flower Farm



Figure 36. Proposed tree nursery and flower farms.

Approximately two and a quarter acres of vacant properties along Etting Street are repurposed for urban agriculture. However, instead of producing food crops, which residents fear may attract rodents, the farms will produce trees and flowers. Cut flowers can be one of the most profitable crops, and an acre of cut flower production can bring in around \$25,000 to \$35,000 (Scoggins, 2014). After harvest, the flowers can be sold on site or be delivered to shops, restaurants, and supermarkets.



Figure 37. Perspective depicting possible reuse of vacant lot near nursery and flower farm to hold equipment and host events.

The tree nursery in the larger inner block spaces can grow hundreds of trees for planting along streets and green space in Druid Heights as well as the rest of the city. In comparison to trees brought in from rural nurseries, these trees, which are grown in urban conditions with poor soil and air pollution, will be able to adapt more easily and survive at a higher rate once they are planted in their final location.

The tree nursery and flower farm operation (See Figure 38) is laid out such that the flowers are located adjacent to the crossing streets and the rows are orientated along Etting Street. This layout maintains visibility into the inner block spaces, which is reserved for the tree nursery. The siting of the flowers also means drivers and pedestrians along the crossing streets are greeted by attractive flowers.

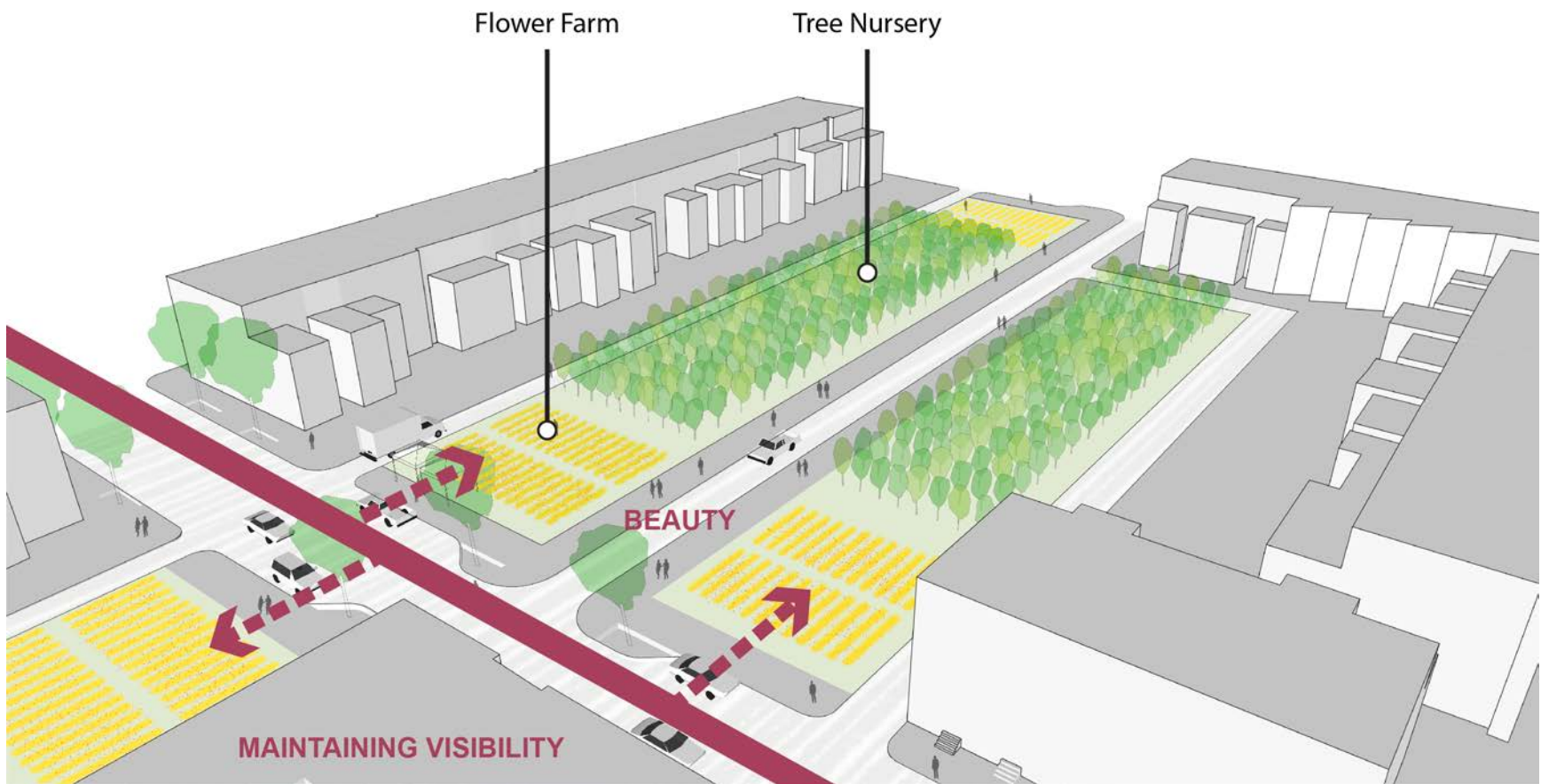


Figure 38. Aerial of tree nursery and flower farm operation.

