

Green Collar Corridors

Transforming Detroit's Vacant Commercial
Corridors Into Community Assets

University of Michigan

Taubman College of Architecture and Urban Planning

April 2018

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Executive Summary |

Green Collar Corridors

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Executive Summary

Detroit has 300 miles of commercial corridors, 27 of which the City of Detroit has targeted for traditional investment. This leaves 273 miles of commercial corridors that may not be suitable for traditional commercial development. This planning study is an assessment of the feasibility of transforming at least some of the remaining 273 miles into “Green Collar Corridors.”

The City of Detroit's Planning & Development Department asked students from the University of Michigan's Taubman College of Architecture and Urban Planning, the Ross School of Business, and the Michigan Law School to address the following questions:

- What is a Green Collar Corridor?
- Where might they be located?
- What land uses and/or businesses are appropriate along Green Collar Corridors ?
- What strategies might the city use to implement Green Collar Corridors?

This planning study seeks to answer these questions by:

- Selecting study sites to test the Green Collar Corridor concept
- Researching different land uses and determining their appropriateness for Green Collar Corridors
- Creating criteria to evaluate the suitability of potential Green Collar Corridor land uses for different corridors
- Identifying barriers that currently hinder redeveloping commercial corridors into Green Collar Corridors and identifying implementation strategies for overcoming those barriers

Green Collar Corridor Study Sites

A methodology was created to determine what types of corridors might be appropriate as Green Collar Corridors. Based on this analysis, five representative study sites were selected:

- **Fenkell Road** between Lahser Road and Evergreen Road
- **Grand River Avenue** between West Grand Boulevard and Joy Road
- **Mt. Elliot Street** between East Grand Boulevard and Gratiot Avenue
- **Mack Avenue** between Conner Street and Alter Road
- **Morang Road** between Kelly Road and I-94

Green Collar Corridors

Morang Road was selected as a control site because of its low vacancy and the presence of commercial activity relative to the other corridors. It was hypothesized that Green Collar Corridors would not be appropriate for corridors like Morang.

Green Collar Corridor Land Uses

Twelve land uses and land-based businesses in five broad categories were selected to study in more depth for a suitability analysis.

Urban Agriculture	Nursery	Renewable Energy	Natural and Passive	Green Collar Retail
Urban Garden	Tree Farm			
Produce Farm	Landscape Business	Solar	Meadow	Farm Stand
Flower Farm			Green Stormwater Infrastructure	
Biofuel Farm			Gateway	
Hydroponics			Urban Forest	
Aquaponics				



Figure ES.1: Examples of an urban farm, flower farm, tree farm, and hydroponics operations

Sources: *Andreini Piante, Daily Detroit, Food Urbanism, Arabia, Inc*

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Pairing Corridors with Land Uses

After land uses were identified, a process for identifying the suitability of land uses to different corridors was created. This process, summarized in Figure ES.2, was designed to match vacant parcels with suitable uses according to several criteria.

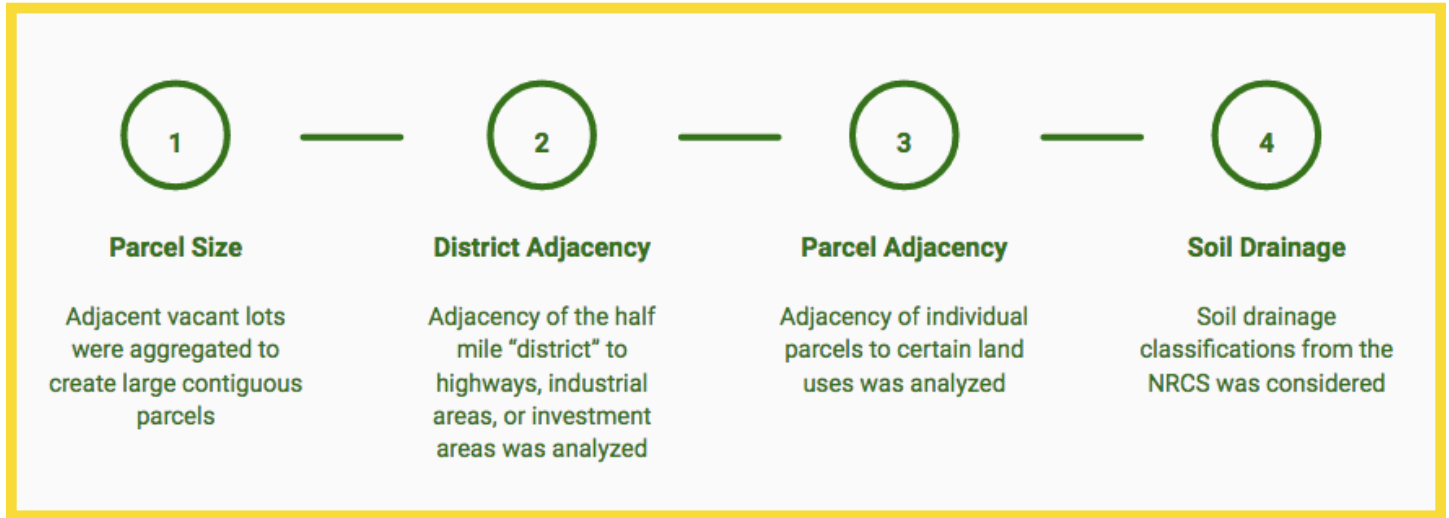


Figure ES.2: Overview of corridor suitability analysis criteria



Figure ES.3: Examples of an urban meadow, green stormwater infrastructure, solar array, and gateway corridor

Sources: UM Water Center, Urban Ecosystems Inc., Detroit Future City, Ground Works PC

Green Collar Corridors

Major Findings

General Themes

- Many parcels were suitable for several different land uses
- Flower farms, forests, and meadows appeared most frequently
- Biofuel production appeared infrequently
- Major differences were found between uses suitable along the corridor compared with the neighborhood behind it
- Parcel sizes along the corridor tended to be smaller, which limited their flexibility
- Growing edible crops was not suitable along corridors
- Parcels off of the corridor had a much greater flexibility in use because of their larger size and lack of other constraints (e.g., potential contamination)
- Gateway plantings and green stormwater infrastructure can be appropriate for all corridors
- Green Collar Corridors are not appropriate for low vacancy corridors that have smaller parcel sizes and more currently active traditional commercial uses.

Corridor Typologies

The analysis also showed that there is not just one type of Green Collar Corridor (GCC). There are several types of GCC that vary based on the characteristics of parcels on and off the corridor, adjacency to certain land uses, and the combination of land uses suitable for the district. While these uses can be mixed and matched along each corridor, five distinct themes emerged:

Productive¹

The defining characteristic of the Productive typology is that it is possible for productive uses to come up to the road. Flower farms make the most sense along the corridor, but produce farms could be close by. These corridors are along roads that have lower traffic, and therefore less air pollution. Fenkell Road is representative of the Productive GCC typology.

Buffer

The defining characteristic of the Buffer typology is its adjacency to a highway or other high-traffic roadway. A Buffer GCC uses non edible, productive agricultural uses to mitigate and separate neighborhoods from highways. Tree farms and urban forests could be planted along the commercial corridor and throughout the neighborhood on larger vacant parcels, while smaller parcels could support less intense uses, such as fresh cut flower farms. Because of Grand River's proximity to I-96 it is representative of a Buffer GCC.

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Energy

This typology is characterized by the presence of very large vacant parcels that can accommodate growing crops for biofuel and large-scale solar panel installation. Energy GCCs are also adjacent to industrial uses. Mt. Elliott is representative of the Energy typology.

Showroom

This typology is characterized by suitability for productive uses in the neighborhood behind the corridor, and smaller parcel types with the potential to act as “showrooms” for those productive uses on the corridor. Mack Avenue is representative of the Showroom typology. Because of the dense collection of contiguous, multi-use parcels located off of Mack, and limited use of the parcels along the corridor, this commercial corridor could be used as a showroom to market and display the productive uses happening in the neighborhood behind it.

Implementation Strategies

The following strategies are recommended to the city and its partner agencies to help facilitate the creation of Green Collar Corridors:

Zoning and Procedures

- **Allow urban farming by right in more zones**, such as R1, R2, or R3 areas, where they are currently a conditional use. This will remove the public hearing requirement and make it easier for land-based businesses to operate in these areas.
- **Streamline permitting and site plan approval** by creating a special, less cumbersome process for GCC land uses. Additionally, PDD could oversee this process rather than the Building, Safety and Engineering Department.

Business and Programming

- **Modify existing small business support to help start up and scale up land-based businesses:** Examples include creating a Motor City Land Match program that would match prospective land-based business owners with vacant land owners and creating a competition like Hatch Detroit for land-based businesses.
- **Recruit key large-scale land-based businesses**, like PureAgro from Fort Collins, CO to operate on large tracts of vacant land.
- **Launch a land-based business incubator**, where land-based businesses would lease a plot of land and receive training and support as they scale up their business. This is an idea similar to a tech business incubator, but it would take place on a shared plot of land rather than an office.

Green Collar Corridors

Land Acquisition and Cost

- **Defray remediation costs for land-based businesses:** Soil remediation costs are high and they pose a significant burden on land-based business operators. State programs that reimburse remediation costs for some types of brownfield developments could be expanded to land-based businesses.
- **Remove the price premium on commercially zoned land:** Residential land in the city is about \$0.20 per square foot. Commercial land is about \$1.00 to \$1.50 per square foot. PDD owns most of the vacant commercially zoned land in the city, while the Detroit Land Bank Authority (DLBA) owns most of the residential vacant land. PDD could sell its commercial parcels at a discount if they were used for GCC land uses, or transfer its inventory to the DLBA for sale at lower price points.
- **Streamline and clarify purchase process for publicly-owned land:** create a single customer-facing online map that allows prospective buyers to know which parcels are owned by which agency and either exclude or label parcels subject to development holds. This would allow buyers to know exactly what land is available and from what agency.
- **Offer Urban Farming Tax Credit:** The city might consider creating a tax credit geared toward urban farmers who own their land for a certain amount of time. If Detroit pursued this option and adapted it to GCCs, it would allow operators of these low-margin and small-scale land uses to improve their financial viability.

Land Ownership

- **Aggregate public and private land for larger-scale GCC uses:** Many land-based businesses need large plots of land to operate with a profit margin. To facilitate this, the DLBA could strategically aggregate vacant parcels in its inventory to facilitate larger scale GCC land uses.
- **Institute a long-term land leasing policy:** Lease agreements could be used to protect and ensure certain rights for GCC land uses long-term, and provide flexibility for transitional land uses. A five-year lease term would provide secure access to land-based businesses, and trigger eligibility for several USDA funding sources.
- **Assist businesses in using alternative land ownership:** Land trusts and cooperatives could increase equity and allow for use of smaller, dispersed parcels.

Design

- **Encourage cues to care:** Cues to care are maintenance practices that make a landscape attractive, and indicate that someone is caring for the site. They include, for example, neat and orderly plantings, visible and crisp edges, fencing, trimmed trees

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or hedges in straight rows, mown turf in the most publicly visible portions of a site, and colorful flowers.

- **Create design guidelines specific to land-based businesses:** One way to encourage cues to care may be through city-created design guidelines tailored to landscaping practices for land-based businesses.
- **Use public land to improve stormwater management and implement gateway designs:** The city might prioritize publicly owned vacant land for these types of plantings to beautify corridors. Green stormwater infrastructure (GSI) could also be placed in public rights-of-way for increased runoff capture and streetscape improvements.
- **Create a design competition for treatments to publicly owned land:** The city might consider funding a design competition for innovative landscaping on publicly owned land. The competition could prioritize projects that incorporate land-based businesses, gateways or GSI. Businesses could be paired with organizations like Detroit Future City or Keep Growing Detroit for design assistance.
- **Use green bonds to support improvements to public land:** Green bonds, sometimes called climate bonds or environmental impact bonds, are municipal bonds that are tied to some kind of performance metric, such as water pollution or emissions reduction. The city, may be able to, and might consider taking out green municipal bonds for GSI projects in the public right of way, tying the payment to combined sewer overflow reduction metrics.
- **Implement pooled stormwater fee credits program:** DWSD could make the process of pooling stormwater credits offsite more repeatable and standardized, as a way to encourage more widespread adoption and make the program more effective.

Conclusion and Next Steps

Green Collar Corridors are an ambitious but promising idea. The city can use the methodology outlined in this planning study to identify and implement Green Collar Corridors. In order to accomplish this, city officials might consider analyzing all commercial corridors and using the techniques from this study to select one to three locations for a pilot Green Collar Corridor.

In order to determine a pilot GCC location, the city might add an additional layer to the methodology in this document that analyzes where GCC land uses are already occurring in Detroit with an eye towards equity and inclusion. Transparent community engagement in a planning process will be key to acceptance. Piloting GCCs in areas where residents are already embracing GCC land uses may help ensure the project's success.

Green Collar Corridors

Finally the city can work with a variety of its partners to create programs to accelerate the start up and scaling-up of land-based businesses, especially those that are resident-led.

Some immediate wins could include:

- Hiring a Green Collar Corridor Coordinator at DEGC
- Partnering with DLBA to create a longer -term land leasing policy
- Partner with organizations such as Detroit Future City, Keep Growing Detroit, and DesignCore to provide design support to land-based businesses

This study is the beginning of a process that the city can undertake to determine how to best unleash the economic potential of detroit's underutilized commercial corridors.

Sources:

1. Icon sources: Agriculture, Noun Project, Accessed April 20, 2018 at <https://thenounproject.com/term/agriculture/639647/>; Buffer, Espavo Design, Accessed April 20, 2018 at <https://espavodesign.com/wp-content/uploads/2016/12/tree-of-life-symbol2.png>; Energy, IconsMind, Accessed April 20, 2018 at <http://www.iconarchive.com/show/outline-icons-by-iconsmind/solar-icon.html>; Showroom, Icon Finder, Accessed April 20, 2018 at https://www.iconfinder.com/icons/538693/bloom_daisy_flower_gardening_planting_spring_flower_icon#-size=256

Executive Summary

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1. Introduction |

Green Collar Corridors

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1. Introduction

Detroit has over 300 miles of commercial corridors, portions of which lie largely vacated and underutilized. Enterprising Detroiters have long been exploring a variety of productive green land uses to turn vacant land from a liability to an asset. This planning study looks at taking these types of projects to scale to unleash the economic potential of vacant commercial corridors as Green Collar Corridors that create a better living environment for Detroiters.

The City of Detroit's Planning and Development Department (PDD) asked students from the University of Michigan to assess the feasibility of creating Green Collar Corridors to leverage



Figure 1.1 Many of Detroit's commercial corridors have an abundance of vacant land

vacant land as an economic and environmental asset in areas along underused commercial corridors.

An interdisciplinary team was engaged, led by graduate students at the Taubman College of Architecture and Urban Planning and supported by students at the Ross School of Business and Michigan Law School.

The PDD charged the interdisciplinary team to:

- Provide a workable definition of what a Green Collar Corridor (GCC) might be
- Provide guidance to PDD on what investments they might make to encourage the repurposing of currently vacant commercial corridors to transform them into GCCs, especially in terms of aesthetic improvements
- Provide guidance to PDD on what kinds of information or support staff might provide to private landowners or potential business owners seeking to establish a GCC
- Identify current barriers to the development of GCCs, such as current zoning and related processes
- If possible, provide guidance and/or criteria PDD might use to identify or prioritize corridors for support as GCCs

Context

Detroit is a quintessential example of a post-industrial Rust Belt city. During the 20th century, Detroit transitioned from an automotive boom town, and one of the wealthiest cities in the country, into post-industrial decline as those jobs left the city. This and other factors outside the city's control resulted in a prolonged decline in population. As automotive industry jobs declined and the city's population followed, Detroit suffered a persistently worsening economic climate.

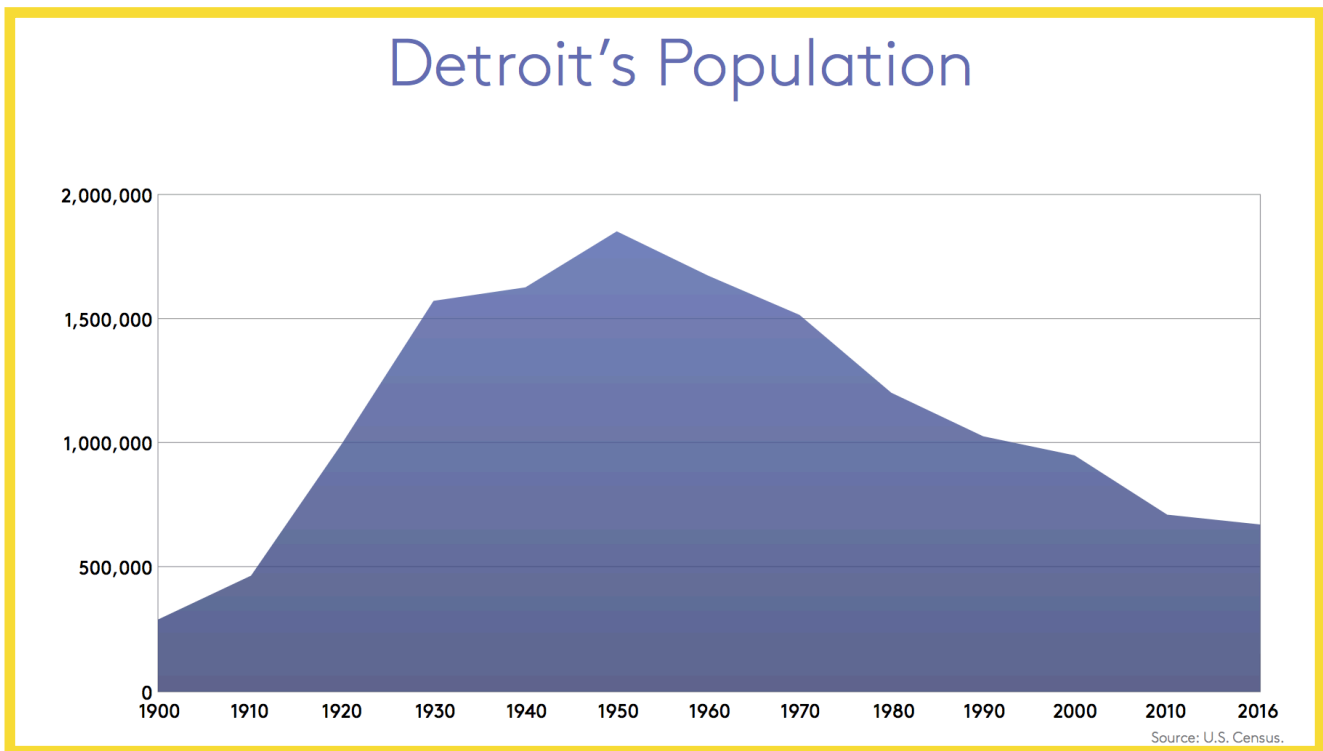


Figure 1.2 Detroit's prolonged population decline
Image source: Detroit Future City

As a result of disinvestment, depopulation, and a rise in unemployment, demand for homes and commercial properties in the city fell over time, particularly during the Great Recession. Today, there are over 300 miles of commercial corridors in the city that are at least partly vacant and underutilized. City departments have pledged to focus investment in traditional commercial development and streetscape improvements on 27 of these miles. This leaves over 250 miles of corridors that may not be suitable for traditional commercial development.

The PDD has been exploring the concept of GCCs as a way to improve the look and economic vibrancy of largely vacant commercial areas. This planning study seeks to assess the feasibility of creating GCCs as a way to leverage vacant land as an economic and environmental asset in these corridors not suitable for traditional commercial development.

Introduction

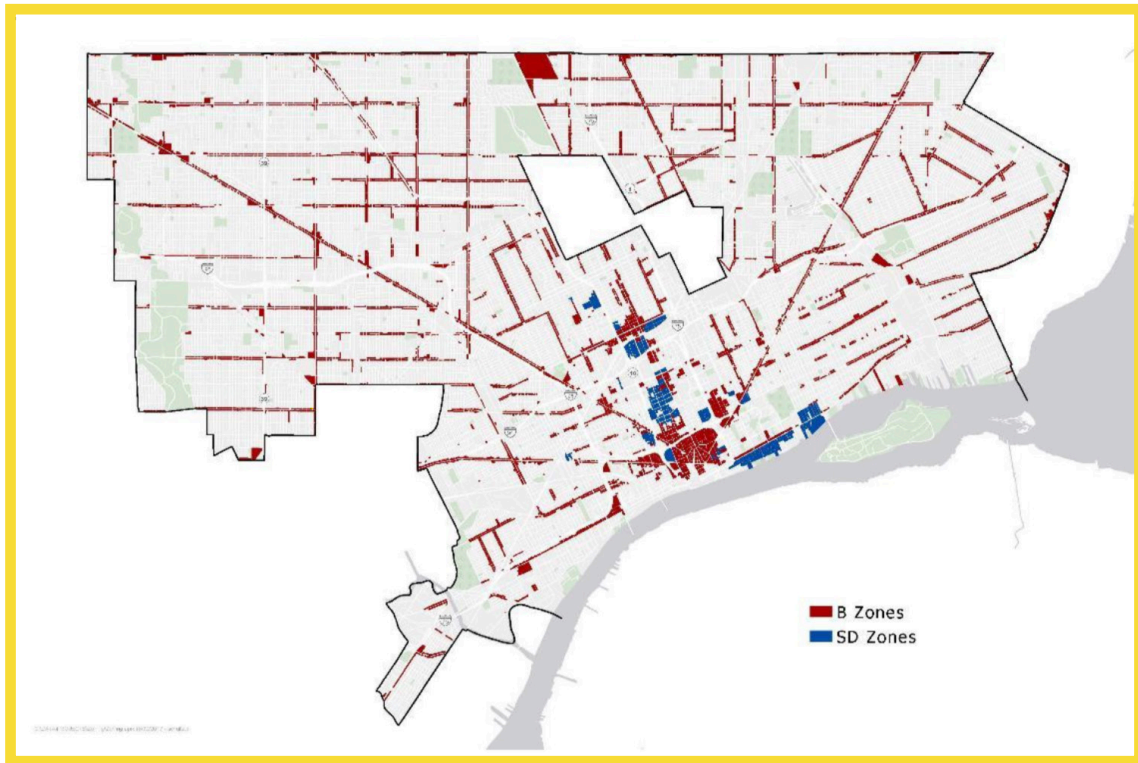


Figure 1.3 Current state of corridor zoning in Detroit
Image source: Detroit Planning & Development Department

Definition and Description of Green Collar Corridors

Preliminary meetings with PDD and members of an advisory group convened to assist with this study, highlighted issues and goals that GCCs should address, and what characteristics they might have. GCCs could:

- Be aesthetically pleasing, well-maintained, safe-looking, economically vibrant and inviting corridors that serve as gateways to neighborhoods and investment areas
- Feature primarily land-based businesses, such as urban agriculture and tree farms, that would ideally serve and benefit the residents of the surrounding neighborhoods, and operate at a scale consistent with the amount of vacant land on the corridor and surrounding area
- Include a spectrum of land uses, from more passive and natural green stormwater infrastructure to more intensive light industrial
- Improve stormwater management, pedestrian and bicycle amenities, and other streetscape elements to attract businesses to the corridors
- Entice private investment to corridors, and surrounding areas
- Create jobs for residents in businesses that conduct green commerce
- Prioritize existing Detroiters in starting or scaling-up their green businesses before recruiting new large-scale green uses from outside of Detroit

Based on these goals, the following working definition of Green Collar Corridors was created:

High-visibility green thoroughfares that feature well-maintained, stakeholder-informed, land-based green commerce. GCCs connect nodes of traditional commercial activity along thoughtfully designed and landscaped transects that provide job creation and environmental benefits throughout the corridor.

Scope of the Project

This report examines the concept of GCCs. It builds off of existing city and non-governmental organization work, such as the Mix Tape report, Detroit Future City reports, and community organization reports.

The report is organized into the following chapters:

- **2. Identifying Green Collar Corridor Typologies:** This study identifies characteristics of commercial corridors that may be appropriate for certain kinds of Green Collar land uses using a number of criteria
- **3. Selecting Land - Based and Green Collar Business Types:** It also analyzes several different land uses for their suitability within these corridors, and provide a guide that the city and prospective business owners can use to identify where these uses are most appropriate
- **4. Pairing Corridors with Land Use Types:** A corridor suitability analysis is used to match corridor and land characteristics with land use and business types
- **5. Innovations to Encourage Green Collar Corridor Implementation:** A variety of tools are analyzed to identify what could encourage the creation of these corridors, including: zoning and administrative processes; programming and technical assistance; land acquisition and ownership models; and design

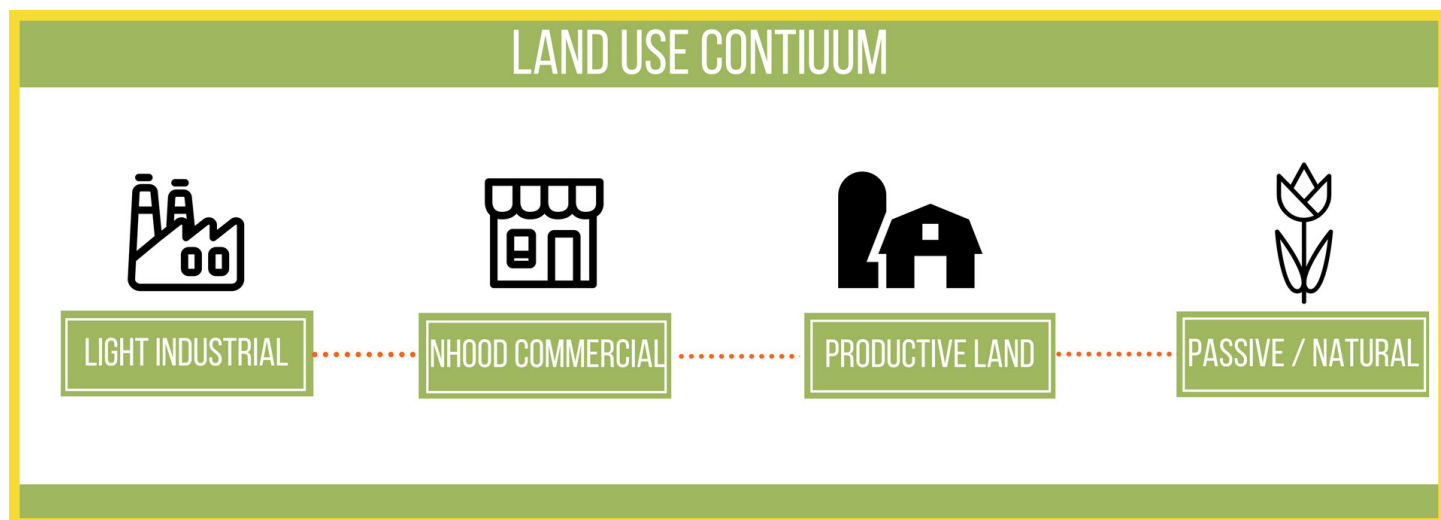


Figure 1.4 Green Collar Corridors could include a variety of land uses

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2. Selecting Green Collar Corridor Study Sites

Green Collar Corridors

2. Selecting Green Collar Corridor Study Sites

This chapter outlines the process used to select the study sites analyzed, and it details the current conditions of these sites.

Site Selection

Five sites were selected to assess the feasibility of Green Collar Corridors (GCCs) in Detroit. These were chosen as study sites or test cases of common types of commercial corridors throughout the city. They are not meant to be the only sites where GCCs are possible, but were chosen to show how GCCs might work along different kinds of commercial corridors with a predominance of vacant land that are typically found in Detroit.

The first step in identifying the five sites involved establishing criteria that characterize key attributes of a GCC. The defining characteristic of a GCC is the presence of a high degree of vacancy, both land and structural. Because many commercial corridors in Detroit have significant vacancy rates, it was necessary to select corridors with higher than average rates. Accordingly, corridor land vacancy was considered low below 50%, and high above 50%. Corridor structural vacancy was considered low below 15% and high above 15%. Vacancy was measured in acres.

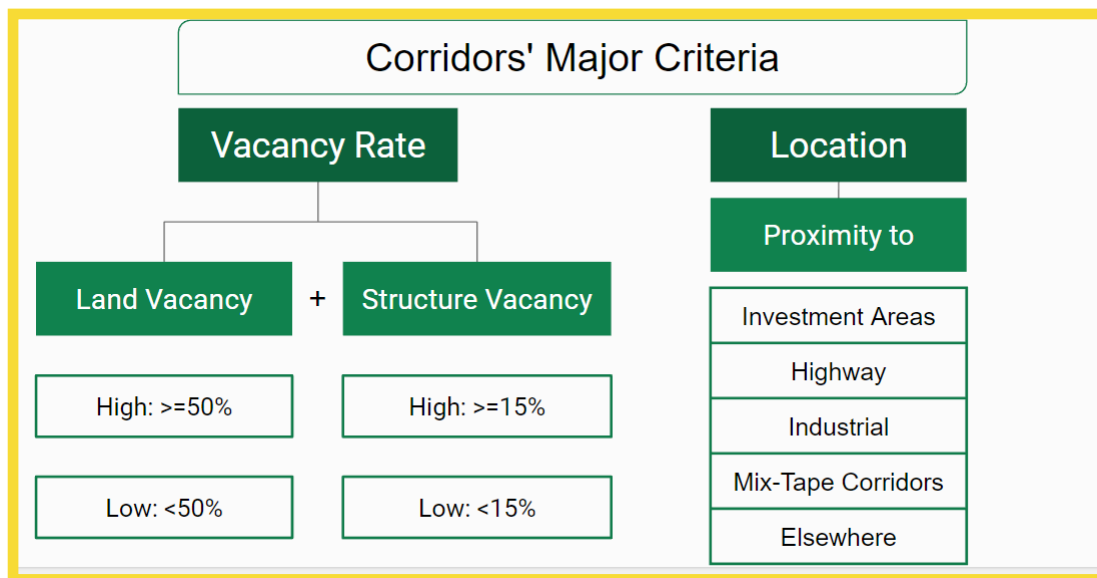


Figure 2.1 Site selection methodology

The secondary criteria considered included the corridors' proximity to certain land uses, the width and traffic level of roads, and areas which the city has targeted for future development projects. GCCs may act as gateways to redeveloping commercial corridors and the neighborhoods behind them, so another consideration was the potential effect that adjacency to certain land uses would have on the success of GCCs.

Green Collar Corridors

Accordingly, proximity to the following land uses was added as a criterion as well:

- Highways
- Industrial uses
- Designated multifamily investment areas
- Designated Mix Tape Corridors

Adjacency to highways and industrial uses were considered because of the potential for GCCs to act as green buffers between major roadways, commercial corridors, or industrial businesses and their adjacent neighborhoods. GCCs could provide air pollution mitigation for areas adjacent to major highways because of increased tree and vegetation plantings.

Multifamily Investment Areas are parts of the city the Detroit Housing and Revitalization Department has targeted for housing development.¹ Mix Tape Corridors have been designated by the Planning and Development Department (PDD) as areas to target mixed-use development.² Adjacency to these areas was considered because of the potential for GCCs to act as gateways to districts where the city is focusing investment and encouraging traditional commercial development. GCCs could be “thoughtfully designed and landscaped transects” that could act as gateways to these investment areas and encourage businesses to locate there.

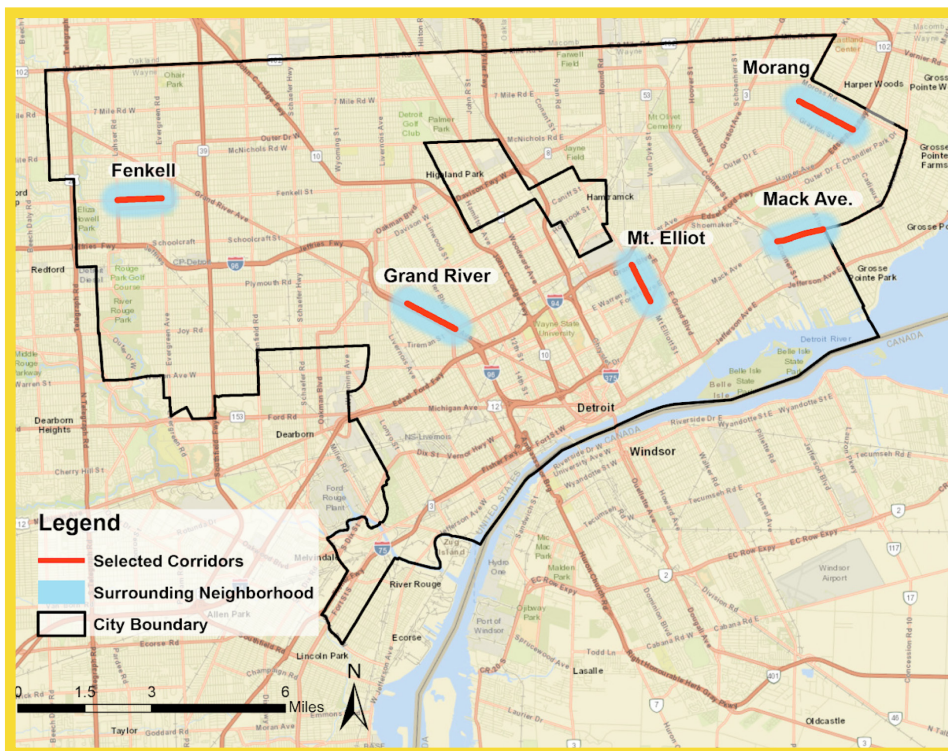


Figure 2.2 Green Collar Corridor representative study sites
Sources: Created from City of Detroit Boundary, 2017; SEMCOG Roads, 2017 (See Appendix A)

After criteria were selected, different combinations of them were used to create nine typologies.

This initial set of nine was then narrowed down to a final set of five that were sufficiently representative of other corridors throughout Detroit. To make this final selection, a frequency test using Geographic Information System (GIS) was conducted. Thirty commercial corridors were randomly selected to see which

Selecting Green Collar Corridor Study Sites

fell into which typologies the most frequently. See Appendix A for a list of data sources used. Five typologies proved to be the most representative of commercial corridors in Detroit, as summarized in Figure 2.2.

As shown on figure 2.2 the five study sites and their geographic location are distributed across Detroit. A half mile buffer was drawn around each study site so that the vacant land located off of the corridor could be included in further analysis.

Corridor Location	Vacant Land in District (Acres)	Traffic Count	Population	Median Income	Zoning Types	Major Land Uses	Street Scale	Other
Mt. Elliott (Grand Blvd E to Gratiot Ave)	326	6,172	1,781	\$20,676	B4, M4	Industrial, Restarants, Auto	Minor Arterial	Close to Packard Plant, Island View Planning District
Grand River (W. Grand Blvd. to Joy Rd.)	241	20,550	11,205	\$19,531	B4	Vacant, Auto, Convenience stores	Principal Arterial	Adjacent to I-96
Fenkell Rd (Lahser Rd to Evergreen Rd.)	257	19,200	16,019	\$28,810	B4, R1	Auto, Religious, Low/Medium Density Residential	Minor Arterial	Mix-Tape Corridor
Mack Ave (Conners St. to Alter Rd.)	323	11,000	4,135	\$13,905	B4, PD, R2	Restaurants, Auto, Religious	Major Arterial	In LEAP area
Morang Dr (Kelly Rd to Edsel Ford Fwy)	37	9,550	18,091	\$27,894	B4, R2	Restaurants, Banks, Convenience stores	Minor Arterial	Adjacent to 94

Table 2.1 Five study sites

Sources: Motor City Mapping, MCMSurveyData (Parcel map), 2014; SEMCOG traffic volume map, 2015; City of Detroit Zoning map, 2018; Census ACS, 2016 (See Appendix A)

Current Conditions of Sample Study Sites

Fenkell Corridor

The Fenkell corridor is located on the city's northwest side. It follows Fenkell Avenue from Lahser Road to Evergreen Road. During Detroit's boom this corridor had many residences and automobile-oriented businesses. Now, the corridor has a large number of empty buildings. This corridor is notable for its community organizations, such as Neighbors Building Brightmoor, working on land transformation and neighborhood stability. Fenkell's adjacency to Grand River, a Mix Tape investment zone, was also notable. See Appendix B for demographic information on Fenkell and the surrounding area. Sixty four percent of the vacant land is publicly owned within the Fenkell district. There are no publicly owned vacant structures on Fenkell and therefore no map showing the location of vacant structures.



Figure 2.3 View of vacant structures along Fenkell Road on Detroit's Northwest Side

Selecting Green Collar Corridor Study Sites

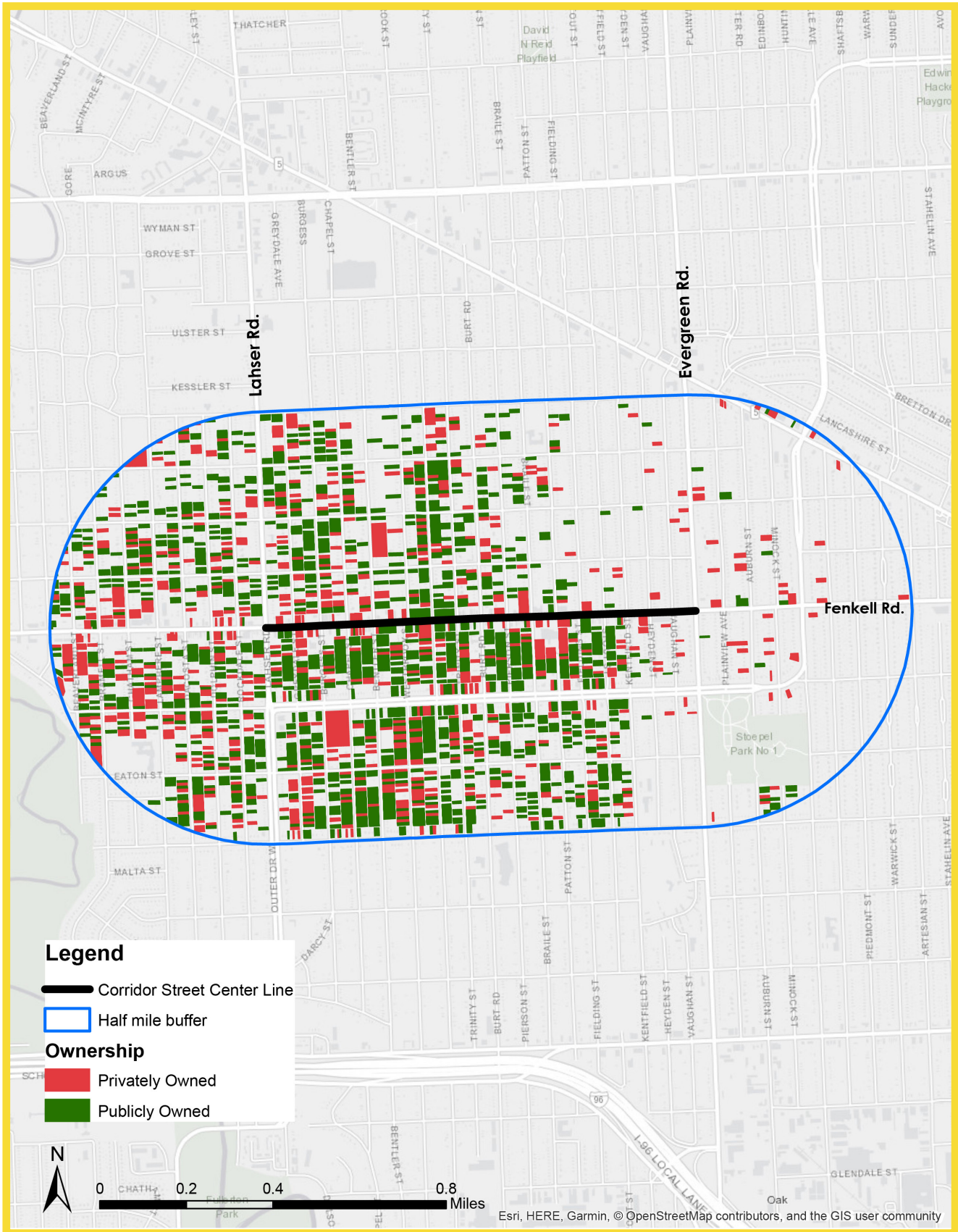


Figure 2.4 Vacant parcel ownership within half mile buffer (Fenkell)
 Sources: Created from Motor City Mapping, MCMsurveyData (Parcel map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Green Collar Corridors

Grand River Corridor

The Grand River corridor is located on the west side of Detroit between West Grand Boulevard to the southeast and Joy Road to the northwest. This stretch of Grand River Avenue is situated about one mile west of Wayne State University's campus. I-96 is located to the southwest of the corridor, and the entire stretch of Grand River is adjacent to the interstate. During Detroit's boom, this corridor had entertainment, retail, and automobile businesses. Now the corridor has a large amount of vacancy in both structures and land compared to the other sample sites. The corridor is notable for closely paralleling I-96. See Appendix B for demographic information on Grand River and the surrounding area. 58% of the vacant land in the Grand River neighborhood is publicly owned. Twenty three percent of the vacant structures are publicly owned along Grand River.



Figure 2.5 View of vacant land along Grand River Avenue

Selecting Green Collar Corridor Study Sites

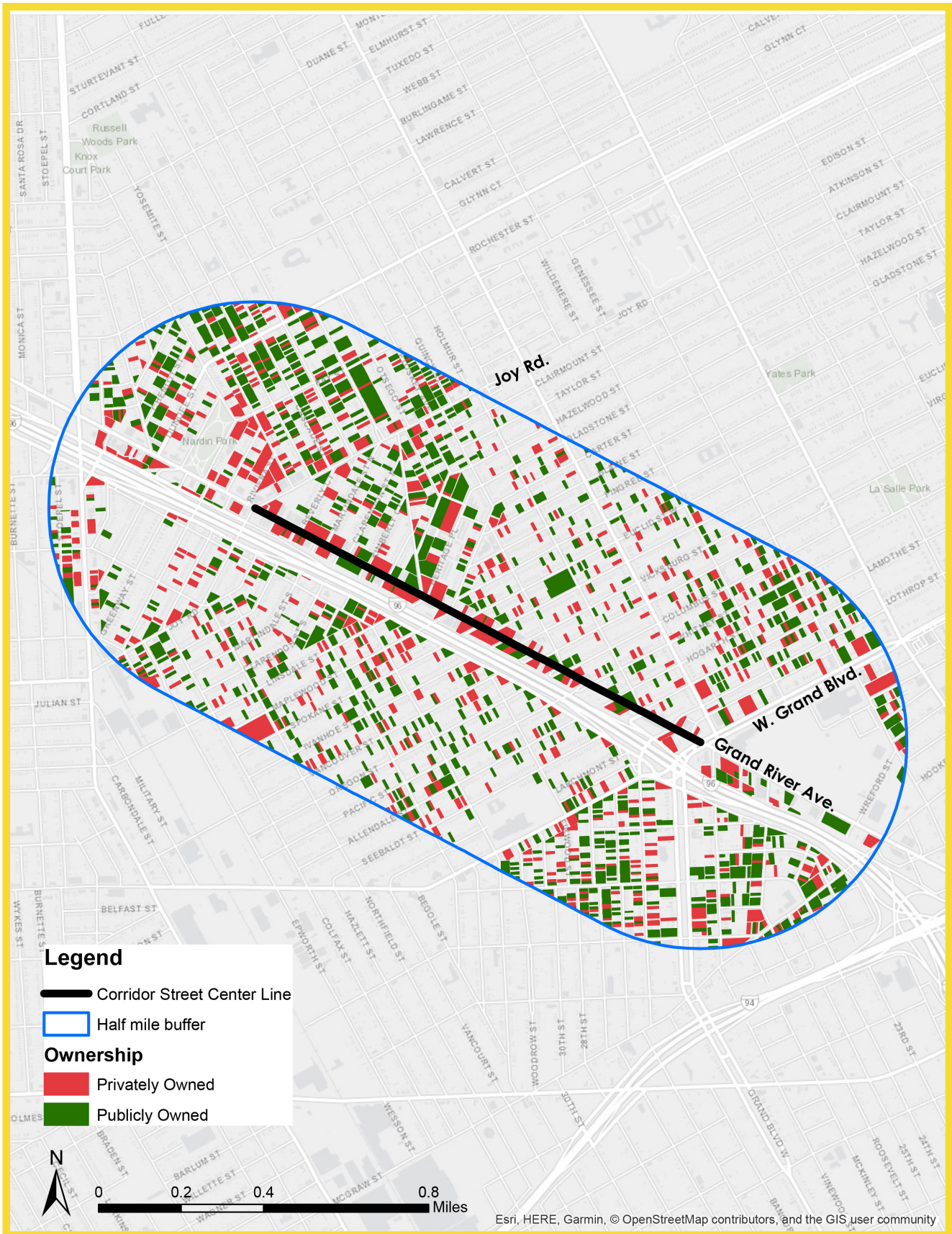


Figure 2.6 Vacant parcel ownership within half mile buffer(Grand River)

Sources: Created from Motor City Mapping, MCMsurveyData (Parcel map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Green Collar Corridors



Figure 2.7 Vacant structure ownership along Grand River
 Sources: Created from Motor City Mapping, MCMsurveyData (Structure map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Selecting Green Collar Corridor Study Sites

Mt. Elliott Corridor

The Mt. Elliott corridor is located in the eastern part of the city, northeast of downtown and south of Hamtramck and I-94. It follows Mt. Elliott Street between Grand Boulevard and Gratiot Avenue. During Detroit's boom, this corridor had automobile service stations, restaurants, and stores. Today, the corridor has a very high level of land vacancy; as well as the highest of any of the five study sites. The vacant former Packard assembly plant is one of the corridor's landmarks. See Appendix B for demographic information on Mt. Elliott and the surrounding area. Fifty two percent of vacant land in the Mt. Elliot district is publically owned. Forty one percent of structures along Mt. Elliott are publically owned.