In addition to increasing the tree canopy and beautifying the neighborhood, utilizing vacant properties as nursery and flower farm can help bring much-needed training and employment opportunities and income into the community.

Take Back the Block With Community Managed Open Spaces



Figure 39. Community managed open spaces scattered throughout the neighborhood.

Instead of filling all vacant lots with new rowhouses, some missing tooth or corner vacant lots, which are too small to repurpose as neighborhood parks or urban agriculture, are set aside as community managed open spaces that are not constructed or managed by the city. The surrounding residents can take ownership of these spaces and customize the space for their own use and needs. The changes to these lots could be as simple as adding trees, flower planters, and seating, or they could be transformed into

community gardens to supplement the local residents' diet with fresh produce; gathering spaces for community events; or even dog parks if the surrounding residents are pet lovers. Through the construction and management of community managed open spaces, residents are given the opportunity to shape the appearance of their own block and express pride through the success of their ownership.

The city and several non profit organizations, such as the Parks and People Foundation and the Chesapeake Bay Trust, offer funding and resource to residents who are implementing stormwater management practices on their lot, so it is likely many CMOSs will implement some form of stormwater management practice. Figure 39 shows a hypothetical CMOS, which serves as a gathering space for the local residents and has a rain barrel and rain garden to capture and treat stormwater coming off the roof of the adjacent rowhouses.