Figure 2.8 View of vacant lot and intersection along Mt. Elliott Street

Green Collar Corridors

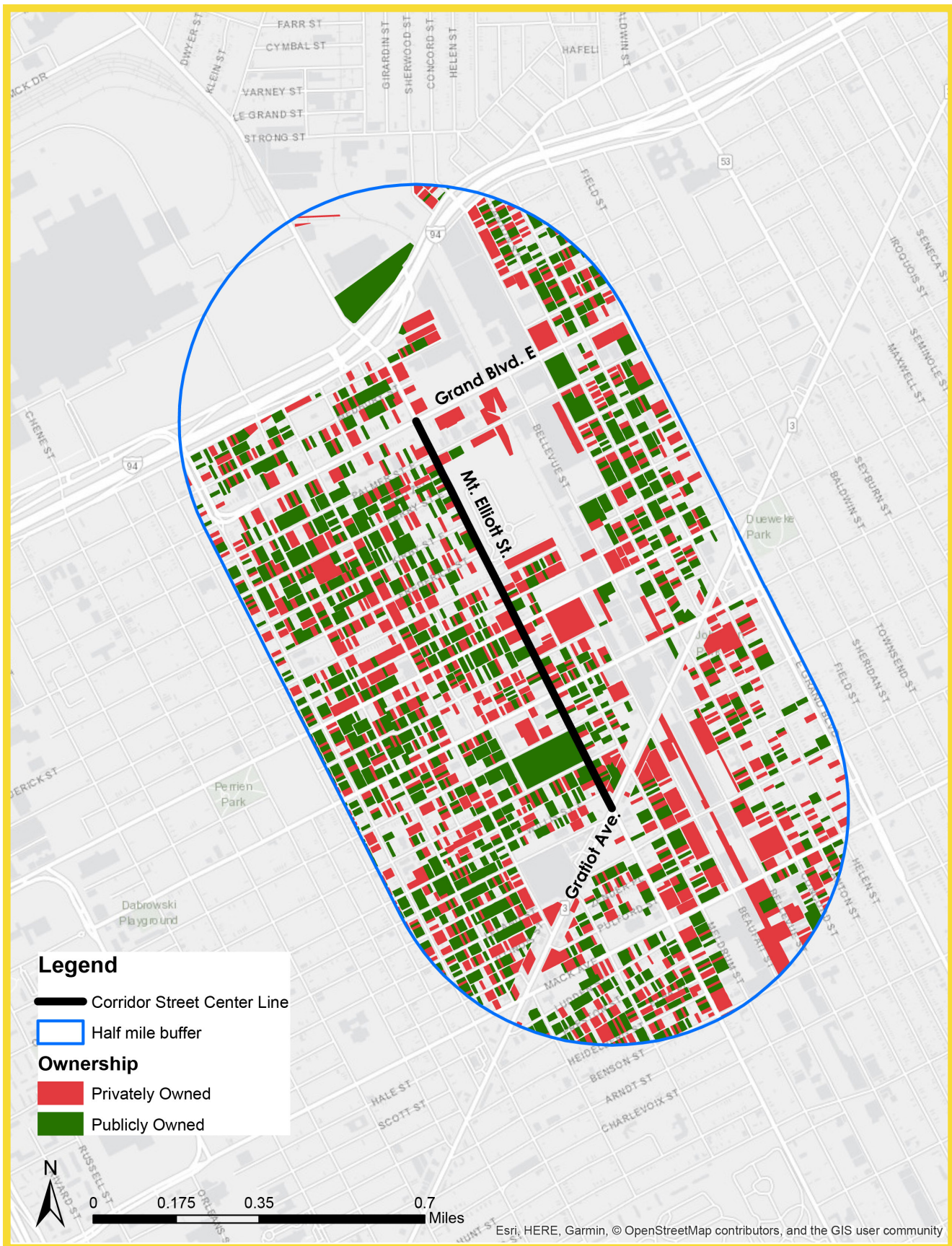


Figure 2.9 Vacant parcel ownership within half mile buffer (Mt. Elliott)
 Sources: Created from Motor City Mapping, MCMSurveyData (Parcel map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Selecting Green Collar Corridor Study Sites

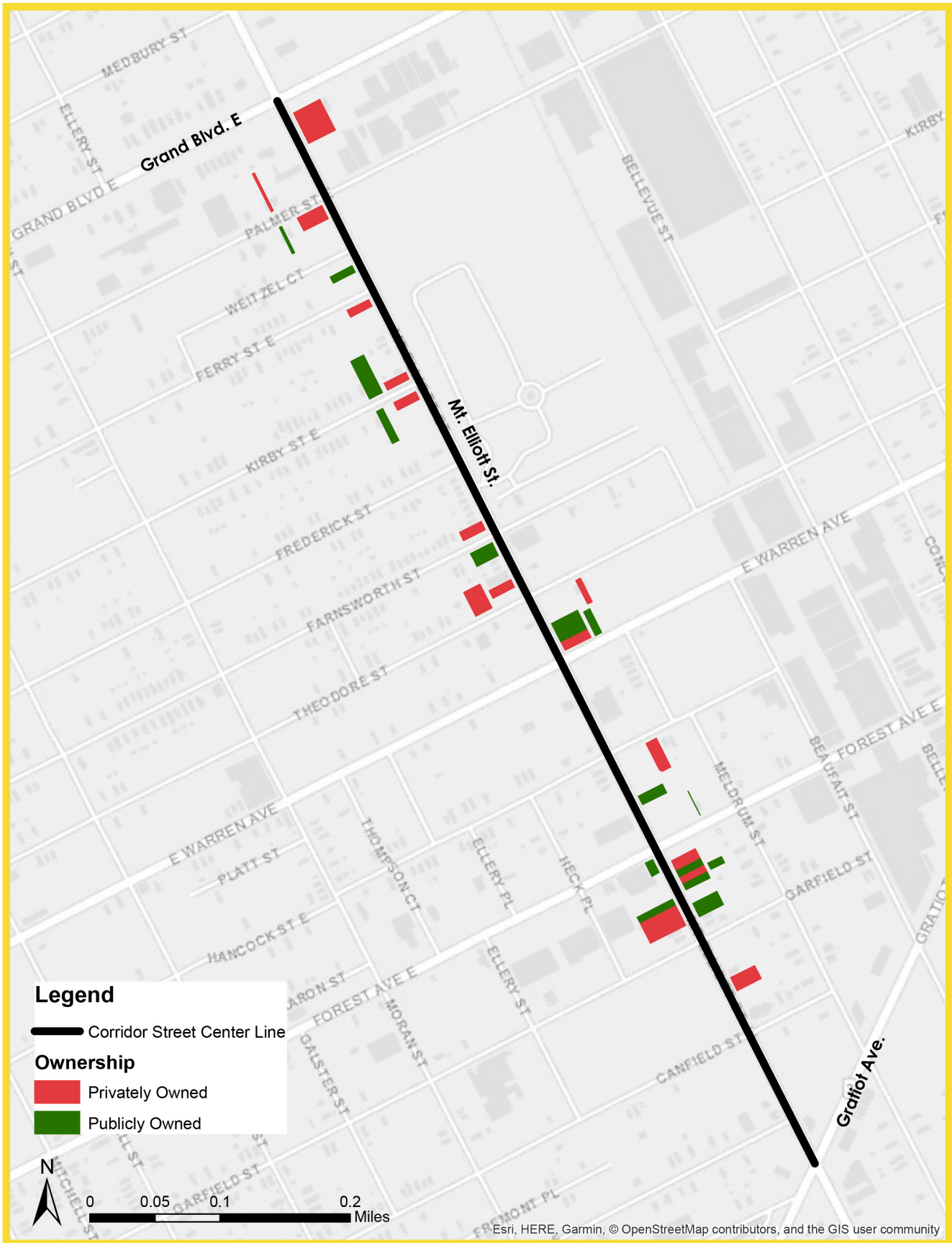


Figure 2.10 Vacant structure ownership along Mt. Elliot

Sources: Created from Motor City Mapping, MCMsurveyData (Structure map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Green Collar Corridors

Mack Corridor

The Mack corridor is located on the southeast side of Detroit, next to the Mack Engine Plant. It follows Mack Avenue between Conner Street and Alter Road. During Detroit's boom this corridor had several automobile service stations, a lumber yard, and a bowling alley. The corridor is notable for its adjacency to the Chrysler plant and Grosse Pointe Park and its active community organizations such as Eastside Community Network working on land transformation and neighborhood stability. See Appendix B for demographic information on Mack and the surrounding area. Fifty two percent of vacant land in the Mack district is publically owned. Twenty two percent of structures along Mack corridor are publically owned.



Figure 3.11 View of intersection along Mack Avenue

Selecting Green Collar Corridor Study Sites

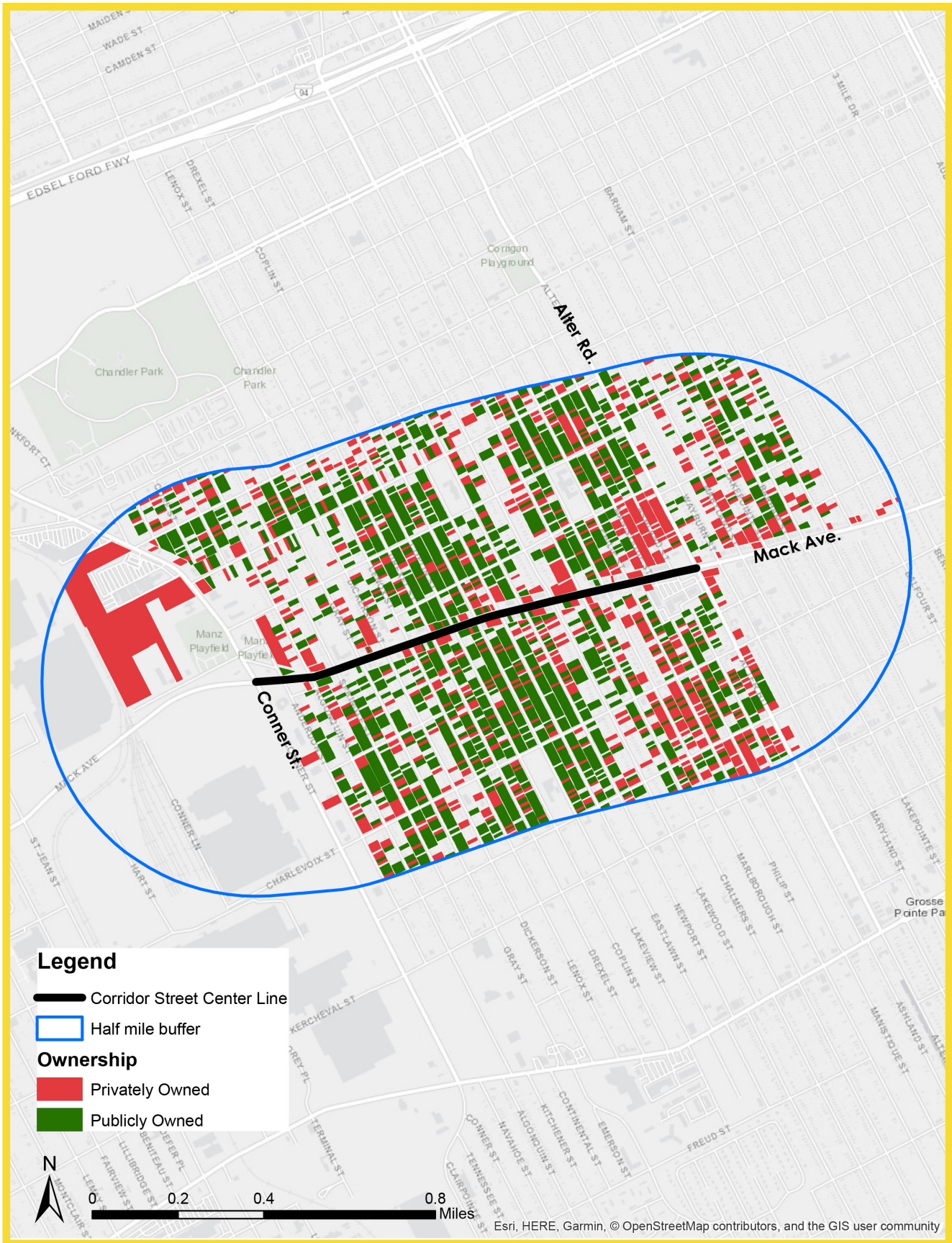


Figure 2.12 Vacant parcel ownership within half mile buffer (Mack)

Sources: Created from Motor City Mapping, MCMsurveyData (Parcel map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Green Collar Corridors



Figure 2.13 Vacant structure ownership along Mack

Sources: Created from Motor City Mapping, MCMsurveyData (Structure map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Selecting Green Collar Corridor Study Sites

Morang Corridor

The Morang corridor is located on the northeast side of Detroit and follows Morang Road between Kelly Road to the northwest and the Edsel Ford Freeway (I-94) to the southeast. During Detroit's boom this corridor included predominantly residential uses and places of worship. Today, the corridor has a relatively stable community and some strip malls. The corridor is notable for its stability and low vacancy relative to the other corridors. See Appendix B for demographic information on Morang and the surrounding area. Fifty four percent of vacant land in the Morang district is publically owned. Eleven percent of structures along Morang are publically owned.

Morang Road was selected as a control corridor because of its lower vacancy and higher levels of economic activity compared with the other corridors, anticipating that it would prove not to represent a viable type of corridor for investment as a GCC.



Figure 2.14 View of stores along Morang Drive

Green Collar Corridors

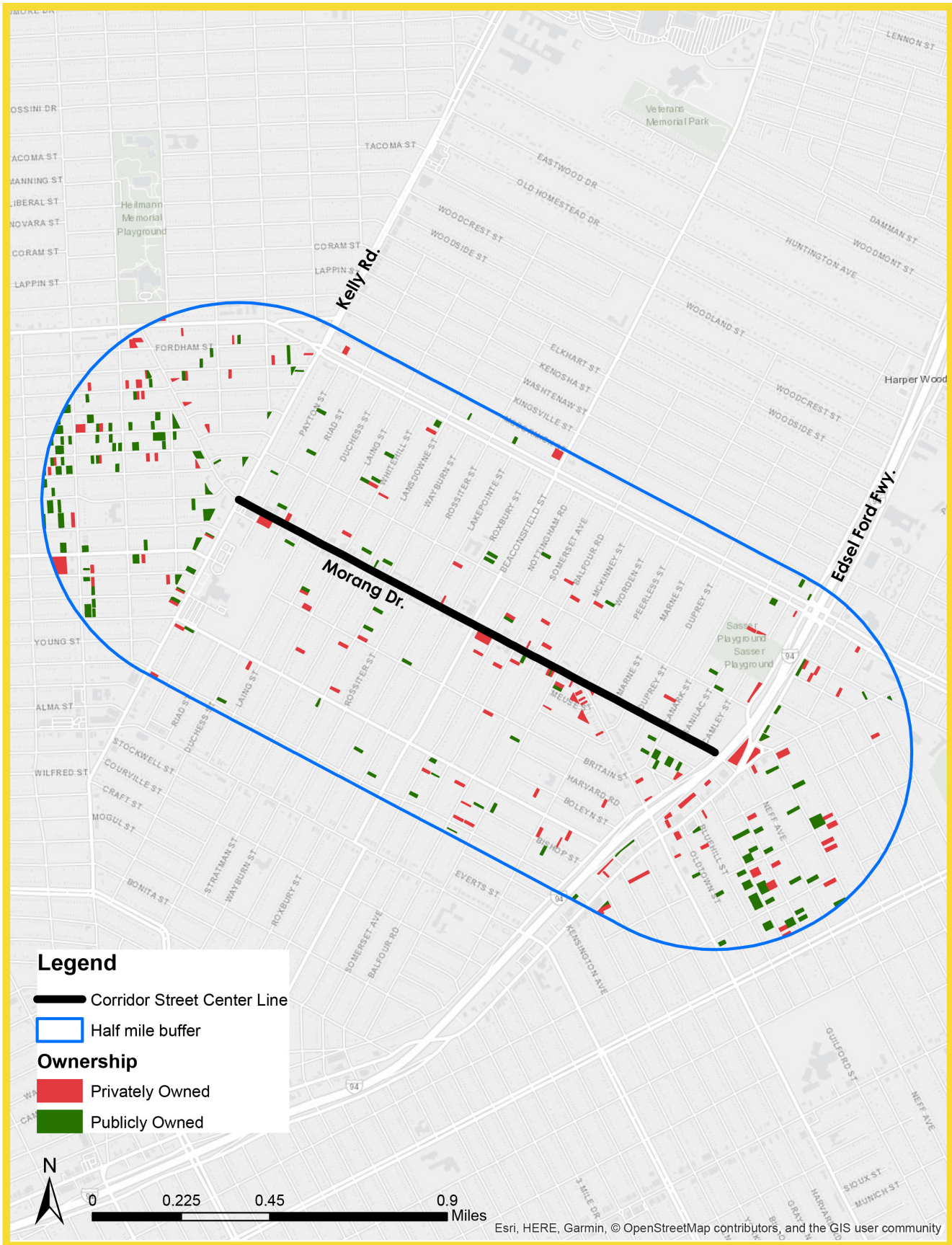


Figure 2.15 Vacant parcel ownership within half mile buffer(Morang)
 Sources: Created from Motor City Mapping, MCMsurveyData (Parcel map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Selecting Green Collar Corridor Study Sites



Figure 2.16 Vacant structure ownership along Morang
 Sources: Created from Motor City Mapping, MCMSurveyData (Structure map), 2014; SEMCOG Roads, 2017 (See Appendix A)

Green Collar Corridors

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3. Selecting Land-Based and Green Collar Business Types

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3. Selecting Land-Based and Green Collar Business Types

Green Collar Corridors (GCCs) are defined as high-visibility green thoroughfares that feature well-maintained, stakeholder-informed, land-based green commerce. GCCs connect nodes of traditional commercial activity along thoughtfully designed and landscaped transects and provide job creation and environmental benefits throughout the corridor. An original list of 27 land-based businesses and other green uses were analyzed for their applicability to a GCC. Figure 3.1 shows the initial list of uses analyzed. The list of 27 was narrowed down to 12, a more manageable size to provide an in-depth look at these uses as requested by the Detroit Planning and Development Department (PDD).

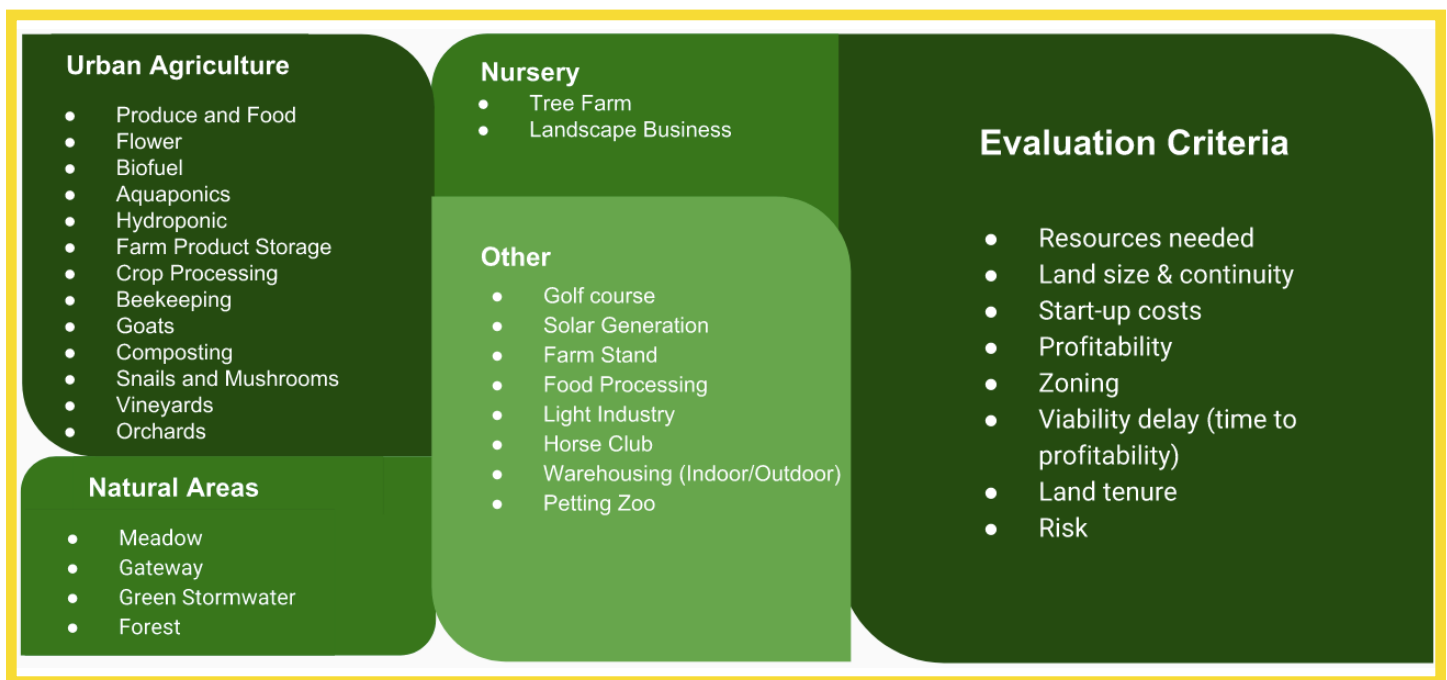


Figure 3.1: Preliminary land-based business evaluation

To distill the original 27 land use types to the final 12, the study drew information from the following sources:

- *PDD permitting data:* Urban farms, orchards, and tree or plant nurseries were the most common businesses applying for permits in the city
- *Reports produced by the Center for Community Progress (CCP) and Detroit Future City (DFC):* Urban farms, tree farms, crops for biofuel, and urban meadows were identified as the most appropriate uses for open space in Detroit
- *Advisory group member feedback:* Group members requested analysis of hydroponics and aquaponics land uses

Green Collar Corridors

Overview of Selected Land Uses

- **Urban agriculture:** Broadly, this category includes crops that are harvested regularly, including food crops. Specifically, it includes:
 - Food and produce
 - Flowers
 - Biofuel crops
 - Aquaponics
 - Hydroponics
- **Nursery:** Nurseries grow plants for eventual transplantation to another site or harvesting after several years. Nurseries can include:
 - Tree farms
 - Landscape businesses
- **Natural and passive uses:** These uses are for areas where traditional developments are least likely, or where a more natural environment is desired. They include:
 - Urban meadows
 - Green stormwater infrastructure
 - Gateway plantings
- **Renewable energy generation:** This use category is focused on the production of energy from renewable sources. It includes solar generation
- **Green collar corridor retail:** This use is meant to connect crop growers to retail opportunities. Here, this use focuses on farm stands

See Appendix C for a detailed overview of land use evaluation criteria and findings. Note that land-based businesses are not universally desired by Detroit residents, therefore the design of Green Collar Corridors and the businesses located on or near them should take cues to care into consideration (See Chapter 5 for more detail on design).

Land Uses

Urban Agriculture

Urban agriculture refers to the growing of crops in an urban setting. While urban farms and gardens commonly grow produce, flowers and crops for the production of biofuel are increasingly common.¹ Detroit defines an urban farm as an operation over one acre that grows food and/or non-edible crops for personal or group use that may or may not be for commercial use. Alternatively, urban gardens are similar but are under an acre.² This planning study focused on urban farms and gardens that grow food, flowers, and crops for biofuel, as well as indoor hydroponics and aquaponics operations. Urban agriculture operations need access to water for crops, which must be considered when choosing a site and creating a budget.³



Figure 3.2: Many urban farms use raised beds to grow produce to avoid contaminated soils
Source: Food Urbanism

Food

The most common types of urban farms and gardens grow food and produce, and they are often non-profit, community-driven organizations. However, commercial urban farms are increasingly common. Urban farms can be profitable at sizes ranging from one to five acres.⁴ Common expenses for urban farms include: soil testing, tilling, irrigation, plowing, raised beds, and hoop house or greenhouse construction.⁵ In Detroit, initial costs for labor, supplies, and equipment for the first year can be as high as \$50,000 per acre.⁶ Soil contamination is also important when evaluating urban farm siting. Urban soils tend to have higher levels of lead, arsenic, mercury, and other hazardous contaminants from past land-uses, which is why

Green Collar Corridors

some farms rely on growing crops in raised beds hoop houses or greenhouses that are not directly adjacent to high car traffic areas.⁷ Based on contamination, higher property prices for commercial properties, and smaller parcel sizes, produce farming is not recommended along commercial corridors.

Keep Growing Detroit estimates that there are over 1,547 urban farms and gardens of various sizes participating in their Garden Resource Program in the City of Detroit.⁸

“Flower Farms are the most profitable types of urban farms”

Flowers

Flower farms grow flowers for eventual sale as bouquets and arrangements. Flower farms are the most profitable types of urban farms, and therefore require less land.⁹ Flower farms can be profitable on land as small as $\frac{1}{4}$ of an acre. Generally, urban flower farms do not exceed five acres in size. Profits from flower farming range between \$25,000 and \$35,000 per acre.¹⁰ To extend the growing season, hoop houses can be used to allow flowers to grow in colder temperatures. Soil contamination is not as critical for flower farms, as they are not usually grown for human consumption. Some flower species, like sunflowers, can remediate soil contaminants over time.



Figure 3.3: Fresh Cut Flower Farm, located in Detroit's Woodbridge neighborhood
Source: Daily Detroit

Cut Flowers: Insights from the Ross School of Business

Cut flowers are some of the most profitable crops grown. Cut flower farms grown on less than an acre, have an average startup cost around \$25,000, and can break even after three to five years. After the break even point, flower farms at this size can make a profit around \$28,000 per acre. Cut flower farms can create jobs for local residents by using unspecialized labor paying above minimum wage. Farms usually have between 1-10 employees.¹¹

Selecting Land Based and Green Collar Business Types

Biofuel

Growing biofuel crops is a low-maintenance option for reusing vacant land. Biofuel crops need to be grown in large quantities to be profitable. Pennycress is a low-maintenance crop that can be used for biofuel. Implementation and maintenance costs of pennycress farms are low, but the revenue potential is also low unless grown at a large scale. One acre of pennycress can produce up to 100 gallons of oil that is used for biofuel.¹² Because pennycress and other biofuel crops require large acreages to be profitable, these low maintenance crops may be most suitable for publicly-owned vacant land to offset maintenance costs and generate a small profit that would not be realized with current practices.¹³ Sunflowers, soybeans, and corn are other examples of biofuel crops. This study focused on pennycress because the cultivation of that crop has already been piloted in Detroit.

Case Study: Pennycress on Mack Avenue Green Thoroughfare



Figure 3.4: The Eastside Community Network launched a pilot project growing pennycress along Mack Avenue
Source: Eastside Community Network

In 2013, Eastside Community Network (ECN), in partnership with MetroAg and LAND, Inc. piloted a pennycress field on a ½ acre site along Mack Avenue. A preliminary study found that pennycress would be profitable at \$69.27 per acre.¹⁴ The eventual goal was to bring pennycress to approximately 111 publicly owned lots along Mack Avenue, which amounted to 350 acres. The profit margin for the full 350 acres would be \$24,245 per year. This test site provided many valuable lessons about the feasibility of pennycress farming in Detroit. The pilot faced challenges with access to water, as a substantial amount of irrigation hose on the site was stolen. The project also faced challenges with weather and support from the surrounding community.¹⁵ Overall, it revealed that, in order to be profitable, pennycress must be grown on a large number of acres.

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Hydroponics

Hydroponics is the practice of growing produce and other plants indoors without soil. Plants are grown in water, where their roots directly absorb a nutrient solution. Hydroponics allows plants to grow faster and year-round.¹⁶ Hydroponics operations can be profitable at footprints as small as 500 square feet. At this size, start-up costs are about \$110,000.



Established operations can generate revenue of \$10,000 per 3 week crop cycle.¹⁷ Herbs and greens are the most appropriate and profitable crops for hydroponic growing.¹⁸ Hydroponics require water with certain chemical compositions and pH balances depending on the crops grown, so regular quality testing must be conducted.¹⁹

Figure 3.5: Lettuces are a common crop grown via hydroponic methods
Source: CropKing, Inc.

Hydroponics: Insights from the Ross School of Business

The yield and profitability of crops vary by type, and the optimal building size is 20,000-30,000 square feet. Necessary equipment results in higher per unit fixed costs and lower scalability for the typical operator. Hydroponics businesses operating on a fraction of an acre can be as profitable as \$14.88 per square feet on average, and they can break even in five to seven years. Hydroponics can create one to two jobs per 1,000 square feet with wages around \$11-\$15 per hour.²⁰

Aquaponics

Aquaponics is similar to hydroponics as it involves growing plants indoors without soil, but it also involves fish. Fish swim in tanks that hydroponic plants are placed on top of, and fish waste provides nutrients to the water in which the plants grow.²¹ The soil pH of the plants must be compatible with the pH of the water where the fish swim.²² Some aquaponics operations also sell the fish in addition to the produce that they grow. The profitability of the fish is dependent on type. Often, the plants grown in aquaponics establishments are more

Selecting Land Based and Green Collar Business Types

profitable than the fish. Certain plants, like basil, can be as profitable as \$22 per pound in winter months.²³

The average size of commercial aquaponics operations in the U.S. is 0.03 acres (roughly 1,300 square feet), with a capacity of 2,700 gallons of water.²⁴ The most frequently raised plants are herbs and greens. Aquaponics can be profitable at \$6,000 per 500 square feet.²⁵ There are additional costs associated with retrofitting vacant buildings for aquaponics and hydroponics. Costs include



Figure 4.6: Aquaponics Farming
Source: Growing Power

building climate control systems and tanks. In Detroit, Detroit Christian CDC renovated a 4,000 square foot vacant former liquor store as an aquaponics operation, which cost \$125,000.²⁶

Nursery

Nurseries grow plants until they reach a desired size for sale and planting elsewhere.²⁷ Nurseries may supply plants for gardens, agriculture, forestry, and conservation biology. This planning study considered tree farms for the wholesale trade of lumber or Christmas trees, along with landscape nurseries for decorative plantings.

Tree Farm

Tree farms can grow trees for lumber or Christmas trees.²⁸ Tree growth requires well drained soil, access to water and sunlight, and a temperate climate. Different soil and climate conditions dictate what tree species can grow.²⁹ Keep Growing Detroit lays out a framework for a small-scale tree farm based on Detroit's temperature and soil conditions.³⁰

Minimum farm size depends on type. Usually, Christmas tree farms need at least one acre³¹, while tree farms for lumber need from two to five acres for profitability.³² Tree farms can provide multiple environmental benefits, such as soil remediation, reduced air pollution, and improved stormwater management. However, long growing cycles (about eight years for Christmas tree³³, 10-15 years for lumber³⁴) delay revenue generation. If located in residential areas, tree farms may have potential negative effects on nearby residents. Trees will grow above rooflines over time, for example limbs could fall and damage homes, or tree roots might damage drainage systems.³⁵ Avoiding planting trees on stand-alone parcels and using setbacks from existing homes might satisfy some of these concerns.³⁶

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Landscaping Businesses

Landscape nurseries grow and maintain landscape plants; provide consultation, design, and installation services; and sometimes provide maintenance for landscaped spaces.³⁷

Landscaping businesses can be profitable at a size of less than one acre,³⁸ and can potentially expand later if profitable. Plants grown in landscape nurseries may include trees, shrubs, ornamental grasses, and perennials.³⁹ A mature tree can have an appraised value of \$1,000 to \$10,000.⁴⁰



Figure 3.7: A tree farm in Detroit
Source: *Keep Growing Detroit*



Figure 3.8: Fraleighs Landscape Nursery in Washtenaw County
Source: *Fraleighs Nursery*

Renewable Energy

Renewable energy sources include moving water, solar, and wind energy.⁴¹ For this planning study, the biofuel land use is addressed as an urban farm because it is primarily a growing operation. This study investigated only solar energy as one of the potential Green Collar Corridor land uses, because it was identified as a compatible use in previous planning studies in Detroit.⁴²



Figure 3.9: An example of solar panels in Buffalo⁴⁷
Source: *University of Buffalo*

Solar

Solar power generation is viable for residential, commercial, or industrial applications.⁴³ Solar energy development should consider locating near major electric users, such as industrial or commercial uses.⁴⁴

Viable land size for solar energy generation depends on application. Utility scale solar installations often cover more than five acres.⁴⁵ Solar energy use should have access

Selecting Land Based and Green Collar Business Types

to sufficient sunlight and have connection with the electric utility. If current state and local policies and priorities that impede widespread solar generation on vacant lots change, solar energy could be a more common use.⁴⁶

Natural and Passive

Natural and passive land uses are appropriate for areas that are likely to experience the lowest demand for traditional business land uses. These uses can provide attractive landscapes that reduce direct municipal maintenance expenses while providing environmental benefits. Issues of minimum land sizes and continuity are less important and more flexible for these land uses compared to others where profit and commercial viability are a concern.

Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) protects, stores, and manages stormwater by mimicking natural water systems.⁴⁸ GSI should be sited where it can effectively reduce flooding and improve water quality.⁴⁹ Examples of GSI include: swales, rain gardens, detention and retention ponds, green roofs, cisterns, and permeable pavement. Specifically, GSI should be sited in areas of high imperviousness to improve onsite stormwater infiltration into the soil.⁵⁰ Implementing GSI interventions in the public right-of-way such as stormwater bumpouts and tree trenches could provide aesthetic improvements, stormwater management, and pedestrian and bicycle safety. GSI can also be more cost effective than equivalent gray infrastructure alternatives.⁵¹ When implemented attractively, GSI can positively impact property values.⁵² GSI interventions must be in close proximity to catch basins to ensure direct tie in to the existing water system.⁵³

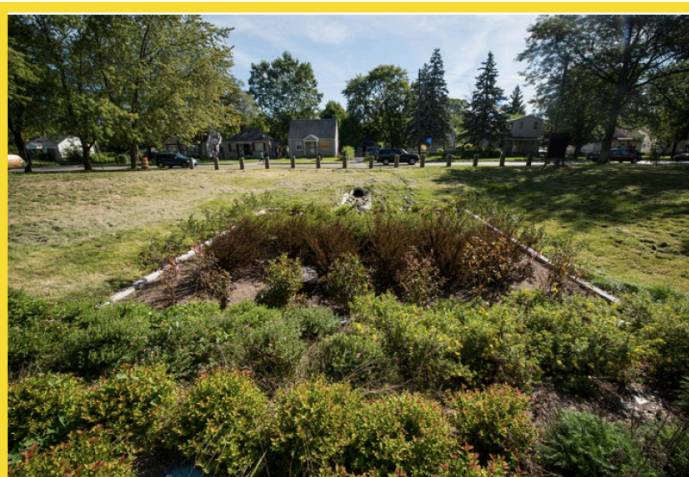


Figure 3.10: A bioretention garden in Detroit's Warrendale Neighborhood
Source: UM Water Center



Figure 3.11: A stormwater bumpout in the public right-of-way
Source: Philadelphia Water Department

Green Collar Corridors

Meadow

Meadows are deliberately planted natural landscapes meant to reduce maintenance costs while providing localized environmental benefits.⁵⁴ Specifically, meadows can be useful in mitigating air pollution when placed as buffers along roads and highways.⁵⁵ Because meadows are not revenue generating businesses, a public or nonprofit land ownership model is likely most effective to ensure long term viability.⁵⁶ Meadows have low maintenance and capital costs compared to other open space uses. Maintenance estimates are between \$100-\$200 per acre per year, and capital startup costs are between \$3,000-\$4,000 per acre.⁵⁷

Gateway

Gateway plantings are designed to attract investment to a given area and boost property values of current businesses. Gateway plantings usually signify entrance into a particular corridor or district. Signage can be incorporated to indicate the start of an investment area, as well as create branding for the corridor or district. Gateway plantings can also signify a transition into residential neighborhoods and act as a buffer between commercial uses and adjacent homes.



Figure 3.12: Urban meadows can attract pollinators, improve corridor aesthetics, and reduce maintenance costs

Source: *Urban Ecosystems*



Figure 3.13: Gateway plantings can act as an indication of a well-maintained corridor

Source: *Greenworks PC*

Green Collar Retail

Green Collar Retail uses connect growers with opportunities to sell their crops. Flower markets and farmer's markets are examples. This study focused on farm stands.

Selecting Land Based and Green Collar Business Types

Farm Stand

A farm stand is a small, sometimes mobile, retail operation that sells produce and other crops grown on local farms. They can be located on the actual farm where the crops were grown, or offsite at another location closer to consumers. The ideal location for a farm stand would be within close proximity to the growing site to cut down on transportation costs.



Figure 3.14: An example of a mobile farm stand
Source: Monona East Side Business Alliance

Location Considerations

An analysis was performed as part of this study to determine where these uses are best sited. Land suitability criteria were created based on this analysis. Table 3.1 is a matrix that details the land use criteria. An important finding was that produce farming was not ideal on commercial corridors because of higher rates of contamination, smaller parcel sizes, and higher prices of commercially zoned land compared with residential. Other notable findings were that GSI projects were best suited within 20 feet of catch basins, and that tree farms and nurseries required sites with well-draining soil.

After the land suitability criteria were determined for each land use, the next step was to use the criteria to identify which of the GCC land uses were suitable for which study sites. Chapter 4 details the process of pairing land uses with corridors.

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Land Suitability Criteria	Urban Agriculture						Nursery			Renewable Energy		Natural/Passive			Green Collar Retail
	Urban Garden	Produce/food	Solar	Biofuel	Hydroponics	Aquaponics	Tree Farm	Landscape Business	Solar	Meadow	Forest	Green Stormwater Infrastructure	Gateway	Farm Stand	
Phase I	Vacant structure: >500 sq. ft.				X										
	Vacant structure: >2,500 sq. ft.					X									
	Vacant land: 0.25 acre or less	X											X		
	Vacant land: 0.25-1.0 acre			X							X				
	Vacant land: 1-2 acres		X	X						X	X				
Phase II	Vacant land: 2-5 acres	X	X								X				
	Vacant land: 5 acres or more				X					X					
	District Adjacency: mix-tape corridor/Invest Area	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Preferred	Preferred	Not Necessary	Not Necessary	Preferred	Preferred	Preferred	
	District Adjacency: industrial use	Negative	Negative	Not Necessary	Not Necessary	Not Necessary	Preferred	Preferred	Preferred	Not Necessary	Preferred	Not Necessary	Not Necessary	Negative	
	District Adjacency: highway	Negative	Negative	Not Necessary	Not Necessary	Not Necessary	Preferred	Preferred	Preferred	Not Necessary	Preferred	Preferred	Not Necessary	Negative	
Phase III	Parcel Adjacency: on commercial corridor	Negative	Negative	Not Necessary	Not Necessary	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Necessary	
	Parcel Adjacency: off commercial corridor	Necessary	Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	N/A	Not Necessary	
	Parcel Adjacency: within 20' of catch basins	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Parcel Adjacency: current use	Preferred	Preferred	Not Necessary	Not Necessary	Not Necessary	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	Necessary	
	Parcel Adjacency: Near substation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Phase IV	Soil Drainage: Well-Drained	Preferred	Preferred	Preferred	Preferred	N/A	Necessary	Necessary	N/A	Not Necessary	Not Necessary	Not Necessary	Not Necessary	N/A	
	Soil Drainage: Poorly Drained	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Not Necessary	Preferred	Not Necessary	Not Necessary	

Table 3.1 Land based suitability criteria matrix
See appendix D for Table Sources

Selecting Land Based and Green Collar Business Types

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4. Identifying Green Collar Corridor Typologies

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4. Identifying Green Collar Corridor Typologies

This chapter outlines the process used for matching Green Collar Corridor (GCC) land uses with study sites, and provides an overview of the results.

A process was established to determine which of the pre-identified Green Collar Corridor (GCC), land uses were suitable across the selected study sites. This process, summarized in Figure 4.1, was designed to match vacant parcels with suitable uses according to several criteria to see if discernable patterns appeared amongst the corridors.

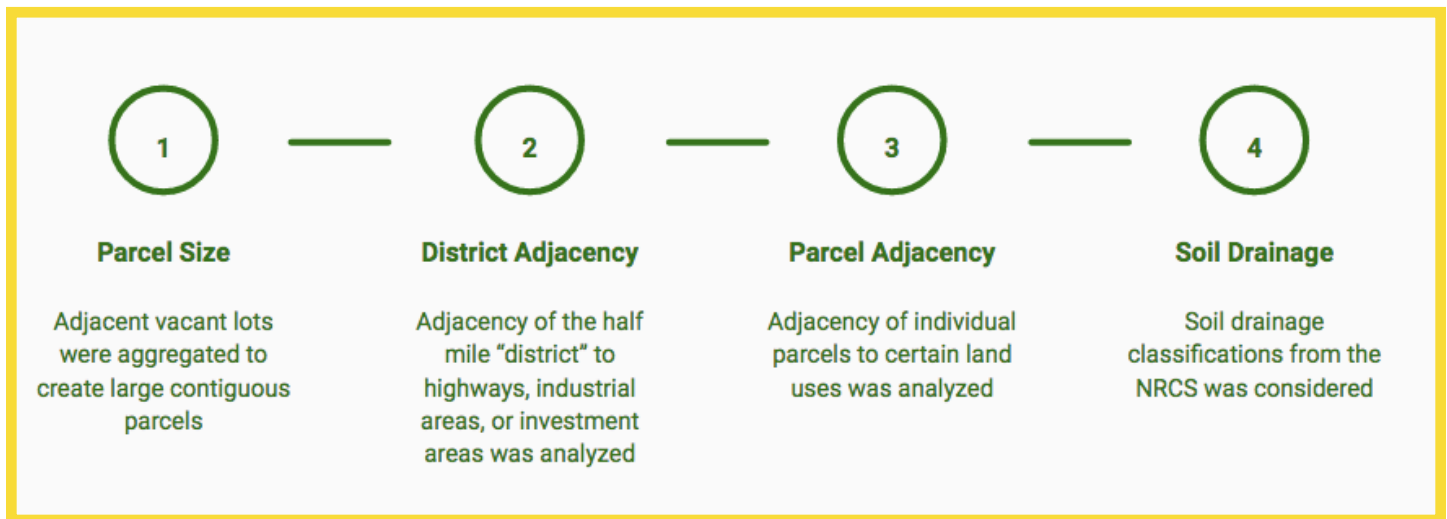


Figure 4.1 Overview of Corridor Suitability Analysis

Corridor Suitability Analysis

In order to match land uses with suitable parcels, a process of elimination was developed to filter out unsuitable contiguous parcels. The process followed the steps from the Land Suitability Criteria table (See Appendix C). First, parcels that were not a suitable size for that land use were eliminated. Then, districts adjacent to highway and industrial were eliminated if the land use being analyzed was not suitable in proximity to those uses. Adjacency to investment areas was also analyzed. Individual parcel adjacency to the corridor and catch basins was then analyzed. Finally, soil drainage of parcels was analyzed.

Findings: General Themes

There were several land use patterns revealed by the analysis as follows:

- Many parcels were suitable for several different land uses (Appendix F lists the number of appropriate parcels for each land use by corridor)
- Flower farms, forests, and meadows appeared most frequently

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- Biofuel production appeared infrequently
- Major differences were found between uses suitable along the corridor compared with the neighborhood behind it
- Parcel sizes along the corridor tended to be smaller, which limited their flexibility
- Growing edible crops was not suitable along corridors
- Parcels off of the corridor in the neighborhoods had a much greater flexibility in use because of their larger size
- Gateway plantings and green stormwater infrastructure (GSI) can be appropriate for all corridors
- GCCs are not appropriate for low vacancy corridors with smaller parcel sizes, and currently active, more traditional commercial uses

Based on the results, it was determined that there is not just one type of GCC. Rather, there can be different typologies that reflect the major land uses possible in the corridor (See Figure 4.2). While these typologies each suggest a selection or theme of uses that would work well for a given corridor given the conditions along that corridor, the conditions of the neighborhood beyond it, and the requirements for the different land use activities, none of the typologies is mutually exclusive; it may be possible to co-mingle these typologies for a particular corridor given the interests of the residents or PDD. Recognizing that flexibility, each corridor is used as a good representation of a GCC theme or typology.

As such, the following representations of each of the corridors are not meant to be site-specific recommendations for that corridor. Rather, they are meant to be reflective of what is possible in the GCC typologies that each corridor represents.

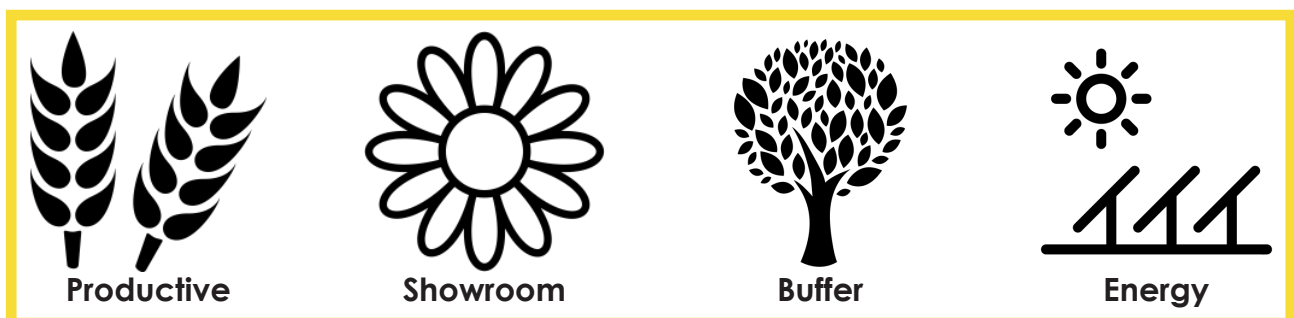


Figure 4.2 Green Collar Corridor typologies¹

Green Collar Corridor Typologies



Fenkell Road: Productive Green Collar Corridor

256 Acres of Vacant Land

Fenkell Road is representative of the Productive GCC typology. The defining characteristic of the Productive typology is that it is possible for productive uses to come right up to the road. Flower farms make the most sense along the corridor, but produce farms could be close by. Fenkell is a low-traffic, two lane road, so air pollution is not as big of a concern here as it would be on a higher-traffic street.



Figure 4.3 On Productive Green Collar Corridors, flower farms could come right up to the road

Image Source: Sustainable Landlab

There are many large, contiguous vacant parcels throughout the neighborhood behind the corridor that lend themselves to multiple productive land uses. The most use-restrictive vacant parcels can be found directly along the corridor, potentially making them good candidates for green stormwater infrastructure (GSI) or as flower farms. The high concentration of large parcels in the southern half of the corridor could allow for a larger scale, single productive use operation. Because of its proximity to an investment area, Fenkell may be suitable for strategic gateway plantings nearer the investment zone. Figure 4.4 shows the specific uses possible per parcel.