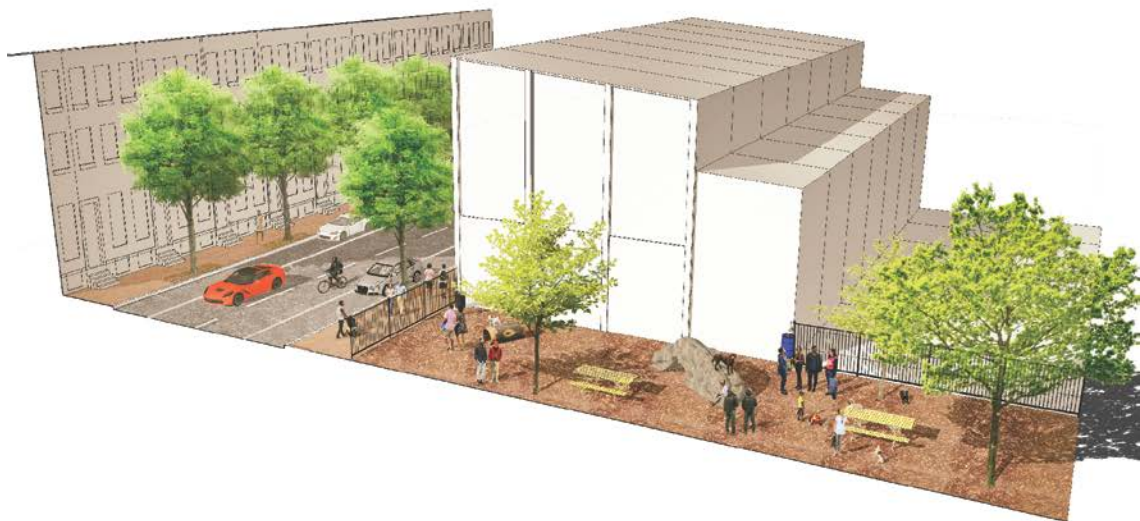
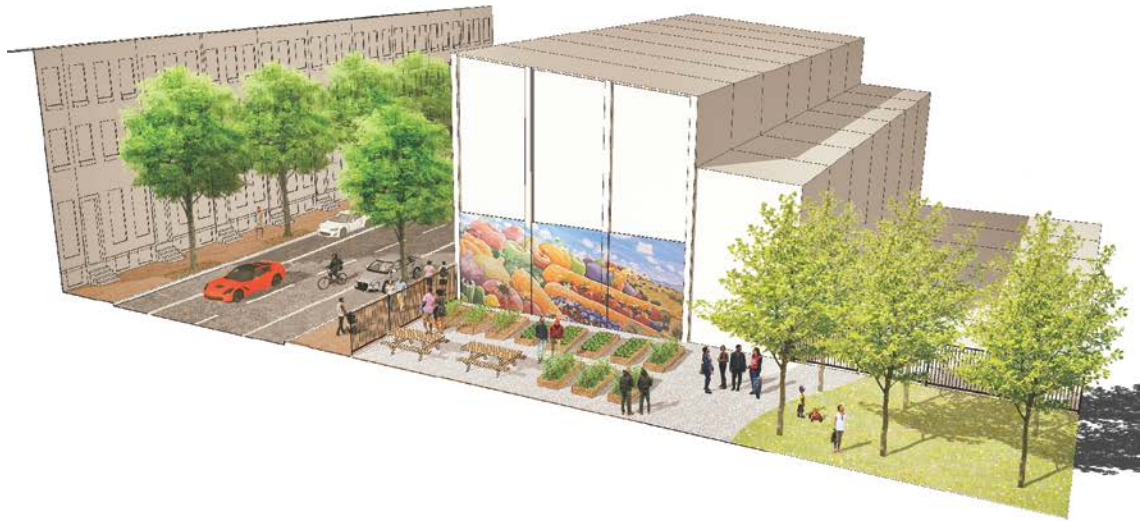


Figure 40. Section perspective of a community managed open space and its possibilities.

Making Green Connections

The existing and proposed neighborhood parks, tree nursery, flower farm, and community managed open spaces create a connected series of green spaces throughout Druid Heights. This network of green spaces offers a safer and more comfortable walk for residents and connects them to several key destinations in the community (See Figure 40). The tree nursery and flower farm connect to Etting and Wilson Park, which is a well-utilized and well-maintained park in the neighborhood of Upton, along the southern border of Druid Heights. This green network follows Etting Street, which today is flanked by vacant lots and houses, and the proposed tree nursery and flower farm northward to the proposed Baker View Park and multipurpose field. The trees and flowers offer pedestrians a more pleasing and comfortable walk and provide the opportunity to explore and learn about this urban agricultural operation.

The multipurpose field at the north side of the neighborhood is just one block away from W North Ave, which has numerous shops and important neighborhood anchors like the Penn North subway station and the Enoch Pratt Library. The master plan also suggests other techniques, such as street tree plantings and stormwater bump outs and marked crosswalks at the intersections, in Druid Heights's green network to further improve the comfort and safety of pedestrians.



Figure 41. Utilizing vacant land to create a green network in Druid Heights.

Design Performance

Recreational and Natural Resources

Today, the residents of Druid Heights only have access to 0.44 acres of green space within neighborhood boundaries. The proposed master plan for Druid Heights accommodates nearly 5.7 acres of green space, which is a 1,295 percent improvement over the current condition (See Figure 42). Overall, the percentage of green space in the neighborhood is increased from 0.7 percent to 10 percent, which is slightly higher than the city average of 9.3 percent. The improved access to green space offers opportunities for a variety of activities and could help encourage healthier lifestyles for neighborhood residents.



Figure 42. Green space breakdown

Tree canopy coverage in the neighborhood is improved by nearly 66 percent with the proposed green infrastructure master plan through strategies (See Figure 43) such as

tree plantings at neighborhood parks, street tree plantings, and the implementation of the tree nursery. Not only do trees make the neighborhood more attractive, but they also improve air and water quality, moderate temperature, and help reduce the stress levels of residents. This improvement in the neighborhood's tree canopy will also help the city's effort to reach its goal of 40 percent canopy coverage.



Figure 43. Typology for urban forestation

Utilizing iTree's Canopy program, which calculates pollutant removal based on acres of tree canopy coverage, I determined that the proposed tree canopy of 13.44 acres could absorb 66% more airborne pollutants such as carbon monoxide, nitrogen dioxide, ozone, PM10, PM2.5, sulfur dioxide, and carbon (See Figure 44). In addition to removing airborne pollutants, the tree plantings will also help moderate temperatures. Over 70 percent of Druid Heights is impervious cover, which exacerbates the heat island effect and increases the risk of heat related illnesses. The large amount of vacant land in Druid Heights presents a great opportunity to plant trees and cool the neighborhood during the hot summer months.

Pollutant Removal

	Rates (lbs/acre/yr)	Existing	Proposed
Tree Canopy (acres)		8.11	13.44
Carbon Monoxide Removal	1.561	12.66	20.98
Nitrogen Dioxide Removal	9.872	80.06	132.68
Ozone Removal	49.479	401.27	664.99
PM10 Removal	11.381	92.3	152.96
PM2.5 Removal	2.389	19.37	32.11
Sulfur Dioxide Removal	3.132	25.4	42.09
Carbon Dioxide Sequestration	10,559.26	85,635.59	141,916.45

Figure 44. Tree canopy increase and pollutant removal.

Stormwater Management

Baltimore City has prioritized the potential of vacant land for stormwater capture and treatment, and as previously mentioned, several grants available to help implement vacant lot projects have stormwater management requirements. Consequently, it is important to determine the stormwater treatment capability of a green infrastructure master plan for Druid Heights. To calculate this capacity, I chose to quantify several stormwater management practices that could be implemented throughout the neighborhood, including bioretention basins, permeable pavement, and tree plantings.

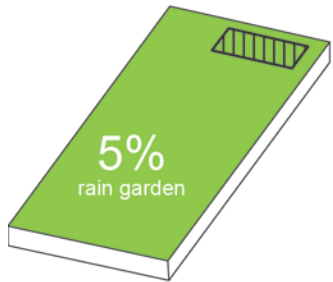
To calculate the stormwater treatment potential of the proposed green spaces, I assumed that 5 percent of the area of neighborhood parks and urban agricultural production and 10 percent of the community managed open spaces are utilized as bioretention basins. This amount to 14,810.8 square feet of bioretention basins, and with

one foot of ponding depth and a 3-foot aggregate/media base, the bioretention systems are capable of capturing and treating 32,583.8 cubic feet of runoff.

Over 17 acres of the neighborhood of Druid Heights is covered by streets, alleys, or parking pads. To treat the stormwater running off these paved surfaces, the master plan proposes installing street side bioretention cells along right of ways. Approximately 30,609 feet of the right of ways in Druid Heights have the minimum width to accommodate a 5-foot wide bioretention cell while maintaining a 7-foot walkway. To estimate the stormwater retention potential of these bioretention cells, I calculated the storage capacity with a foot of ponding depth and 3 feet of media/aggregate base with 40 percent void space. The total amount of retention for street side bioretention cells is 168,351 cubic feet.

Alleys are different from regular streets because the runoff in alleys is pitched towards the center instead of the sides. Since alleys are narrow and meet right up against private properties, there is also no space to install bioretention basins. A possible solution for treating stormwater in the alleys is to replace the impervious surface of alleys with permeable cover like permeable pavers or pervious concrete. If all of the alleys in Druid Heights, which amounts to approximately 69,654 square feet, are converted to permeable cover with a 3-foot deep aggregate base, then they have the capacity to capture and treat 83,354.8 cubic feet of runoff.