According to the data, there were no vacant structures on the corridor suitable for hydroponics or aquaponics use

Green Collar Corridors

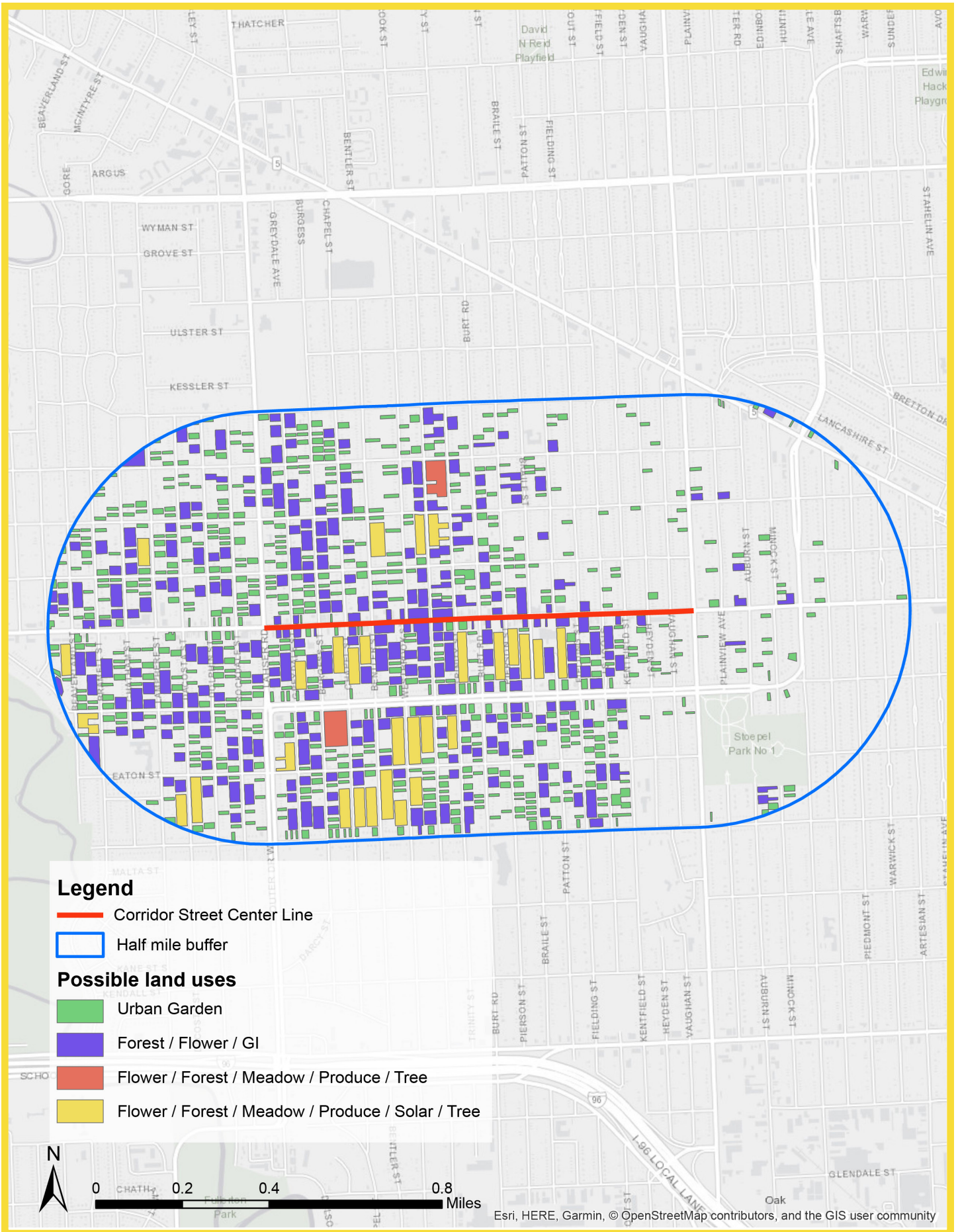


Figure 4.4 Possible land uses per contiguous parcel, Fenkell

Identifying Green Collar Corridor Typologies



Grand River: Buffer Green Collar Corridor

240 Acres of Vacant Land

Grand River Avenue is representative of the Buffer typology. The defining characteristic of the Buffer typology is an abundance of tree plantings and tree farms that act as a noise and pollution buffer between the corridor and an adjacent highway. Because of Grand River's proximity to I-96, the corridor has less flexibility. Figure 4.6 shows the specific uses possible per parcel. While growing edible crops is undesirable so close to the highway, the parcels on the corridor still lend themselves to other green and productive uses such as tree farms, urban forests, flower farms, and GSI.



Figure 5.5 On Buffer Green Collar Corridors, trees provide a screen from an adjacent highway
Image Source: World Architecture

A Buffer GCC uses non-edible, productive agricultural uses to mitigate and separate neighborhoods from high pollution areas. Tree farms and urban forests could be placed along the commercial corridor and throughout the neighborhood on larger vacant parcels, while smaller parcels could support less intense uses, such as fresh cut flower farms. One or two vacant parcels along the commercial corridor could be used as showrooms to sell trees or flowers grown in the neighborhood behind it. Smaller vacant parcels along the commercial corridor that are near a catch basin could support GSI. Gateway plantings could be placed at the corridor's western end toward the nearby investment area.

Grand River has several large, vacant commercial buildings. These buildings would make suitable locations for large scale hydroponics or aquaponics.

Green Collar Corridors

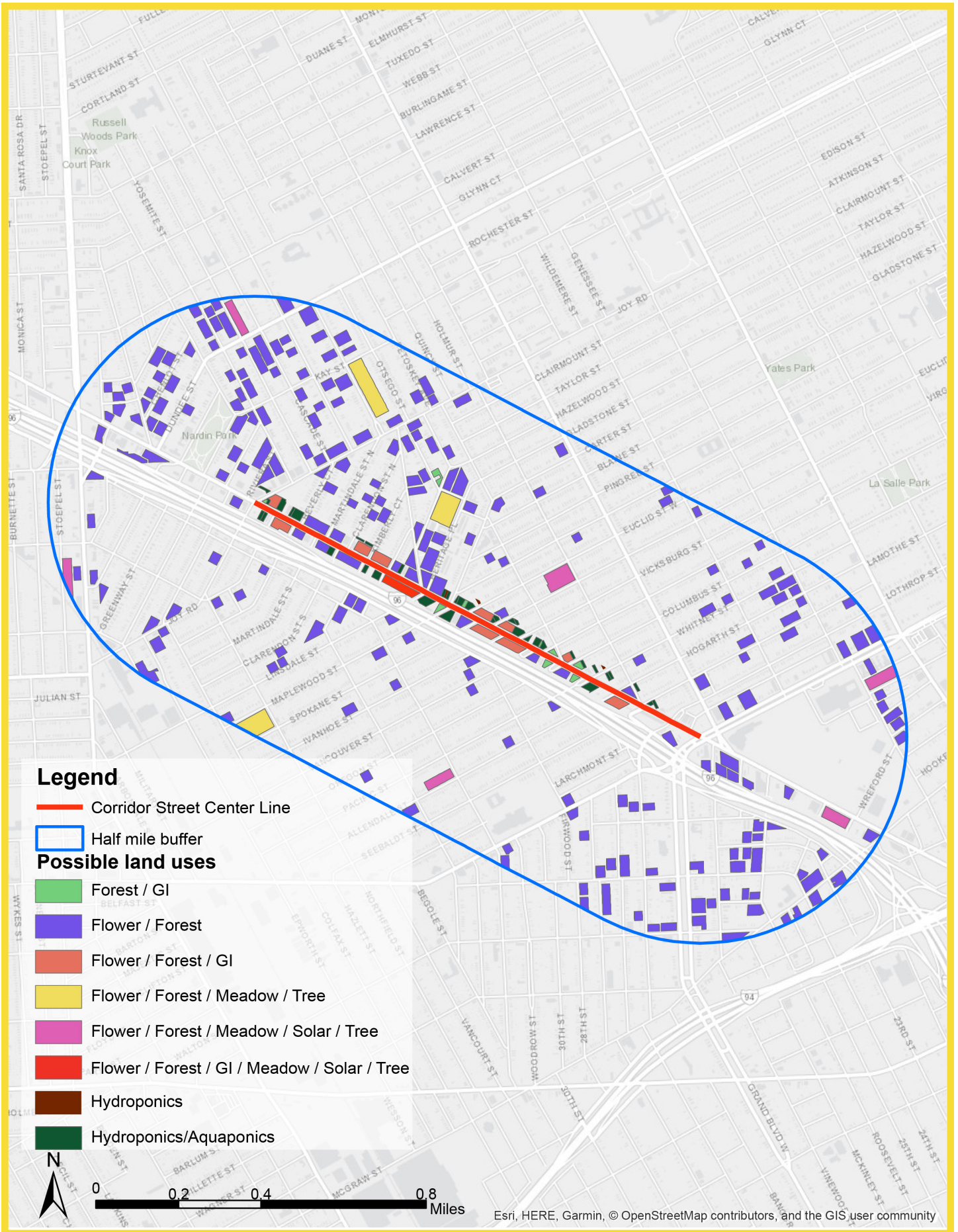


Figure 4.6 Possible land uses per contiguous parcel, Grand River

Identifying Green Collar Corridor Typologies

Mt. Elliott: Energy Green Collar Corridor

 325 Acres of Vacant Land

Mt. Elliott is representative of the Energy typology. This typology is characterized by the presence of very large vacant parcels that can accommodate growing crops for biofuel and large-scale solar panel installation. Energy GCCs are also adjacent to industrial uses. Because of Mt. Elliott's proximity to industrial uses, the corridor's vacant land is unsuitable for some GCC land uses, such as growing edible crops. Figure 4.8 shows the specific uses possible per parcel.



Figure 4.7 Energy Green Collar Corridors are suitable for large scale solar panel installations

Image Source: PurSolar & Electrical

Of the corridors studied, Mt. Elliott is unique in that it is the only corridor that has several parcels large enough to support growing crops for biofuel production. As an Energy GCC, many of the vacant parcels in the Mt. Elliott area could be used for solar energy and biofuel production. The large, formerly industrial structures throughout the corridor provide options for solar or GSI installations on their roofs. These structures could also accommodate larger hydroponics and/or aquaponics operations. Smaller parcels are suitable for non-edible productive uses, such as flower farms, urban forests, or tree farms.

Green Collar Corridors

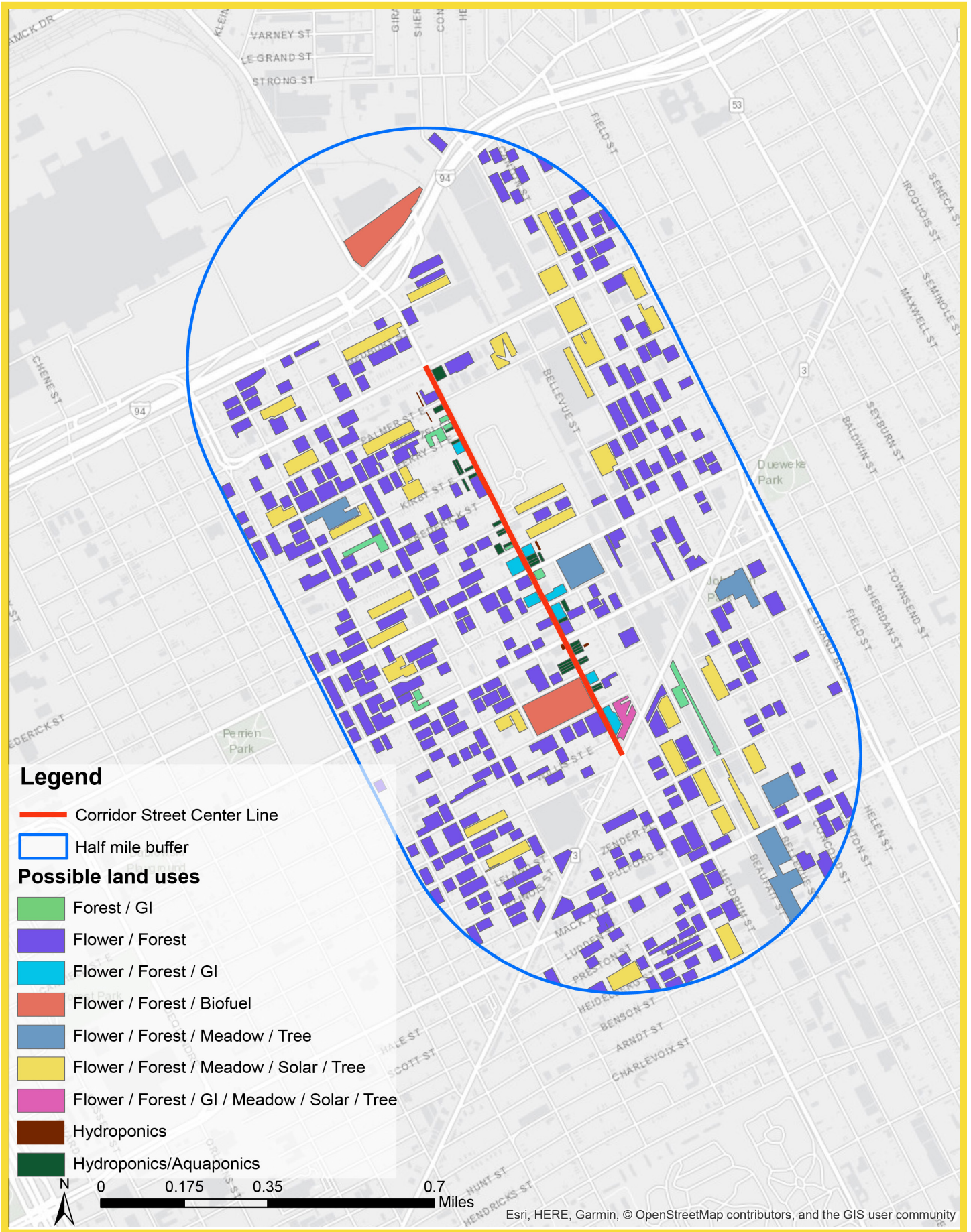


Figure 4.8: Possible land uses per contiguous parcel, Mt. Elliott

Identifying Green Collar Corridor Typologies



Mack: Showroom GCC

323 Acres of Vacant Land

Mack Avenue is representative of the Showroom typology. This typology is characterized by suitability for productive uses in the neighborhood behind the corridor, and smaller parcel types with the potential to act as showrooms for those productive uses on the corridor. Because of the dense collection of contiguous, multi-use parcels off of the corridor, and limited use of the parcels along the corridor, this commercial corridor could be used as a showroom for the productive uses happening in the neighborhood behind it. The neighborhood behind the corridor can support a wide variety of land uses, allowing for a diversity of business types at different scales. The vacant structures and parcels along the corridor could be used for either hydroponics or aquaponics, or be used in tandem with vacant land along the corridor, acting as showroom and sales spaces. Figure 4.10 shows the specific uses possible per parcel.



Figure 4.9: On Showroom Green Collar Corridors, farm stands could act as showrooms for the produce farms located in the neighborhood behind
Image Source: Monona East Side Business Alliance

Green Collar Corridors

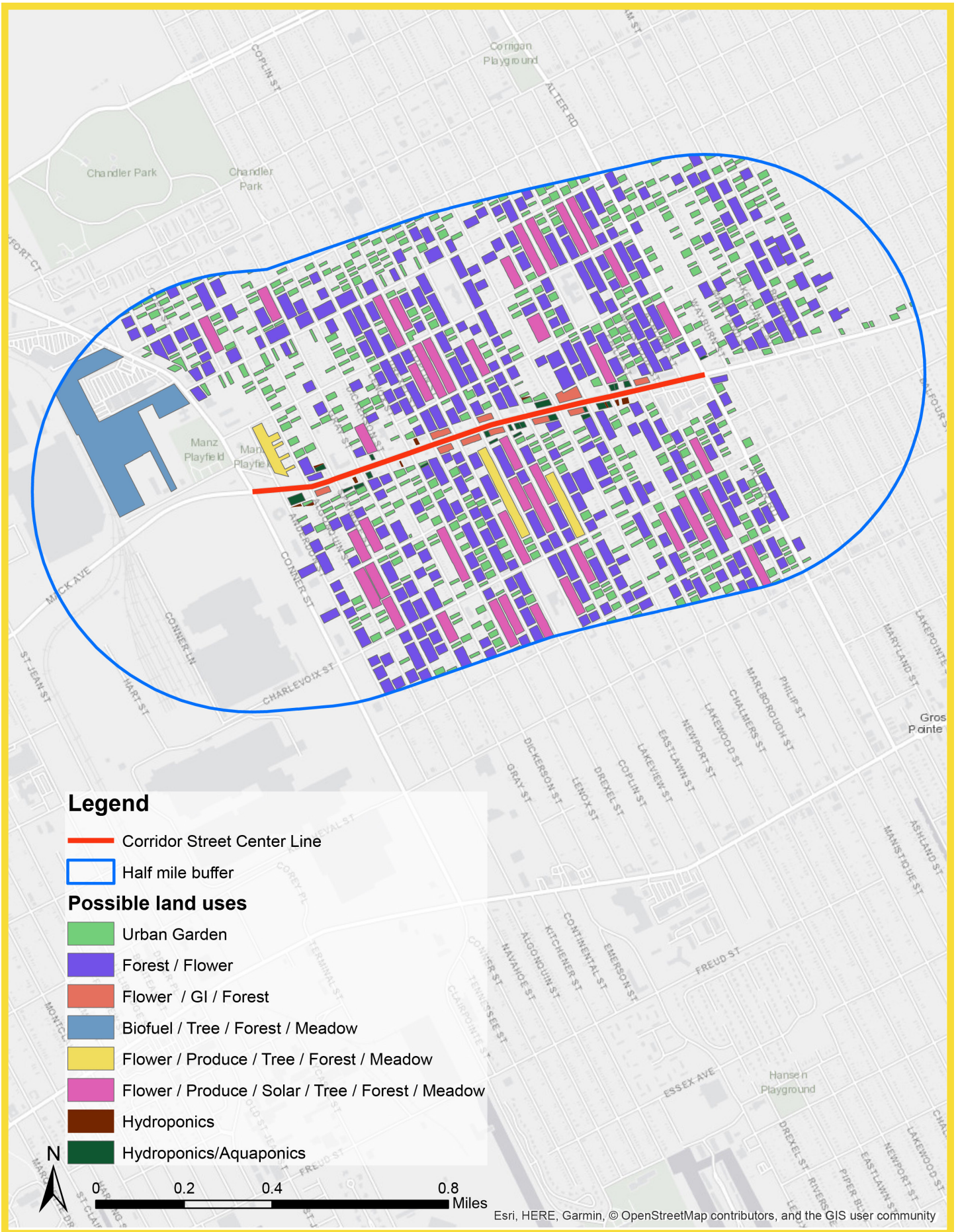


Figure 4.10: Possible land uses per contiguous parcel, Mack

Identifying Green Collar Corridor Typologies

Morang: Not Suitable as a GCC:

36 Acres of Vacant Land

Relatively low vacancy, smaller parcel sizes, and the presence of traditional commercial activity make Morang unsuitable as a GCC. Morang was selected initially as a control site based on the limited amount of vacant land. Vacant parcels are dispersed throughout the neighborhood and are typically small, with limited uses. The few parcels that are along the corridor are also small, and they offer a limited number of uses. Morang has few vacant structures that are mostly in the residential neighborhoods. The structures, being houses, are likely not good candidates for green collar uses.

More in depth suitability analysis confirmed that this corridor is better suited for more traditional commercial development rather than as a dedicated GCC. Streetscape improvements that incorporate GSI are appropriate along this corridor, and small urban gardens for personal use are suitable off of the corridor. Nonetheless, Morang is not suitable for large scale land-based businesses that are characteristic of a GCC.

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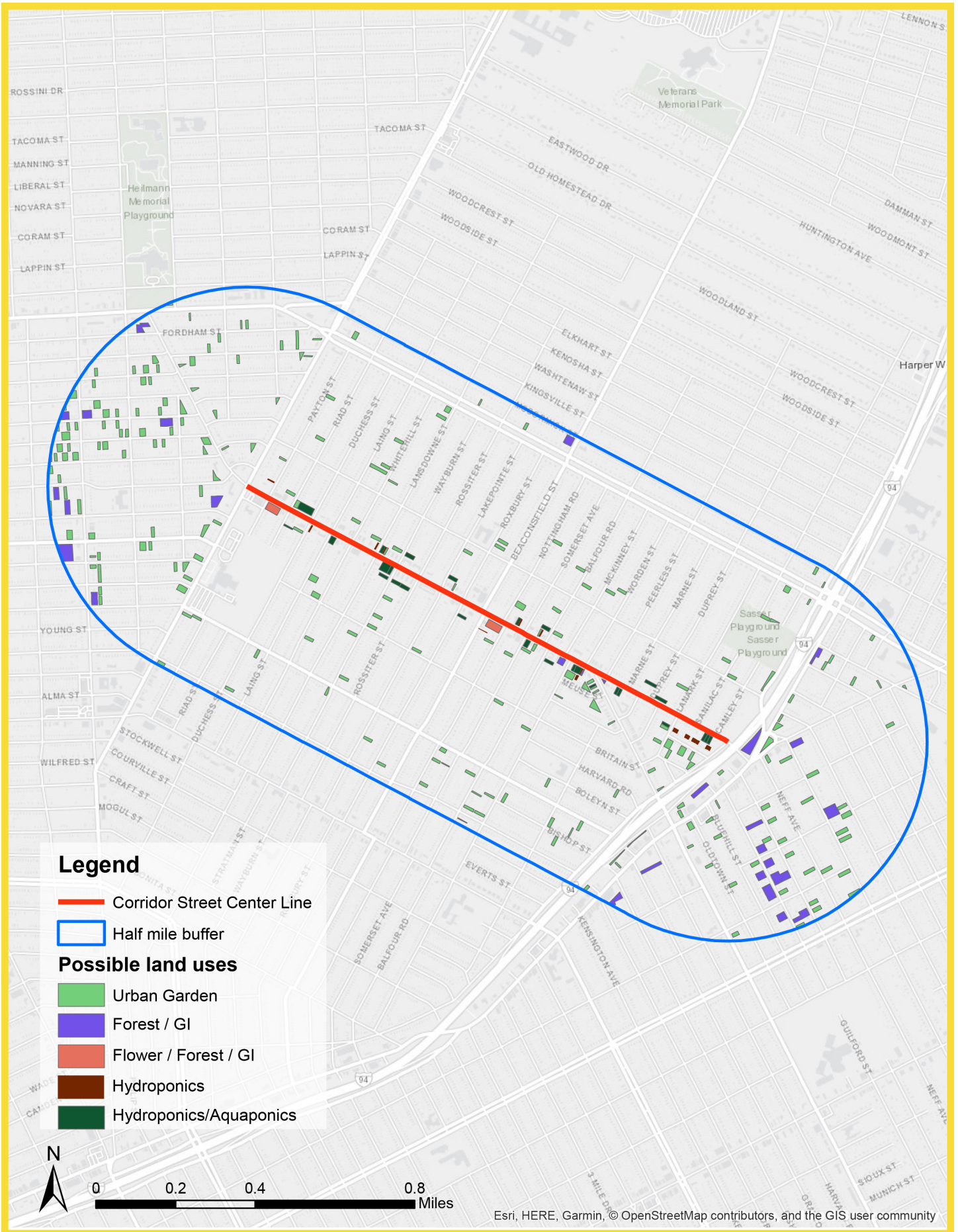


Figure 4.11: Possible land uses per contiguous parcel, Morang

Detailed Analysis of Grand River as a Buffer Corridor

The goal of this planning study is not to make site-specific recommendations, but rather identify typologies of Green Collar Corridors. However, if the next step were taken the analysis presented here offers an illustrative scenario for Grand River as a Buffer Corridor (Figure 4.12).