Neighborhood Park +
Urban Agriculture



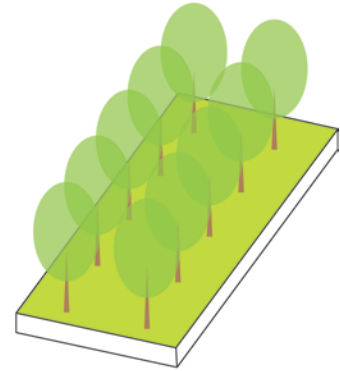
Total capacity: 23383.8 cf

Community Managed
Open Space



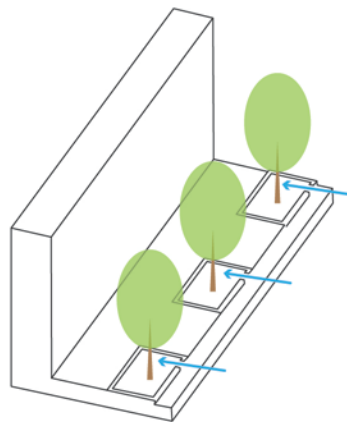
Total capacity: 9199.96 cf

Tree Nursery



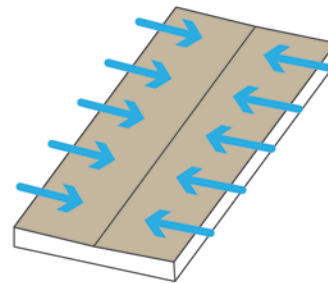
Total capacity: 8,021.8 cf

Street Side
Bioretention Basin



Total capacity: 168,351 cf

Permeable Alley



Total capacity: 83,354.8 cf

Figure 45. Stormwater management techniques

The proposed increase in tree canopy will also help intercept and absorb rainwater. I utilized iTree to calculate the stormwater capture potential of proposed trees, but instead using the area of canopy cover for calculating the stormwater capture capacity, the iTree program uses the species and quantity of trees. Since it is impossible to know exactly how many additional trees are planted in the proposed plan without a detailed survey of existing trees, I only used the trees from the proposed tree nursery in

this calculation. To simplify the calculation, I also assumed that the trees are red maples, which is a common street tree species. 1.62 acres of nursery can accommodate around 1,070 trees, and each red maple, according to iTree, can absorb 56 gallons annually. In total, the tree nursery can reduce runoff by 8021.8 cubic feet.

With the trees in the nursery and stormwater treatment system of rain gardens, street side bioretention cells, and permeable alleys, untreated runoff is reduced by 70.7 percent from 413,628 cubic feet to 121,222 cubic feet.

Chapter 6: Conclusion

The goal of this thesis project was to explore how vacant properties could be repurposed to help improve the public health outcomes of Druid Heights residents. The green infrastructure master plan for Druid Heights proposes the reuse of vacant properties as neighborhood parks, nursery and flower farm, and community managed open spaces to create a connected series of green spaces for residents to use and enjoy. The design increases the amount of green space within neighborhood limits from less than half an acre to over 5 acres. The proposed neighborhood park spaces, which could accommodate activities such as field sports, basketball, playing, gardening, gathering, and relaxing, will encourage healthy behaviors like exercising and socializing. The parks are also strategically located and framed with new housing to discourage criminal activities.

The organization and location of the nursery and flower farm can also help discourage criminal activities. By clearing and maintaining views into the inner block, the proposal transforms a currently neglected and hidden space into a productive and aesthetically pleasing green corridor. The flower and tree farm operation could also provide opportunities for job training and employment and have the potential to bring in over \$44,000 of revenue annually.

Community managed open spaces, which is an idea adapted from the West Philadelphia Landscape Plan, provide residents with the opportunity to take ownership of smaller vacant lots. Working together as neighbors to construct and manage these gardens could help strengthen confidence, sense of ownership, and social ties in the neighborhood of Druid Heights.

The proposed green infrastructure master plan for Druid Heights also reflects the city planning department's efforts to create a Green Network Plan. The nursery and flower farm, which replaces the currently neglected inner block spaces along Etting Street, provide a comfortable and attractive journey through the southern half of the neighborhood. North of Gold Street, the multipurpose field and other neighborhood park spaces are no more than a few blocks away from neighborhood destinations such as the Enoch Pratt Library, Penn North Subway Station, and the neighborhood Community Development Corporation. In addition to establishing a connected series of green spaces, the plan also reflects other citywide goals by increasing tree canopy by nearly 66 percent and reducing the amount of stormwater runoff by over 70 percent.

The decline of Baltimore City's population may continue to leave behind vacant properties, but this design project demonstrates that the vacant properties across the city can be repurposed to establish a network of green spaces. This green network can improve access to recreational and natural amenities and help improve the public health outcomes of the remaining residents.

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