As stated previously, Buffer corridors are adjacent to major roadways and feature an abundance of tree plantings in the form of urban forests or tree farms to mitigate air and noise pollution. This scenario shows urban forest plantings along the southwestern side of Grand River that is adjacent to I-96. A large parcel on this side of Grand River could be a tree farm, adding to increased plantings while providing economic activity. Green stormwater infrastructure (GSI) could be placed strategically along Grand River to manage stormwater from some of the more impervious parcels, particularly old parking lots.

The northwest corner of the Grand River district featured many parcels that were suitable as flower farms. A concentration of flower farms is shown in this area, which could allow for a larger operation spread over many parcels, several smaller operations, or a combination of the two. Borrowing from the Showroom typology, one larger parcel along the corridor could be a flower farm demonstration plot to showcase the activity in the adjacent district.

Finally, gateway plantings could be placed at the western edge of the corridor, which is adjacent to a Multifamily Investment Area. This would provide an attractive transition into the investment area.

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Figure 4.12: Possible green collar land use scenario for Grand River

Identifying Green Collar Corridor Typologies

Sources:

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5. Innovations to Encourage Green Collar Corridor Implementation

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5. Innovations to Encourage Green Collar Corridor Implementation

This chapter outlines recommendations for actions the city can take in order to implement Green Collar Corridors. These include making adjustments to current policies and procedures and removing barriers that may be hindering or slowing down the success of grassroots green initiatives and land-based businesses. In addition, some existing programming can be altered to include provisions specifically tailored to land-based businesses.

The main areas examined for reform are:

- Zoning and Procedures
- Business and Programming
- Land Acquisition and Cost
- Ownership
- Design

It is important to note that each typology can be implemented using these strategies. Specific consideration could be given to each typology when choosing a pilot site, as stated in the “Next Steps” section below.

Zoning and Procedures

After interviewing individuals familiar with the zoning code and various land uses that might work well for a Green Collar Corridor (GCC), it appears that land use restrictions in the code are only a minor concern.¹

Among the land-based and Green Collar Corridor (GCC) business types, most agricultural uses are allowed in residential, business, and industrial districts under Detroit's current zoning ordinance either by right or as a conditional use.² Hydroponics and aquaponics, which have traits similar to agriculture and light industry, would only be allowed in B4, B5, B6 and industrial districts because they are more intensive than other agricultural uses.³ Natural and passive uses such as meadow, forest, and green stormwater infrastructure are likely allowed in many districts, but are only specifically mentioned in Parks & Recreation District Overlay (PR).⁴ Special Development District, and Riverfront mixed use (SD4) also allow green stormwater infrastructure.⁵ Solar generation seems to fit as either a Utility Major or Utility Basic use, and it is therefore a conditional use in residential districts, as well as business districts up to B4.⁶

Land use	Residential						Business						Industrial				
	R1	R2	R3	R4	R5	R6	B1	B4	B3	B4	B5	B6	M1	M2	M3	M4	M5
Urban Garden	R	R	R	R	R	R	R	R	R	R	C	R	C	C	C	C	C
Urban Farm*	C	C	C	R	R	R	R	R	R	R	C	R	C	C	C	C	C
Greenhouse	C	C	C	R	R	R	R	R	R	R	C	R	R	R	R	R	R
Hoop-house	C	C	C	R	R	R	R	R	R	R	C	R	R	R	R	R	R
Hydroponics										C	C	R	R	R	R	R	R
Aquaponics										C	C	R	R	R	R	R	R

*Including orchard and tree farm when principal use, C=Conditional Use, R=By-right Use

Source: Detroit Zoning Ordinance

Table 5.1 Urban Agricultural Use Regulations in Detroit Zoning Ordinance

Innovations to Encourage Green Collar Corridor Implementation

The administrative processes surrounding the zoning code, including specified processes and administrative practice, are inflexible, making compliance with the code cumbersome and expensive. The expense of navigating the conditional use permitting process is particularly burdensome to small prospective operators.

For by-right uses, the process is reasonably quick. It requires a matter of hours to a day and a cost of about \$150 for ministerial permit approvals.⁷ Conditional uses face a much different path to approval. Conditional uses require months of discretionary review and a public hearing on the merits. Besides full approval or denial, conditional uses can be approved with conditions, which can impact the ongoing viability of the proposed land use.⁸ The estimated cost for conditional use approval is about \$1,500.⁹

Recommendations

While the zoning code was not as much of a barrier to implementing GCC uses as previously thought, there are a few changes the city can make to the code and current processes to better facilitate GCC land uses.

- **Reform zoning to increase agricultural flexibility**

Increase agricultural flexibility and allow urban farming by right in more areas, such as R1, R2, or R3 areas, where they are currently a conditional use. In a practical sense, urban farms are possible by right in areas where alleys and small blocks allow aggregation of multiple urban gardens separated by streets and alleys to function as single entities.¹⁰ However, the city is working to remove this loophole and regain its oversight of these operators.¹¹

- **Streamline permitting and site plan approval**

Changes for the zoning process are centered around streamlined permitting, site plan approvals, and public hearing reform. These recommendations reflect possible reforms of obstacles to GCC land uses identified through interviews with stakeholders.¹² In Detroit, the city could adopt a streamlined permitting process tailored to GCC land uses and corridors. This process would be dependent on use and geography to incentivize GCCs to develop in places identified as suitable by the city. The city already utilizes a streamlined permit approach for urban agriculture,¹³ but this could be expanded to affirmatively include other GCC uses such as aquaponics, hydroponics, solar generation, and passive land uses.

- **Put site plan approvals for GCC land uses under Detroit Planning & Development Purview**

Currently, both standard and streamlined site plan approvals flow through the city's Planning and Development Department (PDD) and Building Safety Engineering and Environmental Department (BSEED).¹⁴ There may be certain land uses where BSEED's expertise and staff time are less important to safeguarding the health and safety of the community, and that site

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plans could be approved more swiftly by the PDD alone, or with more limited input by BSEED. Examples of these uses could include farming or tree nurseries without permanent structures, or temporary hoop houses where members of the public are not permitted and the structures are the accessory rather than the primary use.

Case study: Streamlined permitting for green buildings in Chicago

Chicago uses a streamlined permitting process for certain structures centered around sustainable energy production and LEED buildings.¹⁵ The process includes a menu that developers can pick from to become eligible for the process.¹⁶ The seven-step process then includes a clearly defined checklist for each step, along with addresses and room numbers for the offices a developer must visit for the various approvals.¹⁷

- **Create an incentive overlay zone for Green Collar Corridor land uses**

Overlay zoning and green districts were also evaluated. Overlay zones are typically used to add additional or stricter restrictions on property use.¹⁸ In a Green Collar Corridor context, they could be used to remove restrictions and steer development into particular areas.

The idea here is to establish an overlay zone that would allow operators to trade lower property taxes in exchange for accepting restrictions (e.g., through deed restrictions) that would limit allowable uses in the future to specified GCC land uses. Creating an overlay zone like this would allow the city to safeguard against speculators while supporting these low-margin businesses, which may have trouble paying property taxes. Alternatively, a landowner could opt not to take advantage of lower property taxes within the GCC overlay zone and continue paying standard property taxes instead, thereby retaining the flexibility to establish more traditional land uses in the future.

The incentive available under an overlay zone would be modeled after Youngstown, Ohio's, industrial green districts, where the zone designation allows access to property tax reductions.¹⁹ However, unlike in Youngstown, Detroit's reduction could only be on city property taxes, not on taxes levied by the state or county, because it does not have special approval from the state government to do so. Following Youngstown's industrial green districts also allows the city to direct GCC businesses into areas it chooses to pilot.²⁰

- **Reduce or remove public hearing requirements**

The city could remove a substantial burden from the conditional use review process by either eliminating the public hearing component outright, or by restricting it to only the largest projects. A reasonable compromise would be to raise the threshold triggering a hearing from one to three acres to make these uses consistent with conditional uses in industrial zones.²¹

Business and Programming

There has been a tradition of innovation in Detroit for centuries. Recently, there has been a resurgence of entrepreneurs engaged in new businesses and ideas, many of which are in line with GCC land uses. Detroit could build off of its many successful small business programs by providing specific technical expertise needed by land-based or green collar businesses, ranging from programming and incentives from growing small-scale local businesses to recruiting green collar businesses with larger footprints. In addition, Detroit could create new programs or policies to further incentivize the creation of Green Collar Corridors.

Recommendations

- **Modify existing small business supports to start up and scale up businesses**

There are a number of successful programs and incentives in the city that are resources for small businesses, including Motor City Match, BizGrid, Michigan Economic Growth Corporation (MEDC), Build Institute, and BizdomU. The city and its partners could add specific expertise to these programs in order to cater to land-based businesses. Some examples include:

- Motor City Match is a collaboration between the City of Detroit, Detroit Economic Growth Corporation (DEGC), the Economic Development Corporation of the City of Detroit (EDC) and the U.S. Department of Housing and Urban Development (HUD). The program offers assistance for new entrepreneurs operating in Detroit with writing business plans and small grants, as well as financial awards to help companies grow and to match them with building owners on a competitive basis. However, none of the service providers have expertise in land-based business strategy. Motor City Match could add specific expertise in land-based businesses and link owners of vacant land with proprietors of land-based businesses, becoming Motor City LAND Match.²²
- The Build Institute offers entrepreneurial training classes, networking events and opportunities at pop-up marketplaces.²³ Build could add capacity to support land-based businesses by hiring a business counselor with experience in agriculture or green businesses or partnering with existing experts such as Keep Growing Detroit. The Build Institute could also implement a social networking campaign, with the goal of matching entrepreneurs who have dreams or big ideas for the city with others who share the same dream, and have complementary skills. This could potentially increase the businesses' success rate through the hiring of employees who share their passion.

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- Bizdom is a business accelerator that provides seed funding, entrepreneurial mentorship and other resources for new businesses, with a focus on new technologies. Bizdom could have a “neighborhoods” wing that takes a building on the corridor with land behind, creating an incubator and business accelerator that provides training for land-based business startups.

An example could include a farmers market store, like Farmer’s Hand in Corktown, with urban gardening behind. An idea like this might work well on Productive and/or Showroom GCCs. Students of Bizdom could be trained how to run the farm and storefront, learning technical, business management, and financial skills in the three to six month course.

- TechTown Detroit offers programs for small businesses operating in neighborhoods and in new technology. They have networking events, classes, and incubator space, and they provide assistance to people with business ideas on getting them ting to the next steps.²⁴ This organization could add a department called “AgTown” that does the same thing, but it would be geared towards urban agriculture businesses. Staff with expertise in land-based businesses would assist potential business owners with start-up strategies.
- Revolve Detroit is a part of DEGC that activates vacant storefronts at the community level for transformational businesses and temporary uses like pop-ups. The program gets its funding from crowdsourcing, as well as foundations and grants.

This program could be tailored to land-based businesses or supplemented for activating large tracts of empty land for special events like summer festivals, farmer’s markets, and concerts. Community Development Block Grant (CDBG) funding could be used for streetscape and landscape improvements that are necessary on these vacant lots.²⁵

- Hatch Detroit is a competition for independent entrepreneurs that have plans to revitalize commercial retail strips, activate vacant spaces, and spur further investment into the community with new brick and mortar establishments.²⁶ The winner receives a grant of \$50,000. The Hatch organization could have a competition specifically for land-based businesses.

Innovations to Encourage Green Collar Corridor Implementation

- **Recruit key large-scale green collar businesses or uses**

Because Detroit has over 24 square miles of vacant land, portions of it could be directed towards large green collar businesses. Large is defined here as five acres and above. Hantz Woodlands is a local example of a large scale land-based business, and Recovery Park has plans as a large scale business. There is room for others such as biofuel, solar and hydroponics, though special care should be given to community engagement when siting this type of business.

Case Study: PureAgro Foods, Fort Collins, CO

PureAgro, in Fort Collins, Colorado, is a large, diversified hydroponics and urban agriculture supply company.²⁷ The firm operates stores and sells to individual customers in Colorado and California.²⁸

Indoor growing could play an important role in revitalizing corridors that are like Grand River with large vacant buildings. The city can use methods outlined in this planning study to attract businesses like PureAgro to the city to support residents involved in urban agriculture and hydroponics.

- **Launch a land-based business incubator**

Detroit has incubators for manufacturing goods and new technology companies. They do not have an incubator farm, where residents interested in farming in the city can have access to a plot of land, training, guidance or funding. This farm incubator concept could be a good fit in the city, considering the high level of interest in growing food. Organizations such as Keep Growing Detroit, The Greening of Detroit, MSU Extension, and Food Lab also have the shared expertise to carry out this kind of initiative.

Case Study: New Entry Sustainable Farming Project, Lowell, MA

An example of an incubator farm in Lowell, Massachusetts is a collaboration between Tufts University, the United States Department of Agriculture, and local organizations, called New Entry Sustainable Farming Project.²⁹ They assist new immigrant and traditionally underserved populations in entering the food business industry. They have an incubator farm where entrepreneurs can purchase plots to grow food, have access to markets to sell, and receive technical training. New Entry assists these farmers by matching them with landowners once they have sufficient clientele and sales. New Entry's partnership with Tufts is important in that it enabled them to have access to federal Title V education funds for Hispanic service institutions. New Entry's mission is to create a business model by which small scale farmers can thrive.³⁰

Land Acquisition and Costs

Access to usable and affordable land is critical to the viability of GCC land uses. In Detroit, land may require remediation of contaminants before operations can begin, which increases startup costs. Land may also have higher prices depending on what it is zoned for, or adjacent publicly owned parcels may be harder to assemble because they are owned by separate government agencies. The following are recommendations to address those challenges.

Recommendations

- **Defray remediation costs for Green Collar Corridor businesses**

Cleanup and remediation pose a substantial barrier for prospective GCC business operators. Costs are highly variable due to differing levels and kinds of site contaminants as well as varying cleanup standards for different land uses.³¹ The first step toward assessing cleanup requirements is often a soil test. A Phase I assessment costs between \$1,000 and \$5,000. If the Phase I detects contamination, a Phase II assessment may be required, adding \$5,000 to \$15,000 onto a site's pre-purchase cost.³² If a contaminated site must be remediated, one estimate using EPA data shows costs as high as \$57,000 per acre.³³ Generally, these costs are absorbed by property owners,³⁴ although, some resources exist to reimburse these costs. Under the state Brownfield Redevelopment Financing Act, Brownfield Redevelopment Authorities can use tax incremental financing funding to pay for Phase I and II assessments and some other hazard surveys.³⁵ Remediation costs themselves can be reimbursed with Michigan Department of Environmental Quality (MDEQ) approval.³⁶ Reimbursement program priorities are for projects that create jobs, leverage private contributions, or improve the property tax base.³⁷ Within the GCC land uses, some uses would be more likely to receive funding under this list of priorities than others.

- **Remove the price premium on commercially zoned land for Green Collar Corridor businesses**

Generally, residential land in the city is about \$0.20 per square foot. Commercial land is about \$1.00 to \$1.50 per square foot.³⁸ This is another reason agricultural uses are driven into residential areas.³⁹ There is not likely a reason for agricultural operators or other land-based business to pay a premium to locate in commercial areas, unless they would benefit from direct access to customers. The Detroit Land Bank Authority (DLBA) controls much of the publicly owned residential land in Detroit. PDD generally controls commercial and industrial land. To address the price disparity between residential and commercial properties, the PDD could sell its commercial parcels at a discount if they were used for GCC land uses.

Innovations to Encourage Green Collar Corridor Implementation

- **Transfer ownership of commercial land in Green Collar Corridors to the Detroit Land Bank Authority**

In order to assemble, maintain, and operate vacant land for GCC land uses, designated commercially zoned land could be transferred to the Detroit Land Bank Authority and aggregated with other residential land for GCC land uses. The DLBA is already tied into the tax foreclosure system through existing laws to take ownership of and to manage certain tax foreclosed properties. It has the unique ability to perform expedited quiet title actions on property in its inventory, and to generate revenue through leases, sales and its tax recapture powers on property returned to the tax rolls.⁴⁰ This could potentially make it easier to purchase commercial land for GCC land uses.

- **Create an Urban Agriculture Tax Credit**

In addition to acquisition costs, property taxes and assessments are an obstacle for land-based business operators. Detroit could consider creating a tax credit geared toward urban farmers who own their land for a certain amount of time. If Detroit pursued this option and adapted it to GCCs, it would allow operators of these low-margin and small scale land uses to improve their financial viability.

Case Study: Baltimore's Urban Agriculture Tax Credit

In Baltimore, properties used continuously in urban agriculture for at least five years receive a 90 percent credit against the land's city property taxes.⁴¹ Under Baltimore's tax credit program, an owner must first file with the city stating that their land is used in accordance with the credit program's rules. They must then file stating the land is still in agricultural use for each of the five years of the credit's term.⁴² The owner may renew the credit for an additional five year term, with no limit on renewals.⁴³ The credit required a change in state law for full implementation.⁴⁴ More research is needed to understand how the State of Michigan would be involved in the approval of this kind of tax credit.

- **Streamline and clarify purchase process for publicly owned land**

In addition to issues of cost and remediation, split ownership of public land creates another layer of complexity. As stated earlier, vacant residential land in the city is generally owned by the DLBA while commercial land is owned by PDD. To acquire a suitable quantity of land for a land-based business, an operator may have to interact with both entities. Overall, the process of acquiring public land in Detroit has been criticized as opaque, especially for smaller buyers without the political pull that larger investors have. To streamline the acquisition process, the agencies could create a single customer-facing online map that allows prospective buyers to know which parcels are owned by which agency and either exclude or label parcels subject to development holds. This would allow buyers to know exactly what land is available and from what agency. It would remove uncertainty that currently clouds the purchase process.

Ownership Models

Detroit has 139 square miles of land, and 384,840 properties belonging to 196,038 different owners.⁴⁶ According to Loveland Technologies, the Detroit Land Bank Authority (DLBA), the City of Detroit Planning and Development Department (PDD), and the Michigan Land Bank Fast Track Authority are among the city's largest parcel owners.⁴⁷

Owners	Number of Properties
Detroit Land Bank Authority	83,077
City of Detroit – P&DD	8,218
MI Land Bank Fast Track Authority	5,571
Hantz Woodlands LLC	1,927
Michigan Dept of Transportation	766
City of Detroit	738
Detroit Public Schools	718
HUD	650
Fannie Mae	542

Table 5.2: Top owners in Detroit

Source: Loveland Technologies

To purchase publicly owned land, land-based businesses can negotiate with these entities. For example, Hantz Woodlands obtained a development area from the City of Detroit to replace unmanaged surplus city-owned property with a managed tree farm.⁴⁸

Currently, businesses can buy lots from the city or DLBA.⁴⁹ However, the process can be complex and time-consuming. For existing residents and GCC land uses, property owners may buy adjacent vacant land to expand their urban garden. Additionally, the purchase of properties in business districts is very expensive and unavailable for urban agriculture.⁵⁰

Recommendations

Aggregate public and private land for larger-scale Green Collar Corridor land uses

Small aggregated groups of vacant parcels under one acre could keep their current ownership. The owners could use the parcels for small-scale green collar uses, like urban gardens or flower production. Public ownership is ideal for natural/passive uses such as green storm-water infrastructure, meadow, forest, and gateway.⁵¹ Over time, the DLBA could strategically aggregate parcels to facilitate larger scale GCC land uses.

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Institute long-term leases for Green Collar Corridor land uses

Lease agreements could be used to protect and ensure certain rights for GCC land uses long-term, and provide flexibility for transitional land uses.⁵² Leases provide a mechanism to separate the responsibility of land management with the responsibility of land ownership.⁵³ With the increasing demand for vacant land for productive use, long-term land leases can provide an opportunity to facilitate these uses.⁵⁴ For long-term, secure access to vacant land for GCC land uses, the city and DLBA could consider the following policies:

- allow eligible projects the option of a lease that guarantees exclusive, secure access to vacant parcels;
- allow for a minimum lease term of five years, with an option to renew for another five years and possibly an option to purchase;
- set a pricing structure that includes a price per square foot based on land quality; and
- include an abandonment clause in leases that allows for seasonal changes in project activity while providing an enforcement mechanism for neglected projects.⁵⁵

For transitional uses, the lease term could be as short as one year. Transitional land uses could be prepared for development in the future.

Assist businesses in using alternative land ownership

Land trusts

“Land trusts are private, legally incorporated, non-profit organizations that work with property owners to protect open land through direct, voluntary land transactions”.⁵⁶ Existing Michigan land trusts are non-profit organizations which can be structured for specific missions.⁵⁷

Community land trusts are the most common type of land trusts. Community land trusts (CLTs) are nonprofit organizations that provide lasting community assets and permanently affordable access to land for families and communities.⁵⁸ CLTs provide long-term land stewardship services to development projects by retaining ownership of land and resist traditional land speculation and development practices through the mitigation or halting of land value inflation.⁵⁹ Community land trusts can be set up to acquire, hold, and manage vacant land for facilitating the GCC land uses and other community-scale goals. But CLTs still rely on residents' proactive capacities, skills, and motivations to engage in development processes.⁶⁰

Case Study: Urban Community Land Trust in Granby, Liverpool

Motivated by the threat of disinvestment and demolition in a shrinking city, an urban CLT in Granby, Liverpool was established as a vehicle for neighborhood regeneration with an emphasis on collective control of assets.⁶¹ Before the establishment of Granby CLT, which provides inclusion of wider public participation, local homeowners had already actively built shared community gardens.⁶²

Cooperatives (co-ops)

Cooperatives are usually public or non-profit organizations with varied funding sources.⁶³ Land trusts and cooperatives can work in partnership to achieve a given mission.

Case Study: Evergreen Cooperative, Cleveland, OH

Evergreen Cooperative is a worker owned cooperative business model with the goal of launching green businesses in Cleveland. Ohio Cooperative Solar and the Green City Grower Cooperative are examples of businesses launched by Evergreen with the collaboration of a land trust, development fund, and neighborhood connections.⁶⁴

Design

Detroit's abundance of vacant land provides a unique opportunity to utilize innovative landscaping treatments to improve the aesthetic quality of these corridors. What currently may look like an overgrown lot could be screened with contemporary, low-maintenance landscaping designs that would enhance the look of the corridor and potentially raise surrounding property values, eventually encouraging investment.

Design-Related Challenges

Major public land holders like the Detroit Land Bank Authority and various city departments struggle with the unkempt look of many of their vacant lots. Additionally, land-based businesses are perceived by some residents to be unattractive. Farms can look overgrown, and some Detroiters see biofuel crops, such as pennycress, as unattractive.⁶⁵ Land-based businesses can incorporate landscaping best practices, such as treatments that are carefully mowed or colorful plantings, that indicate thoughtful maintenance. This section will highlight some ways the city can encourage land-based businesses to incorporate these practices into their site plans, and highlight how the city itself can improve the look of some of its own vacant lots.

Recommendations

- **Encourage cues to care by creating land-based business design guidelines**

There are several types of landscaping interventions that may be appropriate for different land-based businesses and land uses. Regardless of style, each intervention should incorporate cues to care principles. Cues to care are maintenance practices that make a landscape attractive, and indicate that someone is caring for the site. These practices vary across cultures, but generally include neat and orderly plantings, visible and crisp edges, fencing, trimmed trees or hedges in straight rows, mown turf in at least the most publicly visible portion of a site, and colorful flowers.⁶⁶

One way to do this might be by creating design guidelines specifically tailored to land-based businesses that incorporate cues to care. This guide could create design standards for these types of businesses, and include example lot treatments. The City of Vancouver created urban agriculture design guidelines that create standards for how plots should be shaped, the setback of farms from the road, and other design considerations. They also provide a table of edible plants that gives details on the aesthetic character of each and how they might

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contribute to a landscape treatment.⁶⁷ Detroit could consider the adoption of similar guidelines.

- **Match businesses with organizations providing design assistance and mini-grants**

Another way to encourage land-based businesses to incorporate landscape design might be for the city to match land-based businesses applying for permits, going through site plan review, or any other administrative procedure with local organizations that can provide them with design assistance. Detroit Future City (DFC) and Keep Growing Detroit have each created resources for vacant lot design and urban farm landscaping that would be helpful for businesses as they build out their projects (See Figure 6.2 and 6.3).

Additionally, DFC has a Field Guide to Working with Lots Mini-Grant Program that provides funding to community projects transforming vacant land using one of their 35 lot treatments. In January of 2018, DFC awarded grants totaling \$95,000 to 10 projects.⁶⁸ Grantees also receive technical assistance with design and implementation of their projects. DFC could consider focusing the next round of DFC mini-grants on land-based businesses specifically.

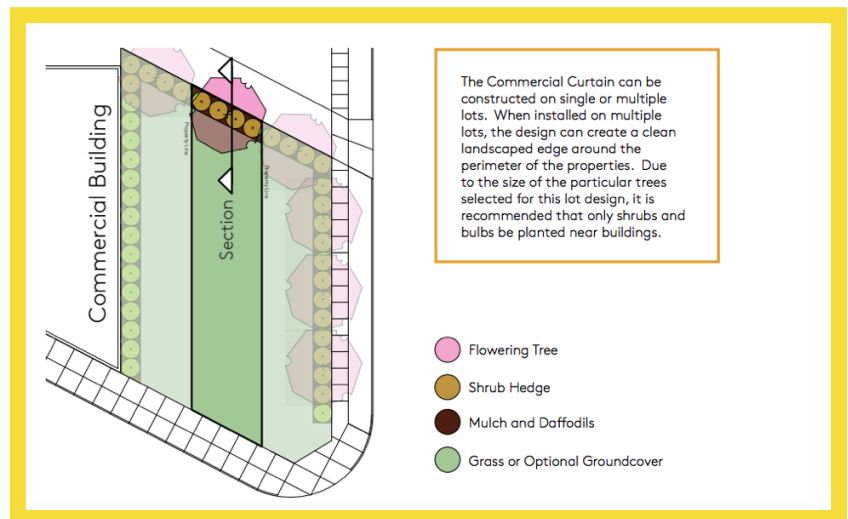


Figure 5.2 The Commercial Curtain is one example of DFC's 35 treatments for vacant lots

Source: Detroit Future City

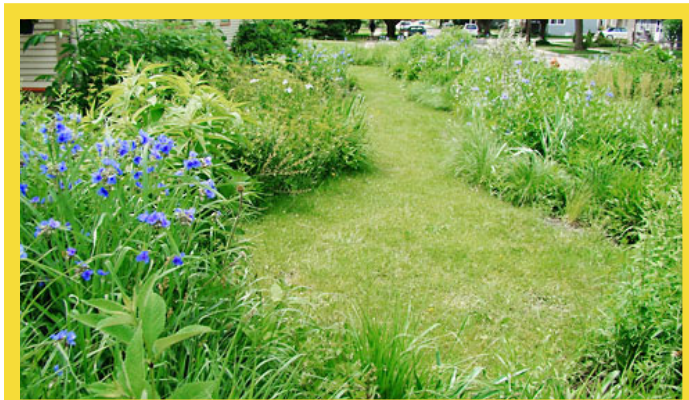


Figure 5.1 Cues to care include color plantings, well mown lots, and clear edges

Source: Wildones.org.

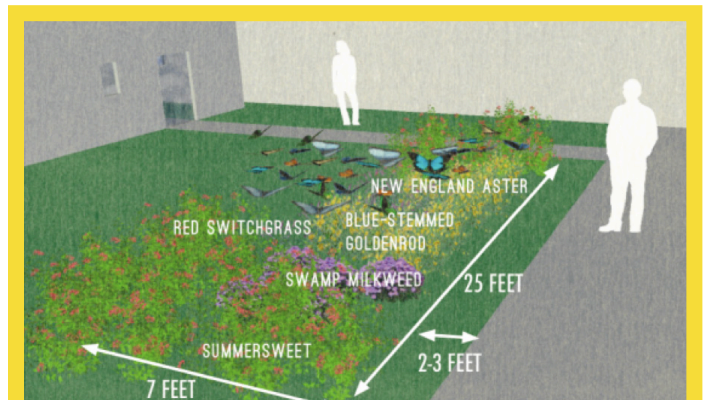


Figure 5.3 The Butterfly Rain Garden is an example of Keep Growing Detroit's Garden Border ideas aimed specifically at urban farming

Source: Keep Growing Detroit

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- Create a design competition for treatments to publicly-owned land

The City might consider funding a design competition for innovative landscaping on publicly owned land in partnership with a group such as Design Core Detroit. The competition could prioritize projects that incorporate land-based businesses, gateways or green stormwater infrastructure (GSI).

Case Study: Baltimore Growing Green Design Challenge

Baltimore's Growing Green Design Challenge could serve as a model for Detroit. The program encouraged greening vacant lots through GSI and other greening initiatives on vacant land. The funding for the challenge came from stormwater fees administered by the Department of Public Works and matching grants from Baltimore's Planning Department and the EPA. Six projects were chosen as winners to receive grants of \$300,000 each.⁶⁹

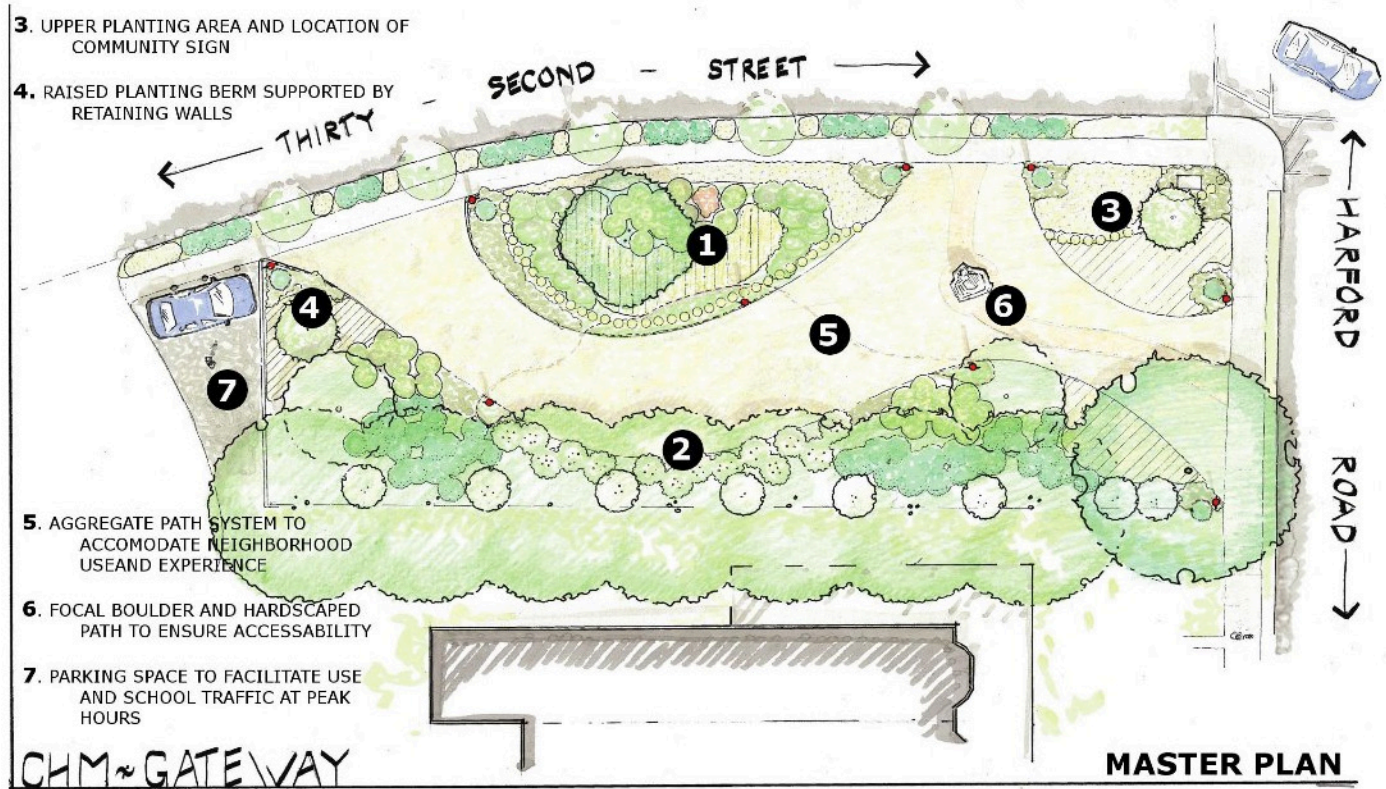


Figure 5.4 The Coldstream-Homestead-Montebello Gateway Garden was a 2014 winner of the Growing Green Design Challenge

Source: Baltimore Office of Sustainability

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- Use public land for green stormwater infrastructure and gateway plantings

All types of commercial corridor plantings and landscaping should have the goal of improving stormwater management. This can be accomplished simply by increasing vegetation and tree cover, or by incorporating green stormwater infrastructure (GSI) on publicly owned land or in the public right-of-way.

GSI along commercial corridors is a functional way to improve aesthetics throughout the corridor, and to manage stormwater in heavily paved areas. Interventions in the right-of-way can also contribute to pedestrian and bike safety. Corridors such as Grand River and Mack have main roads that are far too wide for current traffic levels. Implementing GSI interventions in the form of stormwater bumpouts or tree trenches would provide aesthetic improvements, stormwater management, and pedestrian and bike safety. Bumpouts are vegetated curb extensions that reach into the street, usually midblock or at an intersection.⁷¹ Stormwater tree trenches are systems of street trees connected by an underground infiltration structure.

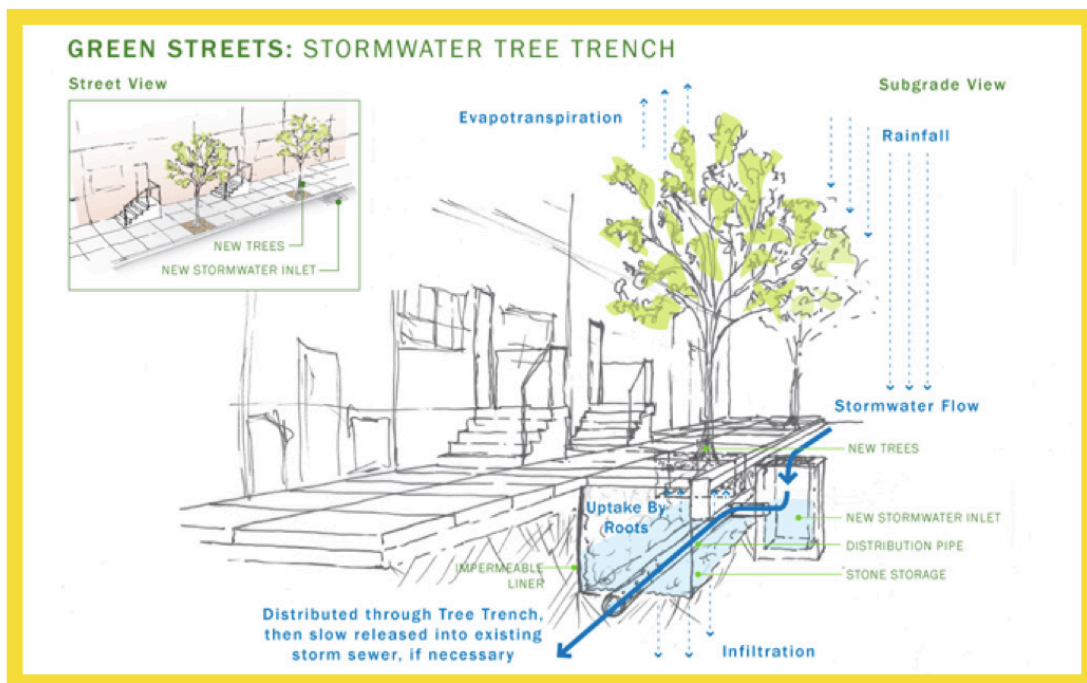


Figure 5.5 Rendering of a stormwater tree trench
Source: Philadelphia Water Department

Innovations to Encourage Green Collar Corridor Implementation

The city could also encourage larger GSI practices such as bioretention gardens, bioswales, and constructed wetlands where possible on vacant land. Safety and attractiveness play an important role in designing GSI on vacant land. On high-traffic commercial corridors, barriers can be installed at the street to discourage people from entering the lot and stop vehicles from driving onto it. Mown turf surrounding the plantings provides for high-visibility of the lot. Colorful perennial plantings planted in neat rows should be used to create an aesthetically pleasing look.

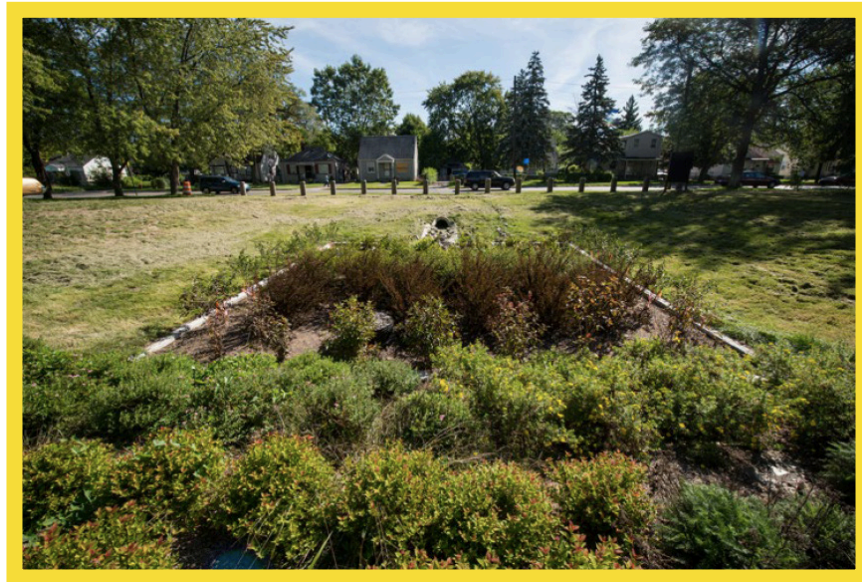


Figure 5.6 A bioretention garden on vacant land in the Warrendale neighborhood of Detroit
Source: UM Water Center

Similarly, the city could prioritize key publicly owned sites for use as gateway plantings. These sites could be adjacent to Multifamily Investment Areas, Mix-Tape Corridors, and other designated focus areas. Gateway plantings would beautify the lot and incentivize investment in the corridor.

- **Use Municipal Green Bonds to Fund GSI and other Landscaping Initiatives**

One method that may be used for funding public costs related to GSI installation and vacant lot landscaping is municipal green bonds. Green bonds, sometimes called climate bonds or environmental impact bonds, are municipal bonds that are tied to some kind of performance metric, such as water pollution or emissions reduction.⁷² If the municipality meets the predetermined goal, bond investors will be provided with a bonus payment. In 2018, the City of Baltimore took out a \$6 million environmental impact bond to pay for GSI projects, which was tied to water quality improvement metrics for the Chesapeake Bay.⁷³ The City of Detroit might consider taking out green municipal bonds for GSI projects in the public right of way, and tying the payment to combined sewer overflow reduction metrics.

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The city could also take out a green bond for landscaping or tree planting and tie payment to reduction of air pollution or increase in acreage of open space. A question remains regarding how Green Bonds would be repaid and what revenue generation challenges exist at the state level under the Headlee Amendment and Proposition A. It is possible the city could establish an ad valorem special assessment district across the entire city or one limited to GCCs to pay off the bonds without violating the Headlee and Proposition A restrictions.⁷⁴ More research is required on this topic.

- **Implement pooled stormwater fee credits program**

Detroit's stormwater fee program has a limited method for multiple properties pooling credits for GSI use or use of credits offsite. Currently, the Detroit Water and Sewer Department's (DWSD) guide to drainage credits only says that when two or more property owners wish to pool their credits, they should enter a legal agreement documenting the shared practice.⁷⁵ The guide also says the DWSD will assess the shared practice and award credits to the individual owners after evaluation.⁷⁶

DWSD could make the process of pooling stormwater credits more repeatable and standardized, as a way to encourage more widespread adoption and make the program more effective. To achieve this, the DWSD could adapt the approach established by the City of Washington, D.C., which created a market for trading stormwater credits and a method for establishing businesses to manage stormwater through GSI.⁷⁷ Any effort to create a market for stormwater fees and credits should recognize the limits imposed under the Michigan State Supreme Court's decision in *Bolt v. City of Lansing*. In that case, the court held Lansing's stormwater fee was an illegal tax under the Headlee Amendment because it was charged without regard to usage of a service.⁷⁸ More research is likely required before implementing this recommendation.

Next Steps

There are several steps the Detroit Planning and Development Department (PDD) could take to start the implementation of Green Collar Corridors:

1. Identify a pilot site

PDD could use the criteria for site selection laid out in Chapter 3 to identify a pilot site, adding some additional layers of consideration:

- Consider neighborhoods where GCC land uses are already occurring

Neighborhoods where current residents are participants in and accepting of these uses could be prioritized for pilot sites. This would provide resources to existing resident-driven initiatives, while supporting new green collar ventures.

- Consider areas with high levels of publicly owned land

Corridors with high amounts of publicly owned land would make land consolidation easier for larger land-based businesses. It would also give the city more control over the planning process, and reduce the burden of maintenance.

Additionally, there may be additional considerations for choosing a pilot site related to the different GCC typologies. The city might want to pilot one of each, and pick four different locations with similarities to the four in this study site, such as a corridor adjacent to a major highway or industrial area. The city must ensure that the process for identifying a pilot site is as transparent and equitable as possible. Publicizing the criteria used to select the pilot site, and building a community engagement component in to the process are essential.

2. Hire a Green Collar Corridor coordinator at DEGC

Hiring a staff member who has expertise in starting and running land-based businesses would allow DEGC to adapt its existing small business support programs to these uses. This staffer could coordinate the land-based business programming across DEGC's different programs, and act as a liaison to start ups.

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3. Partner with DLBA to create a long-term land leasing policy

Allowing land-based businesses to lease publicly owned land would provide them with secure access to land without some of the burdens that come with ownership. Creating five-year leases would ensure farmers would open up eligibility to funding sources, and give them time to test their business model. The lease could be eligible for renewal for another five years. An additional consideration might be to open up eligibility to purchase the property after a successful five-year lease. Building in a clawback provision that requires the land to remain a land-based business for a set amount of years would combat fears of speculation.

4. Partner with organizations already providing support to land-based businesses

The city could create formal partnerships with Detroit Future City (DFC), Keep Growing Detroit (KGD), DEGC, and similar organizations that can provide technical assistance to land-based businesses. Initiatives the city could partner with these organizations include:

- Create Motor City Land Match

Partner with DEGC to expand the existing Motor City Match program to include matching prospective land-based businesses with land. The city could consider offering up publicly owned land as part of this initiative.

- Hold a design competition for land-based business landscaping

Match land-based businesses with DFC and KGD to provide technical assistance for landscaping designs. Winners could receive prize money to implement their designs. Alternatively, the city could fund or partner with DFC on their next mini-grant application process, which could be focused specifically on land-based businesses.

Conclusion

Green Collar Corridors are an ambitious but promising idea. Environmental sustainability depends upon cities adopting innovative practices for land use and reuse. This planning study analyzed the spatial, financial, and legal feasibility of Green Collar Corridors by examining uses that benefit the environment and various stakeholders, and try applying them to sample sites throughout the city. Further analysis is needed to answer key questions related to the public investment required to implement a Green Collar Corridor. How much public investment is required, and how might the city cover the cost? What is the cost of “doing nothing,” or letting nature take back highly abandoned areas? Is this a feasible strategy in terms of resident support? These are questions that a future study should tackle to continue the conversation around Green Collar Corridors and their implementation in Detroit.

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Appendices |

Appendix A: Map Sources

City of Detroit. 2018. Parcel Map [shapefile]. Received from Detroit Open Data

City of Detroit. 2018. Zoning [shapefile]. Received from Detroit Open Data

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Appendix B: Corridor Demographic Data

The following data was collected from the census tracts touching the half mile buffer around each corridor. Census data is from the American Community Survey 2016 five year estimates.

Fenkell Avenue Demographics

Population: 16,019

Household median income: \$28,810

Children (Age 0-17)	28%
Adults of working age (Age 18-59)	57%
Seniors/Retirement age (Age 59-up)	15%

Education

Less than HS	21%
High school graduate (or GED)	28%
College graduate	51%

Race

Black	89%
White	7%
Other and Multiracial	4%

Housing Tenure

Owner occupied	53%
Renter occupied	47%

Corridor Characteristics

Site length	1 Mile
Zoning	B4, R1
Number of Brownfields	3
Adjacent to or inside Mix Tape Corridor	Yes
In Multifamily Investment Area	No
Vacant land	35% of total acreage
Vacant structures	16% of total acreage

Green Collar Corridors

Grand River Demographics

Population: 8,081

Household median income: \$19,531

Children (Age 0-17)	26%
Adults of working age (Age 18-59)	55%
Seniors/Retirement age (Age 59-up)	19%

Education

Less than HS	25%
High school graduate (or GED)	36%
College graduate	39%

Race

Black	90%
White	1%
Other and Multiracial	9%

Housing Tenure

Owner occupied	47%
Renter occupied	53%

Corridor Characteristics

Site length	1.2 Miles
Zoning	B4
Number of Brownfields	2
Adjacent to or inside Mix Tape Corridor	No
In Multifamily Investment Area	No
Vacant land	53% of total acreage
Vacant structures	17% of total acreage

Appendices

Mt. Elliott Demographics

Total Population: 1,781

Household median income: \$20,676

Children (Age 0-17)	16%
Adults of working age (Age 18-59)	57%
Seniors/Retirement age (Age 59-up)	27%

Education

Less than HS	25%
High school graduate (or GED)	62%
College graduate	13%

Race

Black	85%
White	10%
Other and Multiracial	4%

Housing Tenure

Owner occupied	49.4%
Renter occupied	50.6%

Corridor Characteristics

Site length	0.92 Miles
Zoning	B4, M4
Number of Brownfields	1
Adjacent to or inside Mix Tape Corridor	No
In Multifamily Investment Area	No
Vacant land	63% of total acreage
Vacant structures	1.1% of total acreage

Green Collar Corridors

Mack Demographics

Total Population: 4,135

Household median income: \$13,905

Children (Age 0-17)	24%
Adults of working age (Age 18-59)	60%
Seniors/Retirement age (Age 59-up)	16%

Education

Less than HS	25%
High school graduate (or GED)	47%
College graduate	28%

Race

Black	94.7%
White	1.2%
Other and Multiracial	4.1%

Housing Tenure

Owner occupied	43%
Renter occupied	57%

Corridor Characteristics

Site length	1.05 Miles
Zoning	B4, PD, R2
Number of Brownfields	2
Adjacent to or inside Mix Tape Corridor	No
In Multifamily Investment Area	Yes
Vacant land	37% of total acreage
Vacant structures	12% of total acreage

Appendices

Morang Demographics

Population: 18,091

Household median income: \$27,894

Children (Age 0-17)	28%
Adults of working age (Age 18-59)	60%
Seniors/Retirement age (Age 59-up)	12%

Education

Less than HS	21%
High school graduate (or GED)	41%
College graduate	38%

Race

Black	91%
White	7%
Other and Multiracial	2%

Housing Tenure

Owner occupied	50%
Renter occupied	50%

Corridor Characteristics

Site length	1.46 Miles
Zoning	B4, R2
Number of Brownfields	2
Adjacent to or inside Mix Tape Corridor	No
In Multifamily Investment Area	No
Vacant land	10% of total acreage
Vacant structures	0.9% of total acreage

Appendix C: Overview of land use evaluation criteria and findings

Green Collar Corridors

Table of Land Uses Matrix

Land Uses	Resource Needed	Land Size	Land Contiguity	Season/Climate	Capital (start)	Profit	Case study	
Urban Agriculture	Produce/food	1-5 acres for urban farm; under 1 acre for urban garden	Preferred	SSF (W if hoop/green houses present)	\$50k/acre	\$4.7k - \$10k/acre each year	Farm Alliance of Baltimore	
	Flower	0.25-5 acres	Preferred	SSF (W if hoop/green houses present)	\$10k/acre	\$25k-35k/acre	Fresh Cut Flower Farm	
	Biofuel	20 acres, (large scale to generate profit)	Necessary	SSF (W if hoop/green houses present)	\$7K - \$42k/acre depending on scale	Low: \$210/acre	Pittsburgh's Sunflower Gardens	
	Hydroponics	500 square feet to variable	Preferred	WSSF	\$110k/500 square feet	Income: \$10,482/3.6 weeks crop cycle	ZipFarm	
	Aquaponics	Fish, fish feed, biofilter, access to water/electric/gas/sewer, equipment (greenhouse, connected tanks, heater, etc.)	2,500-3,000 square feet	Unnecessary	SSF (W if greenhouses present or grow indoor)	\$10k/500 square feet	\$6k/500 square feet	Friendly Aquaponics, Inc.

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Land Uses	Resource Needed	Land Size	Land Continuity	Season/Cli- mate	Capital (start)	Profit	Case Study
Nursery	Tree Farm Semi-clean soil, drainage, seeds, access to water, sunlight, and freight transport, no flooding	1-5 acres	Unnecessary	WSSF, climate depended upon tree species	\$4k-10k/acre	\$10k-15k/acre	Tree Stand and Nursery
	Landscape business Less than a 5% slope, quality of soil, access to water, sunlight	1 acre to variable	Preferred	WSSF, climate depended upon tree species	Around \$5k-10k/acre	Value-added from landscaping services	Abbott's Nursery
Natural/ Passive	Meadow Contiguous parcels, habitats for animals and grassland birds, incorporation with GSI	Variable	Preferred	WSSF	\$3k-4k/acre		Ojibway Prairie Complex
	Forest Tree plantings, incorporation with passive recreation opportunities	10,000 square feet – 5 acres	Unnecessary	WSSF	\$4k-10k/acre		Forest Patch at Baltimore
Renew- able Energy	Green storm-water infrastructure Existing wetlands, planting	Variable	Preferred	WSSF	\$218k-436k/acre	Potential opportunity by storm-water credit trading	London Wetland Centre
	Gateway Amend soil, plantings, access to water	Variable	Unnecessary	WSSF	Above \$10k/acre depended on design and scale		Or 213 Redlands Road Crossing
Green Collar Retail	Solar Electric utility connection, security, access to sufficient sunlight	500 square feet for 30 panels	Preferred	WSSF	\$600k/acre	Around \$24k/acre/year depended on climate	Solar Photovoltaics at the Refuse Hideaway Landfill
	Farm Stand Adjacency to large productive uses, retail stores or mobile vendor cart, farm products	Variable	Preferred	WSSF	Expenses around \$15k/year	Around \$10k	Heidi's Farmstand & Bakery

Notes: SSF=Spring, Summer, and Fall, W=Winter.

Green Collar Corridors

Table of Land Uses Matrix, Cont'd

Land Uses	Incompatibilities (input)	Incompatibilities (Output)	Business Districts Permitted	Land Preparation	Viability Delay	Preferred Land Tenure
Urban Agriculture		Noise, smells, overgrowth can be a nuisance to surrounding uses	Farmer's Market: B2-4, 6(R), B5(C); Greenhouse/hoophouse and Urban Farm: B1-4,6(R), B5(C)	Soil testing, add top soil, tilling, irrigation, plowing, raised bed/hoop/greenhouse construction if needed	3-5 year to break even	Leased, Co-op, or Own
	Produce/food	Industrial uses, auto-shops and other contaminated sites	Farmer's Market: B2-4, 6(R), B5(C); Greenhouse/hoophouse and Urban Farm: B1-4,6(R), B5(C)	Soil testing, add top soil, tilling, irrigation, plowing, raised bed/hoop/greenhouse construction if needed	Depends on flower type	Leased, Co-op, or Own
	Flower		Greenhouse/hoophouse and Urban Farm: B1-4,6(R), B5(C)	Soil testing, soil ph adjustments, tilling, plowing, irrigation	Around 3 years to break even	Leased, Co-op
	Biofuel	Noise, smells, overgrowth can be a nuisance to surrounding uses	Greenhouse/hoophouse and Urban Farm: B1-4,6(R), B5(C)	Structure/building retrofitting	More than 1 year to break even	Leased, Co-op
	Hydroponics	Contamination		Equipment construction, regular water quality testing	More than 6 months based on scale	Leased, Co-op, or Own
Aquaponics	Air pollution	Smells				

Appendices

Land Uses	Incompatibilities (Input)	Incompatibilities (Output)	Business Districts Permitted	Land Preparation	Valiability Delay	Preferred Land Tenure
Nursery	Tree Farm	Disease, animals, damage from weather events	Urban farm (including orchard & tree farm when principle use): B1-4,6 (R), B5(C); Lumber yard: B6(R)	Remove boulders, rocks, and other debris	About 8-15 years based on species	Leased, Co-op
	Land-scape business	Disease, animals, damage from weather events	Urban farm (including orchard & tree farm when principle use): B1-4,6 (R), B5(C); Lumber yard: B6(R)	Remove boulders, rocks, and other debris	About 5-10 years	Leased, Co-op, or Own
Natural/Passive	Meadow	Intensive uses, new development, pollution	Parks & Recreation District Overlay (PR)			Public Own
	Forest	Pollution, littering	Parks & Recreation District Overlay (PR)			Public Own
	Green storm-water infrastructure	Intensive uses, new development, pollution	Parks & Recreation District Overlay (PR), Special Development District, Riverfront mixed use (SD4)			Public Own
Renewable Energy	Gateway			Remove boulders, rocks, and other debris		Public Own
	Solar	High-rise structures	Utility: B5,6 (R), B1-4 (C)	Site flattening	10-15 or 15-20 years	Leased, Co-op, or Own
Green Collar Retail	Farm Stand	Industrial uses	Retail sales and service: B1-6(R)			Leased, Co-op, or Own

Appendix D: Sources of Land Suitability Criteria

Phase I

Vacant structure: ≥ 500 square feet

- Hydroponics

"With Hydroponics the Possibilities Are Endless." AMHIDRO. Accessed March 21, 2018 at <https://amhydro.com/products/>

Vacant structure: $\geq 2,500$ square feet

- Aquaponics

Mann, Tim. "Aquaponic Failure." Friendly Aquaponics, Inc. 2015. Accessed at March 21, 2018 at <https://www.friendlyaquaponics.com/2015/08/12/this-can-be-your-aquaponic-failure/>

Vacant land: 0.25 acre or less aggregated adjacent vacant lots

- Urban Garden and Gateway

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

Vacant land: 0.25-1.0 acre aggregated adjacent vacant lots

- Flower

Floret. "Small Space Flower Farming - Part II." 2015. Accessed March 25, 2018 at <http://www.floretflowers.com/2015/04/small-space-flower-farming-part-ii/>

- Forest, and Green Stormwater Infrastructure

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

Vacant land: 1-2 acres aggregated adjacent vacant lots

- Produce/food

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Flower

Floret. "Small Space Flower Farming - Part II." 2015. Accessed March 25, 2018 at <http://www.floretflowers.com/2015/04/small-space-flower-farming-part-ii/>

Appendices

- Tree Farm

Wallin, Craig. "How To Start a Christmas Tree Farm. In Profitable Plants Digest." Profitable Plants Digest. Accessed March 20, 2018 at <https://www.profitableplantsdigest.com/how-to-start-a-christmas-tree-farm/> and

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Landscape Business

Wiles, Linda S. "Get Started in the Landscape, Lawn, Nursery and Greenhouse Business." Penn State Extension, 2011. Accessed March 23, 2018 at <https://extension.psu.edu/get-started-in-the-landscape-lawn-nursery-and-greenhouse-businesses>

- Solar

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Meadow, Forest, and Green Infrastructure

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

Vacant land: 2-5 acres aggregated adjacent vacant lots

- Produce/food

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Flower

Floret. "Small Space Flower Farming - Part II." 2015. Accessed March 25, 2018 at <http://www.floretflowers.com/2015/04/small-space-flower-farming-part-ii/>

- Tree Farm

Wallin, Craig. "How To Start a Christmas Tree Farm. In Profitable Plants Digest." Profitable Plants Digest. Accessed March 20, 2018 at <https://www.profitableplantsdigest.com/how-to-start-a-christmas-tree-farm/> and

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

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Wiles, Linda S. "Get Started in the Landscape, Lawn, Nursery and Greenhouse Business." Penn State Extension, 2011. Accessed March 23, 2018 at <https://extension.psu.edu/get-started-in-the-landscape-lawn-nursery-and-greenhouse-businesses>

- Meadow and Forest

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

Green Collar Corridors

Vacant land: 5 acres or more aggregated adjacent vacant lots

- Biofuel

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Tree Farm

Wallin, Craig. "How To Start a Christmas Tree Farm. In Profitable Plants Digest." Profitable Plants Digest. Accessed March 20, 2018 at <https://www.profitableplantsdigest.com/how-to-start-a-christmas-tree-farm/> and

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

- Landscape Business

Wiles, Linda S. "Get Started in the Landscape, Lawn, Nursery and Greenhouse Business." Penn State Extension, 2011. Accessed March 23, 2018 at <https://extension.psu.edu/get-started-in-the-landscape-lawn-nursery-and-greenhouse-businesses>

- Meadow and Forest

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015.

Phase II

District Adjacency: Mix-tape corridor/Investment area

- Landscape Business, Solar, Green Stormwater Infrastructure, Gateway Plantings, and Farm Stand

Note: Increased landscaping and plantings have the potential to raise property values. Gateway plantings and GSI are preferred in locations adjacent to Mix-Tape corridors so that investment can be increased in these areas, and existing developments can benefit from property value boost the landscaping provides.

Detroit Future City. "Achieving an Integrated Open Space Network in Detroit." 2016.

District Adjacency: Industrial Use

- Urban Garden, Produce/food, and Farm Stand -- Negative

Note: Production of food crops close to industries that emit certain toxic elements should be discouraged.

RUAF Foundation. "Urban agriculture: what and why?" Accessed at <http://www.ruaf.org/urban-agriculture-what-and-why>

- Tree Farm, Landscape Business, and Forest

Note: Vacant land adjacent to industry could be planted with forested buffers.

Detroit Future City. "Achieving an Integrated Open Space Network in Detroit." 2016, p. 9.

- Solar

Note: Solar generation could serve adjacent industrial or commercial uses. It's reasonable to consider locating some direct solar power generation adjacent to major power users, particularly along industrial cores.

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015, p. 62, 64.

District Adjacency: Highway

- Urban Garden, Produce/food, and Farm Stand -- Negative

Note: Production of food crops close to industries that emit certain toxic elements should be discouraged.

Appendices

RUAF Foundation. "Urban agriculture: what and why?" Accessed at <http://www.ruaf.org/urban-agriculture-what-and-why>

- Tree Farm, Landscape Business, and Forest

Note: Increased tree and vegetative plantings near highways reduces the effect of automotive pollutants on the surrounding areas. The EPA hopes to increase vegetative buffers adjacent to high traffic roadways to reduce pollution and the resulting negative effects on the health of nearby residents.

Larsen, Larissa. "Prioritizing Tree Planting Locations to Enhance Air Pollution Removal along Detroit's Roadways." 2015.

- Green Stormwater Infrastructure

Note: GSI should be sited near highly impervious areas to reduce flooding.

Detroit Future City. "Achieving an Integrated Open Space Network in Detroit." 2016.

Phase III

Parcel Adjacency: On commercial corridor

- Urban Garden and Produce/food -- Negative

Note: Produce grown for consumption should not be grown adjacent to commercial corridors because of higher rates of soil contamination, air pollution, and higher potential for theft.

Wortman, Sam E., and Sarah Taylor Lovell. "Environmental challenges threatening the growth of urban agriculture in the United States." *Journal of Environmental Quality* 42, no. 5 (2013): 1283-1294.

- Farm Stand

Note: A farm stand on commercial corridor can be a showroom for the adjacent farms.

"How to Develop a Farm Stand." Accessed April 21, 2018 at <https://www.uvm.edu/vtagritourism/files/agritourism-guide/howto-develop-farm-stand.pdf>

Parcel Adjacency: Off commercial corridor

- Urban Garden and Produce/food

Note: Farmers interviewed felt that locating off of commercial corridors limited the potential for theft and vandalism of crops. They also expressed concern about higher levels of pollution along commercial corridors.

Interview with Acre Detroit, Detroit Central Christian CDC.

Parcel Adjacency: Within 20' of catch basins

- Green Stormwater Infrastructure

Note: GSI should be located in close proximity to existing sewer structures to ensure easy tie in to system.

City of Philadelphia. "Green Streets Design Manual". 2014.

Parcel Adjacency: Current or proposed productive use (urban agriculture)

- Urban Garden, Produce/food

Note: Designating urban farm adjacent to related uses will help to potentially reduce startup capital costs or transportation costs and may provide more flexibility for the type of crop grown or the manner in which that crop is cultivated and harvested.

Center for Community Progress. "Open Space in Detroit: Key Ownership and Funding Considerations to Inform a Comprehensive Open Space Planning Process." 2015, p. 58.

Green Collar Corridors

- Tree Farm

Note: Tree farm can incorporate other productive crops and create community-based designs.

Detroit Future City. "Achieving an Integrated Open Space Network in Detroit." 2016, p. 54.

- Solar

Note: Solar-powered devices are useful in farm and urban garden for water pumping, water heating, etc.

Markham, Derek. "Solar technology for farming and urban gardening." Treehugger, 2013.

- Green Stormwater Infrastructure

Note: All urban agricultural use properties must ensure that water and fertilizer do not drain onto adjacent lots.

Urban agriculture can use the water collected by a cistern and handle the regular maintenance required.

Maloney, Stephanie A. "Putting paradise in the parking lot: Using zoning to promote urban agriculture." Notre Dame L. Rev. 88 (2012): 2551.

- Farm Stand

Note: A farm stand is typically located at or near the farm. It can be a permanent set-up, or something as a few roadside tables with crates and baskets filled with whatever was harvested that day.

Fleischer, Evan. "Farm Stands & Farmers Markets Sound Similar, but Their Differences Are Important." Kitchn, 2017. Assessed April 21, 2018 at <https://www.thekitchn.com/farm-stands-amp-farmers-markets-sound-similar-but-their-differences-are-important-234765>

Parcel Adjacency: Near substation

- Solar

Note: Solar panels under power lines could be a major electricity source. It's good for owners and society to connect solar panels to the local utility grid.

Farrell, John. "Solar panels under power lines could be a major electricity source." Grist, 2011.

Phase IV

Soil Drainage: Well-drained

- Urban Garden, Produce/food, Flower, and Biofuel

Note: Well drained soils are highly preferred by urban farm categories for strong root development.

United States Environmental Protection Agency. "Evaluation of Urban Soils: Suitability for Green Infrastructure or Urban Agriculture." EPA Publication No. 905R1103, 2011.

- Tree Farm and Landscape Business

Note: Nurseries require well-drained soil.

Keep Growing Detroit. "Treatment Guide: Tree Stands & Nurseries." 2017.

Soil Drainage: Poorly-drained

- Green Stormwater Infrastructure

Note: GSI improves drainage of poorly-drained soil by providing more infiltration for water into soils. GSI could be sited in areas with poorly draining soil to reduce flooding.

United States Environmental Protection Agency. "Evaluation of Urban Soils: Suitability for Green Infrastructure or Urban Agriculture." EPA Publication No. 905R1103, 2011.

Appendix E: Paring Methodology

Necessary Shapefiles (see Appendix A for sources):

- Parcel level shapefile (shape, ownership, location)
- Vacant Parcel shapefile (location and occupancy status)
- Vacant Structure shapefile (location and occupancy status)
- Soil Drainage shapefile
- City of Detroit Zoning shapefile
- Roads and highways shapefile
- Corridor catch basins shapefile
- Multifamily investment areas shapefile

Data Gathering and Manipulation

Data gathering was the first part the analysis. First, a shapefile for parcel level data for the City of Detroit was collected and put into ArcGIS. Then, parcel vacancy and structural vacancy data were collected from Motor City Mapping and joined to the parcel level data. Data on highways, zoning, soil drainage, corridor catch basin locations, and city-designated investment areas were collected for each corridor. Each dataset was in shapefile form and uploaded to ArcGIS for analysis.

The parcel level data was then filtered to show only vacant parcels and vacant structures. Because some of the GCC land uses require large tracts of land for profitability, adjacent vacant parcels were aggregated, regardless of ownership structure. This showed larger, contiguous tracts of vacant land. These tracts were split into categories to fit prior analysis of how much land certain green uses required (See Table 4.1). Vacant structures were split into two categories: structures greater than 500 but less than 2,500 square feet, and structures larger than 2,500 square feet.

Vacant Parcel Size Categories (acres)	
	0-0.25
	0.25-1
	1-2
	2-5
	5+

Table 4.1 Vacant parcel size categories for analysis

Each parcel was assigned a unique value and, depending on its location, assigned a specific number to correspond with the study corridor. Each parcel was then grouped into a size category.

Green Collar Corridors

Step by Step Instructions

Preparing the Study Area

1. Using the selection tool - select only the corridor centerline of the study area.
2. Export the selected centerline to a new shapefile.
3. Using the buffer tool, create a ½ radius buffer around each corridor centerline. This now becomes the selected study area. Export shape to new shapefile.
4. Assign each corridor a numerical value.
5. Using the join tool, join the parcel data shapefile to the vacant parcels shapefile.
6. Using the select by location tool, select only the parcels that fall within the study area shapefiles. Export the selected parcels to a new shapefile.
7. For the parcel shapefile, open the attribute tables and create a new field. Assign a 1 or 0 numerical value to publicly owned parcels.

Matching Green Collar Uses to Parcels

1. Using the dissolve tool, group adjacent vacant parcels together to determine large plots of vacant land, regardless of ownership structure.
2. For the parcel shapefile (which is now made of us the adjacent parcels), open the attribute table and create a new field. Using the calculate geometry tool, calculate the acreage of each group of adjacent parcel using the US acres measurement. Rename shapefile 'contiguous parcels.
3. Using the select by attribute tool, select the corridors and surrounding neighborhoods whose area is not adjacent to any non compliant uses for that land use.
 - a. In order to determine this, use shapefile 'zoning' and 'roads'. No geoprocessing tool is necessary, simply turn on the zoning and roads layers and select on the study areas who are not directly adjacent to major roads or industrially zoned areas.
4. Apply the select by attribute filter to shapefile 'Contiguous Parcels' in order to filter parcels of appropriate size for each green collar land use.

Example:

- i. Size < 0.25
 - ii. Size > 0.25 OR Size < 2
- a. Once contiguous parcels are isolated, export data to a new shapefile and rename to correspond to the green collar land use that is being investigated.
5. IF NECESSARY Eliminate Parcels that are on commercial corridor using Tool 'Erase' on the newly generated green collar land use layer
 6. Use 'Select by Location Tool' to select parcels outside of 'Very Poorly' drained soil type, which can be found within the 'soils' layer.

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7. Overlay remaining 'Contiguous parcels' layer on top of ownership layer then use 'select by location tool' in order to select only ownership parcels that are overlaid on top of selected contiguous parcel shapefiles. Choose 'centroid of shapefile' as measurement point. Export to new shapefile and rename to correspond to the green collar land use. Delete old green collar land use shapefile.
8. Create color ramp to detail public and private ownership.

Appendix F: Number of Parcels Suitable for each Land Use by Corridor

Fenkell Possible Land Uses by parcel

Land Use	# of Contiguous Parcels	Size (Acres / Sq. Ft.)
Urban Garden	698	90.03 / 3,921,707
Food Production	31	44.15 / 1,923,174
Flower Production	303	164.99 / 7,186,964
Biofuel	0	0
Tree Farm	31	44.15 / 1,923,174
Landscape Nursery	31	44.15 / 1,923,174
Solar	29	39.17 / 1,706,245
Meadow	31	44.15 / 1,923,174
Forest	305	166.52 / 7,253,611
Green Infrastructure	30	8.39 / 147,668

Grand River Possible Land Uses by parcel

Land Use	# of Contiguous Parcels	Size (Acres / Sq. Ft.)
Urban Garden	0	0
Food Production	0	0
Flower Production	255	122.34 / 5,329,130
Biofuel	0	0
Tree Farm	10	16.30 / 710,028
Landscape Nursery	10	16.30 / 710,028
Solar	7	8.65 / 376,794
Meadow	10	16.30 / 710,028
Forest	256	122.66 / 5,343,070
Green Infrastructure	19	7.54 / 328,442

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Mt. Elliot Possible Land Uses by parcel

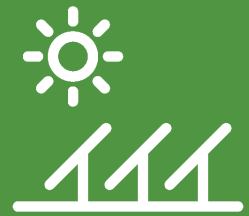
Land Use	# of Contiguous Parcels	Size (Acres / Sq. Ft.)
Urban Garden	0	0
Food Production	0	0
Flower Production	407	229.18 / 9,983,0801
Biofuel	2	11.89 / 517,928
Tree Farm	41	67.27 / 2,930,281
Landscape Nursery	41	67.27 / 2,930,281
Solar	35	46.20 / 2,012,472
Meadow	41	67.27 / 2,930,281
Forest	413	244.68 / 10,658,261
Green Infrastructure	14	11.40 / 496,584

Mack Possible Land Uses by parcel

Land Use	# of Contiguous Parcels	Size (Acres / Sq. Ft.)
Urban Garden	598	76.90 / 3,349,764
Food Production	43	59.26 / 2,581,366
Flower Production	390	220.90 / 9,622,404
Biofuel	1	25.56 / 1,113,394
Tree Farm	44	84.82 / 3,694,759
Landscape Nursery	44	84.82 / 3,694,759
Solar	40	51.81 / 2,256,844
Meadow	44	84.82 / 3,694,759
Forest	391	246.46 / 10,735,798
Green Infrastructure	10	3.68 / 160,301

Morang Possible Land Uses by parcel

Land Use	# of Contiguous Parcels	Size (Acres / Sq. Ft.)
Urban Garden	240	26.56 / 1,156,954
Food Production	0	0
Flower Production	27	10.13 / 441,263
Biofuel	0	0
Tree Farm	0	0
Landscape Nursery	0	0
Solar	0	0
Meadow	0	0
Forest	27	10.13 / 441,263
Green Infrastructure	5	1.12 / 48,787



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